## 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.

Class II FOMC – Restricted (FR)

# Report to the FOMC on Economic Conditions and Monetary Policy

## Book A

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

March 9, 2018

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

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# Comparing the Staff Projection with Other Forecasts

The staff's projection for real GDP growth is close to the projections from both the Survey of Professional Forecasters (SPF) and the Blue Chip consensus in 2018 and ¼ percentage point higher than the Blue Chip in 2019.  The staff's unemployment rate forecast is lower than the SPF and Blue Chip forecasts in 2018 and nearly ½ percentage point below the Blue Chip in 2019.  The staff's projection for CPI inflation is nearly the same as the Blue Chip and SPF forecasts in both 2018 and 2019.  The staff's projections for overall PCE price inflation and for core PCE inflation are about the same as the SPF forecasts in both 2018 and 2019.
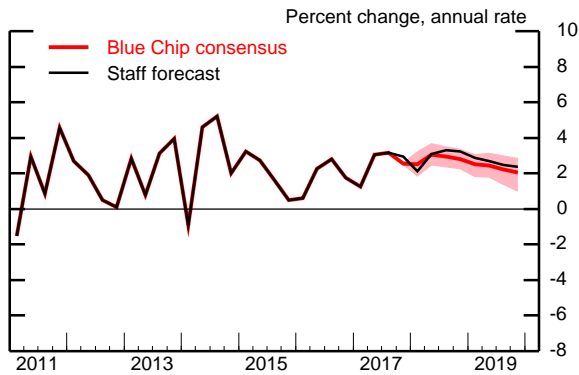
## Comparison of Tealbook and Outside Forecasts

|  | 2017 | 2018 | 2019 |
|---|---|---|---|
| **GDP (Q4/Q4 percent change)** | | | |
| March Tealbook | 2.6 | 2.9 | 2.6 |
| Blue Chip (03/10/18) | 2.5 | 2.8 | 2.3 |
| SPF median (02/09/18) | 2.5 | 2.8 | n.a. |
| | | | |
| **Unemployment rate (Q4 level)** | | | |
| March Tealbook | 4.1 | 3.5 | 3.1 |
| Blue Chip (03/10/18) | 4.1 | 3.7 | 3.6 |
| SPF median (02/09/18) | 4.1 | 3.8 | n.a. |
| | | | |
| **CPI inflation (Q4/Q4 percent change)** | | | |
| March Tealbook | 2.1 | 2.3 | 2.2 |
| Blue Chip (03/10/18) | 2.1 | 2.3 | 2.2 |
| SPF median (02/09/18) | 2.1 | 2.1 | 2.2 |
| | | | |
| **PCE price inflation (Q4/Q4 percent change)** | | | |
| March Tealbook | 1.7 | 1.8 | 2.0 |
| SPF median (02/09/18) | 1.7 | 1.9 | 2.0 |
| | | | |
| **Core PCE price inflation (Q4/Q4 percent change)** | | | |
| March Tealbook | 1.5 | 1.9 | 2.1 |
| SPF median (02/09/18) | 1.5 | 1.9 | 2.0 |

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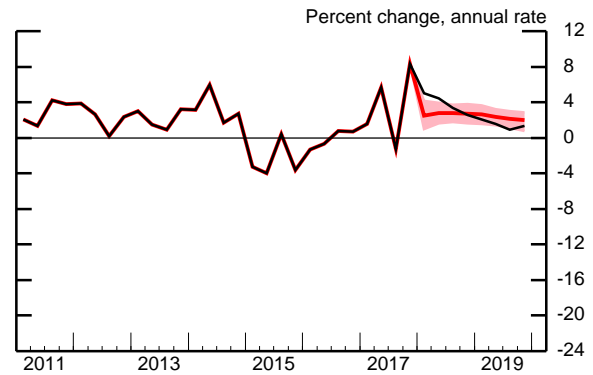Source:  Blue Chip Economic Indicators; Federal Reserve Bank of Philadelphia.

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**Domestic Econ Devel & Outlook**

# Tealbook Forecast Compared with Blue Chip
### (Blue Chip survey released March 10, 2018)

## Real GDP

Percent change, annual rate



Blue Chip consensus
Staff forecast

## Industrial Production

Percent change, annual rate



## Unemployment Rate

Percent



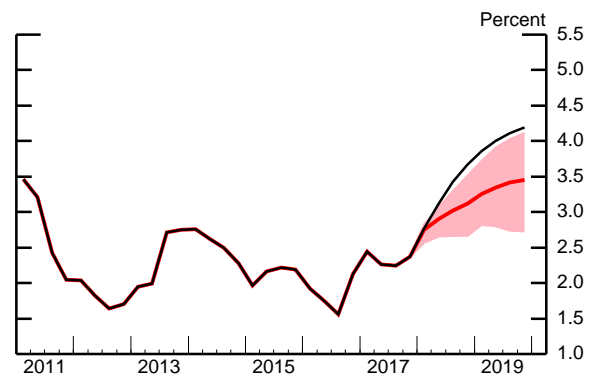## Consumer Price Index

Percent change, annual rate
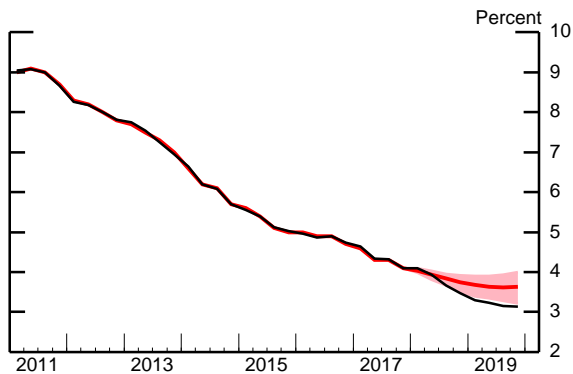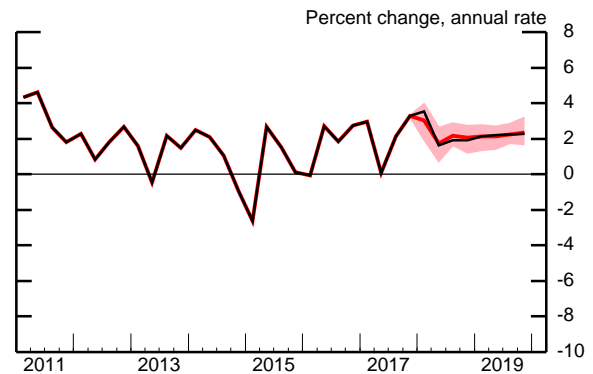


## Treasury Bill Rate

Percent



## 10-Year Treasury Yield

Percent
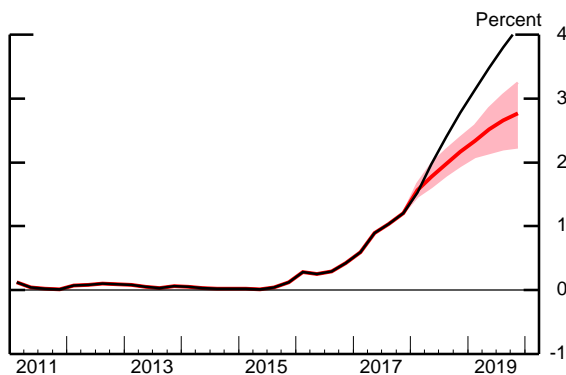


Note: The yield is for on-the-run Treasury securities. Over the forecast period, the staff's projected yield is assumed to be 15 basis points below the off-the-run yield.

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

## Revisions to the Staff Projection since the Previous SEP

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

Since the December Tealbook, we have updated our fiscal policy assumptions to reflect both the Tax Cut and Jobs Act and the Bipartisan Budget Act of 2018, which account for the higher path for GDP growth over the course of the projection. Meanwhile, the unemployment rate has been revised down, reflecting the stronger aggregate demand. Thus, resource utilization, as measured by the unemployment gap or the output gap, is considerably tighter in this projection than in December.[1]

Our projection for both headline and core PCE price inflation in 2018 is revised up a bit relative to the December Tealbook, reflecting stronger readings on core inflation and higher oil prices. We continue to expect inflation to move up in coming years, and with resource utilization tighter than in the December Tealbook, we now expect both total and core inflation to rise a bit above 2 percent in the medium term.

Relative to our December projection, both resource utilization and inflation are noticeably higher, and, correspondingly, the federal funds rate path from the intercept-adjusted inertial Taylor (1999) rule that we use in our baseline forecast rises more steeply than in the December Tealbook.

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

| Variable | 2017 H1 | 2017 H2 | 2017 | 2018 | 2019 | 2020 | Longer run |
|---|---|---|---|---|---|---|---|
| Real GDP[1] | 2.1 | 3.0 | 2.6 | 2.9 | 2.6 | 2.1 | 1.7 |
|   December Tealbook | 2.1 | 2.7 | 2.4 | 2.4 | 2.0 | 1.7 | 1.7 |
| Unemployment rate[2] | 4.3 | 4.1 | 4.1 | 3.5 | 3.1 | 3.1 | 4.7 |
|   December Tealbook | 4.4 | 4.1 | 4.1 | 3.6 | 3.5 | 3.5 | 4.7 |
| PCE inflation[1] | 1.2 | 2.1 | 1.7 | 1.8 | 2.0 | 2.1 | 2.0 |
|   December Tealbook | 1.2 | 2.2 | 1.7 | 1.7 | 1.9 | 2.0 | 2.0 |
| Core PCE inflation[1] | 1.4 | 1.6 | 1.5 | 1.9 | 2.1 | 2.2 | n.a. |
|   December Tealbook | 1.4 | 1.6 | 1.5 | 1.8 | 2.0 | 2.0 | n.a. |
| Federal funds rate[2] | .95 | 1.20 | 1.20 | 2.66 | 4.01 | 4.96 | 2.50 |
|   December Tealbook | .95 | 1.25 | 1.25 | 2.50 | 3.46 | 4.00 | 2.50 |
| Memo: | | | | | | | |
| Federal funds rate, end of period | 1.13 | 1.38 | 1.38 | 2.69 | 4.04 | 4.98 | 2.50 |
|   December Tealbook | 1.13 | 1.26 | 1.26 | 2.52 | 3.47 | 4.01 | 2.50 |
| Output gap[2,3] | .8 | 1.4 | 1.4 | 2.7 | 3.5 | 3.6 | n.a. |
|   December Tealbook | .8 | 1.3 | 1.3 | 2.1 | 2.3 | 2.1 | n.a. |

1. Percent change from final quarter of preceding period to final quarter of period indicated.
2. Percent, final quarter of period indicated.
3. Percent difference between actual and potential. A negative number indicates that the economy is operating below potential.
n.a. Not available.

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[1] The downward revision to the unemployment rate (and the upward revision to the output gap) is somewhat smaller than would be expected given the upward revision to GDP growth, because we assume that the Tax Cut and Jobs Act will boost potential output growth over the next few years. In addition, with the labor market very tight, more of the increased demand for labor is being met by higher labor force participation than is typical, mitigating somewhat the decline in the unemployment rate.

# The Bipartisan Budget Act of 2018

The Bipartisan Budget Act of 2018 (BBA 2018) was signed into law on February 9. The legislation (1) includes an agreement to increase the level of discretionary budget authority by roughly ½ percent of GDP in both fiscal year 2018 and fiscal 2019 relative to our projection in the January Tealbook, (2) suspends the debt ceiling until March 2019, and (3) authorizes an additional $90 billion in disaster relief funding.[1]  Although the BBA 2018 sets higher caps on budget levels, the additional spending is not authorized until the Congress passes fiscal 2018 and 2019 appropriation bills consistent with these levels.  In order to provide the Congress with enough time to pass the fiscal 2018 appropriation bills, the BBA 2018 includes a temporary funding patch for the government through March 23.

To project the effects on aggregate demand of increases in budget authority consistent with the BBA 2018, it is necessary to forecast how quickly government purchases, which we assume pass dollar-for-dollar into aggregate demand, will respond to the increase in budget authority.  Within a fiscal year, government agencies generally sign contracts for goods and services that commit to spending that year's budget authority.  However, a significant share of the spending on goods and services typically occurs in subsequent fiscal years.  Although we estimate the timing of spending using generic budget authority spendout rate estimates from both the Congressional Budget Office (CBO) and the Department of Defense (DOD), we assume a slower spendout rate for two reasons:  (1) In this instance, agencies will receive the increase in budget authority roughly halfway through the current fiscal year, and (2) it appears that the response of government purchases to recent budget deals has been slower than the generic estimates from the CBO and the DOD.  Consequently, we project a three-year phase-in period (with little effect in the first half of this year), whereas the CBO analysis implies a two-year phase-in.[2]

We estimate that the direct boost to aggregate demand from the increase in federal budget authority associated with the BBA 2018 will increase the level of real GDP a little more than ½ percent by the end of 2020 (rightmost column, line 2 of the table).  Additional impetus will occur as a consequence of the usual multiplier effects, shown in line 3, but interest rates will also be higher and the dollar will be stronger (line 4).   All told, we estimate that the BBA 2018 will boost the level of real GDP ½ percent by the end of 2020 (rightmost column, line 1).

## Bipartisan Budget Act of 2018 Effects on the U.S. GDP Outlook
### (Percentage point contributions to Q4/Q4 percentage change)

|  | 2018 | 2019 | 2020 | 2018–20 (cumulative) |
|---|---|---|---|---|
| (1) **Net fiscal policy: Current** | .15 | .20 | .15 | .50 |
| (2)  Direct aggregate demand | .15 | .25 | .15 | .55 |
| (3)  Follow-on multiplier | .05 | .10 | .10 | .20 |
| (4)  Financial offsets | -.05 | -.10 | -.10 | -.30 |

Note: Contributions may not sum because of rounding.
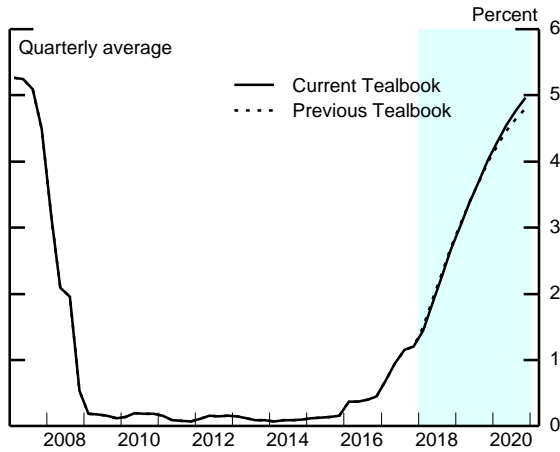Source: Staff estimates.

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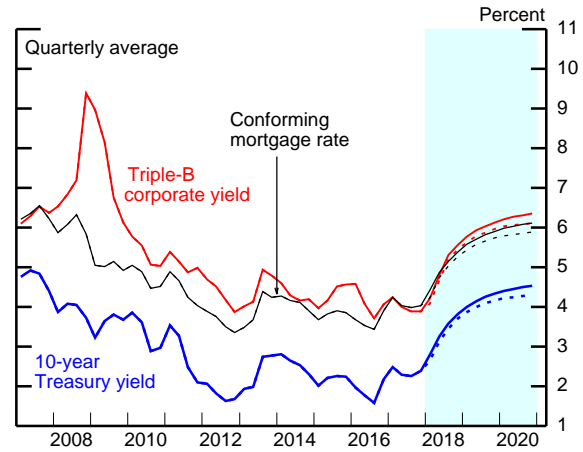[1] The January Tealbook projection included disaster relief funding consistent with this increase.

[2] See Congressional Budget Office (2018), Bipartisan Budget Act of 2018:  Cost Estimate (Washington: CBO, February 8), Table 1:  Authorizing Divisions, pp. 1–2, https://www.cbo.gov/system/files/115th-congress-2017-2018/costestimate/bipartisanbudgetactof2018.pdf.

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# Key Background Factors underlying the Baseline Staff Projection

### Federal Funds Rate

Percent

Quarterly average

—— Current Tealbook
· · · · Previous Tealbook

### Long-Term Interest Rates

Percent

Quarterly average

Conforming mortgage rate

Triple-B corporate yield

10-year Treasury yield

### Equity Prices

Ratio scale, 2007:Q1 = 100

Quarter-end

Dow Jones U.S. Total Stock Market Index

### House Prices

Ratio scale, 2007:Q1 = 100

Quarterly

CoreLogic Index

### Crude Oil Prices

Dollars per barrel

Quarterly average

Imported oil

West Texas Intermediate

### Broad Real Dollar

2007:Q1 = 100

Quarterly average

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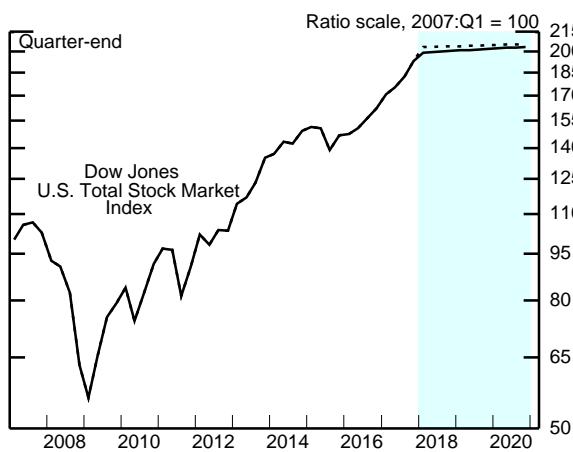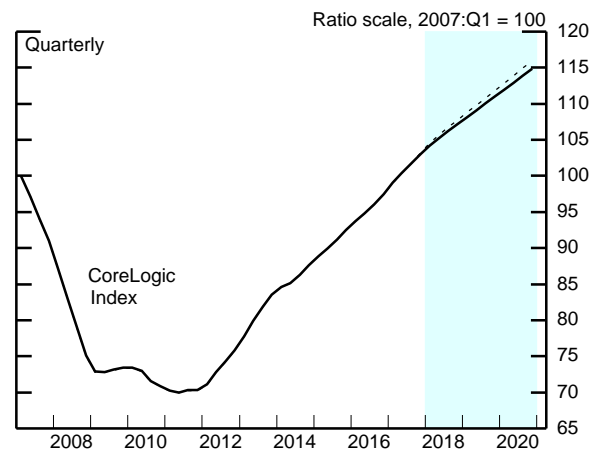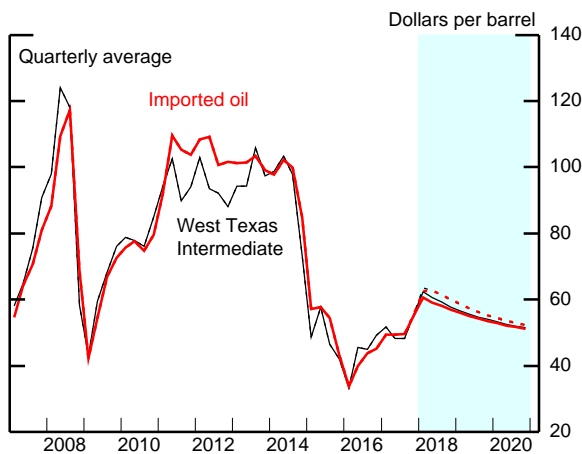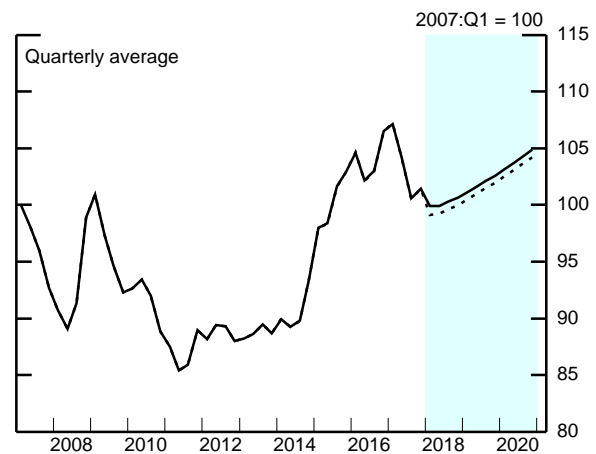
### Federal Reserve System Nowcasts of 2018:Q1 Real GDP Growth
(Percent change at annual rate from previous quarter)

| Federal Reserve Entity | Type of model | Nowcast as of Mar. 7, 2018 |
|---|---|---|
| Federal Reserve Bank | | |
| Boston | • Mixed-frequency BVAR | 2.8 |
| New York | • Factor-augmented autoregressive model combination | 2.8 |
| | • Factor-augmented autoregressive model combination, financial factors only | 2.3 |
| | • Dynamic factor model | 2.8 |
| Cleveland | • Bayesian regressions with stochastic volatility | 3.2 |
| | • Tracking model | 0.2 |
| 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 | 1.8 |
| | • Bayesian VARs | 2.5 |
| St. Louis | • Dynamic factor models | 3.4 |
| | • News index model | 3.3 |
| | • Let-the-data-decide regressions | 2.5 |
| Kansas City | • Accounting-based tracking estimate | 1.9 |
| Board of Governors | • Board staff's forecast (judgmental tracking model)[1] | 2.2 |
| | • Monthly dynamic factor models (DFM-45) | 2.9 |
| | • Mixed-frequency dynamic factor model (DFM-BM) | 2.2 |
| Memo: Median of Federal Reserve System nowcasts | | 2.7 |

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[1] The March Tealbook forecast, finalized on March 9, 2018, is 2.1 percent.

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

| Measure | 2018:Q1 | | 2018:Q2 | | 2018:Q3 | |
|---|---|---|---|---|---|---|
| | Previous Tealbook | Current Tealbook | Previous Tealbook | Current Tealbook | Previous Tealbook | Current Tealbook |
| **Real GDP** | **2.7** | **2.1** | **3.2** | **3.1** | **3.0** | **3.3** |
| Private domestic final purchases | 2.7 | 1.6 | 3.5 | 3.4 | 3.6 | 3.4 |
| Personal consumption expenditures | 2.6 | 1.5 | 2.9 | 2.6 | 3.0 | 2.9 |
| Residential investment | -1.0 | -4.4 | 5.2 | 2.7 | 7.9 | 4.0 |
| Nonres. private fixed investment | 4.6 | 4.2 | 6.3 | 8.2 | 5.4 | 6.2 |
| Government purchases | -.1 | -.3 | .4 | .8 | .0 | 1.8 |
| *Contributions to change in real GDP* | | | | | | |
| Inventory investment[1] | .5 | .8 | .1 | -.2 | -.2 | .0 |
| Net exports[1] | -.1 | .0 | .0 | .2 | .1 | .1 |
| **Unemployment rate** | **3.9** | **4.1** | **3.8** | **3.9** | **3.6** | **3.7** |
| **PCE chain price index** | **2.4** | **2.5** | **1.8** | **1.5** | **1.7** | **1.7** |
| Ex. food and energy | 2.1 | 2.3 | 2.0 | 2.0 | 1.8 | 1.8 |

1. Percentage points.

## Recent Nonfinancial Developments (1)

### Real GDP and GDI

4-quarter percent change



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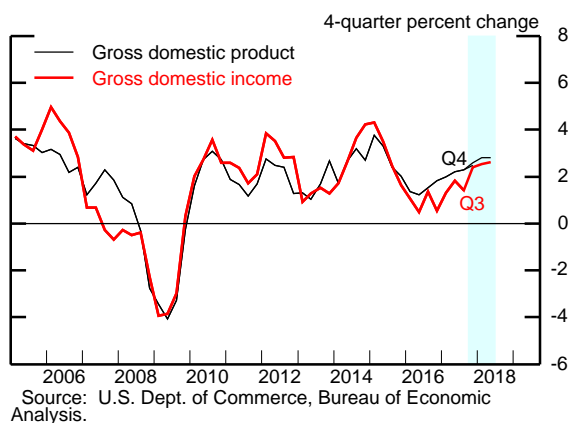
### Manufacturing IP ex. Motor Vehicles and Parts

3-month percent change, annual rate



Source: Federal Reserve Board, G.17 Statistical Release, "Industrial Production and Capacity Utilization."
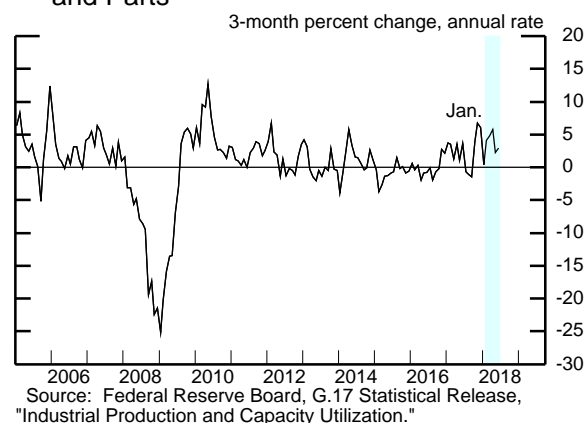
### Sales and Production of Light Motor Vehicles

Millions of units, annual rate



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

### Real PCE Growth

6-month percent change, annual rate



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

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# Recent Nonfinancial Developments (2)

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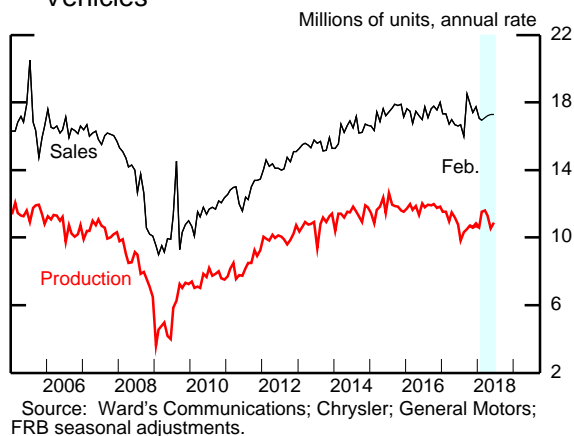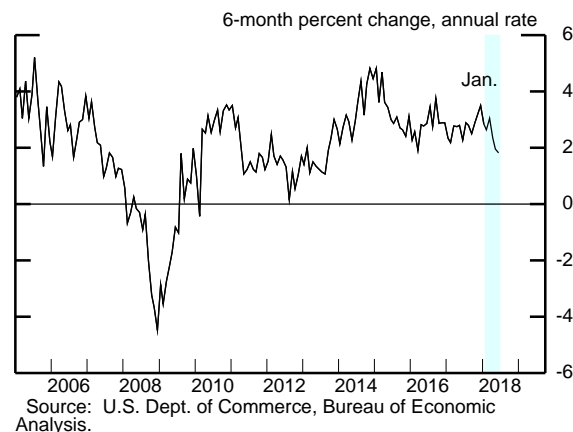
### Single-Family Housing Starts and Permits

Millions of units (annual rate)

— Adjusted permits
— Starts

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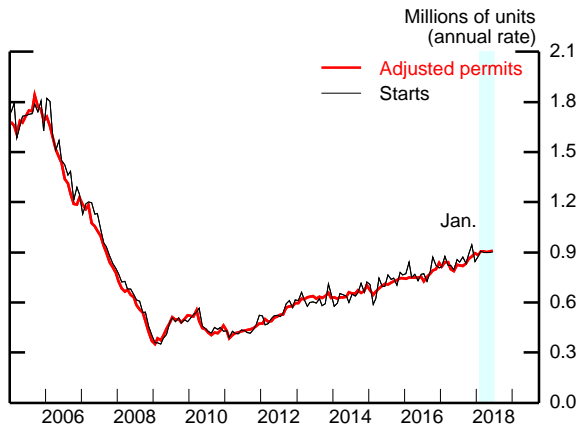
Note: Adjusted permits equal permit issuance plus starts outside of permit-issuing areas.
Source: U.S. Census Bureau.

### Home Sales

Millions of units (annual rate)

Millions of units (annual rate)

Existing homes (left scale)

Jan.

New single-family homes (right scale)
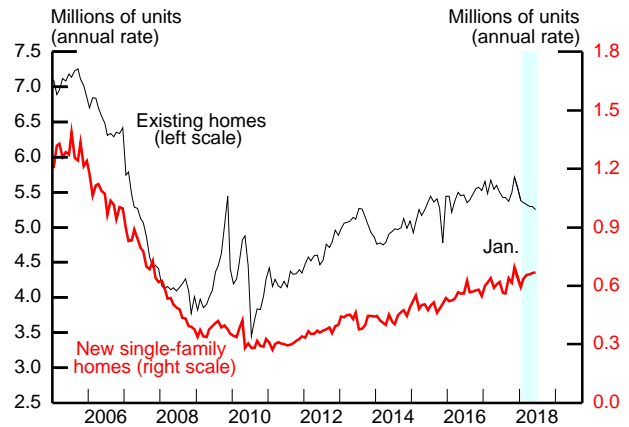
Source: For existing, National Association of Realtors; for new, U.S. Census Bureau.

### Nondefense Capital Goods ex. Aircraft

Ratio scale, billions of dollars

Orders

Jan.

Shipments

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

### Nonresidential Construction Put in Place

Billions of chained (2009) dollars

Jan.
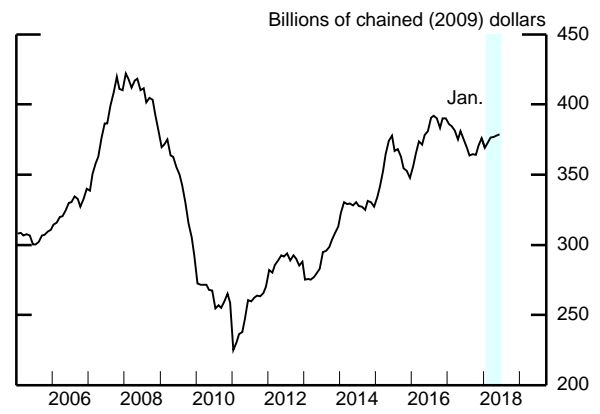
Note: Nominal CPIP deflated by BEA prices through 2017:Q3 and by the staff's estimated deflator thereafter.
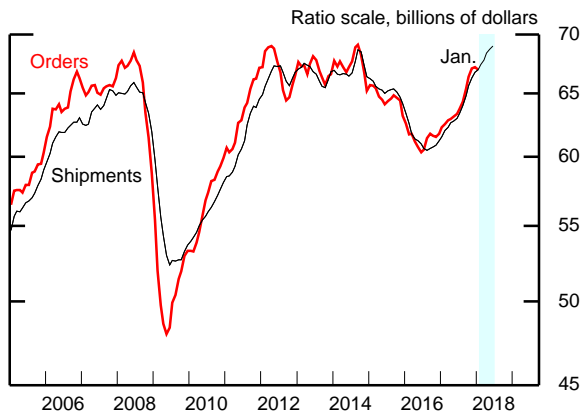Source: U.S. Census Bureau.

### Inventory Ratios

Months

Staff flow-of-goods system

Jan.

Census book-value data

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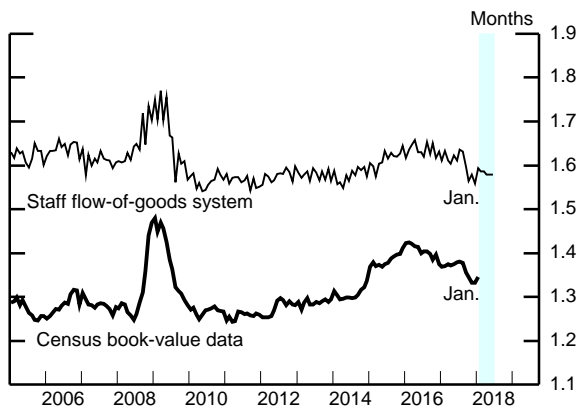
Note: Flow-of-goods system inventories include manufacturing and mining industries and are relative to consumption. Census data cover manufacturing and trade, and inventories are relative to sales.
Source: U.S. Census Bureau; staff calculations.

### Exports and Non-oil Imports

Billions of dollars

Non-oil imports

Jan.

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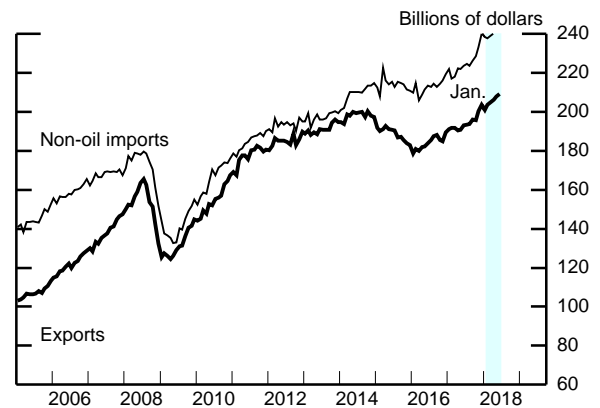
Note: Forecasts are linear interpolations of quarterly values.
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis; U.S. Census Bureau.

## Does Rising Concentration Mean U.S. Markets Are Less Competitive?

The production of goods and services in the United States has become more concentrated in recent years. Figure 1 reports the change in the share of revenue attributable to the top 50 firms in selected sectors since the late 1990s. This share has risen in most sectors, with particularly large increases in transportation and warehousing, retail trade, finance, and wholesale trade. A natural question is whether rising concentration means less competition and more market power. In addition to higher prices and lower output, rising market power could mean restrained investment and increased barriers to firm entry, which could be contributing to low productivity growth and coul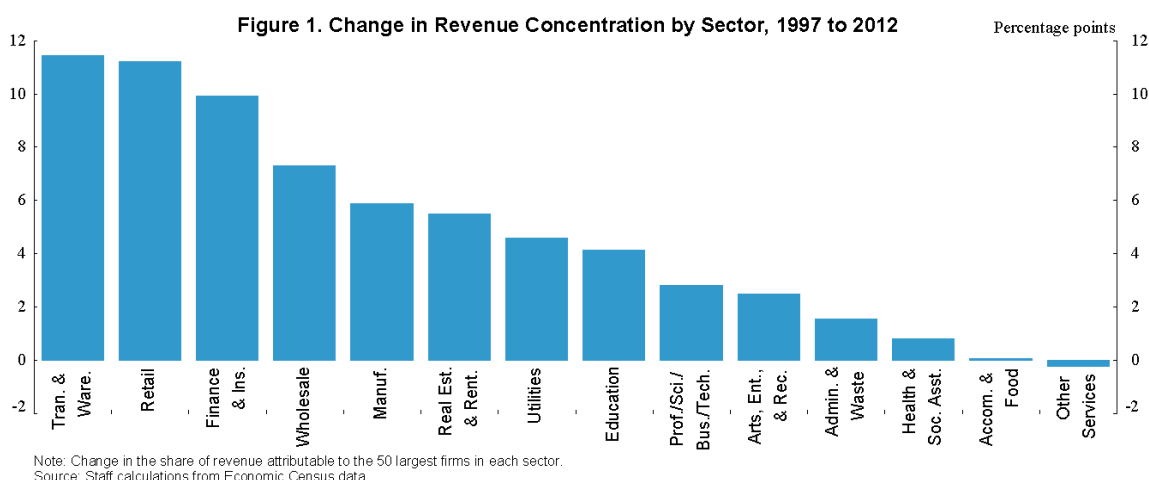d ultimately make the tradeoffs between inflation and unemployment less favorable for monetary policymakers. Moreover, increased monopsony power in labor markets could slow the growth of labor income. However, rising concentration need not imply rising market power and might instead reflect improvements in efficiency or consumer choice, and researchers have not yet shown conclusively that market power is on the rise.



Figure 1. Change in Revenue Concentration by Sector, 1997 to 2012

Note: Change in the share of revenue attributable to the 50 largest firms in each sector.
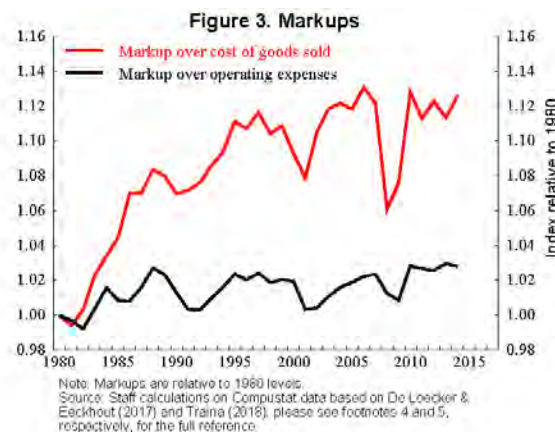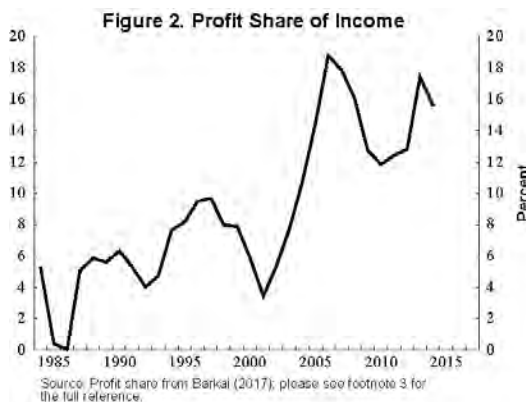Source: Staff calculations from Economic Census data.

Concentration measures alone may not be informative about market power for several reasons. First, competition generally occurs within narrow industries and, in many cases, limited geographic areas, while most discussions of concentration focus on broad sectoral and national aggregates. Second, measures of concentration do not necessarily reveal the extent to which a market or industry is immune to competition from potential entrants. Third, growth of dominant firms may reflect changes in consumer tastes, technology, or scale economies that improve efficiency and *benefit* consumers. For example, consolidation in retail and wholesale trade during the 1990s reflected the rise of highly efficient retail chains and distributors that reduced prices and increased product availability.[1] By contrast, evidence from manufacturing does suggest that consolidation driven by merger activity in recent decades reduced competition.[2]

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[1] For retail, see Lucia Foster, John Haltiwanger, and C.J. Krizan (2006), "Market Selection, Reallocation, and Restructuring in the U.S. Retail Trade Sector in the 1990s,"*Review of Economics and Statistics*, vol. 88 (November), pp. 748–58; and David A. Matsa (2011), "Competition and Product Quality in the Supermarket Industry," *Quarterly Journal of Economics*, vol. 126 (August), pp. 1539–91. For wholesale, see Sharat Ganapati (2017), "The Modern Wholesaler: Global Sourcing, Domestic Distribution, and Scale Economies," unpublished paper, Dartmouth College, April,
http://www.tuck.dartmouth.edu/uploads/content/Ganapati_Wholesalers_2016_copy.pdf.

[2] See Bruce A. Blonigen and Justin R. Pierce (2016), "Evidence for the Effects of Mergers on Market Power and Efficiency," NBER Working Paper Series 22750 (Cambridge, Mass.: National Bureau of Economic Research, October), www.nber.org/papers/w22750; and Sharat Ganapati (2018), "Oligopolies, Prices, Output, and Productivity," unpublished paper, SSRN, February, https://dx.doi.org/10.2139/ssrn.3030966.

Ideally, we would look at direct measures of market power rather than indirect indicators such as concentration, but market power cannot be directly observed. Instead, researchers must study profits or estimated price markups as indicators of market power. The estimated share of aggregate output accruing to economic profits does appear to have risen recently, as seen in figure 2, as have some other profit measures.[3] A rising profit share may indicate increased pricing power and reduced competition, or it may merely indicate that industries with higher average profit shares have grown faster than lower-profit industries. As for markups over marginal costs, these are difficult to estimate because we cannot observe marginal costs and must rely on restrictive assumptions from stylized models. Recent research using one methodology estimates that markups over the cost of goods sold have risen strongly (the red line in figure 3).[4] However, our own analysis shows that this finding is not robust to reasonable changes in methods and assumptions. Moreover, another study that uses a broader measure of variable costs that includes marketing and management expenses finds only a modest increase in markups over the same period (the black line).[5] Importantly, *both* of these markup measures can appear to rise for reasons other than increases in market power, such as increased product quality or changes in firms' cost structure that improve product development or distribution.[6] Finally, further investigation shows that the rise of estimated markups is primarily occurring in sectors that have seen smaller gains in concentration, such as education and accommodation and food services, which casts further doubt on concentration as a market power indicator.

In sum, the implications of greater concentration for market power and consumer pricing remain highly uncertain. Much of the research that has explored these effects has come out in the past year—some even in recent weeks—so this debate is still open and developing.



Figure 2. Profit Share of Income

Source: Profit share from Barkai (2017); please see footnote 3 for the full reference.



Figure 3. Markups

Note: Markups are relative to 1980 levels.
Source: Staff calculations on Compustat data based on De Loecker & Eeckhout (2017) and Traina (2018); please see footnotes 4 and 5, respectively, for the full reference.

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[3] Simcha Barkai (2017), "Declining Labor and Capital Shares," unpublished paper, University of Chicago, http://home.uchicago.edu/~barkai/doc/BarkaiDecliningLaborCapital.pdf; and Gustavo Grullon, Yelena Larkin, and Roni Michaely (2017), "Are U.S. Industries Becoming More Concentrated?" unpublished paper, September, https://dx.doi.org/10.2139/ssrn.2612047.

[4] Jan De Loecker and Jan Eeckhout (2017), "The Rise of Market Power and the Macroeconomic Implications," NBER Working Paper Series 23687 (Cambridge, Mass.: National Bureau of Economic Research, August), www.nber.org/papers/w23687.

[5] James Traina (2018), "Is Aggregate Market Power Increasing? Production Trends Using Financial Statements," New Working Paper Series No. 17 (Chicago: Stigler Center for the Study of the Economy and the State), https://research.chicagobooth.edu/-/media/research/stigler/pdfs/workingpapers/17.

[6] See David Autor, David Dorn, Lawrence F. Katz, Christina Patterson, and John Van Reenen (2017), "The Fall of the Labor Share and the Rise of Superstar Firms," unpublished paper, Massachusetts Institute of Technology, May, https://economics.mit.edu/files/12979; and James E. Bessen (2018), "Information Technology and Industry Concentration," Law and Economics Research Paper 17-41 (Boston, Mass.: Boston University School of Law, January), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3044730.

# Alternative Measures of Slack

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

**Domestic Econ Devel & Outlook**

### Output Gaps



Percentage points

- FRB/US
- EDO* production function gap
- FRBNY
- PRISM
- FRBCHICAGO

Q4

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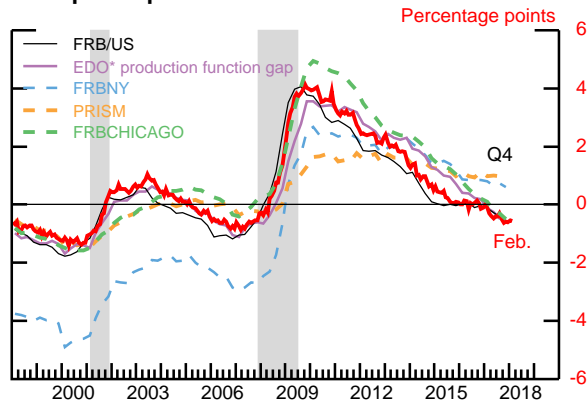
* EDO is Estimated, Dynamic, Optimization-based model.
  Source:  Federal Reserve Board; PRISM: Federal Reserve
  Board Bank of Chicago; Federal Reserve Board Bank of
  Philadelphia, PRISM Model Documentation (June 2011);
  FRBNY: Federal Reserve Bank of New York Staff
  Report 618 (May 2013, revised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

### Manufacturing Capacity Utilization Gap*



Percentage points                    Percentage points

Jan.

Feb.

Source:  Federal Reserve Board.

### Jobs Hard to Fill Gap*



Percentage points                    Percentage points

Feb.

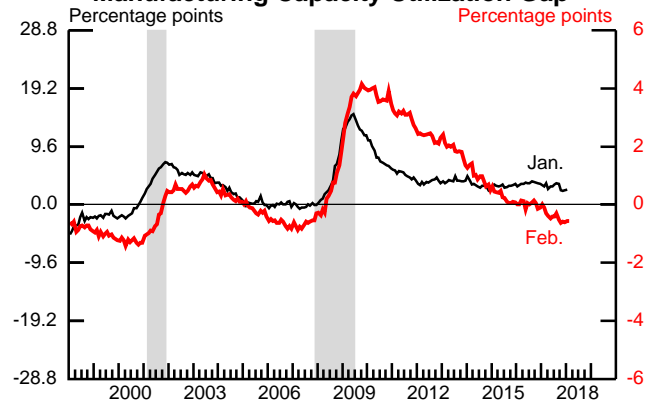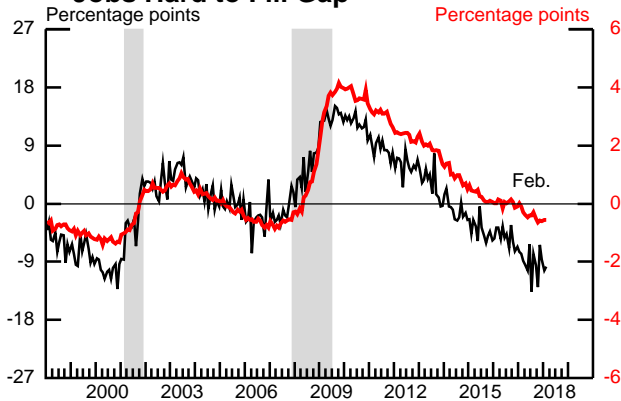Note:  Percent of small businesses surveyed with at least one
"hard to fill" job opening. Seasonally adjusted by Federal Reserve
Board Staff.
  Source:  National Federation of Independent Business,
Small Business Economic Trends Survey.

### Job Openings Gap*



Percentage points                    Percentage points

- Unemployment rate gap
- Private job openings rate

Feb.

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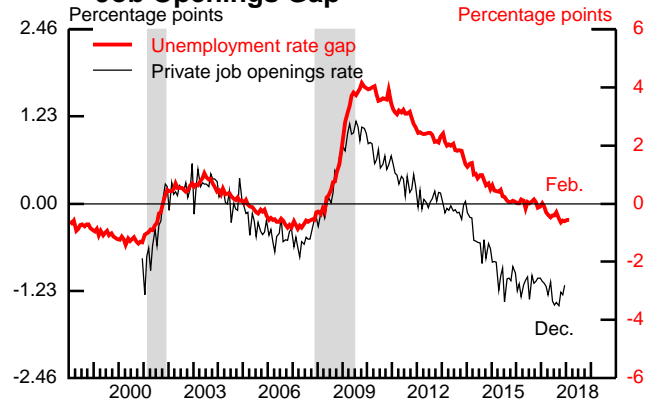
Note:  Job openings rate is the number of job openings divided
by employment plus job openings.
  Source:  Job Openings and Labor Turnover Survey; U.S.
Department of Labor, Bureau of Labor Statistics, Current
Employment Statistics; Conference Board, Help Wanted OnLine.

### Job Availability Gap*



Percentage points                    Percentage points

Feb.
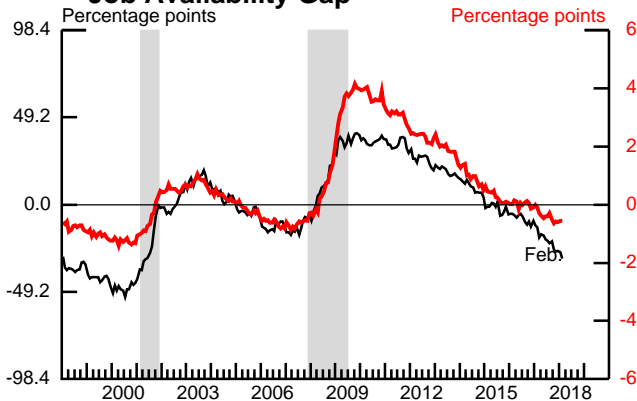
Note:  Percent of households believing jobs are plentiful minus
the percent believing jobs are hard to get.
  Source:  Conference Board.

### Involuntary Part-Time Employment Gap



Percentage points                    Percentage points

Feb.
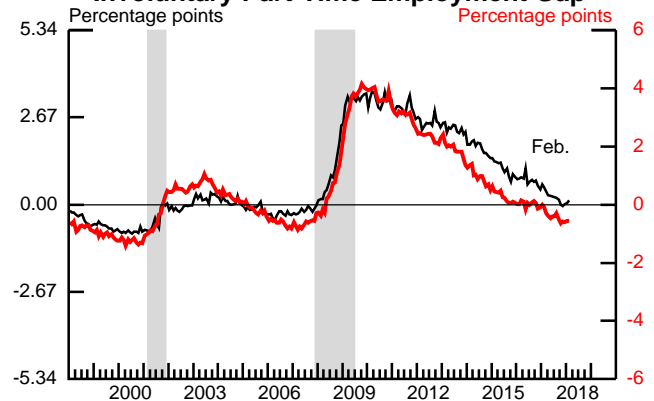
Note:  Percent of employment.
  Source:  U.S. Department of Labor, Bureau of Labor Statistics,
Current Population Survey.

* Plots the negative of the gap to have the same sign as the unemployment rate gap.
  Note:  The shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.  Output gaps are
multiplied by negative 0.54 to facilitate comparison with the unemployment rate gap.  Manufacturing capacity utilization gap is constructed by
subtracting its average rate from 1972 to 2013.  Other gaps were constructed by subtracting each series' average in 2004:Q4 and 2005:Q1.

## Medical Prices:  Recent Developments and Future Prospects

Medical price inflation—as measured using PCE price indexes—has slowed from an average annual pace of 3¼ percent before the Great Recession to 1¾ percent in recent years.[1]  The deceleration has received scrutiny because of the considerable weight (25 percent) of medical prices in core PCE.  In this discussion, we examine the recent drivers of medical prices and possible future developments.

As shown in figure 1, medical prices currently contribute around 0.4 percentage point to core PCE price inflation, about ¼ percentage point less than during the few years preceding the Great Recession.  The slowdown can be attributed to a decline in medical services inflation (the blue bars).[2]  Medical goods prices (the red bars) have a smaller weight, and their contribution appears roughly stable over time, with temporary fluctuations largely driven by the rate of introduction of new generic drugs.

Two main hypotheses have been advanced to explain the deceleration of medical services prices: (1) business cycle fluctuations and (2) sector-specific structural factors, including legislative changes.  Regarding the first item, economic downturns put downward pressure on medical prices via several channels.  For instance, as can be seen in figure 2, economic contractions tend to put downward pressure on wages in the health-care sector, which feeds through to PCE medical services inflation via lower costs for providers and lower Medicare reimbursement rates.[3]

**Figure 1. Contributions of Medical Prices to Core PCE Prices (Q4/Q4)**
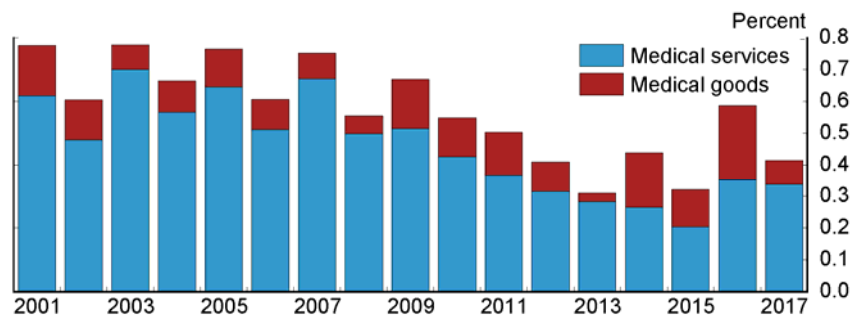


Source:  Bureau of Economic Analysis via Haver Analytics; staff calculations.

[1] The 3¼ percent and 1¾ percent figures refer to the average annual change in PCE medical prices (market- and non-market-based medical services plus medical goods) over the periods from 2004:Q1 to 2007:Q4 and from 2014:Q1 to 2017:Q4, respectively.

[2] The current weights of medical services (market- plus non-market-based) and medical goods (pharmaceutical products) in core PCE are 21 percent and 4 percent, respectively.

[3] The employment cost index is a major source of data used by the Centers for Medicare and Medicaid Services to determine the annual adjustment to Medicare reimbursement for health-care services providers.  For spillovers from Medicare reimbursement rates to private providers, see Jeffrey Clemens and Joshua D. Gottlieb (2017), "In the Shadow of a Giant:  Medicare's Influence on Private Physician Payments," *Journal of Political Economy,* vol. 125 (February), pp. 1–39; Chapin White (2013), "Contrary to Cost-Shift Theory, Lower Medicare Hospital Payment Rates for Inpatient Care Lead to Lower Private Payment Rates," *Health Affairs,* vol. 32 (May), pp. 935–43; Jeffrey Clemens, Joshua D. Gottlieb, and Adam Hale Shapiro (2016), "Medicare Payment Cuts Continue to Restrain Inflation," FRBSF Economic Letter 2016-15 (San Francisco:  Federal Reserve Bank of San Francisco, May), www.frbsf.org/economic-research/publications/economic-letter/2016/may/medicare-payment-cuts-affect-core-inflation.

**Figure 2. Four-Quarter Changes of PCE Medical Services Prices
and ECI for Health Care and Social Assistance**



Note: Shaded bars indicate periods of business recession as defined by the National Bureau of Economic Research.
Source: Bureau of Economic Analysis via Haver Analytics; Bureau of Labor Statistics via Haver Analytics; staff calculations.
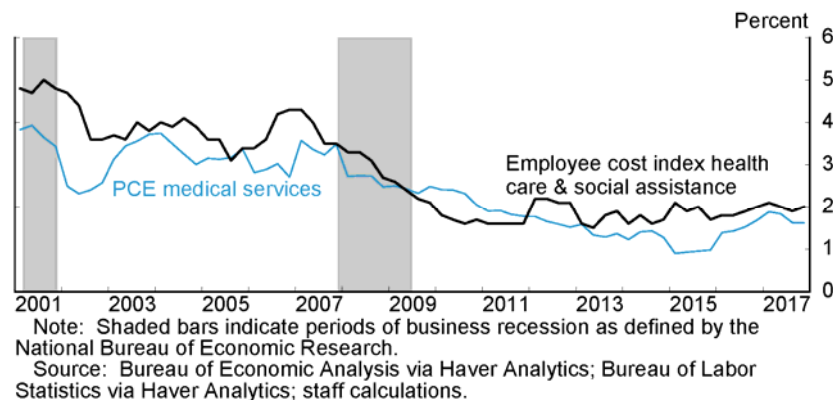
In addition, recessions tend to reduce the demand for medical services, which in turn tends to put downward pressure on medical prices.[4]

Sector-specific structural factors have also contributed to the recent slowdown. For instance, budget stress at the state level has restrained the growth of Medicaid reimbursement rates.[5] Further, legislation passed in recent years has reduced both the level and the growth rate of Medicare reimbursement rates. Important pieces of legislation include the Affordable Care Act, which changed starting in 2012 the way Medicare's payments to hospitals are calculated; the Budget Control Act of 2011, which included a one-time 2 percent cut to Medicare payments; and the Medicare Access and CHIP Reauthorization Act (the 2015 "doc fix"), which overhauled the way Medicare payments to physicians are determined.

The staff projects inflation in the medium term based on macro relationships in the economy and not by building up sector forecasts. That said, we have implicitly assumed a gradual acceleration of medical prices as the economy tightens further, but not a return to pre-recession rates, as structural factors are likely to persist. We think the risks around our forecast are balanced. On the one hand, if inflation responds in a nonlinear fashion to slack, then medical prices could be among the pieces that would rise more than we expect. On the other hand, recent structural reforms could restrain increases in medical prices by more than we implicitly assume, in which case core inflation could rise more slowly than we anticipate, all else being equal.[6]

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[4] See Annamaria Lusardi, Daniel Schneider, and Peter Tufano (2010), "The Economic Crisis and Medical Care Usage," NBER Working Paper Series 15843 (Cambridge, Mass.: National Bureau of Economic Research, March), www.nber.org/papers/w15843.

[5] Medicaid-to-Medicare fee ratios for physicians declined from 72 percent to 66 percent between 2008 and 2011, as estimated in Stephen Zuckerman and Dana Goin (2012), "How Much Will Medicaid Physician Fees for Primary Care Rise in 2013? Evidence from a 2012 Survey of Medicaid Physicians Fees," issue paper (Washington: Henry J. Kaiser Family Foundation, December), www.kff.org/medicaid/issue-brief/how-much-will-medicaid-physician-fees-for.

[6] The staff assumption about the underlying trend of core PCE price inflation is informed by a suite of models that suggest trend core PCE inflation has remained relatively constant at around 1¾ percent over the past 20 years. For this reason, the persistent depressing effect on recent PCE medical price inflation from structural reforms appears to have been offset by other factors.

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# Survey Measures of Longer-Term Inflation Expectations

**Domestic Econ Devel & Outlook**

### CPI Next 10 Years



Percent

Dec.

Q1

SPF median
Livingston Survey median

2008  2010  2012  2014  2016  2018

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

### CPI Forward Expectations



Percent

Mar.

Oct.
Jan.

Q1

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

2008  2010  2012  2014  2016  2018

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

Q1

2008  2010  2012  2014  2016  2018

Source:  Federal Reserve Bank of Philadelphia.

### PCE Forward Expectations



Percent

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

Q1

Jan.

2008  2010  2012  2014  2016  2018

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

### Surveys of Consumers



Percent

Feb.
Feb.

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

2008  2010  2012  2014  2016  2018

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

2008  2010  2012  2014  2016  2018

Note:  Survey of businesses in the Sixth Federal Reserve
District.  Data begin in February 2012.
Source:  Federal Reserve Bank of Atlanta.
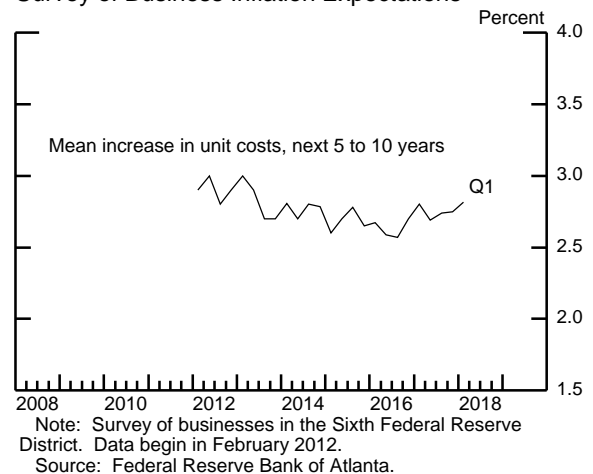
**Projections of Real GDP and Related Components**
(Percent change at annual rate from final quarter
of preceding period except as noted)

| Measure | 2017 | 2018 | | 2018 | 2019 | 2020 |
| --- | --- | --- | --- | --- | --- | --- |
| | | H1 | H2 | | | |
| **Real GDP** | **2.6** | **2.6** | **3.3** | **2.9** | **2.6** | **2.1** |
| Previous Tealbook | 2.7 | 3.0 | 2.9 | 2.9 | 2.4 | 2.0 |
| Final sales | 2.9 | 2.3 | 3.4 | 2.8 | 2.7 | 2.1 |
| Previous Tealbook | 3.0 | 2.7 | 3.2 | 2.9 | 2.4 | 2.0 |
| Personal consumption expenditures | 2.9 | 2.0 | 2.9 | 2.4 | 2.8 | 2.5 |
| Previous Tealbook | 2.8 | 2.8 | 3.0 | 2.9 | 2.8 | 2.5 |
| Residential investment | 2.5 | -.9 | 4.1 | 1.6 | .5 | 4.2 |
| Previous Tealbook | 2.2 | 2.0 | 6.4 | 4.2 | .4 | 4.1 |
| Nonresidential structures | 4.9 | 7.4 | 3.4 | 5.4 | 2.8 | .9 |
| Previous Tealbook | 4.0 | 3.8 | 3.6 | 3.7 | 1.8 | .5 |
| Equipment and intangibles | 6.8 | 5.9 | 6.6 | 6.2 | 4.1 | 2.1 |
| Previous Tealbook | 7.7 | 5.9 | 5.5 | 5.7 | 3.8 | 2.1 |
| Federal purchases | 1.0 | -.8 | 4.4 | 1.8 | 4.1 | 3.2 |
| Previous Tealbook | .8 | -1.6 | .0 | -.8 | .3 | .7 |
| State and local purchases | .5 | .9 | 1.0 | .9 | 1.0 | 1.0 |
| Previous Tealbook | .4 | 1.2 | .8 | 1.0 | .8 | .9 |
| Exports | 4.9 | 4.1 | 6.2 | 5.2 | 5.0 | 3.4 |
| Previous Tealbook | 4.5 | 4.9 | 6.3 | 5.6 | 4.9 | 3.3 |
| Imports | 4.6 | 2.7 | 4.1 | 3.4 | 4.7 | 4.9 |
| Previous Tealbook | 3.3 | 4.0 | 4.4 | 4.2 | 4.4 | 4.5 |
| Contributions to change in real GDP (percentage points) | | | | | | |
| Inventory change | -.3 | .3 | -.1 | .1 | -.1 | -.1 |
| Previous Tealbook | -.3 | .3 | -.2 | .0 | .0 | .0 |
| Net exports | -.1 | .1 | .1 | .1 | -.1 | -.3 |
| Previous Tealbook | .0 | .0 | .1 | .0 | -.1 | -.3 |

Real GDP
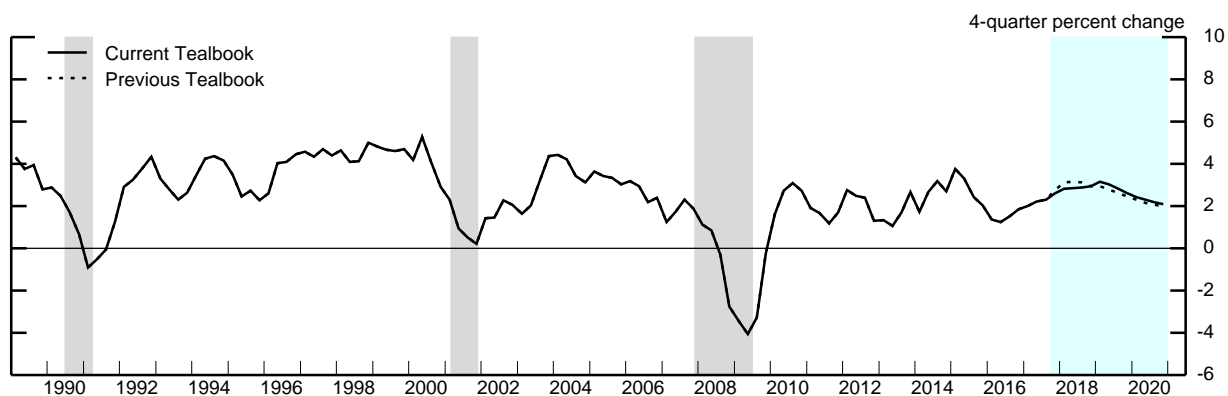


Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.

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

# Components of Final Demand

**Domestic Econ Devel & Outlook**

## Personal Consumption Expenditures



## Residential Investment



## Equipment and Intangibles
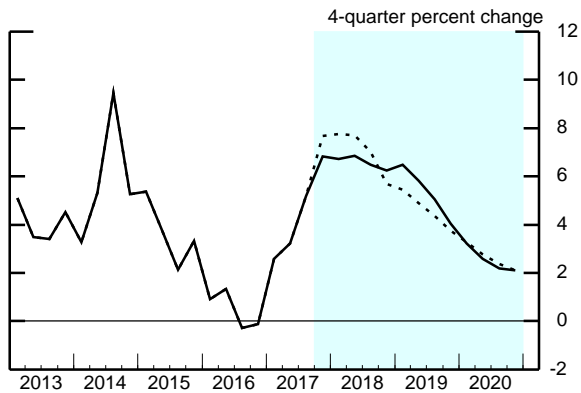


## Nonresidential Structures
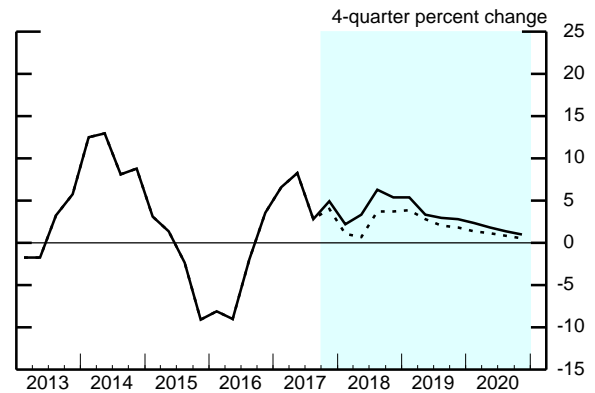


## Government Consumption and Investment
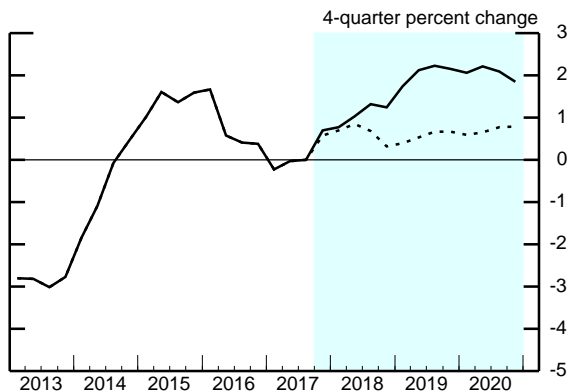


## Exports and Imports
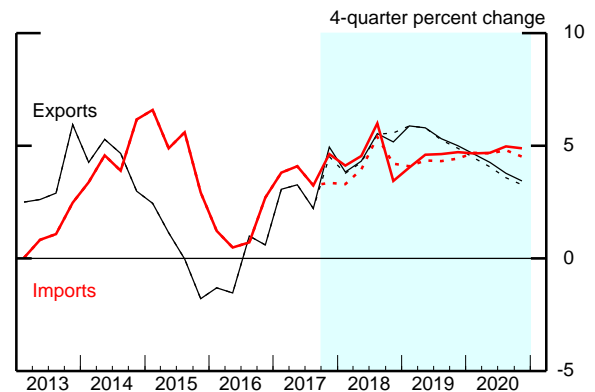


Source: U.S. Department of Commerce, Bureau of Economic Analysis.

# Aspects of the Medium-Term Projection

**Domestic Econ Devel & Outlook**

## Personal Saving Rate

Percent



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.
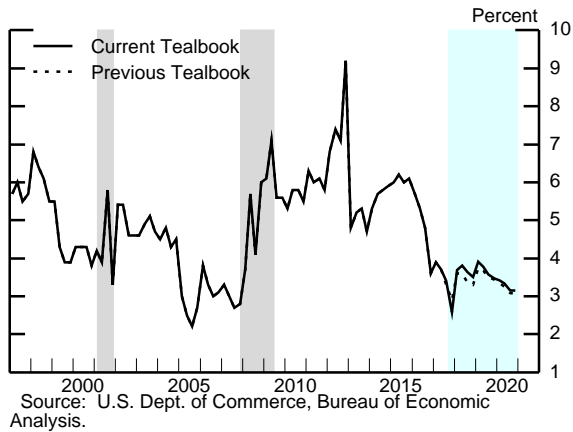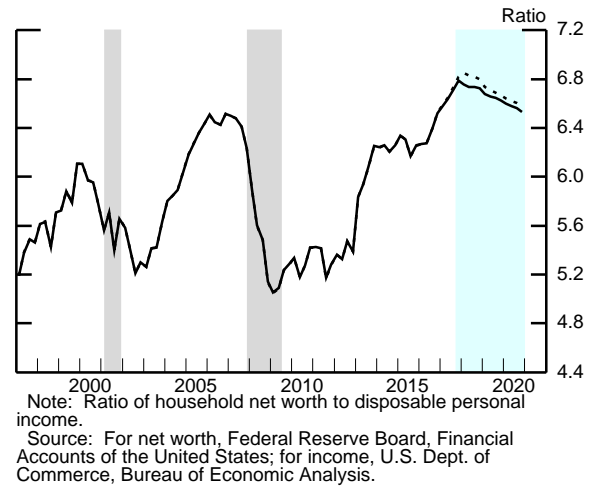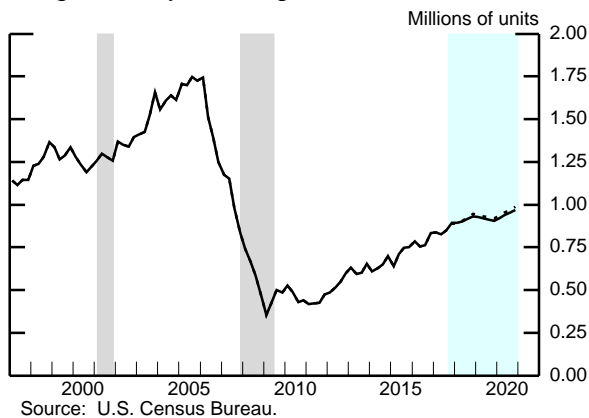
## Equipment and Intangibles Spending

Share of nominal GDP



Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.
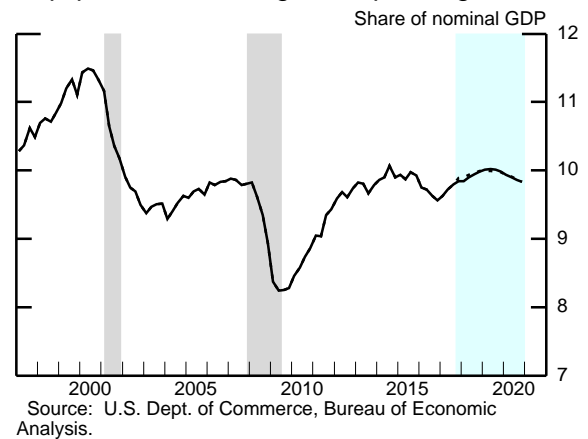
## Federal Surplus/Deficit

Share of nominal GDP

4-quarter moving average



Source: *Monthly Treasury Statement.*
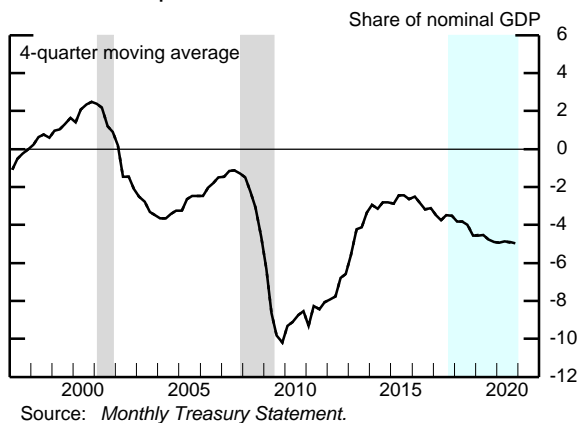
## Current Account Surplus/Deficit
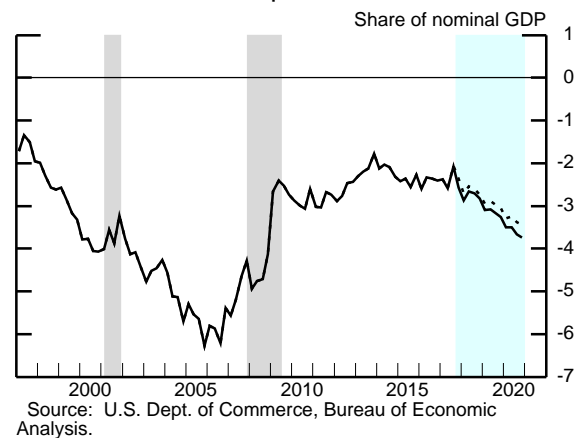
Share of nominal GDP



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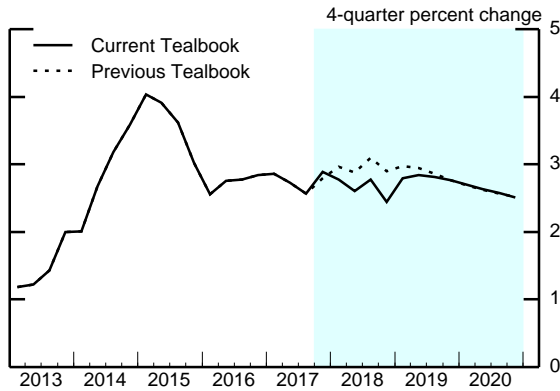
Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.

**Domestic Econ Devel & Outlook**
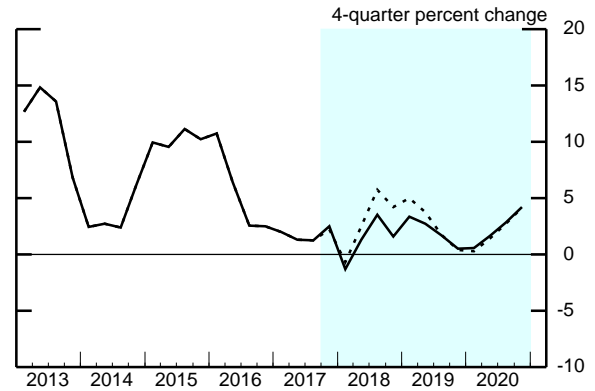
## Decomposition of Potential GDP
(Percent change, Q4 to Q4, except as noted)

| Measure | 1974-95 | 1996-2000 | 2001-07 | 2008-10 | 2011-15 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|
| Potential real GDP | 3.1 | 3.4 | 2.6 | 1.6 | 1.2 | 1.4 | 1.5 | 1.6 | 1.9 | 1.9 |
| Previous Tealbook | 3.1 | 3.4 | 2.6 | 1.6 | 1.2 | 1.4 | 1.5 | 1.7 | 1.8 | 1.9 |
| *Selected contributions[1]* | | | | | | | | | | |
| Structural labor productivity[2] | 1.6 | 2.9 | 2.8 | 1.4 | .8 | .8 | 1.0 | 1.1 | 1.2 | 1.3 |
| Previous Tealbook | 1.6 | 2.9 | 2.8 | 1.4 | .8 | .8 | 1.1 | 1.2 | 1.2 | 1.3 |
| Capital deepening | .6 | 1.5 | 1.0 | .3 | .5 | .5 | .5 | .5 | .6 | .5 |
| Multifactor productivity | .7 | 1.0 | 1.5 | .9 | .1 | .1 | .3 | .4 | .5 | .6 |
| Structural hours | 1.6 | 1.2 | .8 | .0 | .6 | .8 | .2 | .7 | .6 | .6 |
| Previous Tealbook | 1.6 | 1.2 | .8 | .0 | .6 | .8 | .2 | .5 | .6 | .6 |
| Labor force participation | .4 | -.1 | -.2 | -.5 | -.6 | -.3 | -.3 | -.3 | -.2 | -.2 |
| Previous Tealbook | .4 | -.1 | -.2 | -.5 | -.6 | -.3 | -.3 | -.3 | -.2 | -.2 |
| Memo: | | | | | | | | | | |
| Output gap[3] | -1.9 | 2.4 | .8 | -4.2 | -.1 | .3 | 1.4 | 2.7 | 3.5 | 3.6 |
| Previous Tealbook | -1.9 | 2.4 | .8 | -4.2 | -.1 | .3 | 1.5 | 2.7 | 3.3 | 3.3 |

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.

### Output Gap
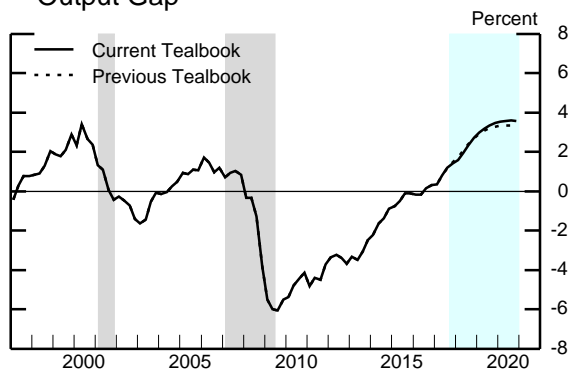


Note: The output gap is the percent difference between actual and potential GDP; a negative number indicates that the economy is operating below potential.
Source: U.S. Department of Commerce, Bureau of Economic Analysis; staff assumptions.

### Unemployment Rate
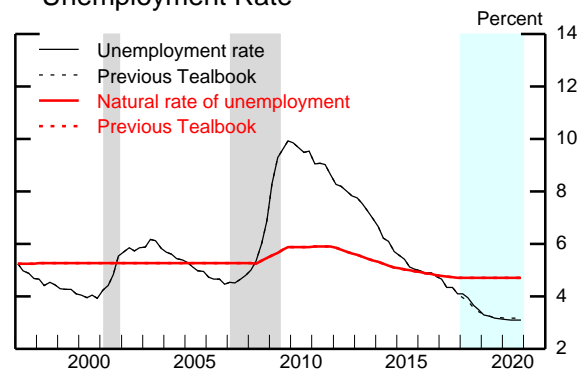


Source: U.S. Department of Labor, Bureau of Labor Statistics; staff assumptions.

### Manufacturing Capacity Utilization Rate
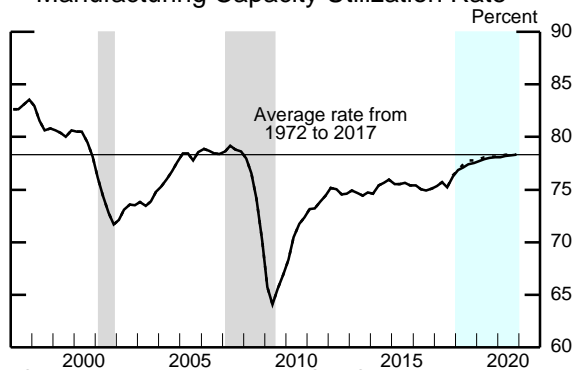


Source: Federal Reserve Board, G.17 Statistical Release, "Industrial Production and Capacity Utilization."

### Structural and Actual Labor Productivity
(Business sector)
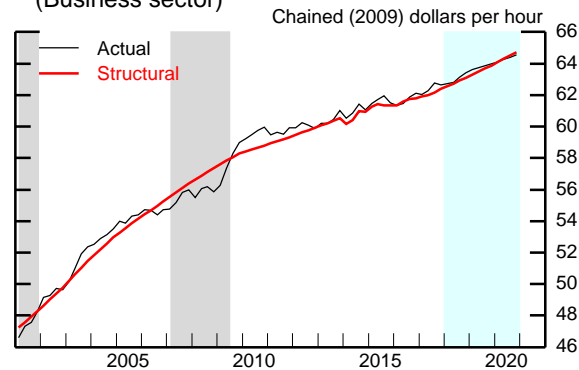


Source: U.S. Department of Labor, Bureau of Labor Statistics; U.S. Department of Commerce, Bureau of Economic Analysis; staff assumptions.

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

## The Outlook for the Labor Market

| Measure | 2017 | 2018 | | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|
| | | H1 | H2 | | | |
| Output per hour, business[1] | .9 | .5 | 1.9 | 1.2 | .9 | .9 |
| Previous Tealbook | 1.0 | .7 | 1.4 | 1.1 | .8 | .9 |
| Nonfarm payroll employment[2] | 183 | 232 | 196 | 214 | 186 | 165 |
| Previous Tealbook | 171 | 185 | 203 | 194 | 179 | 149 |
| Private employment[2] | 180 | 224 | 185 | 205 | 175 | 155 |
| Previous Tealbook | 168 | 178 | 195 | 186 | 170 | 140 |
| Labor force participation rate[3] | 62.7 | 62.8 | 62.7 | 62.7 | 62.7 | 62.7 |
| Previous Tealbook | 62.7 | 62.7 | 62.7 | 62.7 | 62.7 | 62.7 |
| Civilian unemployment rate[3] | 4.1 | 3.9 | 3.5 | 3.5 | 3.1 | 3.1 |
| Previous Tealbook | 4.1 | 3.8 | 3.4 | 3.4 | 3.2 | 3.2 |

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 | 2017 | 2018 | | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|
| | | H1 | H2 | | | |
| *Percent change at annual rate from final quarter of preceding period* | | | | | | |
| PCE chain-weighted price index | 1.7 | 2.0 | 1.6 | 1.8 | 2.0 | 2.1 |
| Previous Tealbook | 1.7 | 2.1 | 1.6 | 1.9 | 1.9 | 2.0 |
| Food and beverages | .7 | 1.4 | 2.2 | 1.8 | 2.4 | 2.4 |
| Previous Tealbook | .6 | 1.4 | 2.2 | 1.8 | 2.3 | 2.2 |
| Energy | 7.6 | .8 | -1.6 | -.4 | -.7 | -.1 |
| Previous Tealbook | 8.2 | 3.8 | -2.2 | .8 | -1.1 | -.4 |
| Excluding food and energy | 1.5 | 2.1 | 1.8 | 1.9 | 2.1 | 2.2 |
| Previous Tealbook | 1.5 | 2.1 | 1.8 | 1.9 | 2.1 | 2.1 |
| Prices of core goods imports[1] | 1.3 | 3.1 | 1.1 | 2.1 | .7 | .6 |
| Previous Tealbook | 1.3 | 2.7 | .9 | 1.8 | .6 | .6 |

| | Dec. 2017 | Jan. 2018 | Feb. 2018[2] | Mar. 2018[2] | Apr. 2018[2] | May 2018[2] |
|---|---|---|---|---|---|---|
| *12-month percent change* | | | | | | |
| PCE chain-weighted price index | 1.7 | 1.7 | 1.7 | 2.0 | 1.9 | 2.1 |
| Previous Tealbook | 1.7 | 1.5 | 1.6 | 2.0 | 1.9 | 2.1 |
| Excluding food and energy | 1.5 | 1.5 | 1.5 | 1.8 | 1.8 | 1.9 |
| Previous Tealbook | 1.5 | 1.4 | 1.4 | 1.7 | 1.7 | 1.8 |

1. Core goods imports exclude computers, semiconductors, oil, and natural gas.
2. Staff forecast.
Source:  U.S. Department of Commerce, Bureau of Economic Analysis.

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**Domestic Econ Devel & Outlook**

# Labor Market Developments and Outlook (1)

## Measures of Labor Underutilization
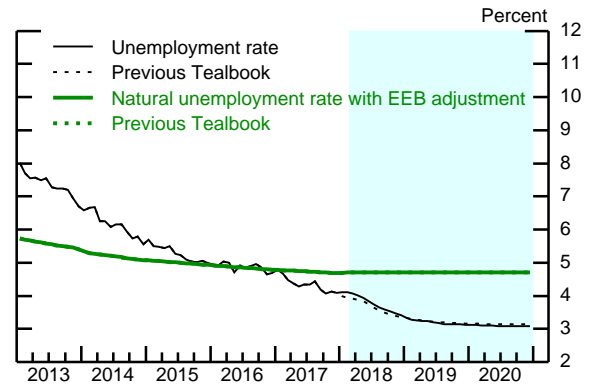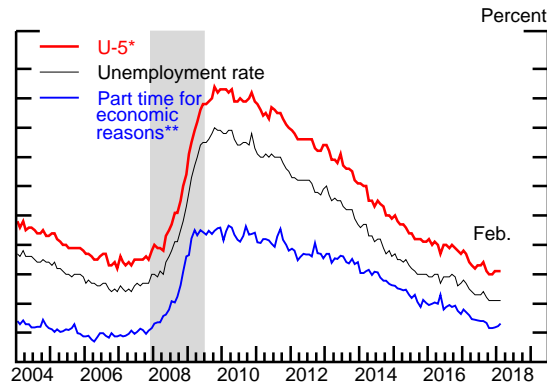
Percent



Percent

* 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*

Millions

Millions

Millions
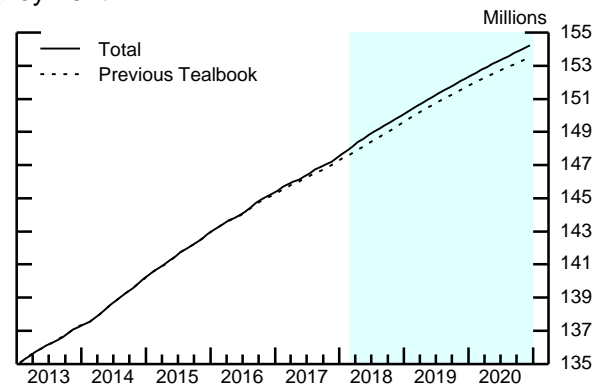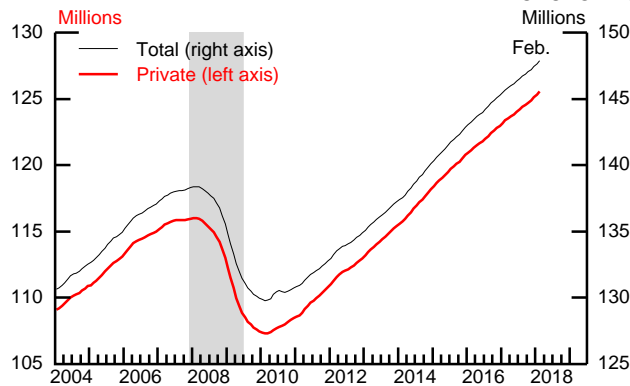


* 3-month moving averages.
Source: U.S. Department of Labor, Bureau of Labor Statistics.

## Change in Payroll Employment*
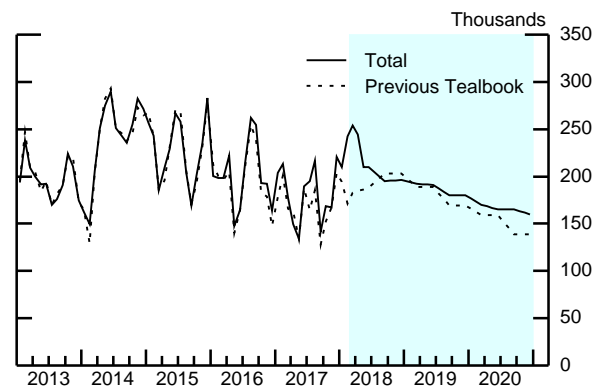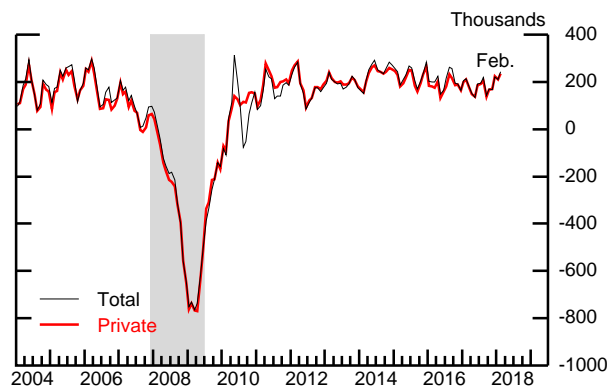
Thousands

Thousands



* 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*
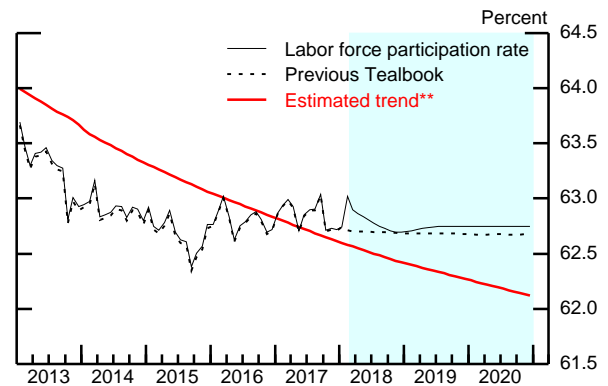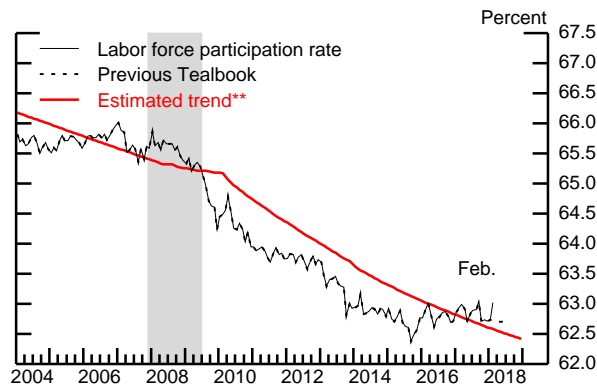


* Published data adjusted by staff to account for changes in population weights.
** Includes staff estimate of the effect of extended and emergency unemployment benefits.
Source: U.S. Department of Labor, Bureau of Labor Statistics; staff assumptions.

## Initial Unemployment Insurance Claims*
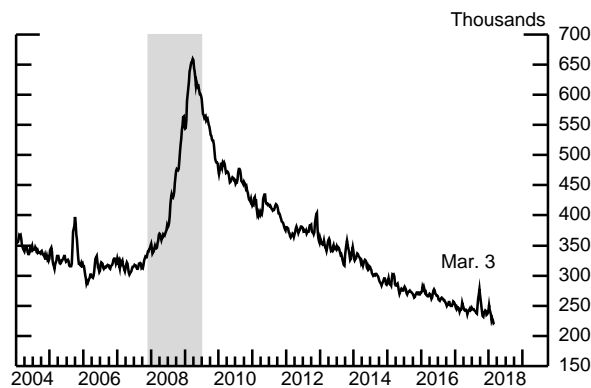


* 4-week moving average.
Source: U.S. Department of Labor, Employment and Training Administration.

## Hires, Quits, and Job Openings
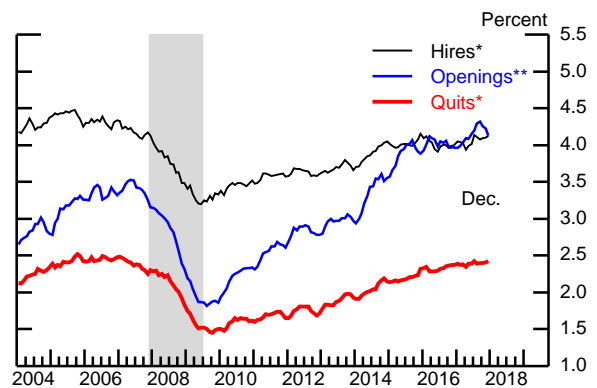


* Percent of private nonfarm payroll employment, 3-month moving average.
** Percent of private nonfarm payroll employment plus unfilled jobs, 3-month moving average.
Source: Job Openings and Labor Turnover Survey.

## Unemployment Rate by Racial/Ethnic Group
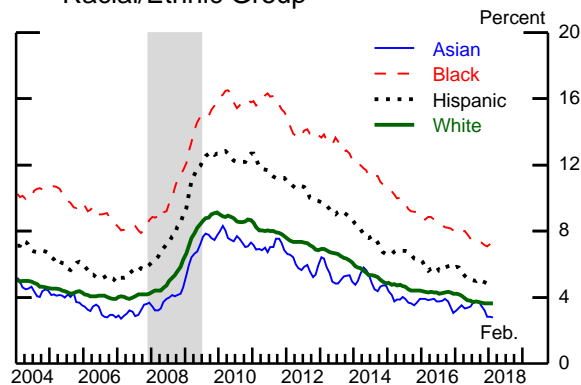


Note: These categories are not mutually exclusive, as the ethnicity Hispanic may include people of any race. The Current Population Survey defines Hispanic ethnicity as those who report their origin is Mexican, Puerto Rican, Cuban, Central American, or South American (and some others). 3-month moving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

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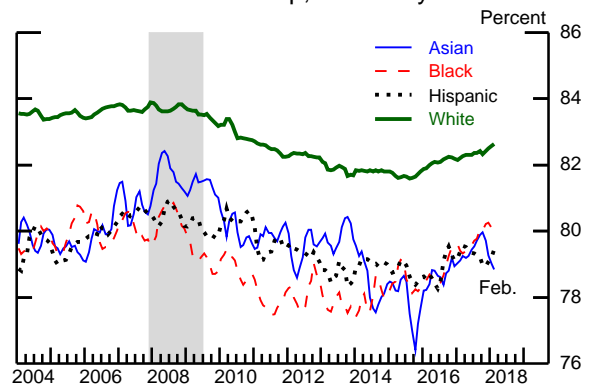


Note: These categories are not mutually exclusive, as the ethnicity Hispanic may include people of any race. The Current Population Survey defines Hispanic ethnicity as those who report their origin is Mexican, Puerto Rican, Cuban, Central American, or South American (and some others). 3-month moving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

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# Inflation Developments and Outlook (1)
(Percent change from year-earlier period)

## Headline Consumer Price Inflation



Source: For CPI, U.S. Department of Labor, Bureau of Labor Statistics; for PCE, U.S. Department of Commerce, Bureau of Economic Analysis.
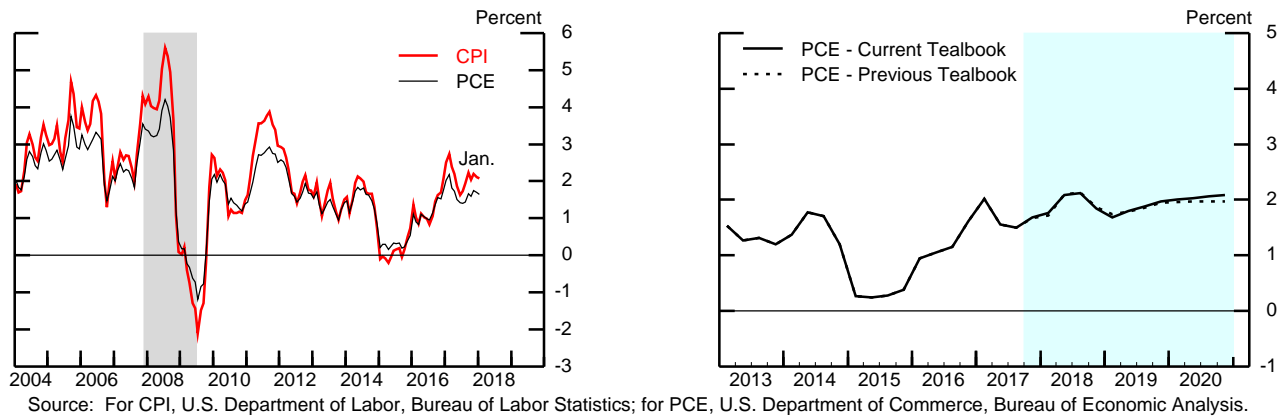
## Measures of Underlying PCE Price Inflation
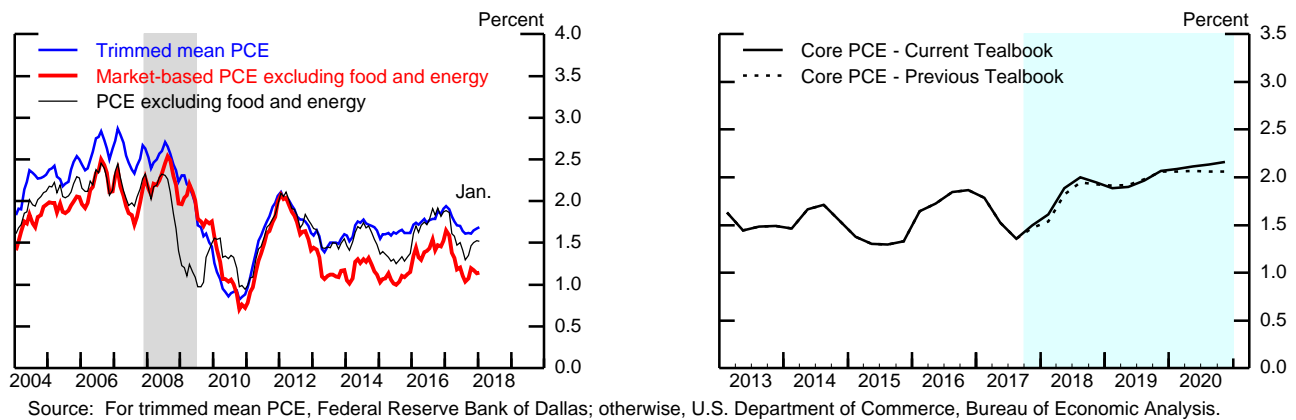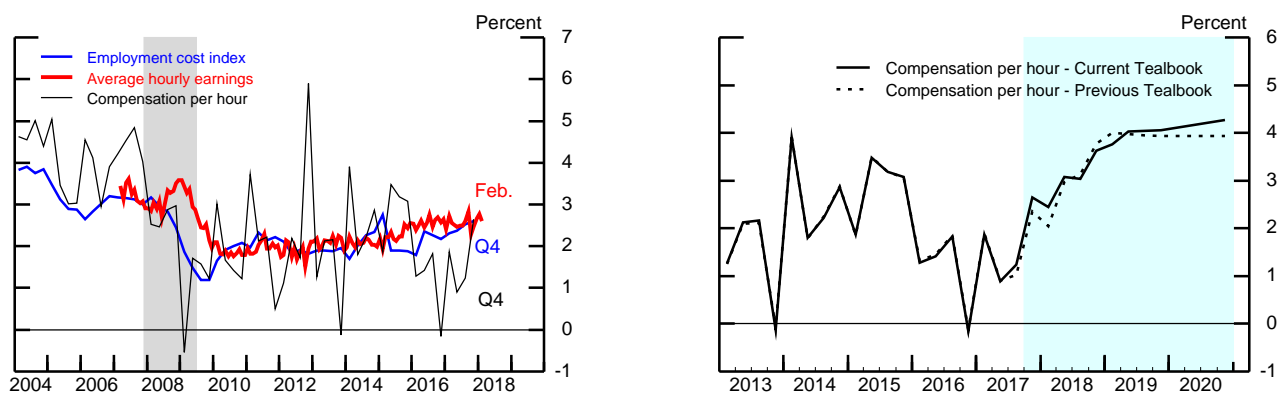


Source: For trimmed mean PCE, Federal Reserve Bank of Dallas; otherwise, U.S. Department of Commerce, Bureau of Economic Analysis.

## 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.

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**Domestic Econ Devel & Outlook**

# 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)
Mar. 6



1967 = 100
Dollars per barrel
Brent crude oil history/futures (right axis)
CRB spot commodity price index (left axis)
Mar. 6

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)
Jan.



Percent
Percent
PCE energy prices (right axis)
Core import prices (left axis)
Jan.

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.
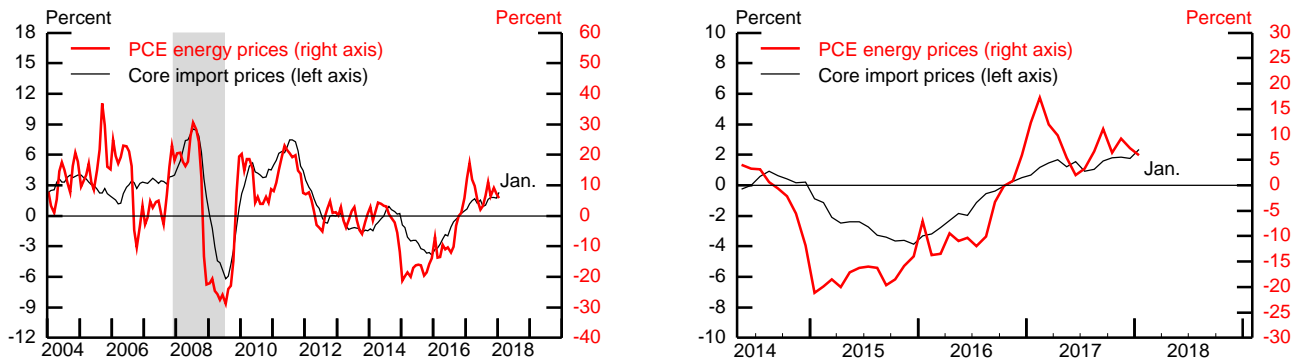
## Long-Term Inflation Expectations and Compensation



Percent
5-to-10-year-ahead TIPS compensation
Michigan median next 5 to 10 years
SPF PCE median next 10 years
Feb.
Q1
Feb.



Percent
5-to-10-year-ahead TIPS compensation
Michigan median next 5 to 10 years
SPF PCE median next 10 years
Feb.
Q1
Feb.

Note: Based on a comparison of an estimated TIPS (Treasury Inflation-Protected Securities) yield curve with an estimated nominal off-the-run Treasury yield curve, with an adjustment for the indexation-lag effect.
SPF Survey of Professional Forecasters.
Source: For Michigan, University of Michigan Surveys of Consumers; for SPF, the Federal Reserve Bank of Philadelphia; for TIPS, Federal Reserve Board staff calculations.

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

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# The Long–Term Outlook

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

| Measure | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | Longer run |
|---|---|---|---|---|---|---|---|
| Real GDP | 2.9 | 2.6 | 2.1 | 1.4 | .9 | .9 | 1.7 |
|   Previous Tealbook | 2.9 | 2.4 | 2.0 | 1.4 | 1.0 | 1.0 | 1.7 |
| Civilian unemployment rate[1] | 3.5 | 3.1 | 3.1 | 3.3 | 3.6 | 4.0 | 4.7 |
|   Previous Tealbook | 3.4 | 3.2 | 3.2 | 3.4 | 3.7 | 4.0 | 4.7 |
| PCE prices, total | 1.8 | 2.0 | 2.1 | 2.2 | 2.2 | 2.2 | 2.0 |
|   Previous Tealbook | 1.9 | 1.9 | 2.0 | 2.1 | 2.2 | 2.2 | 2.0 |
| Core PCE prices | 1.9 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.0 |
|   Previous Tealbook | 1.9 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.0 |
| Federal funds rate[1] | 2.66 | 4.01 | 4.96 | 5.35 | 5.22 | 4.79 | 2.50 |
|   Previous Tealbook | 2.69 | 3.99 | 4.80 | 5.09 | 4.95 | 4.57 | 2.50 |
| 10-year Treasury yield[1] | 3.8 | 4.3 | 4.5 | 4.4 | 4.2 | 4.0 | 3.4 |
|   Previous Tealbook | 3.7 | 4.2 | 4.3 | 4.2 | 3.9 | 3.7 | 3.2 |

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



Real GDP
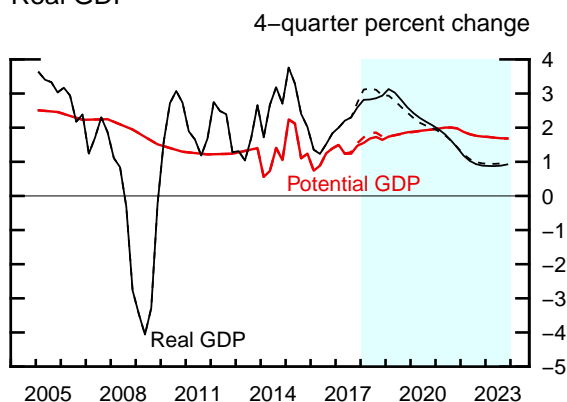


Unemployment Rate
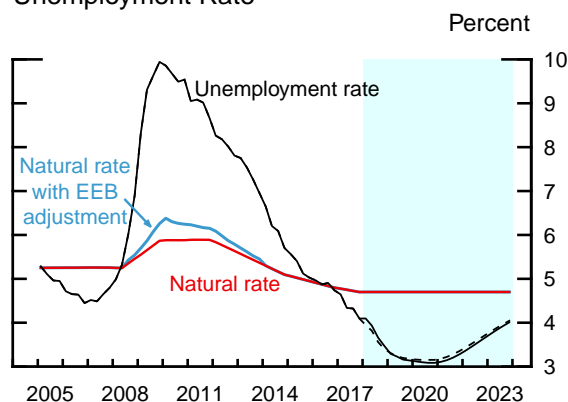


PCE Prices
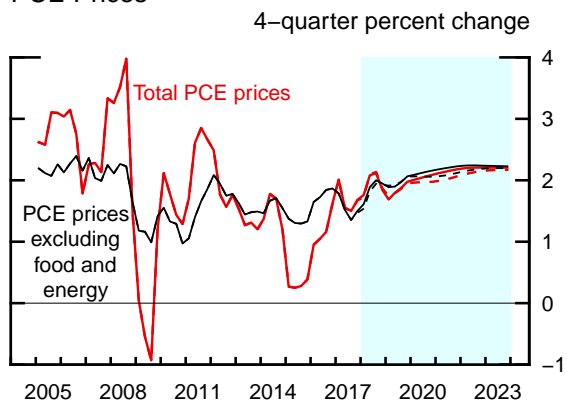


Interest Rates
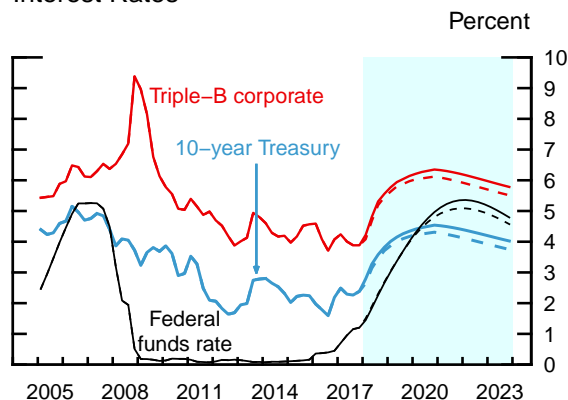
Note:  In each panel, shading represents the projection period, and dashed lines are the previous Tealbook.

**Domestic Econ Devel & Outlook**

# Evolution of the Staff Forecast

## Change in Real GDP

Percent, Q4/Q4



Tealbook publication date

## Unemployment Rate

Percent, fourth quarter
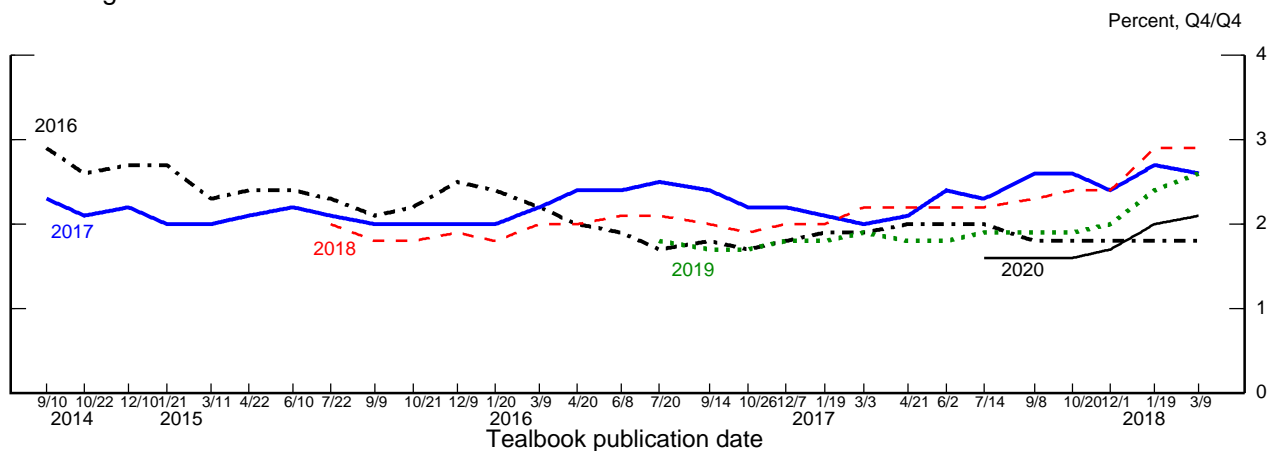


Tealbook publication date
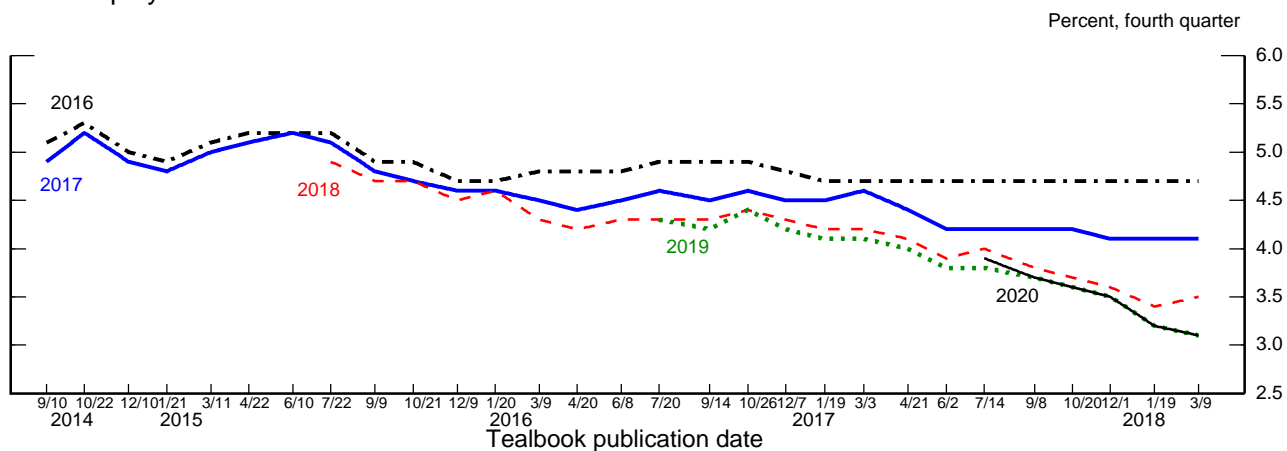
## Change in PCE Prices excluding Food and Energy

Percent, Q4/Q4



Tealbook publication date
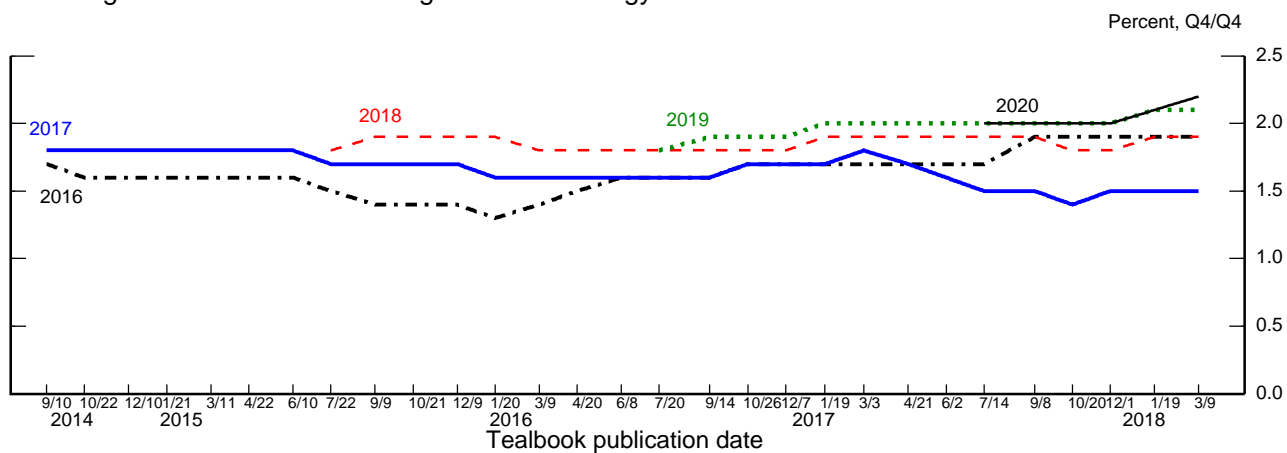
We use the VAR to simulate the effects of shocks to global financial variables that lead to a decline in equity prices of 20 percent, a rise in corporate spreads of 50 basis points, and a rise in 10-year government yields of 20 basis points, all within one year. Such shocks die out slowly over time and bring asset valuations from currently elevated levels to close to their historical median, though without inducing the widespread disruptions in financial markets that occurred during the Global Financial Crisis.[4]

Panels 1, 2, and 3 present the VAR-based estimates alongside simulations from the "Global Market Correction" scenario described in the Risks and Uncertainty section and based on the staff's multicountry SIGMA model. The SIGMA scenario embeds similar conditioning assumptions for the financial variables.

In the VAR (blue lines), U.S. and foreign GDP fall 1 percent below their baseline values after one year and remain depressed for several years, the dollar appreciates nearly 3 percent, and global consumer confidence (not shown) drops substantially. The SIGMA-based scenario (red dots) is largely within the 70 percent confidence interval of the estimated VAR. In SIGMA, the interaction between financial conditions and consumer confidence is captured through additional shocks to spending.

Both SIGMA and the VAR results support the idea that a global market correction could produce sizable macroeconomic effects. However, the confidence intervals around the VAR estimates suggest a significant degree of uncertainty about the overall size of the effects. Of course, it is possible that a deeper and more prolonged correction in asset prices could cause much worse macroeconomic outcomes, especially in economies with limited space for appropriate policy responses.

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### VAR and SIGMA Simulations under a Global Market Correction



Note: Variables are shown in percent deviations from baseline. Shaded areas depict 70% (dark shade) and 90% (light shade) confidence intervals.
Source: Staff calculations.
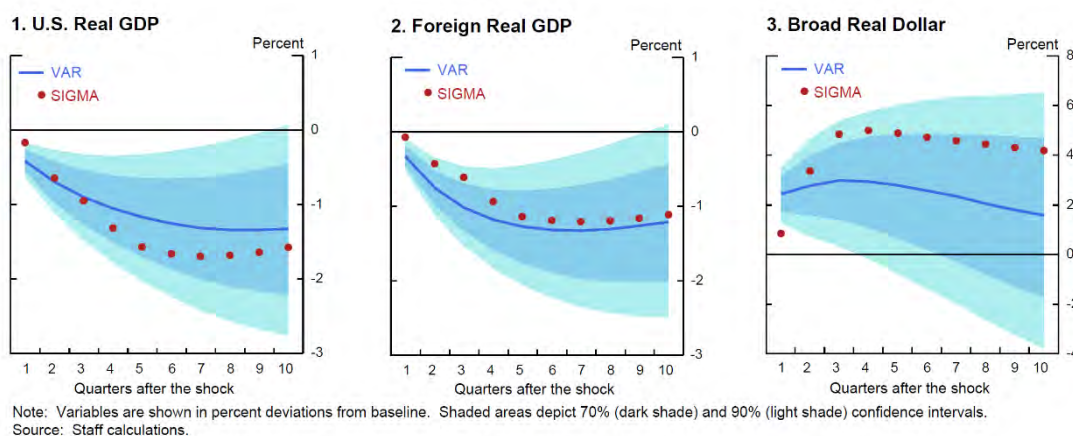
Dario Caldara, Cristina Fuentes-Albero, Simon Gilchrist, and Egon Zakrajsek (2016), "The Macroeconomic Impact of Financial and Uncertainty Shocks," *European Economic Review,* vol. 88 (September), pp. 185–207.

[4] Both the fall in U.S. and foreign equity markets in our scenario and the rise in U.S. and foreign corporate spreads are roughly half as large as those that occurred during the 2000–02 dot-com crash.

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# The Foreign GDP Outlook

Real GDP*

Percent change, annual rate

|  | 2017 | | | 2018 | | | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|
|  | H1 | Q3 | Q4 | Q1 | Q2 | H2 | | |
| 1. Total Foreign | 3.1 | 2.5 | 2.7 | 3.0 | 3.0 | 2.9 | 2.8 | 2.7 |
| Previous Tealbook | 3.1 | 2.4 | 3.0 | 3.1 | 3.0 | 2.9 | 2.8 | 2.8 |
| 2. Advanced Foreign Economies | 3.1 | 2.1 | 1.9 | 2.2 | 2.2 | 2.1 | 1.8 | 1.8 |
| Previous Tealbook | 3.0 | 2.2 | 2.2 | 2.2 | 2.1 | 2.0 | 1.8 | 1.7 |
| 3. Canada | 4.2 | 1.5 | 1.7 | 2.4 | 2.4 | 2.3 | 2.0 | 1.9 |
| 4. Euro Area | 2.7 | 2.8 | 2.4 | 2.4 | 2.3 | 2.1 | 1.8 | 1.7 |
| 5. Japan | 2.1 | 2.4 | 1.6 | 1.3 | 1.2 | 1.0 | .3 | .9 |
| 6. United Kingdom | 1.0 | 2.0 | 1.6 | 1.5 | 1.8 | 1.8 | 1.8 | 1.8 |
| 7. Emerging Market Economies | 3.2 | 2.9 | 3.4 | 3.8 | 3.7 | 3.7 | 3.8 | 3.7 |
| Previous Tealbook | 3.1 | 2.6 | 3.8 | 4.0 | 3.9 | 3.8 | 3.8 | 3.8 |
| 8. China | 7.0 | 6.5 | 6.4 | 6.5 | 6.6 | 6.3 | 6.2 | 5.9 |
| 9. Emerging Asia ex. China | 4.2 | 5.3 | 3.3 | 4.4 | 4.0 | 4.1 | 3.8 | 3.7 |
| 10. Mexico | 1.7 | -.7 | 3.2 | 2.9 | 2.8 | 2.8 | 2.9 | 3.0 |
| 11. Brazil | 3.8 | 1.0 | .2 | 2.5 | 2.5 | 2.5 | 3.0 | 2.6 |

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

**Total Foreign GDP**

Percent change, annual rate



**Foreign GDP**

Percent change, annual rate

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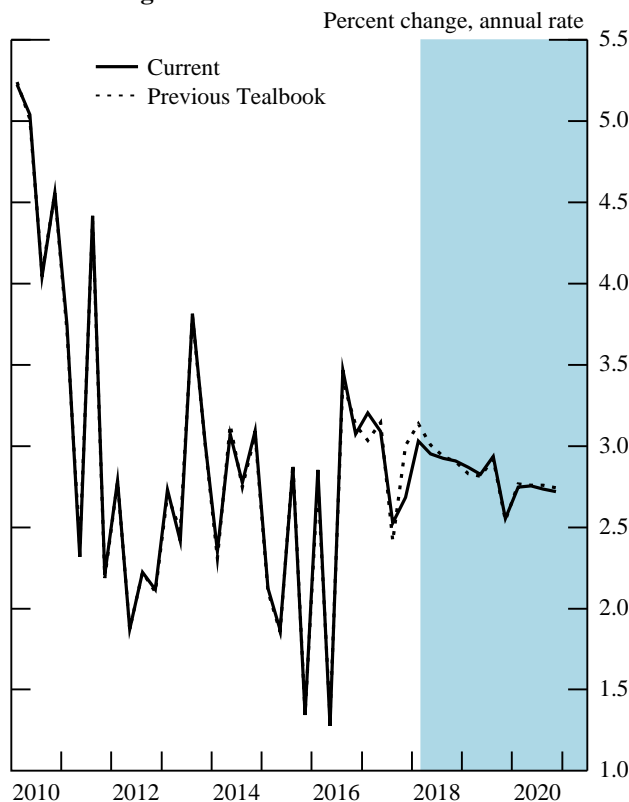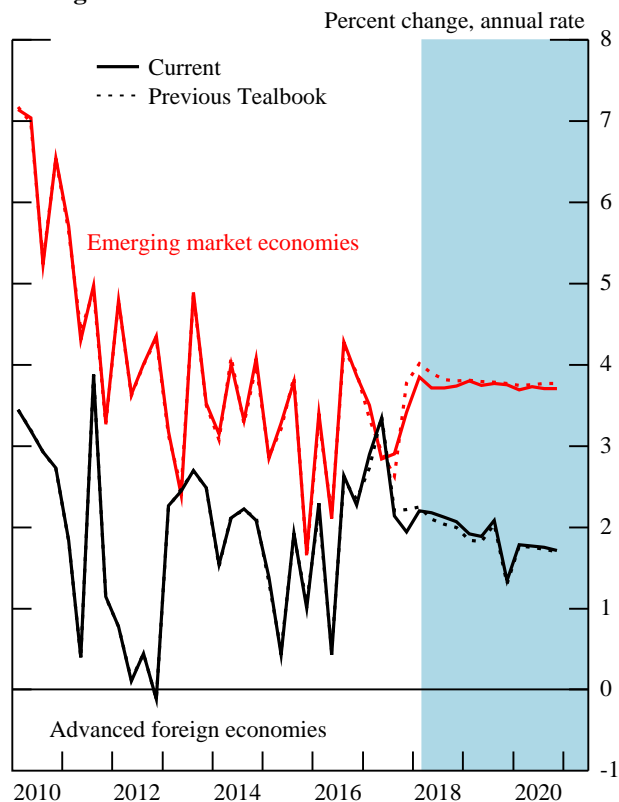
# The Foreign Inflation Outlook

**Consumer Prices***

Percent change, annual rate

| | | 2017 | | | 2018 | | | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|
| | | H1 | Q3 | Q4 | Q1 | Q2 | H2 | | |
| 1. | Total Foreign | 2.4 | 2.3 | 3.0 | 2.6 | 2.6 | 2.5 | 2.5 | 2.4 |
| | Previous Tealbook | 2.4 | 2.2 | 3.1 | 2.9 | 2.5 | 2.5 | 2.5 | 2.4 |
| 2. | Advanced Foreign Economies | 1.3 | 1.2 | 2.1 | 2.1 | 1.5 | 1.5 | 1.8 | 1.7 |
| | Previous Tealbook | 1.3 | 1.1 | 2.1 | 2.0 | 1.6 | 1.5 | 1.8 | 1.7 |
| 3. | Canada | 1.4 | 1.4 | 3.0 | 2.8 | 2.4 | 2.2 | 2.0 | 2.0 |
| 4. | Euro Area | 1.5 | 1.1 | 1.7 | 1.9 | 1.2 | 1.3 | 1.5 | 1.7 |
| 5. | Japan | -.1 | .7 | 1.9 | 1.3 | .5 | .5 | 2.2 | 1.0 |
| 6. | United Kingdom | 3.4 | 2.3 | 3.0 | 3.2 | 2.5 | 2.3 | 2.3 | 2.1 |
| 7. | Emerging Market Economies | 3.2 | 3.1 | 3.7 | 2.9 | 3.4 | 3.3 | 3.0 | 2.9 |
| | Previous Tealbook | 3.3 | 3.0 | 3.8 | 3.6 | 3.3 | 3.2 | 3.0 | 2.9 |
| 8. | China | 1.0 | 2.2 | 2.9 | 1.7 | 2.7 | 2.5 | 2.5 | 2.5 |
| 9. | Emerging Asia ex. China | 2.0 | 2.1 | 3.2 | 2.7 | 3.2 | 3.2 | 3.1 | 3.0 |
| 10. | Mexico | 8.0 | 5.4 | 5.0 | 4.2 | 4.0 | 3.9 | 3.5 | 3.2 |
| 11. | Brazil | 2.7 | 2.3 | 3.6 | 3.6 | 4.3 | 4.3 | 4.3 | 4.3 |

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

# Foreign Monetary Policy

**AFE Policy Rates**
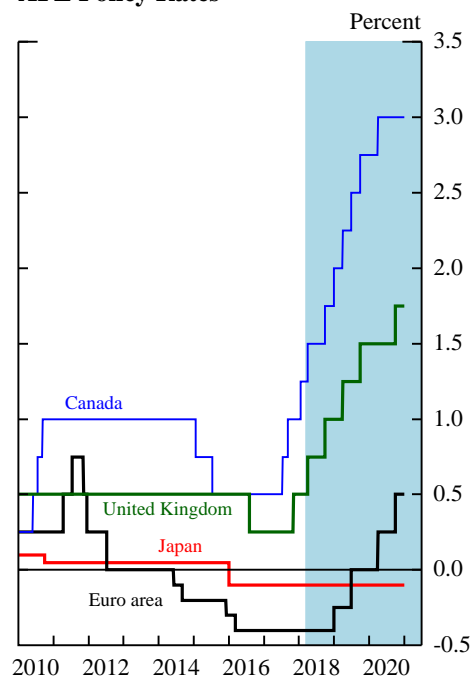
**AFE Central Bank Balance Sheets**

**EME Policy Rates**



* 1-year benchmark lending rate.

Int'l Econ Devel & Outlook
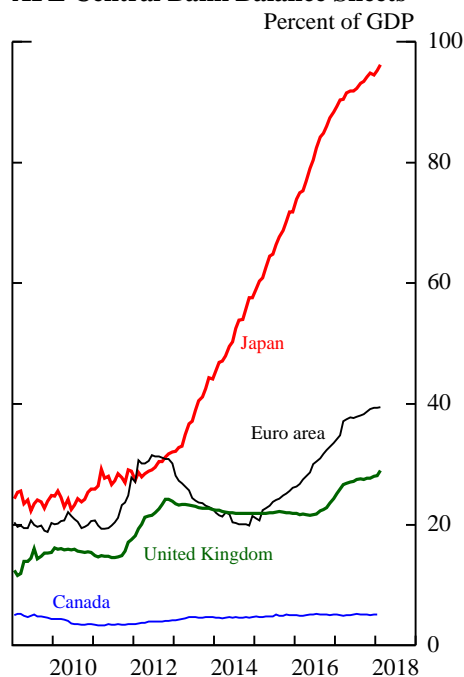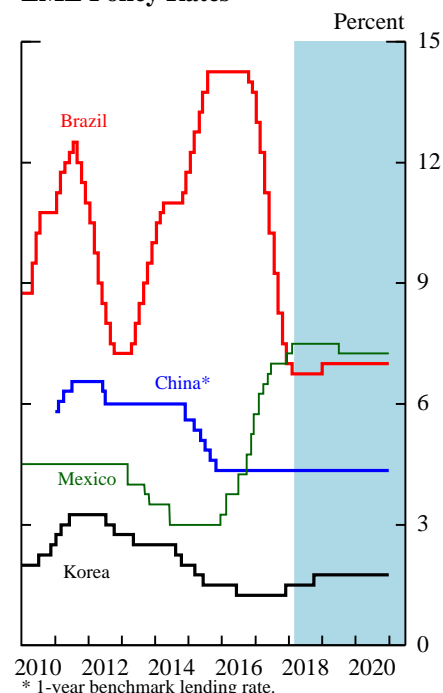
# Recent Foreign Indicators

**Int'l Econ Devel & Outlook**

### Nominal Exports

Jan. 2011 = 100



Legend: Foreign, EME**, AFE*

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

### Industrial Production

Jan. 2011 = 100



Legend: 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



Legend: Foreign, AFE*, EME**

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

### Employment

4-quarter percent change



Legend: 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



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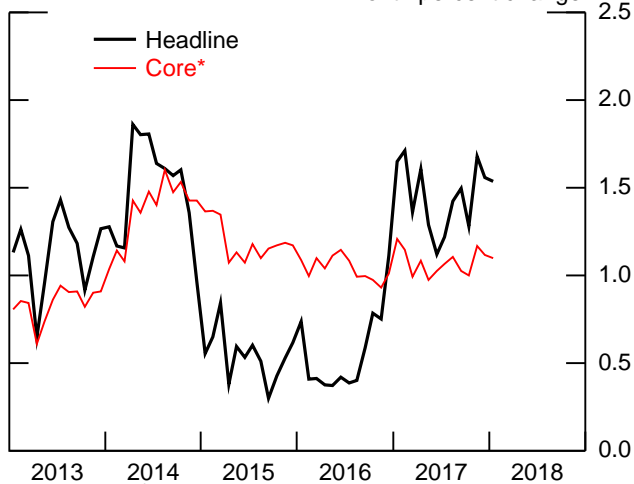
Note: Includes Canada, euro area, Japan, U.K.
* Excludes all food and energy; staff calculation.
Source: Haver Analytics.

### Consumer Prices: Emerging Market Economies

12-month percent change



Legend: 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.

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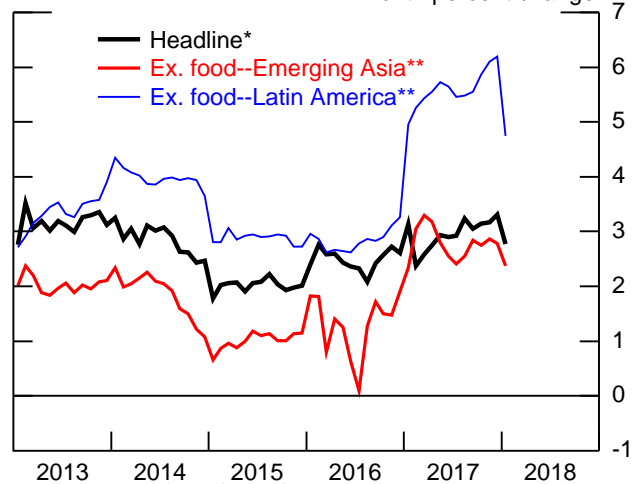
## Evolution of Staff's International Forecast

### Total Foreign GDP

Percent change, Q4/Q4



Tealbook publication date

### Total Foreign CPI

Percent change, Q4/Q4



Tealbook publication date

### U.S. Current Account Balance

Percent of GDP



Tealbook publication date

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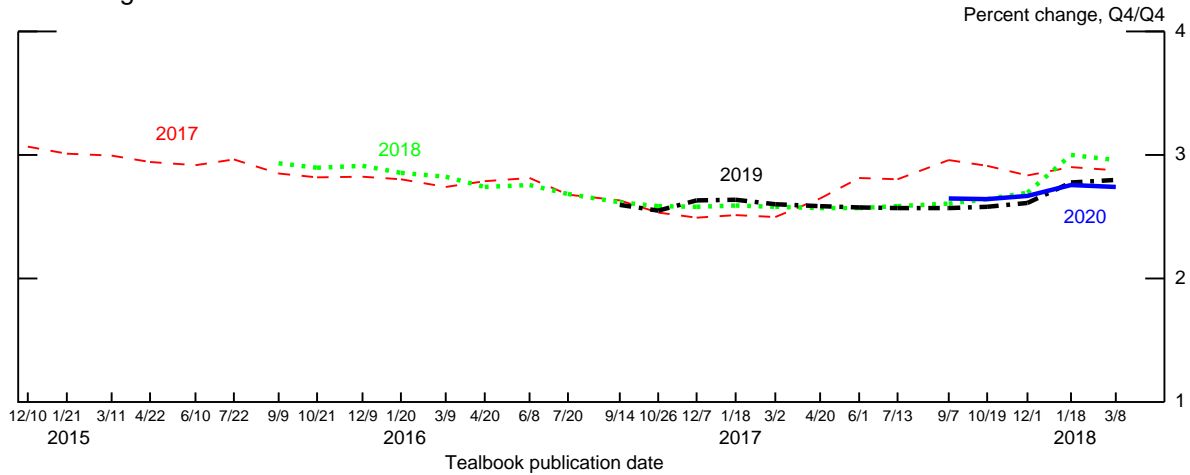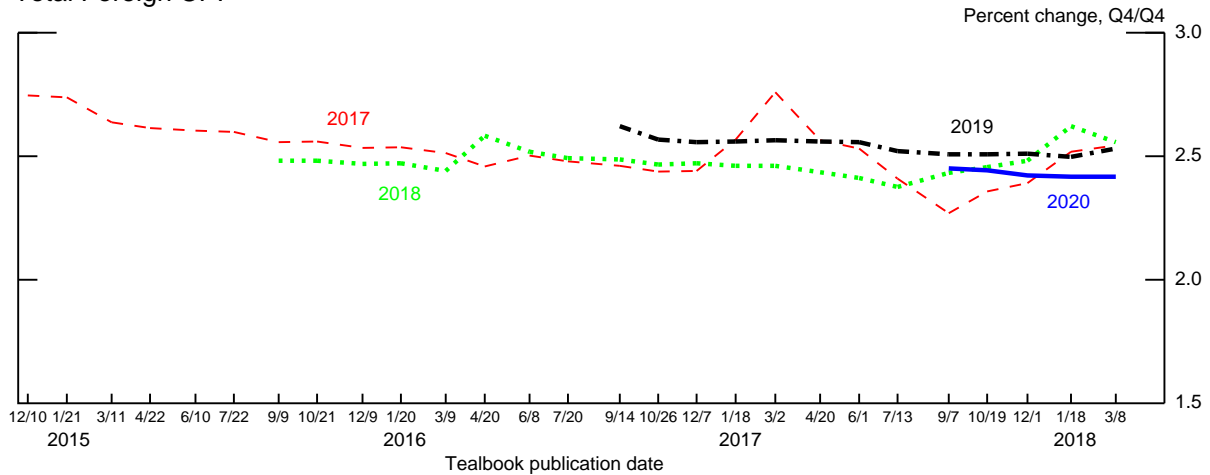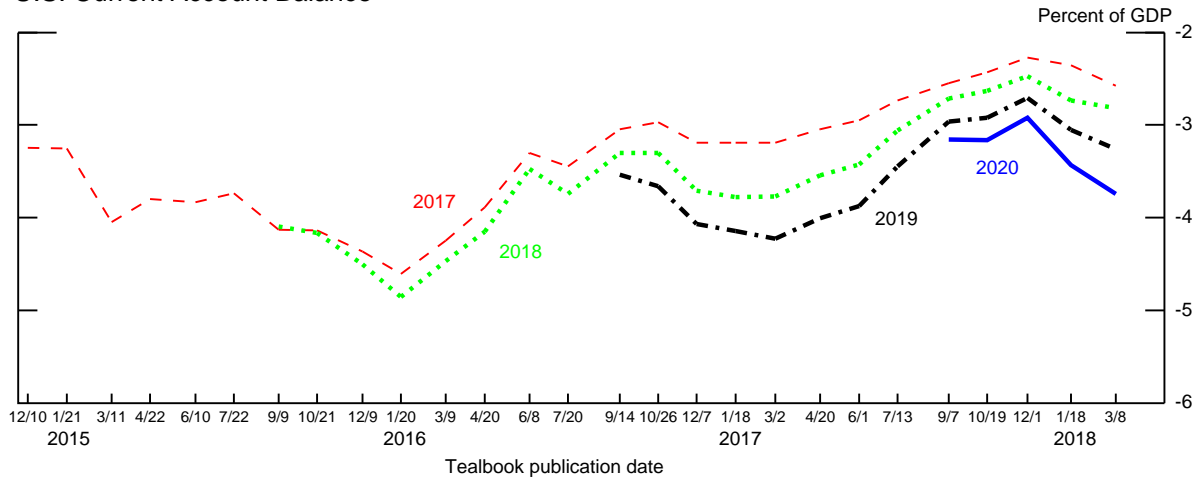
# Corporate Asset Market Developments

## S&P 500 Stock Price Index

Jan. 30, 2018 = 100

Daily

Jan. FOMC

Labor Report

Mar. 8
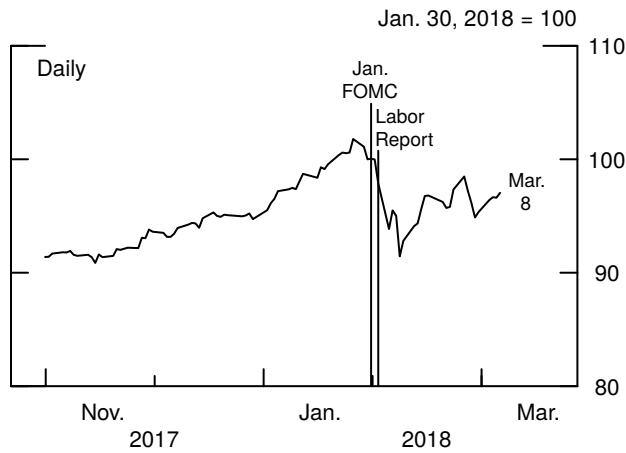
Source: Bloomberg.

## Correlation of S&P 500 Intraday 5-Min. Returns and 10-Year Treasury Yield

Daily

Jan. FOMC

Mar. 8
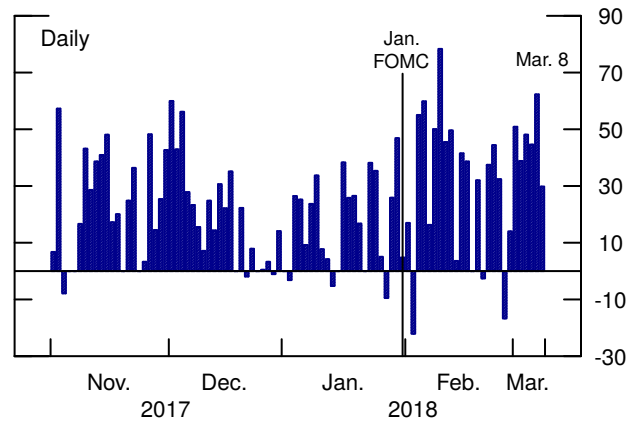
Note: 5-minute returns between 7:00 AM and 4:00 PM used to calculate daily correlation.
Source: Thomson Reuters Tick History.

## Equity Risk Premium

Percent

Monthly

Jan. FOMC

—— Expected 10-year real equity return
—— Expected real yield on 10-year Treasury*

Mar. 8
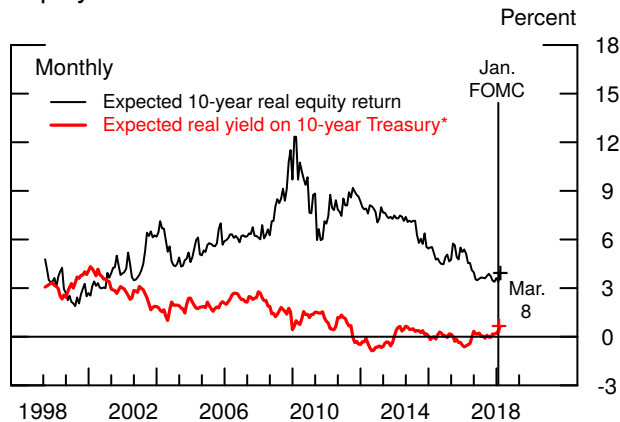
Note: The equity risk premium is the difference between the two data series.
* Off-the-run 10-year Treasury yield less Philadelphia Fed 10-year expected inflation.
+ Denotes latest observation using daily interest rates and stock prices as well as staff forecast of corporate profits.
Source: Bloomberg; Philadelphia Fed; staff estimates; Thomson Reuters Financial.

## Implied Volatility on S&P 500 (VIX)

Log scale, percent

Daily

Jan. FOMC

- - - Historical median

Mar. 8
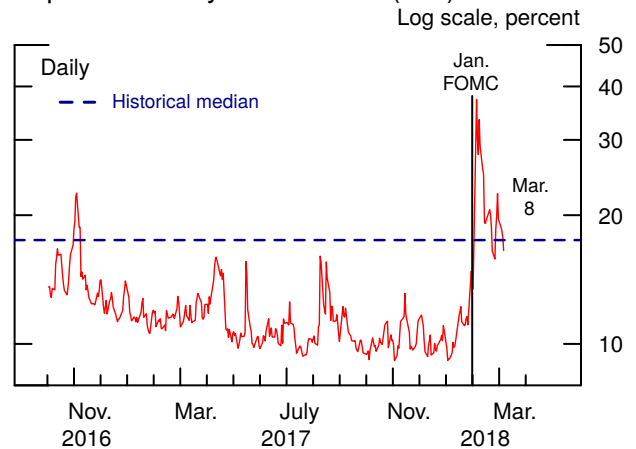
Note: Historical median is taken from 1990 onward.
Source: Chicago Board Options Exchange.

## 10-Year Corporate Bond Yields

Percent

Daily

—— High-yield
—— Triple-B

Jan. FOMC

Mar. 8
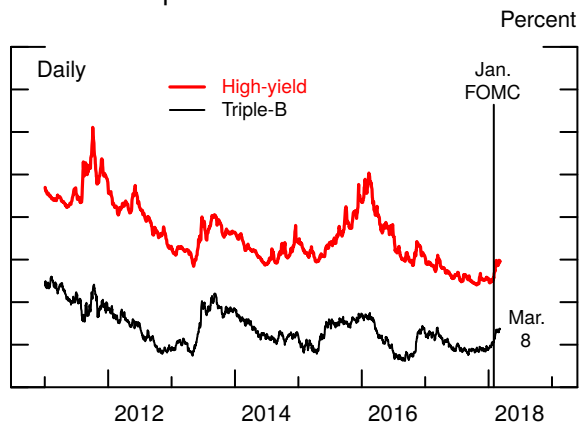
Source: Staff estimates of smoothed yield curves based on Merrill Lynch bond data.

## 10-Year Corporate Bond Spreads

Basis points                                   Basis points

Daily

—— Triple-B (left scale)
—— High-yield (right scale)

Jan. FOMC

Mar. 8
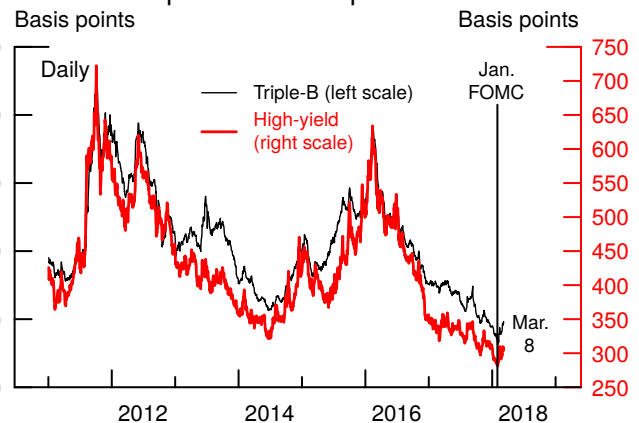
Note: Spreads over 10-year Treasury yield.
Source: Staff estimates of smoothed yield curves based on Merrill Lynch bond data and smoothed Treasury yield curve.

Financial Markets

# Unusual Volatility Dynamics on February 5, 2018

On Monday, February 5, the S&P 500 index fell 4 percent, and option-implied volatility at the one-month horizon—the VIX—closed the trading day at 37 percent, its highest level since mid-2015. While both moves were very large, the sharp increase in the VIX was extraordinary (figure 1). Treasury yields also dropped sharply on the day and were highly positively correlated with equity prices (figure 2).

The price action accelerated just after 3 p.m., when equity prices and Treasury yields dropped sharply and the VIX spiked. There was no evidence of market infrastructure problems and disruptions to trading were limited, but liquidity conditions in Treasury markets changed notably, with volumes reportedly rising significantly and order book depth deteriorating. After persisting for several days, these effects mostly retraced by the end of the intermeeting period.

Several factors appear to have contributed to the sharp moves in asset prices, including concerns about stretched valuations in equity prices and unusually low levels of volatility as well as investing strategies that require same-day portfolio rebalancing. In particular, managers of leveraged and inverse volatility-linked exchange-traded products (ETPs) reportedly were forced to quickly purchase large volumes of VIX futures late in the trading day as a result of the earlier rise in the VIX. In addition, equity ETPs that use leveraged and inverse strategies may have compounded the drop in equity prices late in the day by selling equities and equity derivatives. Dealers that accommodated these ETP rebalancing transactions may have exacerbated moves in underlying equity markets by selling equity futures to hedge their exposures. Other strategies also may have contributed to the increase in volatility, albeit to a lesser extent on February 5, as they typically respond to volatility spikes with some lag. For example, insurance companies' "managed volatility" funds as well as some small risk-parity hedge funds and commodity trading advisors probably contributed to downward pressure on equity prices over the following days by reducing their portfolio allocations to equities in response to the increase in volatility.



Figure 1: Daily Stock Returns and Changes in the VIX, 1990–2018

Figure 2: Intraday S&P 500 Futures and Treasury Yields on February 5, 2018

# Policy Expectations and Treasury Yields

## Selected Interest Rates

Percent

Employment report

Budget deal

Jan. CPI release

Jan. FOMC minutes

MPR release

Chairman's MPR testimony

Tariff announcements

Dec. 2018 Eurodollar (left scale)

March 8 4:00 p.m.

10-year Treasury yield (right scale)

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

## Market–Implied Probability Distribution of the Timing of Next Rate Increase

Percent

■ Most recent: March 8, 2018
- - - Last FOMC: January 30, 2018

Jan.   Mar.   May   June   >= Aug.

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

## Implied Federal Funds Rate

Percent

—— Most recent: March 8, 2018
- - - Last FOMC: January 30, 2018

With model–based term premium

With zero term premium

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.

## Inflation Compensation

Percent

Daily

Jan. FOMC

Mar. 9

5 to 10 years ahead

Next 5 years*

Mar.  June  Sept.  Dec.  Mar.  June  Sept.  Dec.  Mar.
     2016              2017              2018

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.
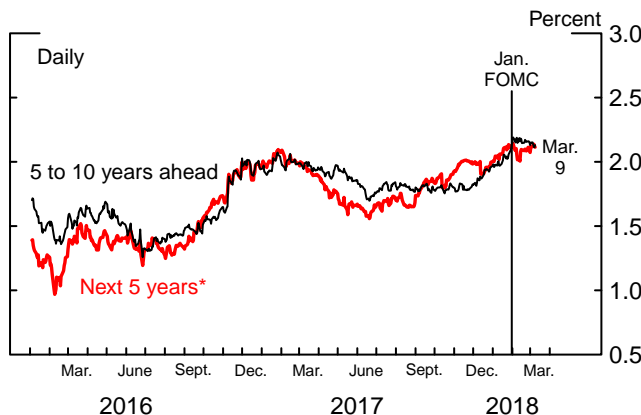
## Option–Implied Volatilities on 10–Year Swap Rate

Basis points

—— 1 month ahead
—— 1 year ahead

Jan. FOMC

Mar. 8

Nov.  Jan.  Mar.  May  July  Sept.  Nov.  Jan.  Mar.
     2016              2017              2018

Note: Implied volatility on the 10–year swap rate 1 month and 1 year ahead is derived from swaptions.
Source: Barclays; Federal Reserve Board staff estimates.

**Financial Markets**
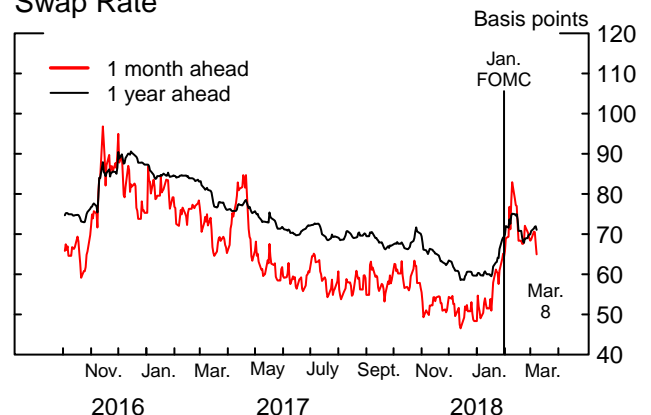
# Foreign Developments

## Equity Indexes

Jan. 30, 2018 = 100



Note: EME stocks represented by MSCI local-currency index.
Source: Bloomberg; MSCI.

## Implied Volatilities

Percent



Source: Bloomberg.
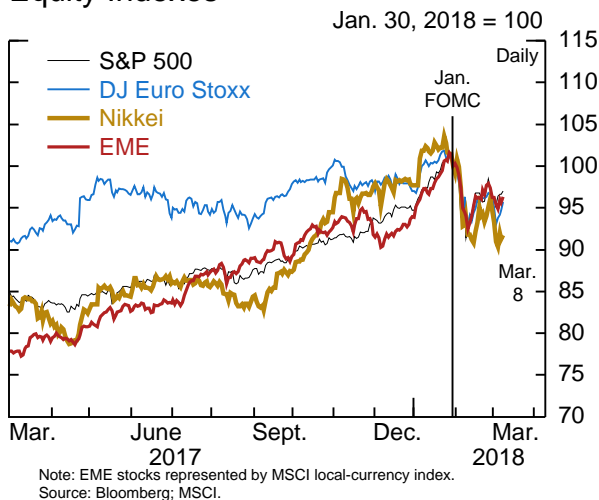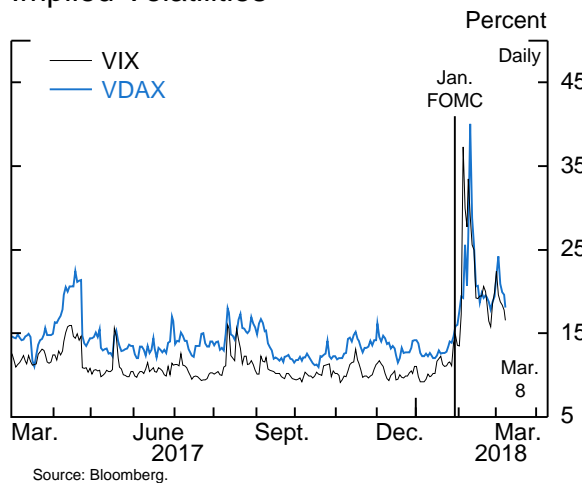
## 10-Year AFE Sovereign Yields

Percent



Source: Bloomberg.
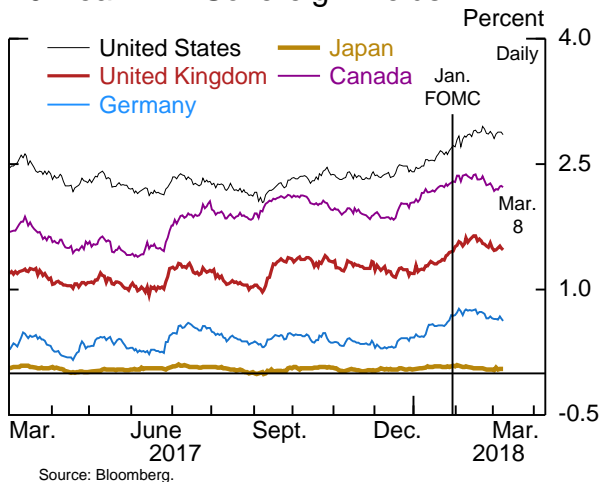
## 24-Month-Ahead Policy Expectations

Percent



Source: Staff calculation; Bloomberg; ECB.

## Exchange Rates

Jan. 30, 2018 = 100



Note: The devaluation of the Venezuelan bolivar during the intermeeting
period contributed to 2.2% and 1.3% increases in the EME and broad dollar
indexes, respectively.
Source: Bloomberg.

## Emerging Market Flows and Spreads

Billions of dollars                     Basis points



Note: Emerging market bond spreads over zero-coupon Treasury securities.
Flows data exclude Intra-China flows. Monthly figures are averaged.
Source: EPFR; J.P. Morgan.

Financial Markets

# The Recent Rise in Longer-Term Treasury Yields

After changing little on net in 2017, the 10-year nominal Treasury yield has risen notably in the past few months, reaching levels near 3 percent for the first time in four years (figure 1). Market commentary has attributed this rise to several factors, including an improving global growth outlook, expectations for less accommodative monetary policy from major central banks, firming inflation data, and some fiscal developments that have likely increased the expected future supply of Treasury securities.

Staff models also point to multiple factors contributing to the recent increase in the 10-year yield. In particular, all four components of the 10-year nominal yield—the expected real short-term rate, expected inflation, the real term premium, and the inflation risk premium—are estimated to have contributed to its rise since December.[1] The rise in real term and inflation risk premiums is consistent with the fiscal developments as well as some spillover effects from the prospect of less accommodative policies from foreign central banks amid the improving global outlook. The modest rise in expected inflation is consistent with the recent firming of inflation data, while the rise in the real short rate reflects expectations for further increases in the federal funds rate in the face of the strengthening economic outlook and rising inflationary pressures. Furthermore, part of the recent rise in the expected real short rate also reflects a modest rise in longer-horizon (5 to 10 year) real short rate expectations, which could be consistent with the view that r* (the neutral real federal funds rate) is likely to move up.

Additional staff analysis provides rough estimates of the effect of the increased future supply of Treasury securities—through the passage of tax reform in December and the budget agreement in early February—on the 10-year yield.[2] Assuming supply-effect magnitudes similar to previous staff studies, the increase in the expected future supply of Treasury securities may have raised the 10-year yield by 5 to 20 basis points.[3] Note that spreads between long-term swap rates and Treasury yields have not narrowed recently, as one might expect if Treasury yields had been boosted by unusual supply effects. Nonetheless, some market commentary has pointed to potential regulatory easing as a factor that may have masked pure supply effects on those spreads.

<div style="text-align:right"><strong>Financial Markets</strong></div>



Figure 1: 10−year Nominal Treasury Yield

Note. Smoothed yield estimated from off−the−run Treasury coupon securities.
Source: FRBNY, Staff calculations.

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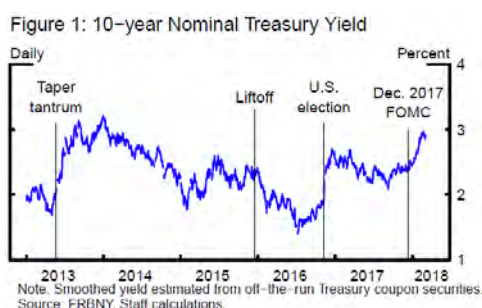
[1] The 51 basis point rise (as of March 6, 2018) in the 10-year yield since December 1, 2017, can be decomposed as a 17 basis point rise in the real short-term rate expectation, an 11 basis point rise in expected inflation, a 16 basis point rise in the real term premium, and a 7 basis point rise in the inflation risk premium. For the underlying model, see Stefania D'Amico, Don H. Kim, and Min Wei (2018), "Tips from TIPS: The Informational Content of Treasury Inflation-Protected Security Prices," *Journal of Financial and Quantitative Analysis*, vol. 53 (February), pp. 395–436.

[2] Although the market reaction to the passage of tax reform on December 19, 2017, was muted, yields rose in the preceding week, which may have reflected growing expectation for the passage of the tax reform.

[3] The reported range reflects (1) an assumption that a supply increase of $100 billion in Treasury 10-year equivalents raises the term premium by 5 to 10 basis points; (2) an estimated $400 billion to $500 billion increase in supply due to the fiscal developments, based on changes in primary dealers' Treasury issuance forecasts; (3) conversion of the increased supply expectations into a 10-year equivalent amount based on maturity composition assumptions for future issuance that reflect the Treasury's most recent refunding statements.

# Short–Term Funding Markets and Federal Reserve Operations

## Selected Money Market Rates

Basis points

Daily

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

Jan. FOMC

Mar. 7
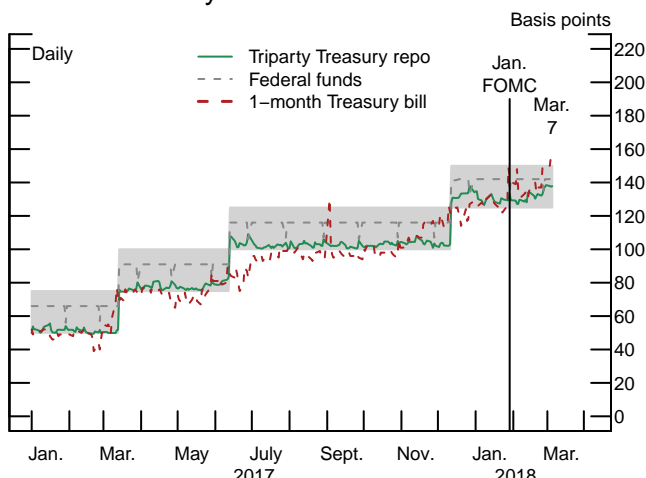
Note: Federal funds rate is a weighted median; shaded area is the target range for the federal funds rate.
Source: Federal Reserve Bank of New York; Federal Reserve Board, Form FR 2420, Report of Selected Money Market Rates.

## 3–Month Treasury Bill–OIS Spread

Basis points

Daily

Mar. 8
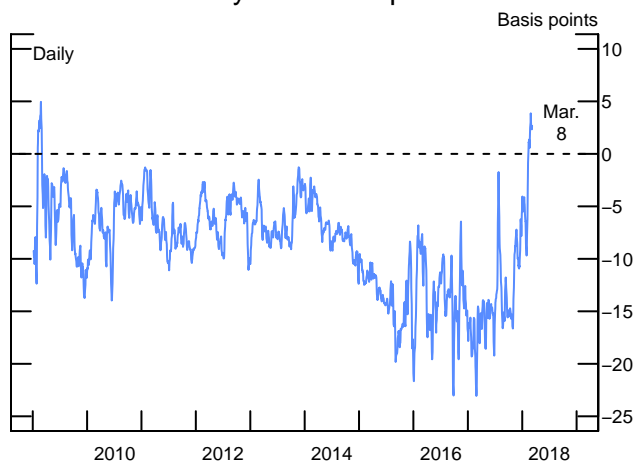
Note: 3–month Treasury bill–OIS spread is a 5–day moving average.
Source: Bloomberg.

## ON RRP Take–Up, by Type

Billions of dollars

Daily

- Government MMFs
- Prime MMFs
- Other

Jan. FOMC

Mar. 8
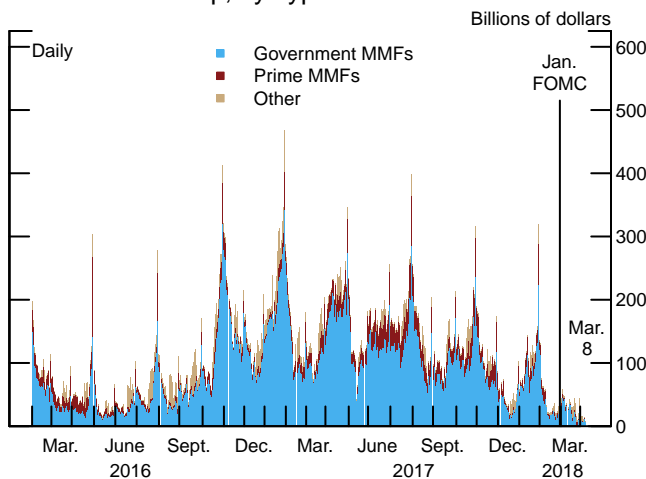
Note: ON RRP is overnight reverse repurchase agreement. MMF is money market fund.
Source: Federal Reserve Bank of New York.

## ON RRP Take–Up and Treasury Bills Net Issuance

ON RRP take–up (billions of dollars)

Daily

- Q1 2017
- Q2 2017
- Q3 2017
- Q4 2017
- Q1 2018

Treasury bills net issuance (billions of dollars)
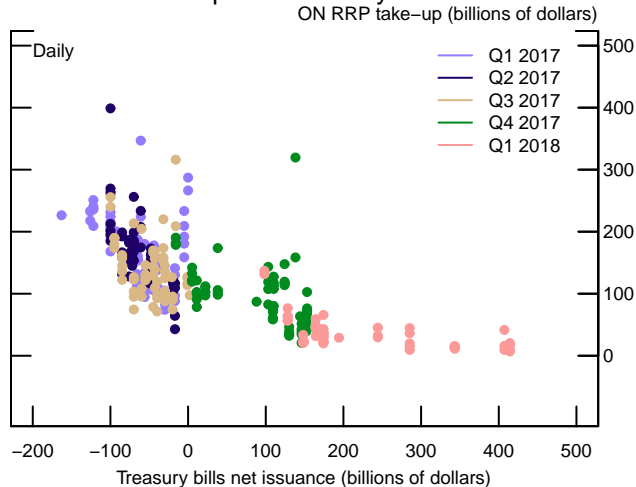
Note: ON RRP is overnight reverse repurchase agreement. Net issuance = amount issued – amount redeemed.
Source: Federal Reserve Bank of New York; Department of the Treasury.

## CD Rates

Basis points

Daily

- 3–month CD
- 30–day CD

Jan. FOMC

Mar. 8
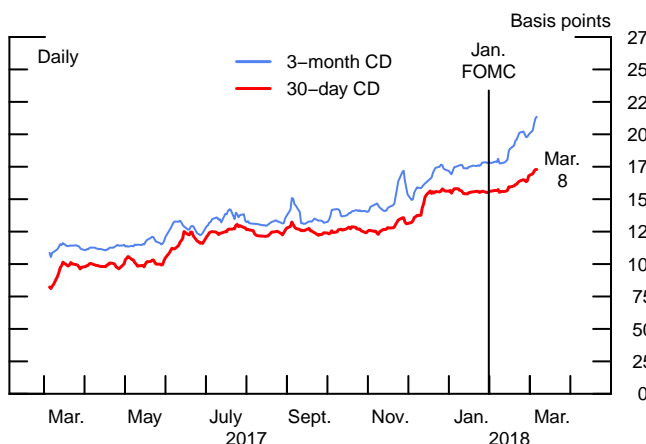
Note: CD rates are a 5–day moving average.
Source: Depository Trust & Clearing Corporation.

## CD–OIS Spreads

Basis points

Daily

- 3–month CD
- 30–day CD

Jan. FOMC

Mar. 8
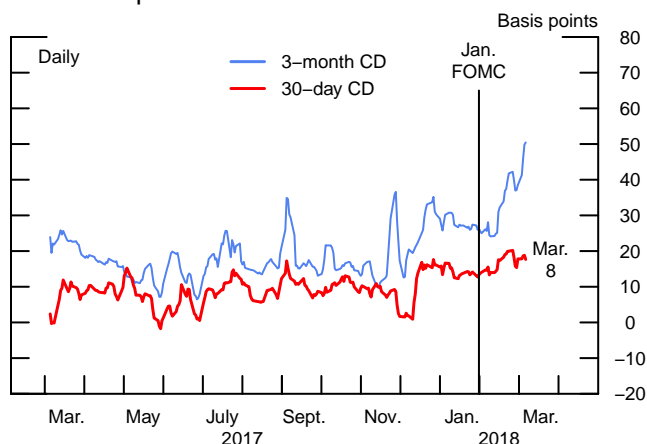
Note: CD–OIS spread is a 5–day moving average.
Source: Depository Trust & Clearing Corporation; Bloomberg.

Financial Markets

# Recent Dynamics of the U.S. Dollar Exchange Rate

Although the U.S. dollar strengthened slightly over the intermeeting period, the dollar has depreciated notably against most major currencies over the past year.  In particular, the trade-weighted dollar index for the advanced foreign economies (AFEs) has declined about 10 percent since early 2017 (figure 1).  This decline in the dollar has occurred despite continued normalization of U.S. monetary policy and, particularly since last August, a notable widening of the gap between U.S. and AFE interest rates at short and long horizons (figure 2).  Here we consider potential explanations for recent dollar weakness.  We believe some of the depreciation reflects the improved foreign outlook and a reduction of risks abroad.  We find less evidence for arguments that attribute the dollar weakness to U.S. fiscal or trade policy.

For much of 2017, the decline in the dollar seemed well explained by the strengthening economic recovery abroad, especially in the euro area.  External forecasts of foreign growth were revised higher, and foreign currencies also benefited from improved sentiment abroad.  Importantly, the passage of key risk events, including elections in France and Germany, has resulted in a decline in policy uncertainty and tail risks in the euro area.[1]  Until September 2017, the upward growth revisions were accompanied by increases in foreign interest rates relative to U.S. rates, which likely also weighed on the dollar.

The further depreciation of the dollar since August amid the widening differential between U.S. and AFE interest rates, however, poses a puzzle.  Our best guess is that some of the same factors weighing on the dollar earlier—improving economic prospects abroad as well as improved risk-sentiment that induced reversals of earlier flight-to-safety demand for the dollar—continued to operate over this period.  It also bears emphasizing that between August and the present, the dollar fell only another 1¾ percent against AFE currencies.



Figure 1. AFE Dollar Index



Figure 2. U.S.-AFE Interest Rate Differentials
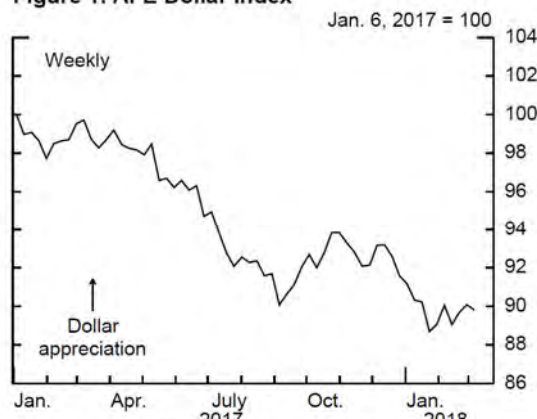
Note: The AFE dollar index and interest rate differential are trade weighted and based on the euro, Japanese yen, British pound, and Canadian dollar. AFE is advanced foreign economy.
Source: Federal Reserve Board H10; Bloomberg; staff calculations.

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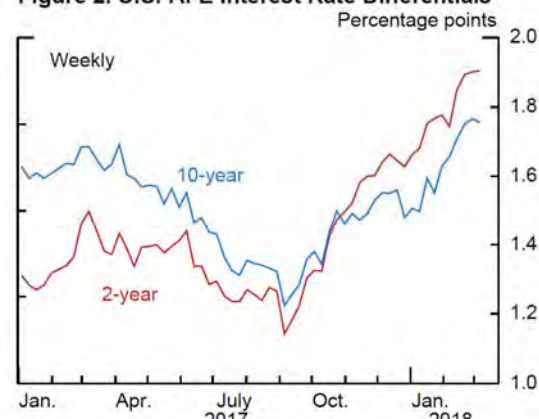
[1] In 2017, the euro rose about 15 percent against the dollar, with a sizable portion of this appreciation occurring on days with news of positive macroeconomic data surprises or a reduction in political uncertainty.

Taking a longer-term view, the left panel in figure 3 plots the AFE dollar index against the value implied by the historical relationship between yield differentials and exchange rates over the post-crisis period.[2]  Although the long-term trend of the AFE dollar index follows the path implied by interest rate differentials, deviations can be notable.  In particular, from mid-2014 to early 2016, the dollar appreciated more than 25 percent, but the path predicted by interest rate differentials moved up only moderately.  Some of the dollar's rise over that period has been attributed to increased downside risks as foreign economies languished and oil prices plummeted; the recent dollar weakness could reflect a retracement of those risks.  In addition, some of the run-up in the dollar in 2014 beyond what was captured in yield differentials could have been firming expectations of the removal of quantitative easing in the United States as prospects for growth improved.  Similarly, we could now be observing the same dynamic abroad, as eventual monetary policy normalization by some foreign central banks is being increasingly discussed.  It is unclear why interest rates are not fully capturing these shifts in expectations, which is an issue that remains an active area of research.

Some recent commentary has suggested that the weakness in the dollar since early last year may reflect investors shedding U.S. assets on concerns over the effect of fiscal stimulus on U.S. debt levels and rising trade protectionism.  So far, there is less support in the data for this argument.  The dollar's weakness was primarily concentrated in the first part of 2017, before major fiscal and trade policies were announced.  In fact, the dollar has changed little since the turn of the year and appreciated more recently, a period when changes in fiscal and trade policy were more prominent.  This strengthening of the dollar is, in fact, exactly what economic theory would predict as a consequence of greater fiscal stimulus and higher tariffs.[3]  There is also little evidence in the data of foreign investors selling U.S. assets.  U.S. equity markets have continued to outperform their foreign counterparts, and foreign demand for U.S. assets has remained strong in recent months.[4]



Figure 3. Actual and Interest Rate Implied Dollar Paths

Source: Federal Reserve Board H10; Bloomberg; staff calculations.

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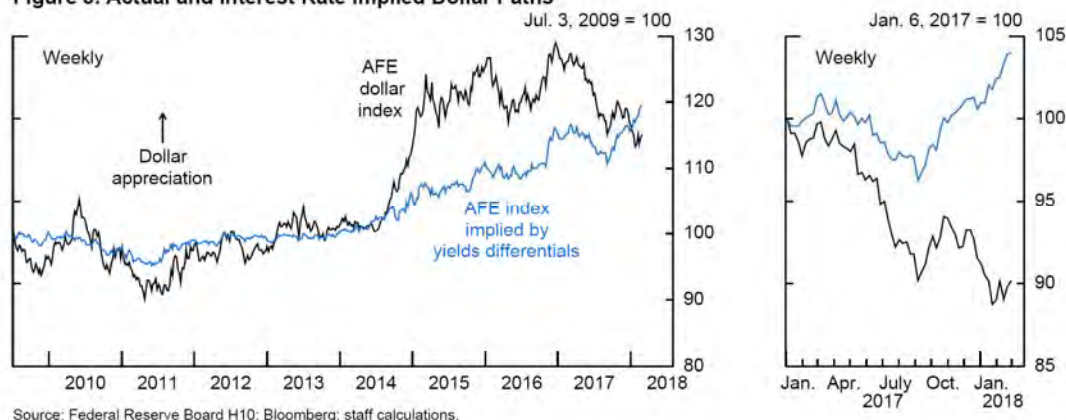
[2] Specifically, we estimate rolling-window regressions of changes in constituent exchange rates on differentials of near-term interest rates (2-year yield) and yield curve slopes (10-year yield minus 2-year yield), compute implied weekly changes in exchange rates, and compound them over time.

[3] Recent empirical literature provides support for currency appreciation due to fiscal expansion. See, for example, Alan J. Auerbach and Yuriy Gorodnichenko (2016), "Effects of Fiscal Shocks in a Globalized World," *IMF Economic Review,* vol. 64 (April), pp. 177–215.

[4] Foreign private purchases of U.S. securities was robust throughout 2017 and totaled about $600 billion. Despite a slowdown later in the year, official sector purchases were about $160 billion.

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# Business Finance

## Selected Components of Net Debt Financing, Nonfinancial Firms

Billions of dollars
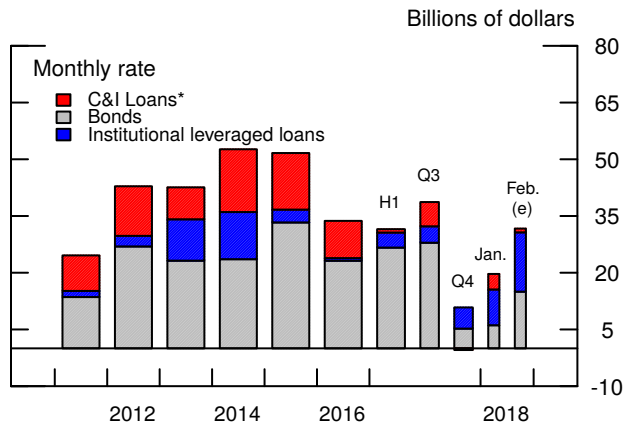


Note: C&I is commercial and industrial.
* Period-end basis.
e Estimate.
Source: Depository Trust & Clearing Corporation; Mergent Fixed Income Securities Database; Federal Reserve Board.

## Gross Issuance of Nonfinancial Corporate Bonds

Billions of dollars
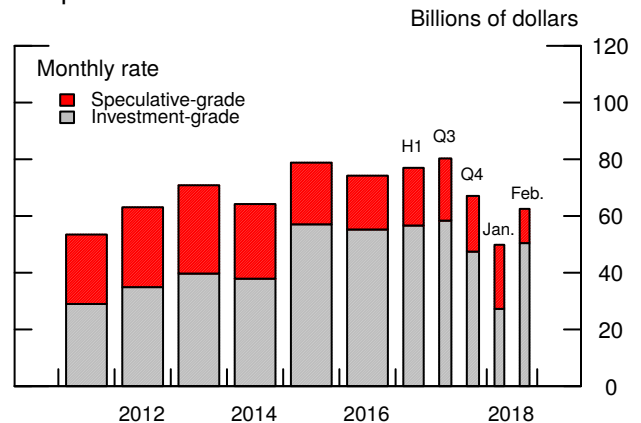


Note: Bonds are categorized by Moody's, Standard & Poor's, and Fitch.
Source: Mergent Fixed Income Securities Database.
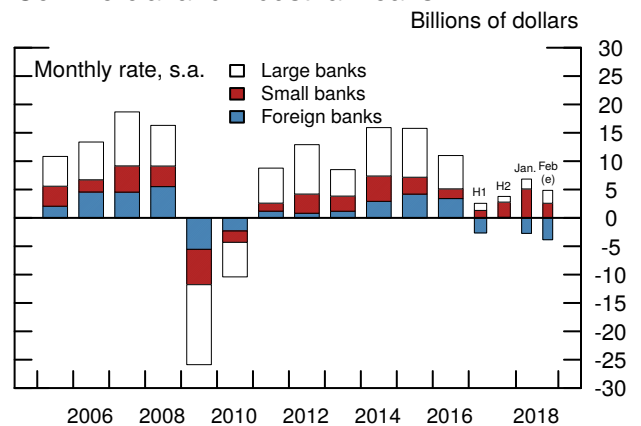
## Institutional Leveraged Loan Issuance, by Purpose

Billions of dollars



Source: Thomson Reuters LPC LoanConnector.

## Commercial and Industrial Loans

Billions of dollars



e Estimate.
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; staff calculations.

## S&P 500 Earnings per Share

Dollars per share
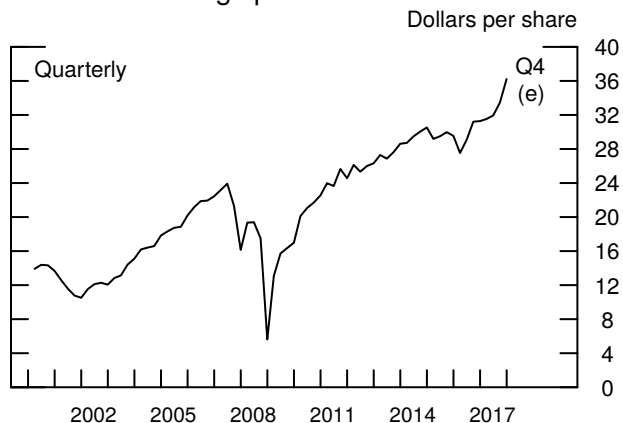


Note: The data are seasonally and bias adjusted by Federal Reserve Board staff.
e Estimate.
Source: Thomson Reuters Financial.

## Announced Share Repurchases, Nonfinancial Firms

Billions of dollars



Source: Securities Data Company.

Financing Conditions

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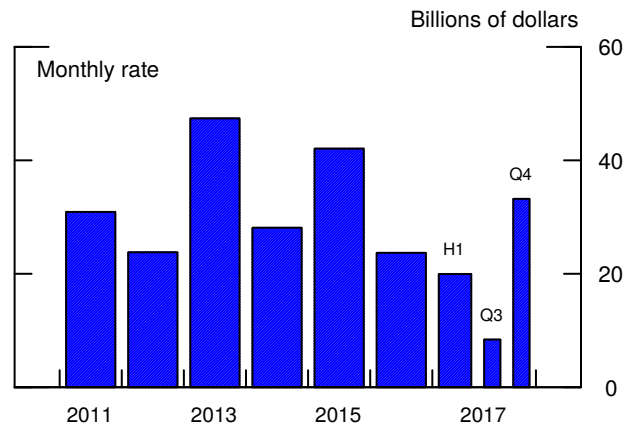
# Equity Issuance, Commercial Real Estate Lending, and Small Business Lending

## Initial Public Offering Issuance by Domestic Nonfinancial Corporations

Billions of dollars
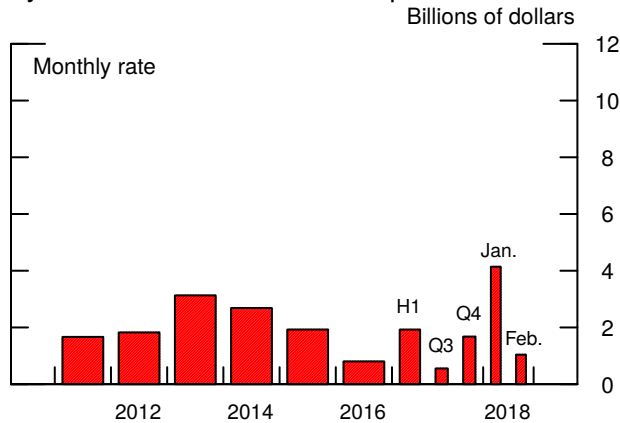


Source: Securities Data Company.

## Secondary Equity Offering Issuance by Domestic Nonfinancial Corporations

Billions of dollars
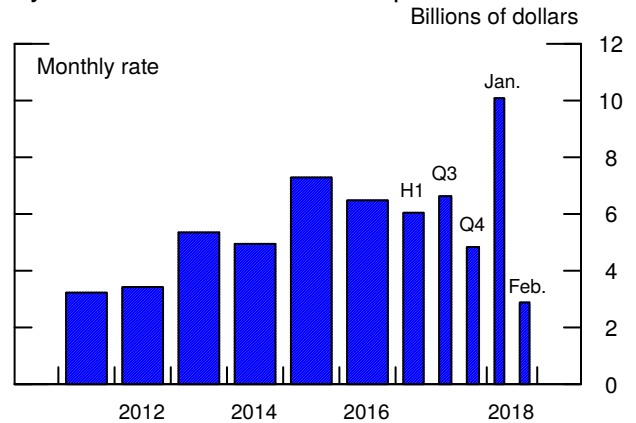


Source: Securities Data Company.

## Commercial Real Estate Loans
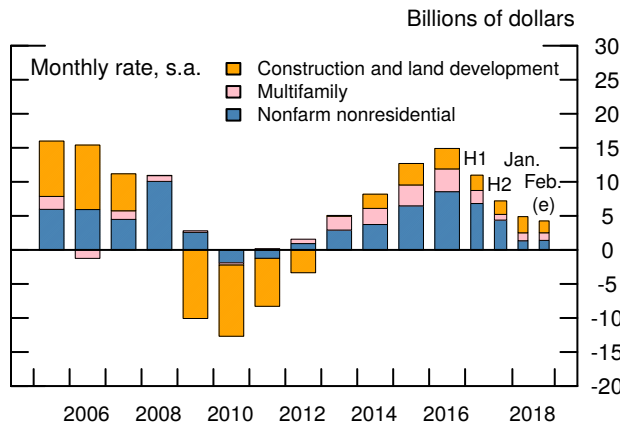
Billions of dollars



e Estimate.
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; staff calculations.

## Non-agency CMBS Issuance

Billions of dollars
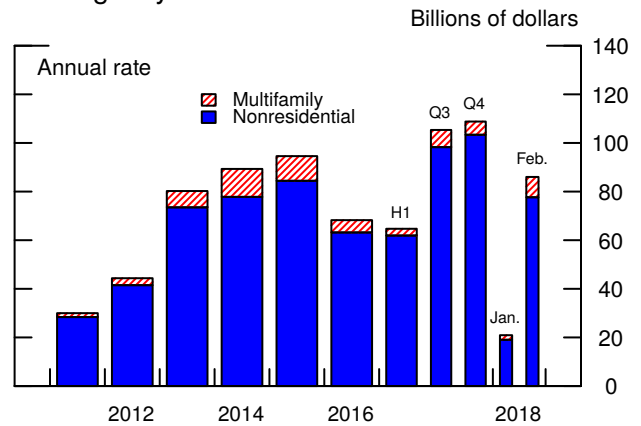


Note: Multifamily excludes agency issuance. CMBS is commercial mortgage-backed securities.
Source: Consumer Mortgage Alert.

## 10-Year CMBS Spreads over Swaps

Basis points                                    Basis points
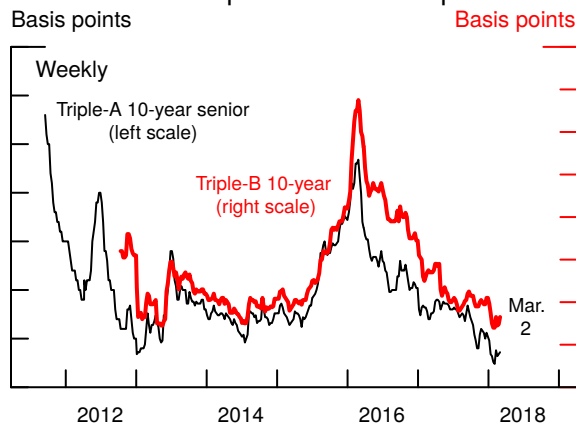


Note: CMBS is commercial mortgage-backed securities.
Source: J.P. Morgan.

## Amount Outstanding on Bank Loans to Businesses

Trillions of dollars                            Billions of dollars
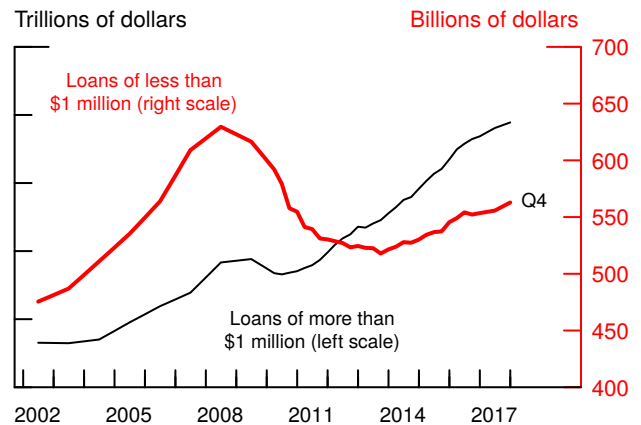


Note: Beginning in March 2010, the data reporting frequency changed from annual to quarterly. Beginning in December 2016, the data reporting frequency changed from quarterly to semiannual.
Source: These data are constructed from special tabulations of the June 30, 2002, to June 30, 2017, Call Reports (Consolidated Reports of Condition and Income for U.S. Banks).

Financing Conditions

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# Household Finance

## Maximum Allowed Debt-Service-to-Income Ratio for Residential Morgages
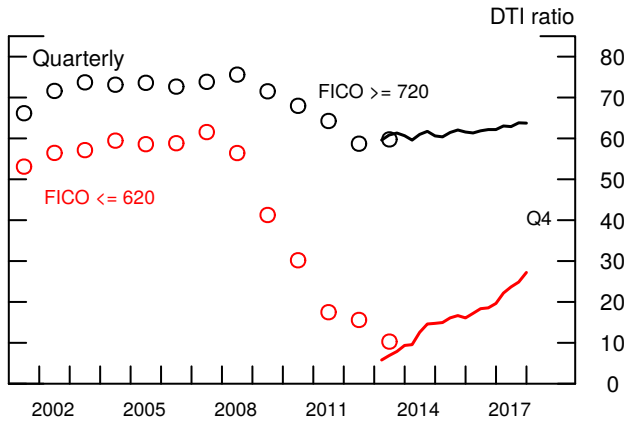


Source: For frontiers shown with circles, McDash and CoreLogic; for frontiers shown with solid lines, Optimal Blue.

## Mortgage Rate and MBS Yield
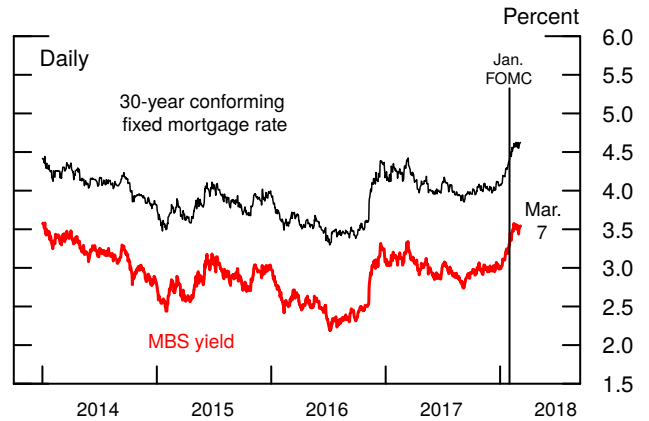


Note: The mortgage-backed securities (MBS) yield is the Fannie Mae 30-year current-coupon rate.
Source: For MBS yield, Barclays; for mortgage rate, Optimal Blue.

## Purchase and Refinance Activity
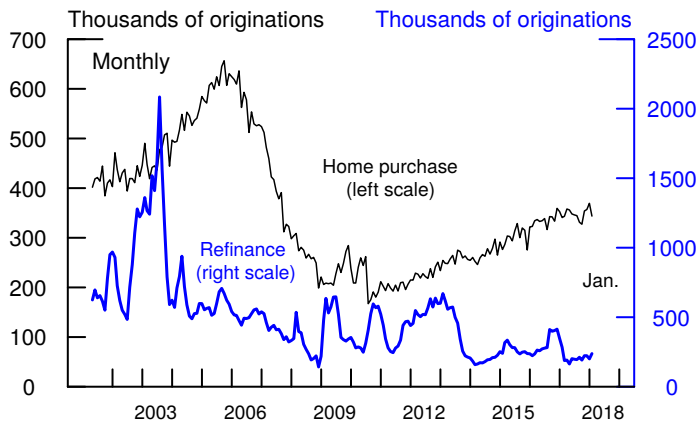


Note: The data are seasonally adjusted by Federal Reserve Board staff.
Source: For values prior to 2017, data reported under the Home Mortgage Disclosure Act of 1975; for values in and after 2017, staff estimates.

## Consumer Credit
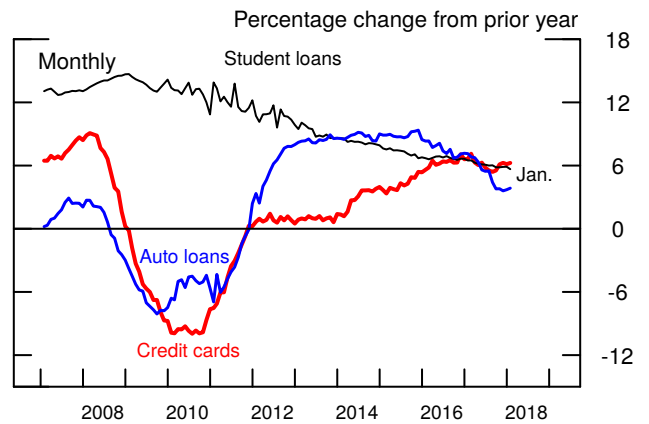


Note: The data are not seasonally adjusted.
Source: Federal Reserve Board.

## Delinquencies on Consumer Loans
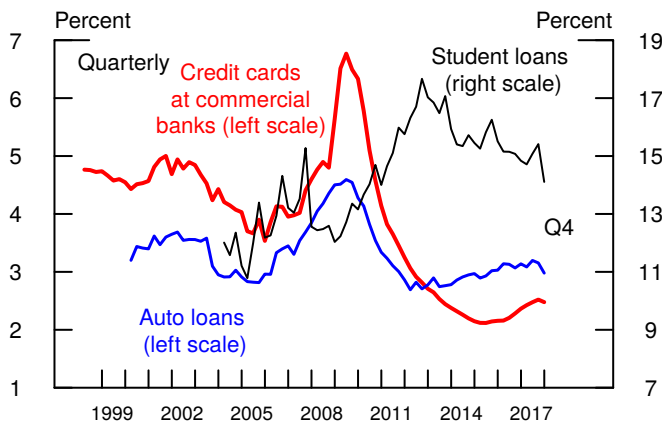


Note: Credit card and auto loan rates are seasonally adjusted shares of balances 30 or more days past due; the student loan rate is the share of balances 90 or more days past due among borrowers in repayment.
Source: For student and auto loans, Federal Reserve Bank of New York/Equifax Consumer Credit Panel; for credit cards, Call Report.

## New Extensions: Auto
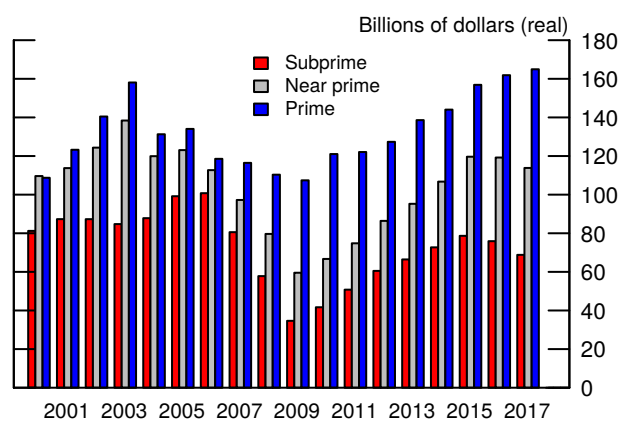


Note: Year-over-year change in balances for the 4th quarter of each year among those whose balance increased over this window. Near prime is between 620 and 719, and prime is greater than 719. Scores were measured a year ago.
Source: Federal Reserve Bank of New York/Equifax Consumer Credit Panel.

**Financing Conditions**

# The Effect of Fannie Mae's Relaxation of Debt-Service-to-Income Underwriting Constraints on Residential Mortgage Lending

Fannie Mae recently amended its policies for approving the purchase of mortgage loans with high debt-service-to-income (DTI) ratios through its automated underwriting system, Desktop Underwriter (DU).[1] In this analysis, we show that this policy change represents a notable relaxation of credit conditions for some borrowers. However, we also find that the change had little effect on the riskiness of new mortgages, as the other underwriting characteristics of high-DTI mortgages tended to be strong.

In order to be purchased by Fannie Mae, a mortgage must either be manually underwritten within the strictures of Fannie Mae's eligibility matrix or automatically underwritten through DU. Because Fannie Mae funds a large fraction of the mortgage market, its policies determine the credit standards that many borrowers face.[2] Although Fannie Mae has imposed a maximum DTI ratio of 45 percent for manually underwritten loans for several years, the maximum DTI ratio for mortgages approved through DU was set at 50 percent if a borrower's mortgage loan-to-value (LTV) ratio was less than or equal to 80 percent and the borrower had enough savings to cover 12 months of mortgage payments.[3] However, on July 29, 2017, Fannie Mae lifted the additional LTV ratio and savings requirements for DU-approved mortgages. As a result, any loan approved by DU with a DTI ratio less than or equal to 50 percent is now eligible for sale to Fannie Mae.

This change was quickly followed by a marked increase in the overall volume of high-DTI mortgage lending. Figure 1 plots the share of home-purchase loans with a DTI ratio in excess of 45 percent (black line) by the month in which the mortgage rate was locked in. High-DTI loans jumped from about



Figure 1. Purchase Mortgage Loans with a High DTI Ratio

Note: DTI is debt service-to-income; DU is Desktop Underwriter.
Source: Optimal Blue.

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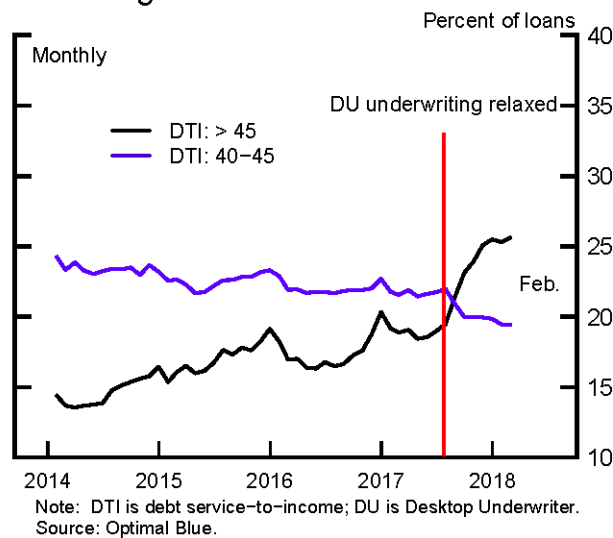
[1] DTI ratios include the borrowers' required monthly payments to service all of their obligations on both the proposed mortgage as well as all other types of debt (primarily credit card accounts, auto loans, and student loans).

[2] According to Inside Mortgage Finance, about 28 percent by dollar volume of first-lien residential mortgages are purchased by Fannie Mae.

[3] The qualified mortgage (QM) rule provides a safe harbor from litigation for loans with DTI ratios less than or equal to 43 percent. This safe harbor also extends to mortgages eligible for sale to Fannie Mae or Freddie Mac or mortgages eligible for insurance through the Federal Housing Administration.

Financing Conditions

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18 percent of newly originated loans prior to Fannie Mae's underwriting change to about 25 percent by late 2017. This expansion translates to approximately 30,000 additional high-DTI loans per month (seasonally adjusted).

Prior to Fannie Mae's underwriting change, high-DTI mortgages had been available through the Federal Housing Administration (FHA) but under more stringent terms (higher effective interest rates and lower loan limits). The increased take-up of high-DTI mortgages may consist, in part, of borrowers who found the FHA loans to be too expensive or too small and thus were brought into the market by the changed underwriting standards. However, it also appears that some borrowers may have merely adjusted their applications under the less stringent underwriting policies. For example, some borrowers may have applied for larger mortgages or declared income more conservatively under the higher DTI limits. Indeed, the share of new loans originated to borrowers with DTI ratios between 40 and 45 percent (the purple line in figure 1) decreased over 2 percentage points from July 2017 to February 2018, indicating that some borrowers shifted from being just below the previous DTI cap into higher DTI mortgages.

Given the greater frequency of high-DTI mortgages, both Fannie Mae and private investors (through credit risk transfers) could be exposed to some additional risk. To estimate how much riskier this lending could be, we examined a sample of servicing records of loans originated from 2000 to 2015 and estimated delinquency rates as a function of borrowers' DTI ratios, credit scores, and LTV ratios. We used the estimated model to project delinquency rates for newly originated mortgages before and after Fannie Mae's underwriting expansion and plotted the results in figure 2.[4] The estimates indicate essentially no discernable increase in the credit risk of new loans since July 2017, as the rise in average DTI ratios has been largely offset by increases in credit scores and decreases in LTV ratios among borrowers getting high-DTI mortgages. Indeed, our analysis indicates that low credit scores and high LTV ratios are more powerful predictors of mortgage default than are high DTI ratios. In all, Fannie Mae has notably expanded mortgage credit availability without yet appearing to take on substantially more credit risk.

Figure 2. Estimated Riskiness of New Loans
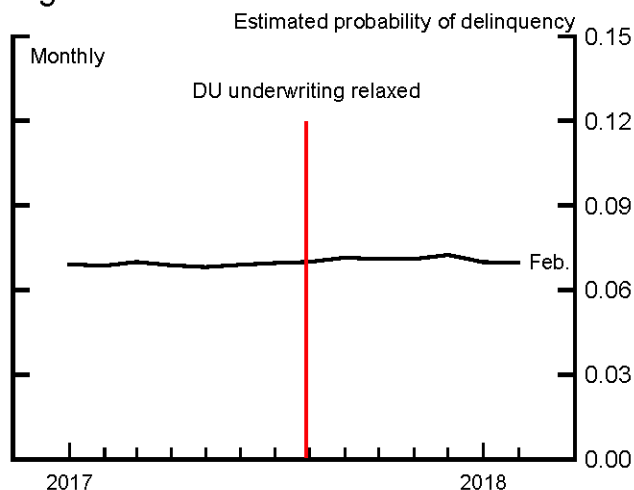


Note: Figure plots the model-based estimate of delinquency probability for loans by date of rate lock; DU is Desktop Underwriter.
Source: Optimal Blue.

_____

[4] "Delinquency" is defined as having a payment 60 days or more past due any time within the first two years after origination.

Financing Conditions

**Risks & Uncertainty**

# Time-Varying Macroeconomic Risk

## Unemployment Rate

Percent



| March 2018 | |
|---|---|
| 95th | 0.4 |
| 85th | 0.2 |
| 50th | -0.1 |
| 15th | -0.6 |
| 5th | -0.9 |

## GDP Growth

Percent



| March 2018 | |
|---|---|
| 95th | 1.8 |
| 85th | 1.1 |
| 50th | 0.0 |
| 15th | -1.0 |
| 5th | -1.7 |

## CPI Inflation

Percent



| March 2018 | |
|---|---|
| 95th | 1.8 |
| 85th | 1.2 |
| 50th | 0.1 |
| 15th | -0.8 |
| 5th | -1.4 |
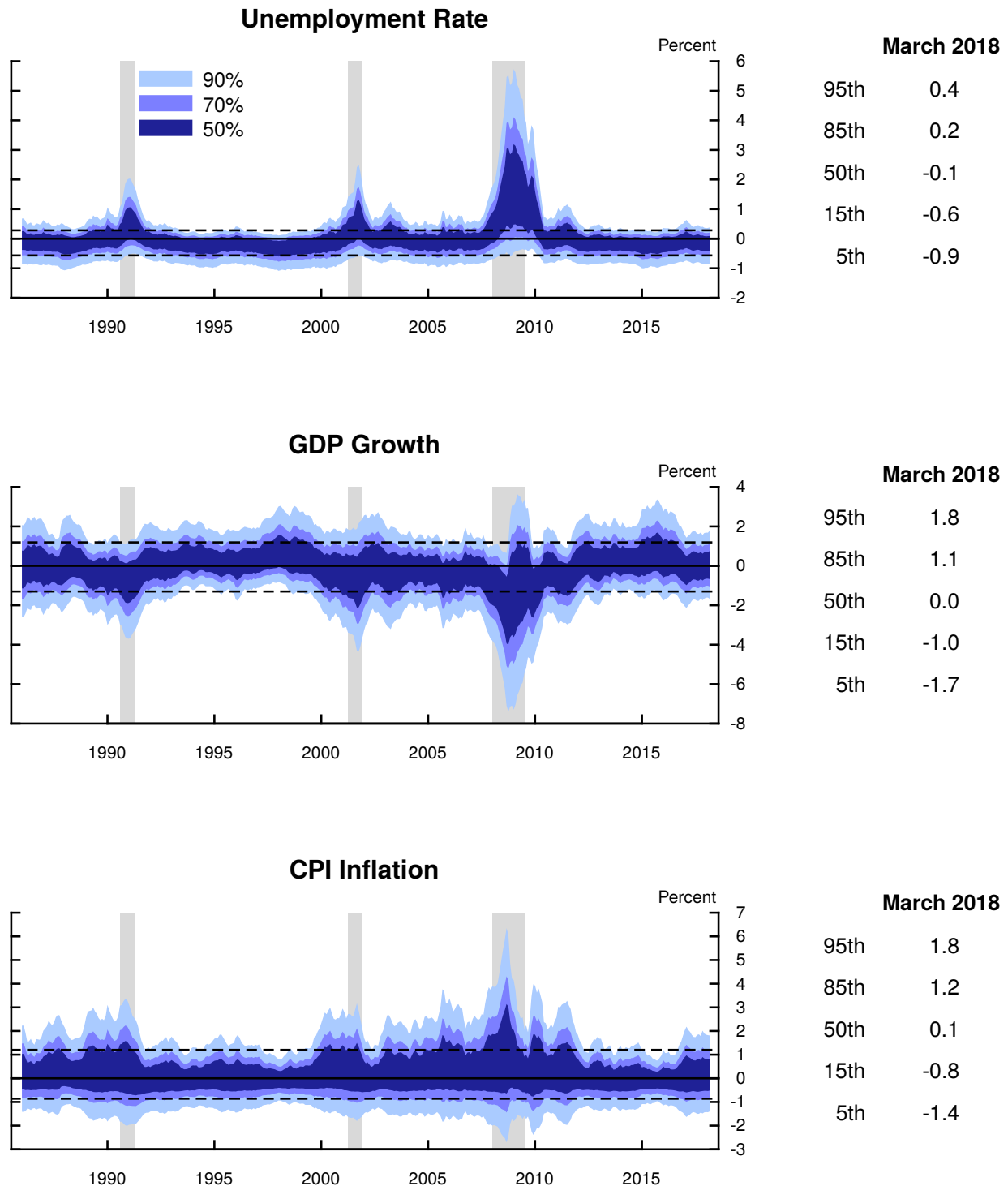
Note: The exhibit shows estimates of quantiles of the distribution of errors for four-quarter-ahead staff forecasts. The estimates are conditioned on indicators of real activity, inflation, financial market strain, and the volatility of high-frequency macroeconomic indicators. The tables show selected quantiles of the predictive distributions for the respective variables as of the current Tealbook. Dashed lines denote the median 15th and 85th percentiles.

# Effective Lower Bound Risk Estimate

## ELB Risk since Liftoff

Percent

Current-quarter ELB risk = 8%

Mar. 2016   June 2016   Sept. 2016   Dec. 2016   Mar. 2017   June 2017   Sept. 2017   Dec. 2017   Mar. 2018
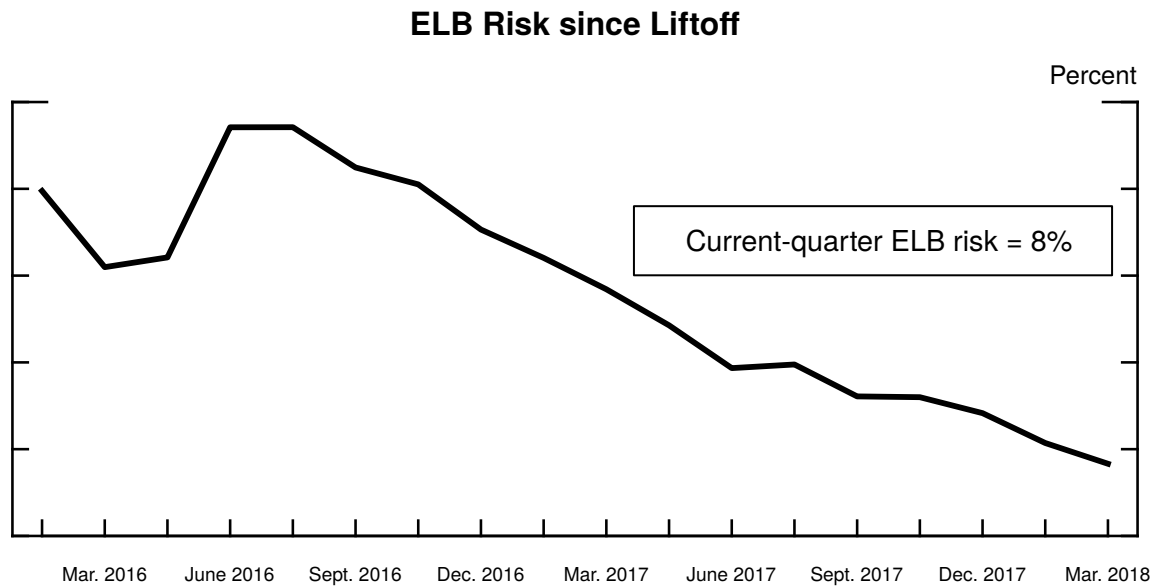
## ELB Risk over the Projection Period

Percent

2018:Q2   2018:Q4   2019:Q2   2019:Q4   2020:Q2   2020:Q4
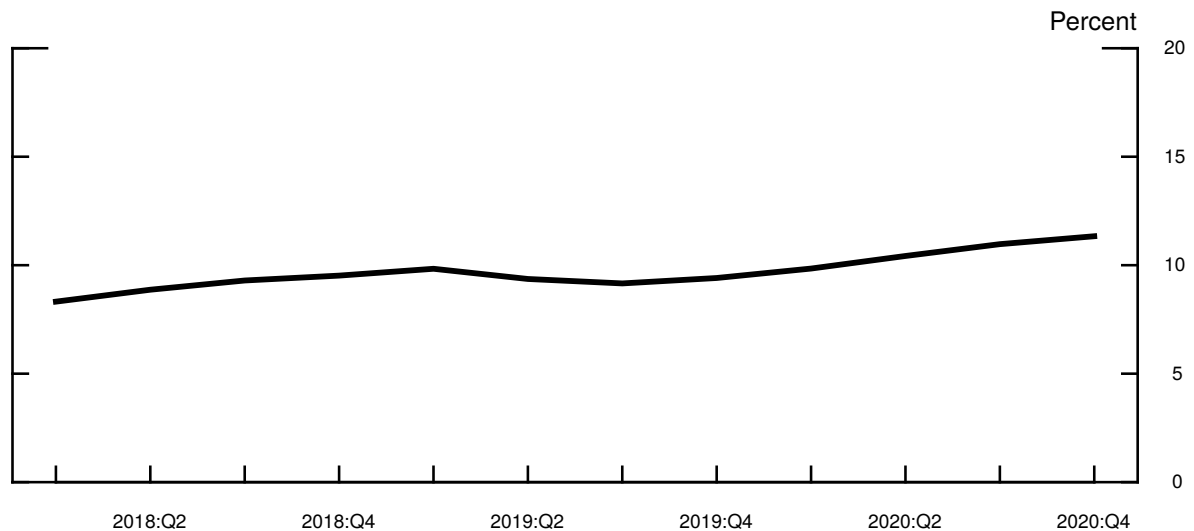
Note: The figures show the probability that the federal funds rate reaches the effective lower bound (ELB) over the next 3 years starting in the given quarter. Details behind the computation of the ELB risk measure are provided in the box "A Guidepost for Dropping the Effective Lower Bound Risk from the Assessment of Risks" in the Risks and Uncertainty section of the April 2017 Tealbook A. The lower panel computes ELB risk over a forward-looking moving 3-year window using stochastic simulations in FRB/US beginning in the current quarter. The simulations are computed around the Tealbook baseline.

Risks & Uncertainty

# Alternative Scenarios

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

| Measure and scenario | 2018 | | 2019 | 2020 | 2021-22 |
|---|---|---|---|---|---|
| | H1 | H2 | | | |
| *Real GDP* | | | | | |
| Extended Tealbook baseline | 2.6 | 3.3 | 2.6 | 2.1 | 1.1 |
| Recession | 2.6 | 3.3 | .2 | 1.5 | 1.9 |
| Positive hysteresis | 2.6 | 3.3 | 2.8 | 2.5 | 1.6 |
| Lower inflation expectations | 2.1 | 3.1 | 2.7 | 2.1 | 1.2 |
| Steeper Phillips curve | 2.6 | 3.3 | 2.6 | 2.0 | 1.0 |
| Global market correction | 1.3 | 1.9 | 2.2 | 2.4 | 1.5 |
| Stronger foreign growth and weaker dollar | 2.7 | 4.0 | 3.1 | 2.1 | .8 |
| *Unemployment rate[1]* | | | | | |
| Extended Tealbook baseline | 3.9 | 3.5 | 3.1 | 3.1 | 3.6 |
| Recession | 3.9 | 3.5 | 4.5 | 5.5 | 5.4 |
| Positive hysteresis | 3.9 | 3.5 | 3.1 | 2.9 | 3.3 |
| Lower inflation expectations | 4.1 | 3.6 | 3.3 | 3.2 | 3.7 |
| Steeper Phillips curve | 3.9 | 3.5 | 3.2 | 3.2 | 4.0 |
| Global market correction | 4.1 | 3.9 | 3.9 | 3.8 | 4.1 |
| Stronger foreign growth and weaker dollar | 3.9 | 3.4 | 2.7 | 2.5 | 3.2 |
| *Total PCE prices* | | | | | |
| Extended Tealbook baseline | 2.0 | 1.6 | 2.0 | 2.1 | 2.2 |
| Recession | 2.0 | 1.6 | 1.9 | 2.0 | 2.1 |
| Positive hysteresis | 2.0 | 1.6 | 2.0 | 2.1 | 2.2 |
| Lower inflation expectations | 1.9 | 1.3 | 1.6 | 1.7 | 1.9 |
| Steeper Phillips curve | 2.1 | 2.0 | 2.6 | 3.0 | 3.4 |
| Global market correction | 1.6 | 1.0 | 1.6 | 1.9 | 2.1 |
| Stronger foreign growth and weaker dollar | 2.5 | 2.2 | 2.5 | 2.4 | 2.2 |
| *Core PCE prices* | | | | | |
| Extended Tealbook baseline | 2.1 | 1.8 | 2.1 | 2.2 | 2.2 |
| Recession | 2.1 | 1.8 | 2.0 | 2.1 | 2.2 |
| Positive hysteresis | 2.1 | 1.7 | 2.1 | 2.2 | 2.3 |
| Lower inflation expectations | 2.0 | 1.4 | 1.7 | 1.8 | 1.9 |
| Steeper Phillips curve | 2.2 | 2.1 | 2.7 | 3.1 | 3.4 |
| Global market correction | 1.9 | 1.3 | 1.7 | 2.0 | 2.1 |
| Stronger foreign growth and weaker dollar | 2.4 | 2.2 | 2.5 | 2.4 | 2.3 |
| *Federal funds rate[1]* | | | | | |
| Extended Tealbook baseline | 1.8 | 2.7 | 4.0 | 5.0 | 5.2 |
| Recession | 1.8 | 2.7 | 1.5 | 1.2 | 3.3 |
| Positive hysteresis | 1.8 | 2.7 | 4.0 | 4.9 | 5.1 |
| Lower inflation expectations | 1.8 | 2.5 | 3.6 | 4.4 | 4.7 |
| Steeper Phillips curve | 1.8 | 2.7 | 4.4 | 5.6 | 6.3 |
| Global market correction | 1.9 | 2.4 | 2.9 | 3.7 | 4.3 |
| Stronger foreign growth and weaker dollar | 1.9 | 2.9 | 4.7 | 5.6 | 5.5 |

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

*Risks & Uncertainty*

**Risks & Uncertainty**

# Forecast Confidence Intervals and Alternative Scenarios

## Confidence Intervals Based on FRB/US Stochastic Simulations

- Extended Tealbook baseline
- Recession
- Positive hysteresis
- Lower inflation expectations
- Steeper Phillips curve
- Global market correction
- 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
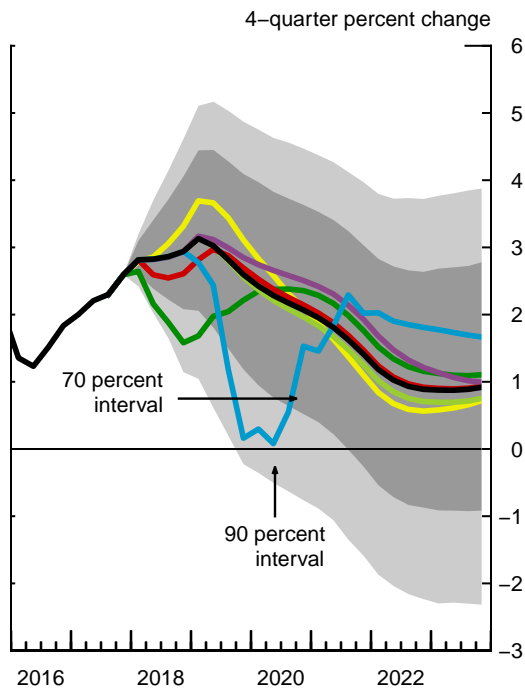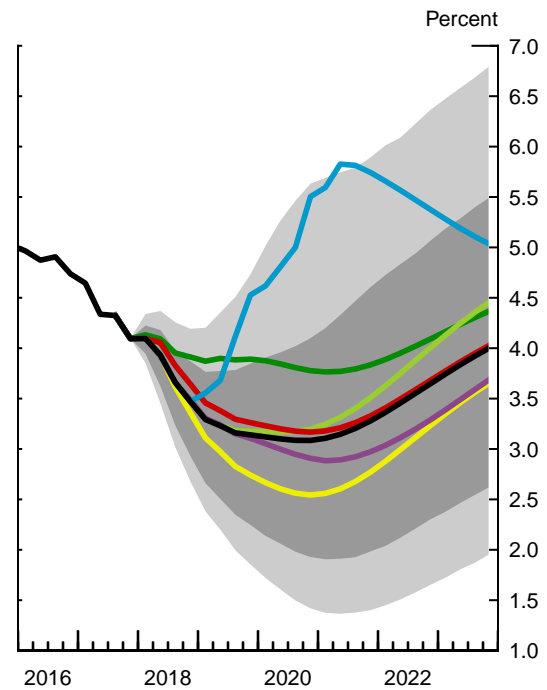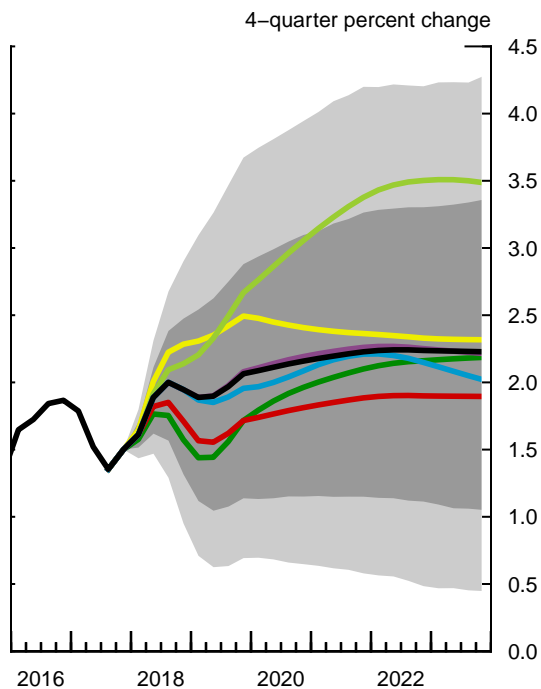
### Federal Funds Rate
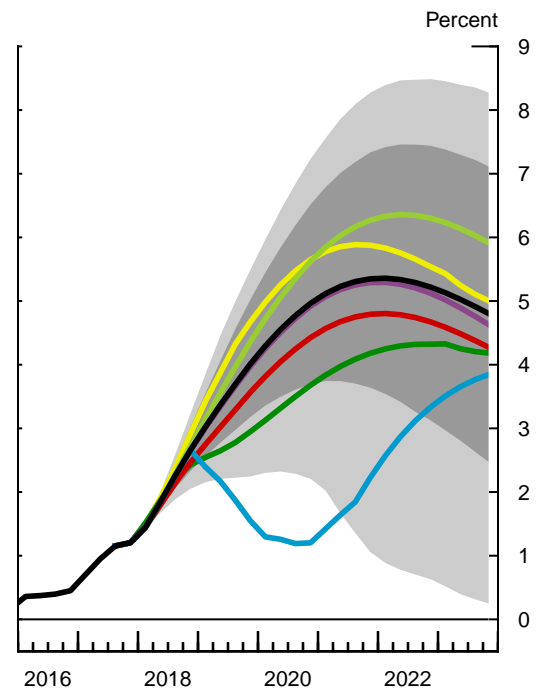
Percent

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

| Measure | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|
| *Real GDP* | | | | | | |
| *(percent change, Q4 to Q4)* | | | | | | |
| Projection | 2.9 | 2.6 | 2.1 | 1.4 | .9 | .9 |
| Confidence interval | | | | | | |
|   Tealbook forecast errors | 1.2–4.4 | .3–4.0 | -.6–3.4 | . . . | . . . | . . . |
|   FRB/US stochastic simulations | 2.1–4.1 | 1.2–4.1 | .5–3.6 | -.3–3.0 | -.9–2.6 | -.9–2.8 |
| *Civilian unemployment rate* | | | | | | |
| *(percent, Q4)* | | | | | | |
| Projection | 3.5 | 3.1 | 3.1 | 3.3 | 3.6 | 4.0 |
| Confidence interval | | | | | | |
|   Tealbook forecast errors | 3.0–3.9 | 2.2–4.3 | 1.8–4.7 | . . . | . . . | . . . |
|   FRB/US stochastic simulations | 2.9–3.9 | 2.2–3.8 | 1.9–4.1 | 2.0–4.6 | 2.3–5.1 | 2.6–5.5 |
| *PCE prices, total* | | | | | | |
| *(percent change, Q4 to Q4)* | | | | | | |
| Projection | 1.8 | 2.0 | 2.1 | 2.2 | 2.2 | 2.2 |
| Confidence interval | | | | | | |
|   Tealbook forecast errors | 1.4–2.6 | 1.3–3.6 | 1.5–3.5 | . . . | . . . | . . . |
|   FRB/US stochastic simulations | 1.1–2.5 | .9–2.9 | 1.0–3.1 | 1.0–3.3 | 1.0–3.3 | 1.0–3.4 |
| *PCE prices excluding* | | | | | | |
| *food and energy* | | | | | | |
| *(percent change, Q4 to Q4)* | | | | | | |
| Projection | 1.9 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 |
| Confidence interval | | | | | | |
|   Tealbook forecast errors | 1.6–2.4 | 1.5–2.9 | . . . | . . . | . . . | . . . |
|   FRB/US stochastic simulations | 1.3–2.5 | 1.1–2.9 | 1.2–3.1 | 1.1–3.3 | 1.1–3.3 | 1.1–3.4 |
| *Federal funds rate* | | | | | | |
| *(percent, Q4)* | | | | | | |
| Projection | 2.7 | 4.0 | 5.0 | 5.3 | 5.2 | 4.8 |
| Confidence interval | | | | | | |
|   FRB/US stochastic simulations | 2.3–3.0 | 3.2–5.0 | 3.7–6.5 | 3.6–7.3 | 3.1–7.4 | 2.5–7.1 |

Note: Shocks underlying FRB/US stochastic simulations are randomly drawn from the 1969–2016 set of model equation residuals. Intervals derived from Tealbook forecast errors are based on projections made from 1980 to 2016 for real GDP and unemployment and from 1998 to 2016 for PCE prices. The intervals for real GDP, unemployment, and total PCE prices are extended into 2020 using information from the Blue Chip survey and forecasts from the CBO and CEA.
. . . Not applicable.

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# Prediction Intervals Derived from Historical Tealbook Forecast Errors

**Forecast Error Percentiles**
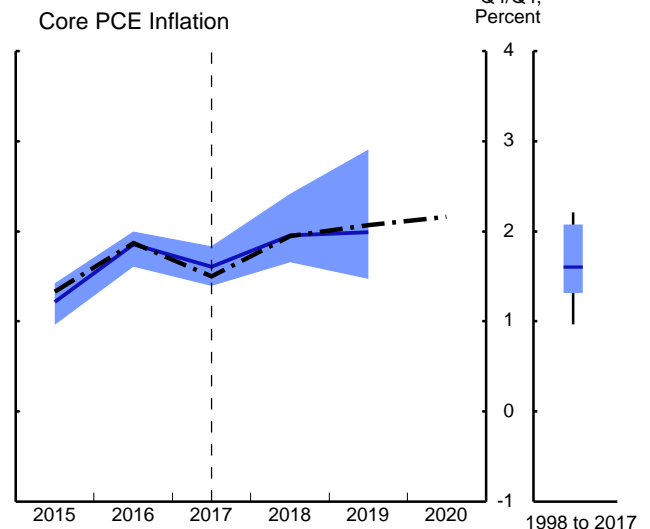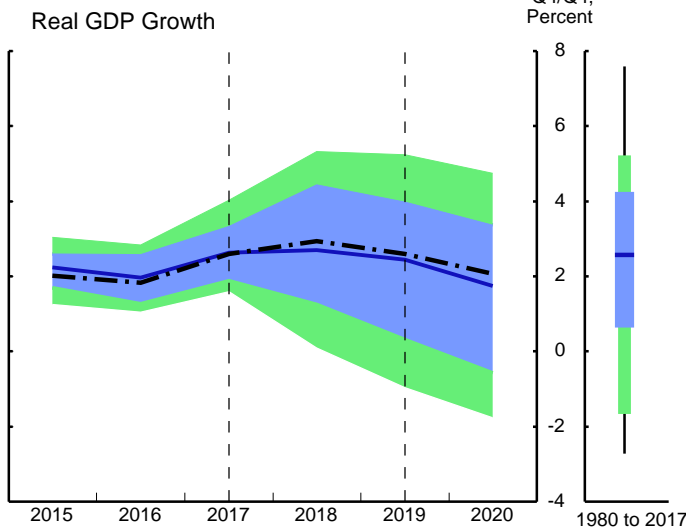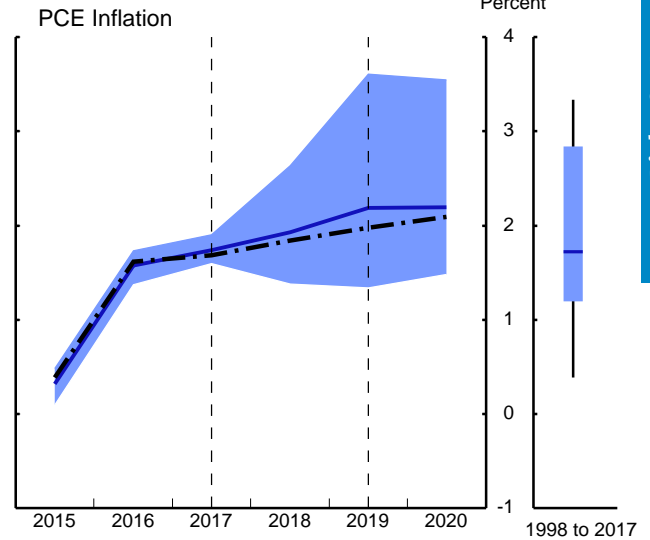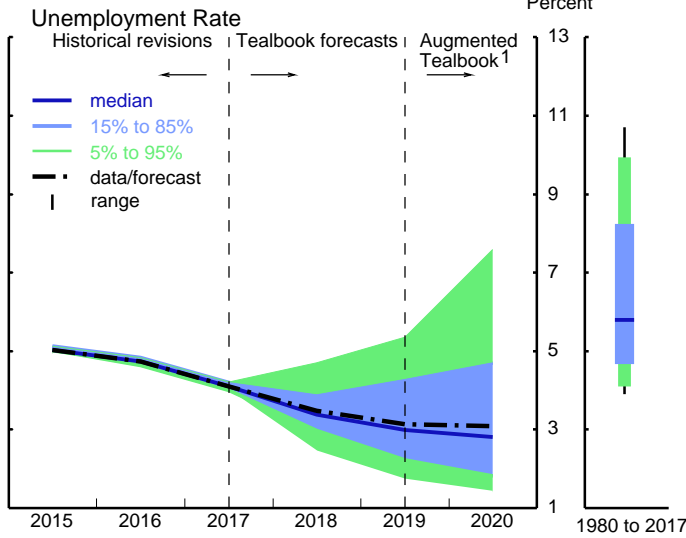
**Historical Distributions**
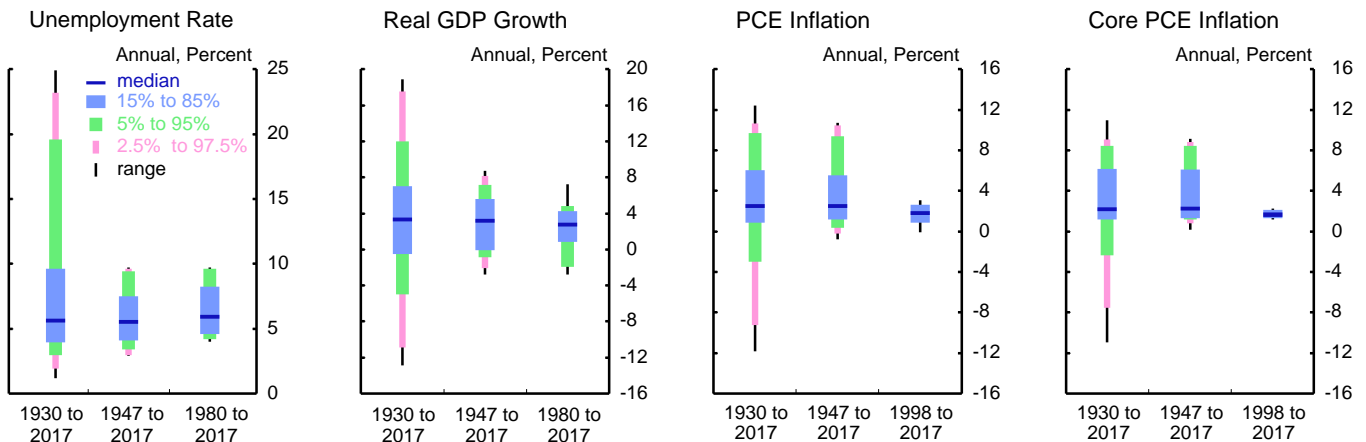


Note: See the technical note in the appendix for more information on this exhibit.

1. Augmented Tealbook prediction intervals use 1- and 2-year-ahead forecast errors from Blue Chip, CBO, and CEA to extend the Tealbook prediction intervals through 2020.

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

| Measure and projection | 2018 | | 2019 | | 2020 | |
|---|---|---|---|---|---|---|
| | December Tealbook | Current Tealbook | December Tealbook | Current Tealbook | December Tealbook | Current Tealbook |
| *Real GDP* | | | | | | |
| Staff | 2.4 | 2.9 | 2.0 | 2.6 | 1.7 | 2.1 |
| FRB/US | 2.2 | 2.1 | 1.5 | 2.0 | 1.1 | 1.7 |
| EDO | 2.4 | 2.3 | 2.3 | 2.3 | 2.4 | 2.4 |
| *Unemployment rate[1]* | | | | | | |
| Staff | 3.6 | 3.5 | 3.5 | 3.1 | 3.5 | 3.1 |
| FRB/US | 3.9 | 3.9 | 4.0 | 3.9 | 4.3 | 4.0 |
| EDO | 4.3 | 4.2 | 4.5 | 4.4 | 4.7 | 4.7 |
| *Total PCE prices* | | | | | | |
| Staff | 1.7 | 1.8 | 1.9 | 2.0 | 2.0 | 2.1 |
| FRB/US | 1.7 | 2.0 | 1.8 | 1.8 | 1.8 | 1.8 |
| EDO | 1.7 | 2.0 | 1.9 | 1.9 | 2.0 | 2.0 |
| *Core PCE prices* | | | | | | |
| Staff | 1.8 | 1.9 | 2.0 | 2.1 | 2.0 | 2.2 |
| FRB/US | 1.8 | 2.1 | 1.8 | 1.9 | 1.8 | 1.8 |
| EDO | 1.7 | 2.0 | 1.9 | 1.9 | 2.0 | 2.0 |
| *Federal funds rate[1]* | | | | | | |
| Staff | 2.5 | 2.7 | 3.5 | 4.0 | 4.0 | 5.0 |
| FRB/US | 2.3 | 2.4 | 2.9 | 3.2 | 3.0 | 3.5 |
| EDO | 2.3 | 2.4 | 3.0 | 3.1 | 3.5 | 3.5 |

1. Percent, average for Q4.

**Estimates of the Short-Run Real Natural Rate of Interest**
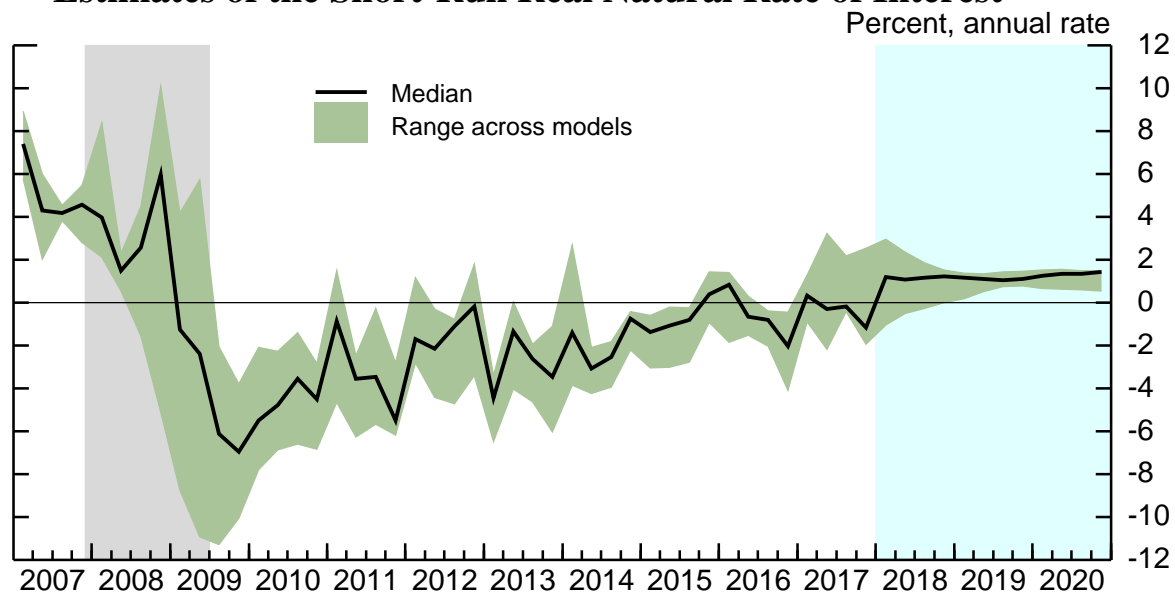


Note: Estimates are based on the four models from the System DSGE project; for more information, see the box "Estimates of the Short-Run Real Natural Rate of Interest" in the March 2016 Tealbook. The gray shaded bar indicates a period of recession as defined by the National Bureau of Economic Research.

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**Risks & Uncertainty**

## Assessment of Key Macroeconomic Risks

### Probability of Inflation Events
(4 quarters ahead)

| Probability that the 4-quarter change in total PCE prices will be . . . | Staff | FRB/US | EDO | BVAR |
|---|---|---|---|---|
| *Greater than 3 percent* | | | | |
| Current Tealbook | .05 | .05 | .04 | .07 |
| Previous Tealbook | .06 | .05 | .01 | .09 |
| | | | | |
| *Less than 1 percent* | | | | |
| Current Tealbook | .19 | .15 | .09 | .15 |
| Previous Tealbook | .12 | .17 | .20 | .13 |

### Probability of Unemployment Events
(4 quarters ahead)

| Probability that the unemployment rate will . . . | Staff | FRB/US | EDO | BVAR |
|---|---|---|---|---|
| *Increase by 1 percentage point* | | | | |
| Current Tealbook | .00 | .01 | .20 | .06 |
| Previous Tealbook | .00 | .01 | .15 | .01 |
| | | | | |
| *Decrease by 1 percentage point* | | | | |
| Current Tealbook | .45 | .07 | .03 | .03 |
| Previous Tealbook | .35 | .17 | .06 | .17 |

### Probability of Near-Term Recession

| Probability that real GDP declines in the next two quarters | Staff | FRB/US | EDO | BVAR | Factor Model |
|---|---|---|---|---|---|
| Current Tealbook | .00 | .02 | .06 | .04 | .00 |
| Previous Tealbook | .00 | .00 | .03 | .01 | .03 |

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.

# Policy Rules and the Staff Projection

## Near–Term Prescriptions of Selected Simple Policy Rules[1]

(Percent)

|  | 2018:Q2 | 2018:Q3 |
|---|---|---|
| Taylor (1999) rule | **4.14** | **4.67** |
| *Previous Tealbook* | *4.18* | *4.66* |
| Taylor (1993) rule | **3.23** | **3.58** |
| *Previous Tealbook* | *3.20* | *3.53* |
| First–difference rule | **2.04** | **2.57** |
| *Previous Tealbook projection* | *1.96* | *2.39* |
| Nominal income targeting rule | **1.52** | **1.65** |
| *Previous Tealbook projection* | *1.52* | *1.65* |
| *Addendum:* | | |
| Tealbook baseline | **1.84** | **2.26** |

## Key Elements of the Staff Projection



Federal Funds Rate — GDP Gap — PCE Prices ex. Food and Energy
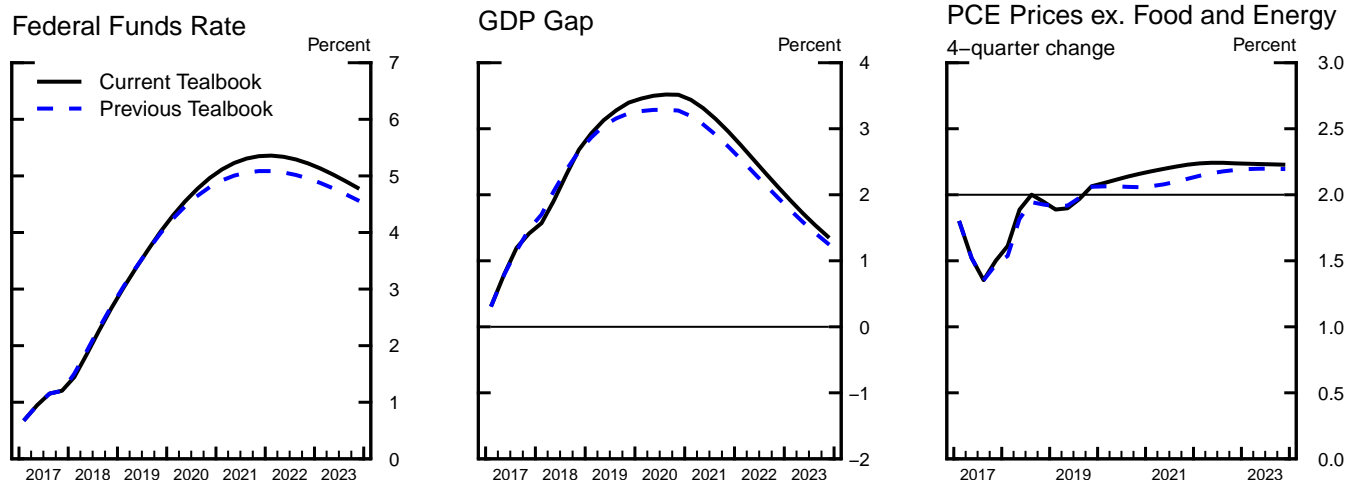
## A Medium–Term Notion of the Equilibrium Real Federal Funds Rate[2]

(Percent)

|  | Current Tealbook | *Previous Tealbook* |
|---|---|---|
| Tealbook baseline | | |
| FRB/US *r** | 3.62 | *3.43* |
| Average projected real federal funds rate | 1.45 | *1.46* |
| SEP–consistent baseline | | |
| FRB/US *r** | 1.09 | |
| Average projected real federal funds rate | .46 | |

1. For rules that have a lagged policy rate as a right–hand–side variable, the lines denoted "Previous Tealbook projection" report prescriptions based on the previous Tealbook's staff outlook for inflation and the output gap, but conditional on the current–Tealbook value of the lagged policy rate.

2. The "FRB/US *r**" is the level of the real federal funds rate that, if maintained over a 12–quarter period (beginning in the current quarter) in the FRB/US model, sets the output gap equal to zero in the final quarter of that period given either the Tealbook or SEP–consistent projection. The SEP–consistent baseline corresponds to the December 2017 median SEP responses. The "Average projected real federal funds rate" is calculated under the Tealbook and SEP–consistent baseline projections over the same 12–quarter period as FRB/US *r**.

# Simple Policy Rule Simulations

**Monetary Policy Strategies**
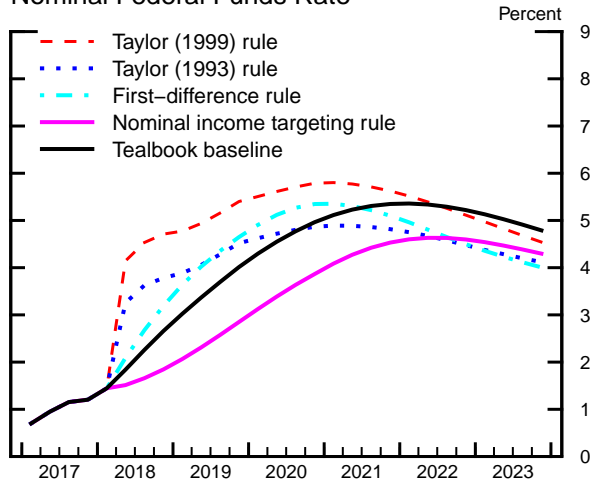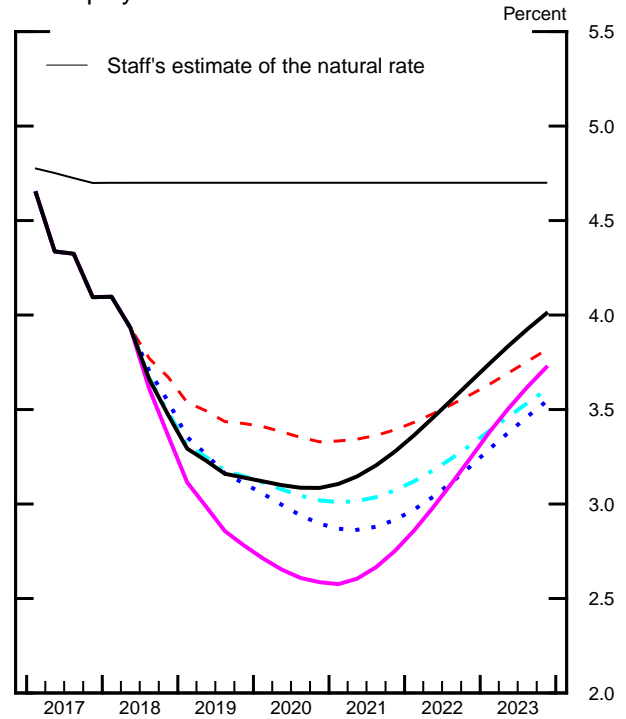
### Nominal Federal Funds Rate

Percent

- Taylor (1999) rule
- Taylor (1993) rule
- First–difference rule
- Nominal income targeting 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
4–quarter average

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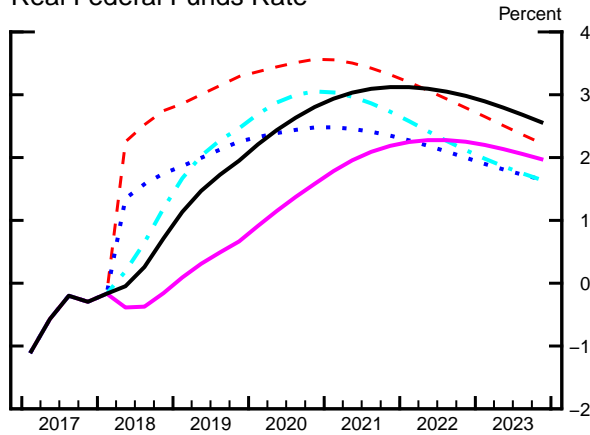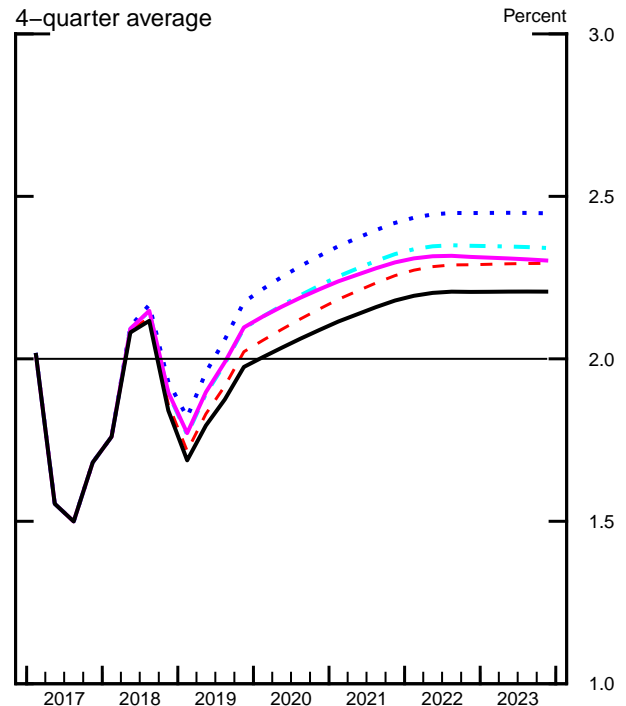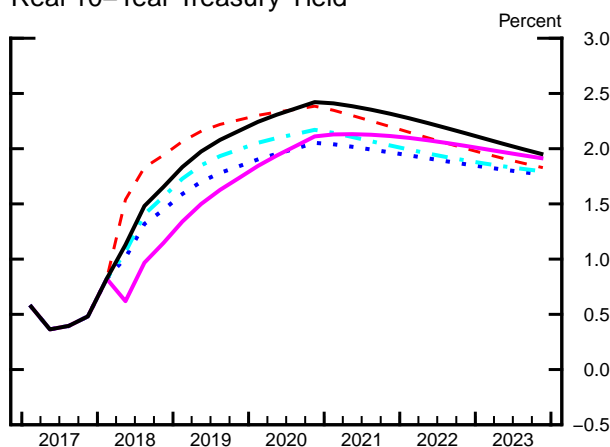
Note: The policy rule simulations in this exhibit are based on rules that respond to core inflation rather than to headline inflation. This choice of rule specification was made in light of a tendency for current and near–term core inflation rates to outperform headline inflation rates as predictors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

# Optimal Control Simulations under Commitment

**Monetary Policy Strategies**
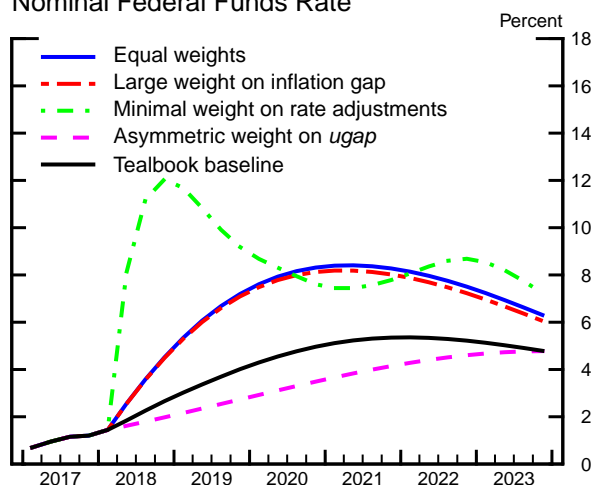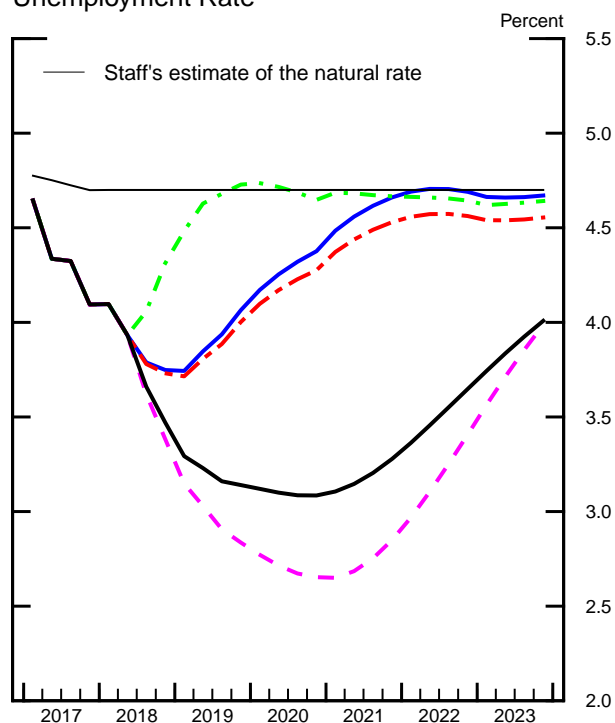
### Nominal Federal Funds Rate



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

### Real Federal Funds Rate



### Real 10−Year Treasury Yield



### Unemployment Rate



- Staff's estimate of the natural rate
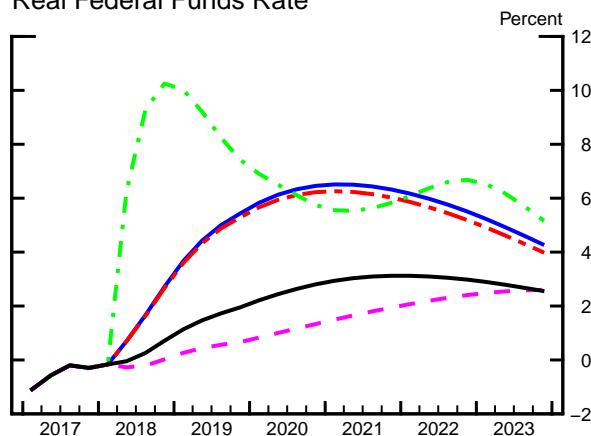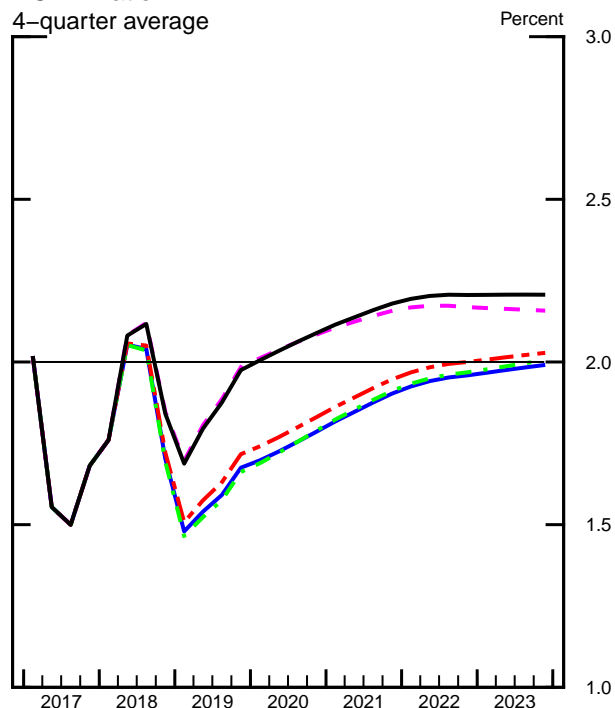
### PCE Inflation
4−quarter average
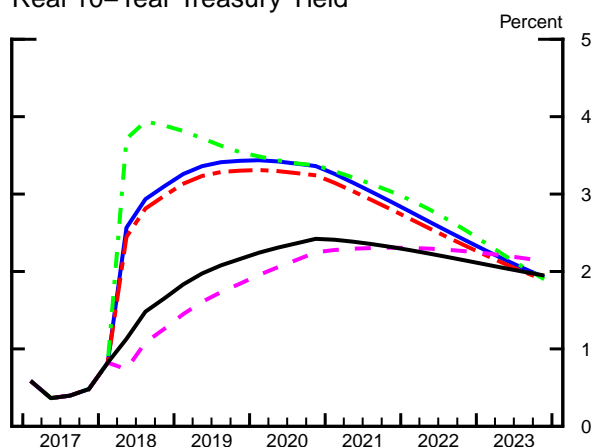


Note: Each set of lines corresponds to an optimal control policy under commitment in which policymakers minimize a discounted weighted sum of squared deviations of 4−quarter headline PCE inflation from the Committee's 2 percent objective, of squared deviations of the unemployment rate from the staff's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

# Changes in Prescriptions and Outcomes from the December Tealbook

**Monetary Policy Strategies**

## Simple Rules

### Nominal Federal Funds Rate
Percentage points

- - - Taylor (1999) rule
- - - - Taylor (1993) rule
- · - · First–difference rule
——— Nominal income targeting rule
——— Tealbook baseline

### Unemployment Rate
Percentage points

### PCE Inflation
Percentage points

## Optimal Control

### Nominal Federal Funds Rate
Percentage points

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

### Unemployment Rate
Percentage points

### PCE Inflation
Percentage points

Note: For each simple policy rule and optimal control policy reported in the previous two exhibits, we report the difference between prescriptions and economic outcomes under the current Tealbook baseline and the corresponding simulated variables under the December Tealbook baseline. To facilitate inference about the implications of revisions in the staff projection, we set the start of the simulation period under both the current Tealbook baseline and the December Tealbook baseline to 2018:Q2.

# Estimates of the Equilibrium Real Federal Funds Rate in the Longer Run

## Selected Time–Series Estimates

Monetary Policy Strategies

Percent

Quarterly

Range
Mean
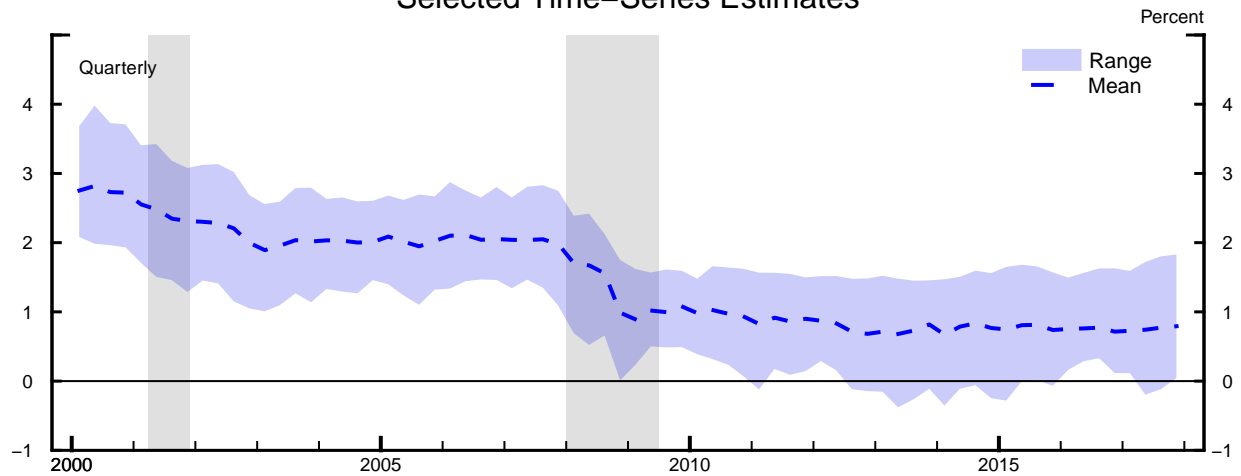


## Uncertainty around Latest Point Estimates

Percent

Tealbook baseline



| Del Negro, Giannone, Giannoni, and Tambalotti (2017) | Holston, Laubach, and Williams (2017) | Johannsen and Mertens (2016) | Kiley (2015) | Laubach and Williams (2003) | Lewis and Vazquez–Grande (2017) | Lubik and Matthes (2015) |
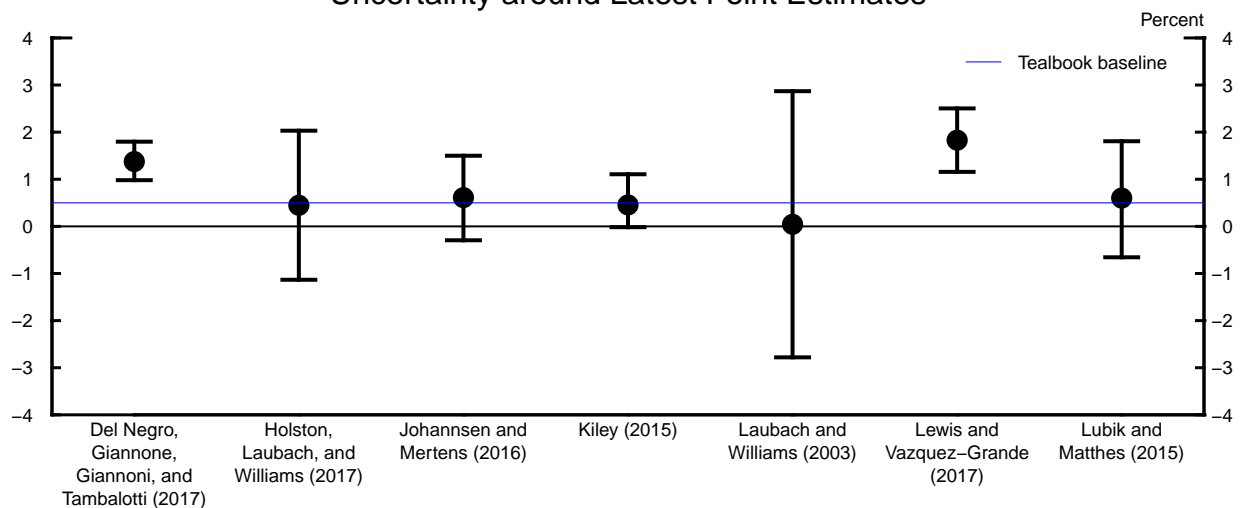
## Longer–Run Values from Selected Forecasters

| | Release Date | Percent |
|---|---|---|
| Tealbook baseline | Mar. 2018 | .50 |
| Median SEP | Dec. 2017 | .75 |
| Median Survey of Primary Dealers | Jan. 2018 | .75 |
| Median Blue Chip (6–10–year) | Dec. 2017 | .90 |
| Congressional Budget Office (10–year) | June 2017 | 1.10 |

Note: All time–series estimates run through 2017:Q4. The shaded vertical areas in the top panel are NBER recessions. In addition to the studies listed in the middle panel, the computation of the mean and the range in the top panel includes estimates from Christensen and Rudebusch (2017). The middle panel reports, where available, 68 percent uncertainty bands around each point estimate for 2017:Q4. See the technical appendix for sources.

## Outcomes of Simple Policy Rule Simulations

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

| Outcome and strategy | 2017 H2 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|
| *Nominal federal funds rate[1]* | | | | | | | |
| Taylor (1999) | 1.2 | 4.7 | 5.4 | 5.8 | 5.6 | 5.1 | 4.5 |
| Taylor (1993) | 1.2 | 3.8 | 4.5 | 4.9 | 4.8 | 4.5 | 4.1 |
| First-difference | 1.2 | 3.2 | 4.6 | 5.3 | 5.1 | 4.5 | 4.0 |
| Nominal income targeting | 1.2 | 1.8 | 2.9 | 3.9 | 4.5 | 4.6 | 4.3 |
| Extended Tealbook baseline | 1.2 | 2.7 | 4.0 | 5.0 | 5.3 | 5.2 | 4.8 |
| | | | | | | | |
| *Real GDP* | | | | | | | |
| Taylor (1999) | 3.0 | 2.6 | 2.4 | 2.2 | 1.7 | 1.2 | 1.1 |
| Taylor (1993) | 3.0 | 2.9 | 2.8 | 2.4 | 1.7 | 1.1 | 1.0 |
| First-difference | 3.0 | 2.9 | 2.6 | 2.2 | 1.6 | 1.1 | 1.1 |
| Nominal income targeting | 3.0 | 3.2 | 3.1 | 2.3 | 1.4 | .7 | .8 |
| Extended Tealbook baseline | 3.0 | 2.9 | 2.6 | 2.1 | 1.4 | .9 | .9 |
| | | | | | | | |
| *Unemployment rate[1]* | | | | | | | |
| Taylor (1999) | 4.1 | 3.7 | 3.4 | 3.3 | 3.4 | 3.6 | 3.8 |
| Taylor (1993) | 4.1 | 3.5 | 3.1 | 2.9 | 2.9 | 3.2 | 3.5 |
| First-difference | 4.1 | 3.5 | 3.1 | 3.0 | 3.1 | 3.3 | 3.6 |
| Nominal income targeting | 4.1 | 3.4 | 2.8 | 2.6 | 2.8 | 3.2 | 3.7 |
| Extended Tealbook baseline | 4.1 | 3.5 | 3.1 | 3.1 | 3.3 | 3.6 | 4.0 |
| | | | | | | | |
| *Total PCE prices* | | | | | | | |
| Taylor (1999) | 2.1 | 1.9 | 2.0 | 2.2 | 2.3 | 2.3 | 2.3 |
| Taylor (1993) | 2.1 | 1.9 | 2.2 | 2.3 | 2.4 | 2.4 | 2.4 |
| First-difference | 2.1 | 1.9 | 2.1 | 2.2 | 2.3 | 2.3 | 2.3 |
| Nominal income targeting | 2.1 | 1.9 | 2.1 | 2.2 | 2.3 | 2.3 | 2.3 |
| Extended Tealbook baseline | 2.1 | 1.8 | 2.0 | 2.1 | 2.2 | 2.2 | 2.2 |
| | | | | | | | |
| *Core PCE prices* | | | | | | | |
| Taylor (1999) | 1.6 | 2.0 | 2.1 | 2.2 | 2.3 | 2.3 | 2.3 |
| Taylor (1993) | 1.6 | 2.0 | 2.3 | 2.4 | 2.5 | 2.5 | 2.5 |
| First-difference | 1.6 | 2.0 | 2.2 | 2.3 | 2.4 | 2.4 | 2.4 |
| Nominal income targeting | 1.6 | 2.0 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 |
| Extended Tealbook baseline | 1.6 | 1.9 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 |

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

**Monetary Policy Strategies**

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**Monetary Policy Strategies**

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

| Outcome and strategy | 2018 | | | | 2019 | | | |
|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| *Nominal federal funds rate[1]* | | | | | | | | |
| Taylor (1999) | 1.4 | 4.1 | 4.5 | 4.7 | 4.8 | 4.9 | 5.2 | 5.4 |
| Taylor (1993) | 1.4 | 3.3 | 3.6 | 3.8 | 3.9 | 4.1 | 4.3 | 4.5 |
| First-difference | 1.4 | 2.1 | 2.7 | 3.2 | 3.6 | 4.0 | 4.4 | 4.6 |
| Nominal income targeting | 1.4 | 1.5 | 1.7 | 1.8 | 2.1 | 2.3 | 2.6 | 2.9 |
| Extended Tealbook baseline | 1.4 | 1.8 | 2.3 | 2.7 | 3.0 | 3.4 | 3.7 | 4.0 |
| *Real GDP* | | | | | | | | |
| Taylor (1999) | 2.8 | 2.8 | 2.7 | 2.6 | 2.7 | 2.6 | 2.5 | 2.4 |
| Taylor (1993) | 2.8 | 2.8 | 2.8 | 2.9 | 3.1 | 3.0 | 2.9 | 2.8 |
| First-difference | 2.8 | 2.8 | 2.9 | 2.9 | 3.1 | 3.0 | 2.8 | 2.6 |
| Nominal income targeting | 2.8 | 2.8 | 3.0 | 3.2 | 3.5 | 3.5 | 3.3 | 3.1 |
| Extended Tealbook baseline | 2.8 | 2.8 | 2.9 | 2.9 | 3.1 | 3.0 | 2.8 | 2.6 |
| *Unemployment rate[1]* | | | | | | | | |
| Taylor (1999) | 4.1 | 3.9 | 3.8 | 3.7 | 3.5 | 3.5 | 3.4 | 3.4 |
| Taylor (1993) | 4.1 | 3.9 | 3.7 | 3.5 | 3.4 | 3.3 | 3.2 | 3.1 |
| First-difference | 4.1 | 3.9 | 3.7 | 3.5 | 3.3 | 3.2 | 3.2 | 3.1 |
| Nominal income targeting | 4.1 | 3.9 | 3.6 | 3.4 | 3.1 | 3.0 | 2.9 | 2.8 |
| Extended Tealbook baseline | 4.1 | 3.9 | 3.7 | 3.5 | 3.3 | 3.2 | 3.2 | 3.1 |
| *Total PCE prices* | | | | | | | | |
| Taylor (1999) | 1.8 | 2.1 | 2.1 | 1.9 | 1.7 | 1.8 | 1.9 | 2.0 |
| Taylor (1993) | 1.8 | 2.1 | 2.2 | 1.9 | 1.8 | 2.0 | 2.1 | 2.2 |
| First-difference | 1.8 | 2.1 | 2.1 | 1.9 | 1.8 | 1.9 | 2.0 | 2.1 |
| Nominal income targeting | 1.8 | 2.1 | 2.1 | 1.9 | 1.8 | 1.9 | 2.0 | 2.1 |
| Extended Tealbook baseline | 1.8 | 2.1 | 2.1 | 1.8 | 1.7 | 1.8 | 1.9 | 2.0 |
| *Core PCE prices* | | | | | | | | |
| Taylor (1999) | 1.6 | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | 2.0 | 2.1 |
| Taylor (1993) | 1.6 | 1.9 | 2.1 | 2.0 | 2.0 | 2.1 | 2.2 | 2.3 |
| First-difference | 1.6 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.2 |
| Nominal income targeting | 1.6 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.2 |
| Extended Tealbook baseline | 1.6 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 |

1. Percent, average for the quarter.

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

| Outcome and strategy | 2017 H2 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|
| *Nominal federal funds rate[1]* | | | | | | | |
| Equal weights | 1.2 | 4.5 | 7.2 | 8.3 | 8.3 | 7.5 | 6.3 |
| Large weight on inflation gap | 1.2 | 4.5 | 7.1 | 8.1 | 8.0 | 7.2 | 6.1 |
| Minimal weight on rate adjustments | 1.2 | 12.0 | 9.2 | 7.6 | 7.8 | 8.7 | 7.2 |
| Asymmetric weight on *ugap* | 1.2 | 2.0 | 2.7 | 3.5 | 4.1 | 4.6 | 4.8 |
| Extended Tealbook baseline | 1.2 | 2.7 | 4.0 | 5.0 | 5.3 | 5.2 | 4.8 |
| | | | | | | | |
| *Real GDP* | | | | | | | |
| Equal weights | 3.0 | 2.3 | 1.3 | 1.4 | 1.4 | 1.4 | 1.3 |
| Large weight on inflation gap | 3.0 | 2.4 | 1.4 | 1.5 | 1.4 | 1.4 | 1.3 |
| Minimal weight on rate adjustments | 3.0 | 1.5 | .8 | 2.0 | 1.9 | 1.4 | 1.2 |
| Asymmetric weight on *ugap* | 3.0 | 3.1 | 3.0 | 2.3 | 1.4 | .6 | .6 |
| Extended Tealbook baseline | 3.0 | 2.9 | 2.6 | 2.1 | 1.4 | .9 | .9 |
| | | | | | | | |
| *Unemployment rate[1]* | | | | | | | |
| Equal weights | 4.1 | 3.7 | 4.1 | 4.4 | 4.7 | 4.7 | 4.7 |
| Large weight on inflation gap | 4.1 | 3.7 | 4.0 | 4.3 | 4.5 | 4.6 | 4.6 |
| Minimal weight on rate adjustments | 4.1 | 4.3 | 4.7 | 4.6 | 4.7 | 4.6 | 4.6 |
| Asymmetric weight on *ugap* | 4.1 | 3.4 | 2.8 | 2.7 | 2.8 | 3.4 | 4.0 |
| Extended Tealbook baseline | 4.1 | 3.5 | 3.1 | 3.1 | 3.3 | 3.6 | 4.0 |
| | | | | | | | |
| *Total PCE prices* | | | | | | | |
| Equal weights | 2.1 | 1.7 | 1.7 | 1.8 | 1.9 | 2.0 | 2.0 |
| Large weight on inflation gap | 2.1 | 1.7 | 1.7 | 1.8 | 1.9 | 2.0 | 2.0 |
| Minimal weight on rate adjustments | 2.1 | 1.7 | 1.7 | 1.8 | 1.9 | 2.0 | 2.0 |
| Asymmetric weight on *ugap* | 2.1 | 1.8 | 2.0 | 2.1 | 2.2 | 2.2 | 2.2 |
| Extended Tealbook baseline | 2.1 | 1.8 | 2.0 | 2.1 | 2.2 | 2.2 | 2.2 |
| | | | | | | | |
| *Core PCE prices* | | | | | | | |
| Equal weights | 1.6 | 1.8 | 1.8 | 1.9 | 2.0 | 2.0 | 2.0 |
| Large weight on inflation gap | 1.6 | 1.8 | 1.8 | 1.9 | 2.0 | 2.0 | 2.0 |
| Minimal weight on rate adjustments | 1.6 | 1.8 | 1.8 | 1.9 | 2.0 | 2.0 | 2.0 |
| Asymmetric weight on *ugap* | 1.6 | 2.0 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 |
| Extended Tealbook baseline | 1.6 | 1.9 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 |

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

**Monetary Policy Strategies**

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

**Monetary Policy Strategies**

| Outcome and strategy | 2018 | | | | 2019 | | | |
|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| *Nominal federal funds rate[1]* | | | | | | | | |
| Equal weights | 1.4 | 2.6 | 3.6 | 4.5 | 5.3 | 6.1 | 6.7 | 7.2 |
| Large weight on inflation gap | 1.4 | 2.5 | 3.6 | 4.5 | 5.3 | 6.0 | 6.6 | 7.1 |
| Minimal weight on rate adjustments | 1.4 | 8.1 | 11.2 | 12.0 | 11.7 | 10.8 | 9.9 | 9.2 |
| Asymmetric weight on *ugap* | 1.4 | 1.6 | 1.8 | 2.0 | 2.2 | 2.3 | 2.5 | 2.7 |
| Extended Tealbook baseline | 1.4 | 1.8 | 2.3 | 2.7 | 3.0 | 3.4 | 3.7 | 4.0 |
| *Real GDP* | | | | | | | | |
| Equal weights | 2.8 | 2.8 | 2.6 | 2.3 | 2.1 | 1.7 | 1.5 | 1.3 |
| Large weight on inflation gap | 2.8 | 2.8 | 2.6 | 2.4 | 2.2 | 1.8 | 1.6 | 1.4 |
| Minimal weight on rate adjustments | 2.8 | 2.8 | 2.2 | 1.5 | 1.0 | .4 | .6 | .8 |
| Asymmetric weight on *ugap* | 2.8 | 2.8 | 3.0 | 3.1 | 3.4 | 3.4 | 3.2 | 3.0 |
| Extended Tealbook baseline | 2.8 | 2.8 | 2.9 | 2.9 | 3.1 | 3.0 | 2.8 | 2.6 |
| *Unemployment rate[1]* | | | | | | | | |
| Equal weights | 4.1 | 3.9 | 3.8 | 3.7 | 3.7 | 3.8 | 3.9 | 4.1 |
| Large weight on inflation gap | 4.1 | 3.9 | 3.8 | 3.7 | 3.7 | 3.8 | 3.9 | 4.0 |
| Minimal weight on rate adjustments | 4.1 | 3.9 | 4.1 | 4.3 | 4.5 | 4.6 | 4.7 | 4.7 |
| Asymmetric weight on *ugap* | 4.1 | 3.9 | 3.6 | 3.4 | 3.1 | 3.0 | 2.9 | 2.8 |
| Extended Tealbook baseline | 4.1 | 3.9 | 3.7 | 3.5 | 3.3 | 3.2 | 3.2 | 3.1 |
| *Total PCE prices* | | | | | | | | |
| Equal weights | 1.8 | 2.1 | 2.0 | 1.7 | 1.5 | 1.5 | 1.6 | 1.7 |
| Large weight on inflation gap | 1.8 | 2.1 | 2.1 | 1.7 | 1.5 | 1.6 | 1.6 | 1.7 |
| Minimal weight on rate adjustments | 1.8 | 2.1 | 2.0 | 1.7 | 1.5 | 1.5 | 1.6 | 1.7 |
| Asymmetric weight on *ugap* | 1.8 | 2.1 | 2.1 | 1.8 | 1.7 | 1.8 | 1.9 | 2.0 |
| Extended Tealbook baseline | 1.8 | 2.1 | 2.1 | 1.8 | 1.7 | 1.8 | 1.9 | 2.0 |
| *Core PCE prices* | | | | | | | | |
| Equal weights | 1.6 | 1.9 | 1.9 | 1.8 | 1.7 | 1.6 | 1.7 | 1.8 |
| Large weight on inflation gap | 1.6 | 1.9 | 1.9 | 1.8 | 1.7 | 1.7 | 1.7 | 1.8 |
| Minimal weight on rate adjustments | 1.6 | 1.9 | 1.9 | 1.8 | 1.7 | 1.6 | 1.7 | 1.8 |
| Asymmetric weight on *ugap* | 1.6 | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | 2.0 | 2.1 |
| Extended Tealbook baseline | 1.6 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 |

1. Percent, average for the quarter.

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

| Interval | Nominal GDP | | Real GDP | | PCE price index | | Core PCE price index | | Unemployment rate[1] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 01/19/18 | 03/09/18 | 01/19/18 | 03/09/18 | 01/19/18 | 03/09/18 | 01/19/18 | 03/09/18 | 01/19/18 | 03/09/18 |
| *Quarterly* | | | | | | | | | | |
| 2017:Q1 | 3.3 | 3.3 | 1.2 | 1.2 | 2.2 | 2.2 | 1.8 | 1.8 | 4.6 | 4.6 |
| Q2 | 4.1 | 4.1 | 3.1 | 3.1 | .3 | .3 | .9 | .9 | 4.3 | 4.3 |
| Q3 | 5.3 | 5.3 | 3.2 | 3.2 | 1.5 | 1.5 | 1.3 | 1.3 | 4.3 | 4.3 |
| Q4 | 6.0 | 5.3 | 3.5 | 2.9 | 2.7 | 2.7 | 1.8 | 1.9 | 4.1 | 4.1 |
| 2018:Q1 | 4.8 | 4.4 | 2.7 | 2.1 | 2.4 | 2.5 | 2.1 | 2.3 | 3.9 | 4.1 |
| Q2 | 4.9 | 4.9 | 3.2 | 3.1 | 1.8 | 1.5 | 2.0 | 2.0 | 3.8 | 3.9 |
| Q3 | 5.0 | 5.3 | 3.0 | 3.3 | 1.7 | 1.7 | 1.8 | 1.8 | 3.6 | 3.7 |
| Q4 | 4.7 | 5.1 | 2.8 | 3.2 | 1.6 | 1.6 | 1.7 | 1.7 | 3.4 | 3.5 |
| 2019:Q1 | 5.0 | 5.1 | 2.7 | 2.9 | 1.9 | 1.9 | 2.0 | 2.0 | 3.3 | 3.3 |
| Q2 | 4.7 | 4.8 | 2.6 | 2.7 | 1.9 | 2.0 | 2.1 | 2.1 | 3.2 | 3.2 |
| Q3 | 4.4 | 4.6 | 2.3 | 2.5 | 2.0 | 2.0 | 2.1 | 2.1 | 3.2 | 3.2 |
| Q4 | 4.2 | 4.4 | 2.2 | 2.3 | 2.0 | 2.0 | 2.1 | 2.1 | 3.2 | 3.1 |
| *Two-quarter[2]* | | | | | | | | | | |
| 2017:Q2 | 3.7 | 3.7 | 2.1 | 2.1 | 1.2 | 1.2 | 1.4 | 1.4 | -.4 | -.4 |
| Q4 | 5.7 | 5.3 | 3.3 | 3.0 | 2.1 | 2.1 | 1.6 | 1.6 | -.2 | -.2 |
| 2018:Q2 | 4.8 | 4.6 | 3.0 | 2.6 | 2.1 | 2.0 | 2.1 | 2.1 | -.3 | -.2 |
| Q4 | 4.9 | 5.2 | 2.9 | 3.3 | 1.6 | 1.6 | 1.8 | 1.8 | -.4 | -.4 |
| 2019:Q2 | 4.8 | 5.0 | 2.6 | 2.8 | 1.9 | 1.9 | 2.0 | 2.0 | -.2 | -.3 |
| Q4 | 4.3 | 4.5 | 2.2 | 2.4 | 2.0 | 2.0 | 2.1 | 2.1 | .0 | -.1 |
| *Four-quarter[3]* | | | | | | | | | | |
| 2016:Q4 | 3.4 | 3.4 | 1.8 | 1.8 | 1.6 | 1.6 | 1.9 | 1.9 | -.3 | -.3 |
| 2017:Q4 | 4.7 | 4.5 | 2.7 | 2.6 | 1.7 | 1.7 | 1.5 | 1.5 | -.6 | -.6 |
| 2018:Q4 | 4.9 | 4.9 | 2.9 | 2.9 | 1.9 | 1.8 | 1.9 | 1.9 | -.7 | -.6 |
| 2019:Q4 | 4.6 | 4.7 | 2.4 | 2.6 | 1.9 | 2.0 | 2.1 | 2.1 | -.2 | -.4 |
| 2020:Q4 | 4.1 | 4.3 | 2.0 | 2.1 | 2.0 | 2.1 | 2.1 | 2.2 | .0 | .0 |
| *Annual* | | | | | | | | | | |
| 2016 | 2.8 | 2.8 | 1.5 | 1.5 | 1.2 | 1.2 | 1.8 | 1.8 | 4.9 | 4.9 |
| 2017 | 4.2 | 4.1 | 2.3 | 2.3 | 1.7 | 1.7 | 1.5 | 1.5 | 4.4 | 4.4 |
| 2018 | 5.1 | 4.9 | 3.1 | 2.9 | 2.0 | 1.9 | 1.8 | 1.9 | 3.7 | 3.8 |
| 2019 | 4.8 | 4.9 | 2.7 | 2.9 | 1.8 | 1.8 | 2.0 | 2.0 | 3.2 | 3.2 |
| 2020 | 4.3 | 4.4 | 2.1 | 2.2 | 2.0 | 2.0 | 2.1 | 2.1 | 3.2 | 3.1 |

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**

**Greensheets**

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

| Item | 2017 Q2 | Q3 | Q4 | 2018 Q1 | Q2 | Q3 | Q4 | 2019 Q1 | Q2 | Q3 | Q4 | 2017[1] | 2018[1] | 2019[1] | 2020[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Real GDP | 3.1 | 3.2 | 2.9 | 2.1 | 3.1 | 3.3 | 3.2 | 2.9 | 2.7 | 2.5 | 2.3 | 2.6 | 2.9 | 2.6 | 2.1 |
| *Previous Tealbook* | 3.1 | 3.2 | 3.5 | 2.7 | 3.2 | 3.0 | 2.8 | 2.7 | 2.6 | 2.3 | 2.2 | 2.7 | 2.9 | 2.4 | 2.0 |
| Final sales | 3.0 | 2.4 | 3.6 | 1.3 | 3.3 | 3.3 | 3.5 | 3.0 | 2.7 | 2.6 | 2.4 | 2.9 | 2.8 | 2.7 | 2.1 |
| *Previous Tealbook* | 3.0 | 2.4 | 4.0 | 2.2 | 3.1 | 3.2 | 3.2 | 2.8 | 2.4 | 2.2 | 2.2 | 3.0 | 2.9 | 2.4 | 2.0 |
| Priv. dom. final purch. | 3.3 | 2.2 | 5.0 | 1.6 | 3.4 | 3.4 | 3.3 | 3.1 | 2.9 | 2.7 | 2.4 | 3.4 | 2.9 | 2.8 | 2.5 |
| *Previous Tealbook* | 3.3 | 2.2 | 4.9 | 2.7 | 3.5 | 3.6 | 3.4 | 3.0 | 2.8 | 2.6 | 2.5 | 3.4 | 3.3 | 2.7 | 2.5 |
| Personal cons. expend. | 3.3 | 2.2 | 4.2 | 1.5 | 2.6 | 2.9 | 2.9 | 2.8 | 2.8 | 2.7 | 2.6 | 2.9 | 2.4 | 2.8 | 2.5 |
| *Previous Tealbook* | 3.3 | 2.2 | 3.8 | 2.6 | 2.9 | 3.0 | 3.0 | 2.9 | 2.8 | 2.7 | 2.6 | 2.8 | 2.9 | 2.8 | 2.5 |
| Durables | 7.6 | 8.6 | 13.8 | -1.8 | 4.3 | 4.5 | 4.1 | 2.3 | 2.3 | 2.2 | 2.1 | 7.4 | 2.8 | 2.3 | 1.9 |
| Nondurables | 4.2 | 2.3 | 4.3 | 2.0 | 3.4 | 3.1 | 3.1 | 2.9 | 2.9 | 2.8 | 2.7 | 3.0 | 2.9 | 2.9 | 2.6 |
| Services | 2.3 | 1.1 | 2.7 | 1.9 | 2.1 | 2.5 | 2.6 | 2.9 | 2.9 | 2.8 | 2.7 | 2.1 | 2.3 | 2.8 | 2.6 |
| Residential investment | -7.3 | -4.7 | 12.4 | -4.4 | 2.7 | 4.0 | 4.1 | 2.5 | .3 | -.1 | -.8 | 2.5 | 1.6 | .5 | 4.2 |
| *Previous Tealbook* | -7.3 | -4.7 | 11.3 | -1.0 | 5.2 | 7.9 | 4.9 | 2.2 | .1 | -.1 | -.7 | 2.2 | 4.2 | .4 | 4.1 |
| Nonres. priv. fixed invest. | 6.7 | 4.7 | 7.1 | 4.2 | 8.2 | 6.2 | 5.5 | 4.9 | 4.3 | 3.4 | 2.4 | 6.4 | 6.0 | 3.8 | 1.8 |
| *Previous Tealbook* | 6.7 | 4.7 | 8.9 | 4.6 | 6.3 | 5.4 | 4.7 | 3.9 | 3.6 | 3.1 | 2.6 | 6.8 | 5.2 | 3.3 | 1.7 |
| Equipment & intangibles | 6.6 | 8.4 | 7.4 | 4.5 | 7.2 | 6.8 | 6.4 | 5.5 | 4.6 | 3.7 | 2.4 | 6.8 | 6.2 | 4.1 | 2.1 |
| *Previous Tealbook* | 6.6 | 8.4 | 10.8 | 5.3 | 6.5 | 5.6 | 5.4 | 4.3 | 4.2 | 3.5 | 3.0 | 7.7 | 5.7 | 3.8 | 2.1 |
| Nonres. structures | 7.0 | -7.0 | 6.2 | 3.4 | 11.6 | 4.0 | 2.8 | 3.1 | 3.5 | 2.5 | 2.1 | 4.9 | 5.4 | 2.8 | .9 |
| *Previous Tealbook* | 7.0 | -7.0 | 2.6 | 2.1 | 5.6 | 4.7 | 2.5 | 2.5 | 1.5 | 1.6 | 1.4 | 4.0 | 3.7 | 1.8 | .5 |
| Net exports[2] | -614 | -598 | -653 | -654 | -647 | -643 | -637 | -638 | -649 | -657 | -661 | -622 | -645 | -651 | -702 |
| *Previous Tealbook[2]* | -614 | -598 | -627 | -632 | -631 | -628 | -623 | -618 | -625 | -633 | -641 | -615 | -628 | -629 | -678 |
| Exports | 3.5 | 2.1 | 6.9 | 2.9 | 5.4 | 7.0 | 5.4 | 5.6 | 5.1 | 5.1 | 4.2 | 4.9 | 5.2 | 5.0 | 3.4 |
| Imports | 1.5 | -.7 | 14.0 | 2.2 | 3.2 | 4.9 | 3.4 | 4.6 | 5.5 | 5.0 | 3.8 | 4.6 | 3.4 | 4.7 | 4.9 |
| Gov't. cons. & invest. | -.2 | .7 | 3.0 | -.3 | .8 | 1.8 | 2.7 | 1.7 | 2.3 | 2.2 | 2.4 | .7 | 1.2 | 2.1 | 1.8 |
| *Previous Tealbook* | -.2 | .7 | 2.4 | -.1 | .4 | .0 | 1.0 | .2 | .9 | .5 | 1.0 | .6 | .3 | .7 | .8 |
| Federal | 1.9 | 1.3 | 3.3 | -2.1 | .6 | 3.2 | 5.6 | 2.9 | 4.6 | 4.2 | 4.7 | 1.0 | 1.8 | 4.1 | 3.2 |
| Defense | 4.7 | 2.4 | 5.6 | -2.5 | 1.0 | 3.7 | 7.0 | 3.0 | 5.7 | 5.1 | 5.5 | 2.3 | 2.2 | 4.8 | 3.6 |
| Nondefense | -1.9 | -.2 | .0 | -1.6 | .0 | 2.4 | 3.5 | 2.8 | 2.9 | 3.0 | 3.5 | -.8 | 1.1 | 3.0 | 2.7 |
| State & local | -1.5 | .2 | 2.8 | .8 | 1.0 | .9 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | .5 | .9 | 1.0 | 1.0 |
| Change in priv. inventories[2] | 5 | 39 | 10 | 44 | 38 | 37 | 28 | 24 | 22 | 18 | 14 | 14 | 37 | 19 | 8 |
| *Previous Tealbook[2]* | 5 | 39 | 18 | 40 | 42 | 35 | 22 | 19 | 25 | 30 | 30 | 16 | 35 | 26 | 37 |

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 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|
| Real GDP | 1.7 | 1.3 | 2.7 | 2.7 | 2.0 | 1.8 | 2.6 | 2.9 | 2.6 | 2.1 |
| *Previous Tealbook* | 1.7 | 1.3 | 2.7 | 2.7 | 2.0 | 1.8 | 2.7 | 2.9 | 2.4 | 2.0 |
| Final sales | 1.5 | 1.7 | 2.0 | 2.9 | 2.0 | 1.9 | 2.9 | 2.8 | 2.7 | 2.1 |
| *Previous Tealbook* | 1.5 | 1.7 | 2.0 | 2.9 | 2.0 | 1.9 | 3.0 | 2.9 | 2.4 | 2.0 |
| Priv. dom. final purch. | 2.6 | 2.3 | 2.6 | 4.1 | 2.9 | 2.5 | 3.4 | 2.9 | 2.8 | 2.5 |
| *Previous Tealbook* | 2.6 | 2.3 | 2.6 | 4.1 | 2.9 | 2.5 | 3.4 | 3.3 | 2.7 | 2.5 |
| Personal cons. expend. | 1.5 | 1.3 | 2.0 | 3.6 | 3.0 | 2.8 | 2.9 | 2.4 | 2.8 | 2.5 |
| *Previous Tealbook* | 1.5 | 1.3 | 2.0 | 3.6 | 3.0 | 2.8 | 2.8 | 2.9 | 2.8 | 2.5 |
| Durables | 4.8 | 7.2 | 5.2 | 8.7 | 6.4 | 7.0 | 7.4 | 2.8 | 2.3 | 1.9 |
| Nondurables | .4 | .8 | 2.6 | 2.8 | 2.8 | 2.5 | 3.0 | 2.9 | 2.9 | 2.6 |
| Services | 1.4 | .6 | 1.3 | 3.0 | 2.6 | 2.3 | 2.1 | 2.3 | 2.8 | 2.6 |
| Residential investment | 6.0 | 15.7 | 6.8 | 6.3 | 10.3 | 2.5 | 2.5 | 1.6 | .5 | 4.2 |
| *Previous Tealbook* | 6.0 | 15.7 | 6.8 | 6.3 | 10.3 | 2.5 | 2.2 | 4.2 | .4 | 4.1 |
| Nonres. priv. fixed invest. | 9.0 | 5.2 | 4.8 | 6.1 | .3 | .7 | 6.4 | 6.0 | 3.8 | 1.8 |
| *Previous Tealbook* | 9.0 | 5.2 | 4.8 | 6.1 | .3 | .7 | 6.8 | 5.2 | 3.3 | 1.7 |
| Equipment & intangibles | 9.2 | 5.5 | 4.5 | 5.3 | 3.3 | -.1 | 6.8 | 6.2 | 4.1 | 2.1 |
| *Previous Tealbook* | 9.2 | 5.5 | 4.5 | 5.3 | 3.3 | -.1 | 7.7 | 5.7 | 3.8 | 2.1 |
| Nonres. structures | 8.0 | 4.1 | 5.8 | 8.8 | -9.1 | 3.5 | 4.9 | 5.4 | 2.8 | .9 |
| *Previous Tealbook* | 8.0 | 4.1 | 5.8 | 8.8 | -9.1 | 3.5 | 4.0 | 3.7 | 1.8 | .5 |
| Net exports[1] | -459 | -447 | -405 | -428 | -545 | -586 | -622 | -645 | -651 | -702 |
| *Previous Tealbook[1]* | -459 | -447 | -405 | -428 | -545 | -586 | -615 | -628 | -629 | -678 |
| Exports | 4.2 | 2.2 | 5.9 | 3.0 | -1.8 | .6 | 4.9 | 5.2 | 5.0 | 3.4 |
| Imports | 3.5 | .3 | 2.5 | 6.2 | 2.9 | 2.7 | 4.6 | 3.4 | 4.7 | 4.9 |
| Gov't. cons. & invest. | -3.0 | -2.2 | -2.8 | .5 | 1.6 | .4 | .7 | 1.2 | 2.1 | 1.8 |
| *Previous Tealbook* | -3.0 | -2.2 | -2.8 | .5 | 1.6 | .4 | .6 | .3 | .7 | .8 |
| Federal | -4.0 | -2.1 | -6.7 | -1.2 | 1.2 | -.3 | 1.0 | 1.8 | 4.1 | 3.2 |
| Defense | -4.1 | -3.9 | -7.1 | -4.0 | .0 | -1.4 | 2.3 | 2.2 | 4.8 | 3.6 |
| Nondefense | -3.9 | 1.0 | -6.0 | 3.5 | 2.9 | 1.2 | -.8 | 1.1 | 3.0 | 2.7 |
| State & local | -2.3 | -2.3 | -.1 | 1.5 | 1.9 | .8 | .5 | .9 | 1.0 | 1.0 |
| Change in priv. inventories[1] | 38 | 55 | 79 | 68 | 101 | 33 | 14 | 37 | 19 | 8 |
| *Previous Tealbook[1]* | 38 | 55 | 79 | 68 | 101 | 33 | 16 | 35 | 26 | 37 |

1. Billions of chained (2009) dollars.

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

| Item | 2017 Q2 | 2017 Q3 | 2017 Q4 | 2018 Q1 | 2018 Q2 | 2018 Q3 | 2018 Q4 | 2019 Q1 | 2019 Q2 | 2019 Q3 | 2019 Q4 | 2017[1] | 2018[1] | 2019[1] | 2020[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Real GDP | 3.1 | 3.2 | 2.9 | 2.1 | 3.1 | 3.3 | 3.2 | 2.9 | 2.7 | 2.5 | 2.3 | 2.6 | 2.9 | 2.6 | 2.1 |
| *Previous Tealbook* | 3.1 | 3.2 | 3.5 | 2.7 | 3.2 | 3.0 | 2.8 | 2.7 | 2.6 | 2.3 | 2.2 | 2.7 | 2.9 | 2.4 | 2.0 |
| Final sales | 2.9 | 2.4 | 3.6 | 1.3 | 3.2 | 3.3 | 3.4 | 3.0 | 2.7 | 2.6 | 2.4 | 2.6 | 2.8 | 2.7 | 2.1 |
| *Previous Tealbook* | 2.9 | 2.4 | 4.0 | 2.2 | 3.1 | 3.2 | 3.2 | 2.8 | 2.4 | 2.2 | 2.2 | 2.7 | 2.9 | 2.4 | 2.0 |
| Priv. dom. final purch. | 2.8 | 1.9 | 4.2 | 1.4 | 2.9 | 2.9 | 2.8 | 2.7 | 2.5 | 2.3 | 2.1 | 2.9 | 2.5 | 2.4 | 2.1 |
| *Previous Tealbook* | 2.8 | 1.9 | 4.1 | 2.3 | 3.0 | 3.1 | 2.9 | 2.6 | 2.4 | 2.3 | 2.1 | 2.9 | 2.8 | 2.3 | 2.1 |
| Personal cons. expend. | 2.2 | 1.5 | 2.9 | 1.0 | 1.8 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.8 | 2.0 | 1.7 | 1.9 | 1.7 |
| *Previous Tealbook* | 2.2 | 1.5 | 2.6 | 1.8 | 2.0 | 2.1 | 2.1 | 2.0 | 1.9 | 1.9 | 1.8 | 1.9 | 2.0 | 1.9 | 1.7 |
| Durables | .6 | .6 | 1.0 | -.1 | .3 | .3 | .3 | .2 | .2 | .2 | .2 | .6 | .2 | .2 | .1 |
| Nondurables | .6 | .3 | .6 | .3 | .5 | .4 | .4 | .4 | .4 | .4 | .4 | .4 | .4 | .4 | .4 |
| Services | 1.1 | .5 | 1.3 | .9 | 1.0 | 1.2 | 1.2 | 1.4 | 1.3 | 1.3 | 1.3 | 1.0 | 1.1 | 1.3 | 1.2 |
| Residential investment | -.3 | -.2 | .5 | -.2 | .1 | .2 | .2 | .1 | .0 | .0 | .0 | .1 | .1 | .0 | .2 |
| *Previous Tealbook* | -.3 | -.2 | .4 | .0 | .2 | .3 | .2 | .1 | .0 | .0 | .0 | .1 | .2 | .0 | .2 |
| Nonres. priv. fixed invest. | .8 | .6 | .9 | .5 | 1.0 | .8 | .7 | .6 | .6 | .4 | .3 | .8 | .8 | .5 | .2 |
| *Previous Tealbook* | .8 | .6 | 1.1 | .6 | .8 | .7 | .6 | .5 | .5 | .4 | .3 | .8 | .7 | .4 | .2 |
| Equipment & intangibles | .6 | .8 | .7 | .4 | .7 | .7 | .6 | .5 | .5 | .4 | .2 | .6 | .6 | .4 | .2 |
| *Previous Tealbook* | .6 | .8 | 1.0 | .5 | .6 | .6 | .5 | .4 | .4 | .3 | .3 | .7 | .6 | .4 | .2 |
| Nonres. structures | .2 | -.2 | .2 | .1 | .3 | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .2 | .1 | .0 |
| *Previous Tealbook* | .2 | -.2 | .1 | .1 | .2 | .1 | .1 | .1 | .0 | .0 | .0 | .1 | .1 | .1 | .0 |
| Net exports | .2 | .4 | -1.2 | .0 | .2 | .1 | .2 | .0 | -.2 | -.1 | -.1 | -.1 | .1 | -.1 | -.3 |
| *Previous Tealbook* | .2 | .4 | -.6 | -.1 | .0 | .1 | .1 | .1 | -.1 | -.1 | -.1 | .0 | .0 | -.1 | -.3 |
| Exports | .4 | .3 | .8 | .3 | .7 | .9 | .7 | .7 | .6 | .6 | .5 | .6 | .6 | .6 | .4 |
| Imports | -.2 | .1 | -2.0 | -.3 | -.5 | -.7 | -.5 | -.7 | -.8 | -.8 | -.6 | -.7 | -.5 | -.7 | -.7 |
| Gov't. cons. & invest. | .0 | .1 | .5 | .0 | .1 | .3 | .5 | .3 | .4 | .4 | .4 | .1 | .2 | .4 | .3 |
| *Previous Tealbook* | .0 | .1 | .4 | .0 | .1 | .0 | .2 | .0 | .2 | .1 | .2 | .1 | .1 | .1 | .1 |
| Federal | .1 | .1 | .2 | -.1 | .0 | .2 | .4 | .2 | .3 | .3 | .3 | .1 | .1 | .3 | .2 |
| Defense | .2 | .1 | .2 | -.1 | .0 | .1 | .3 | .1 | .2 | .2 | .2 | .1 | .1 | .2 | .1 |
| Nondefense | -.1 | .0 | .0 | .0 | .0 | .1 | .1 | .1 | .1 | .1 | .1 | .0 | .0 | .1 | .1 |
| State & local | -.2 | .0 | .3 | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .1 |
| Change in priv. inventories | .1 | .8 | -.6 | .8 | -.2 | .0 | -.2 | -.1 | .0 | -.1 | -.1 | -.3 | .1 | -.1 | -.1 |
| *Previous Tealbook* | .1 | .8 | -.4 | .5 | .1 | -.2 | -.3 | -.1 | .1 | .1 | .0 | -.3 | .0 | .0 | .0 |

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 | 2017 Q2 | 2017 Q3 | 2017 Q4 | 2018 Q1 | 2018 Q2 | 2018 Q3 | 2018 Q4 | 2019 Q1 | 2019 Q2 | 2019 Q3 | 2019 Q4 | 2017[1] | 2018[1] | 2019[1] | 2020[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GDP chain-wt. price index | 1.0 | 2.1 | 2.3 | 2.3 | 1.7 | 1.9 | 1.8 | 2.2 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 2.1 | 2.2 |
| *Previous Tealbook* | 1.0 | 2.1 | 2.4 | 2.0 | 1.7 | 1.9 | 1.8 | 2.2 | 2.1 | 2.1 | 2.0 | 1.9 | 1.9 | 2.1 | 2.1 |
| PCE chain-wt. price index | .3 | 1.5 | 2.7 | 2.5 | 1.5 | 1.7 | 1.6 | 1.9 | 2.0 | 2.0 | 2.0 | 1.7 | 1.8 | 2.0 | 2.1 |
| *Previous Tealbook* | .3 | 1.5 | 2.7 | 2.4 | 1.8 | 1.7 | 1.6 | 1.9 | 1.9 | 2.0 | 2.0 | 1.7 | 1.9 | 1.9 | 2.0 |
| Energy | -16.0 | 8.4 | 27.6 | 11.5 | -8.9 | -1.7 | -1.6 | -1.2 | -.6 | -.5 | -.5 | 7.6 | -.4 | -.7 | -.1 |
| *Previous Tealbook* | -16.0 | 8.4 | 30.6 | 12.4 | -4.1 | -2.4 | -1.9 | -1.6 | -1.2 | -1.0 | -.8 | 8.2 | .8 | -1.1 | -.4 |
| Food | 2.0 | .2 | .2 | .9 | 1.9 | 2.1 | 2.3 | 2.4 | 2.4 | 2.4 | 2.4 | .7 | 1.8 | 2.4 | 2.4 |
| *Previous Tealbook* | 2.0 | .2 | -.1 | .9 | 1.9 | 2.1 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | .6 | 1.8 | 2.3 | 2.2 |
| Ex. food & energy | .9 | 1.3 | 1.9 | 2.3 | 2.0 | 1.8 | 1.7 | 2.0 | 2.1 | 2.1 | 2.1 | 1.5 | 1.9 | 2.1 | 2.2 |
| *Previous Tealbook* | .9 | 1.3 | 1.8 | 2.1 | 2.0 | 1.8 | 1.7 | 2.0 | 2.1 | 2.1 | 2.1 | 1.5 | 1.9 | 2.1 | 2.1 |
| Ex. food & energy, market based | .3 | 1.0 | 1.5 | 2.2 | 2.0 | 1.5 | 1.5 | 1.8 | 1.9 | 1.9 | 1.9 | 1.2 | 1.8 | 1.9 | 2.0 |
| *Previous Tealbook* | .3 | 1.0 | 1.6 | 1.8 | 1.9 | 1.6 | 1.5 | 1.8 | 1.9 | 1.9 | 1.9 | 1.2 | 1.7 | 1.9 | 1.9 |
| CPI | .1 | 2.1 | 3.3 | 3.6 | 1.6 | 1.9 | 1.9 | 2.1 | 2.2 | 2.2 | 2.3 | 2.1 | 2.3 | 2.2 | 2.4 |
| *Previous Tealbook* | -.3 | 2.0 | 3.7 | 3.1 | 2.0 | 2.0 | 2.0 | 2.2 | 2.2 | 2.3 | 2.3 | 2.1 | 2.3 | 2.2 | 2.3 |
| Ex. food & energy | .8 | 1.8 | 2.2 | 3.0 | 2.5 | 2.2 | 2.1 | 2.4 | 2.4 | 2.4 | 2.5 | 1.7 | 2.5 | 2.4 | 2.6 |
| *Previous Tealbook* | .6 | 1.7 | 2.3 | 2.6 | 2.5 | 2.3 | 2.2 | 2.4 | 2.5 | 2.5 | 2.5 | 1.7 | 2.4 | 2.5 | 2.5 |
| ECI, hourly compensation[2] | 2.2 | 3.1 | 1.9 | 2.7 | 2.4 | 2.4 | 2.4 | 2.7 | 2.7 | 2.8 | 2.8 | 2.6 | 2.5 | 2.8 | 3.0 |
| *Previous Tealbook*[2] | 2.2 | 3.1 | 2.5 | 2.6 | 2.5 | 2.5 | 2.5 | 2.6 | 2.6 | 2.7 | 2.7 | 2.8 | 2.5 | 2.7 | 2.7 |
| **Business sector** | | | | | | | | | | | | | | | |
| Output per hour | 1.6 | 3.2 | -.6 | .4 | .6 | 2.0 | 1.9 | 1.2 | .9 | .8 | .6 | .9 | 1.2 | .9 | .9 |
| *Previous Tealbook* | 1.4 | 3.3 | .2 | .5 | .9 | 1.6 | 1.3 | 1.0 | .9 | .8 | .5 | 1.0 | 1.1 | .8 | .9 |
| Compensation per hour | .5 | 4.1 | 1.7 | 3.5 | 3.0 | 4.0 | 4.0 | 4.1 | 4.1 | 4.1 | 4.1 | 2.7 | 3.6 | 4.1 | 4.3 |
| *Previous Tealbook* | .3 | 3.3 | 1.5 | 3.0 | 4.0 | 4.0 | 4.0 | 3.9 | 3.9 | 3.9 | 3.9 | 2.4 | 3.8 | 3.9 | 3.9 |
| Unit labor costs | -1.0 | .9 | 2.3 | 3.1 | 2.4 | 2.0 | 2.0 | 2.9 | 3.1 | 3.3 | 3.4 | 1.8 | 2.4 | 3.1 | 3.4 |
| *Previous Tealbook* | -1.0 | .1 | 1.3 | 2.5 | 3.1 | 2.4 | 2.7 | 2.9 | 3.0 | 3.2 | 3.4 | 1.3 | 2.7 | 3.1 | 3.0 |
| Core goods imports chain-wt. price index[3] | 2.5 | 1.1 | 1.6 | 2.8 | 3.4 | 1.3 | .9 | .7 | .7 | .6 | .6 | 1.3 | 2.1 | .7 | .6 |
| *Previous Tealbook*[3] | 2.5 | 1.1 | 1.7 | 2.4 | 3.0 | 1.1 | .8 | .7 | .6 | .6 | .6 | 1.3 | 1.8 | .6 | .6 |

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 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|
| GDP chain-wt. price index | 1.9 | 1.9 | 1.6 | 1.6 | 1.0 | 1.5 | 1.9 | 1.9 | 2.1 | 2.2 |
| *Previous Tealbook* | 1.9 | 1.9 | 1.6 | 1.6 | 1.0 | 1.5 | 1.9 | 1.9 | 2.1 | 2.1 |
| PCE chain-wt. price index | 2.7 | 1.8 | 1.2 | 1.2 | .4 | 1.6 | 1.7 | 1.8 | 2.0 | 2.1 |
| *Previous Tealbook* | 2.7 | 1.8 | 1.2 | 1.2 | .4 | 1.6 | 1.7 | 1.9 | 1.9 | 2.0 |
| Energy | 12.0 | 2.3 | -2.5 | -6.5 | -16.2 | 2.2 | 7.6 | -.4 | -.7 | -.1 |
| *Previous Tealbook* | 12.0 | 2.3 | -2.5 | -6.5 | -16.2 | 2.2 | 8.2 | .8 | -1.1 | -.4 |
| Food | 5.1 | 1.2 | .7 | 2.6 | .3 | -1.7 | .7 | 1.8 | 2.4 | 2.4 |
| *Previous Tealbook* | 5.1 | 1.2 | .7 | 2.6 | .3 | -1.7 | .6 | 1.8 | 2.3 | 2.2 |
| Ex. food & energy | 1.9 | 1.8 | 1.5 | 1.5 | 1.3 | 1.9 | 1.5 | 1.9 | 2.1 | 2.2 |
| *Previous Tealbook* | 1.9 | 1.8 | 1.5 | 1.5 | 1.3 | 1.9 | 1.5 | 1.9 | 2.1 | 2.1 |
| Ex. food & energy, market based | 1.9 | 1.5 | 1.1 | 1.2 | 1.1 | 1.5 | 1.2 | 1.8 | 1.9 | 2.0 |
| *Previous Tealbook* | 1.9 | 1.5 | 1.1 | 1.2 | 1.1 | 1.5 | 1.2 | 1.7 | 1.9 | 1.9 |
| CPI | 3.3 | 1.9 | 1.2 | 1.2 | .4 | 1.8 | 2.1 | 2.3 | 2.2 | 2.4 |
| *Previous Tealbook* | 3.3 | 1.9 | 1.2 | 1.2 | .4 | 1.8 | 2.1 | 2.3 | 2.2 | 2.3 |
| Ex. food & energy | 2.2 | 1.9 | 1.7 | 1.7 | 2.0 | 2.2 | 1.7 | 2.5 | 2.4 | 2.6 |
| *Previous Tealbook* | 2.2 | 1.9 | 1.7 | 1.7 | 2.0 | 2.2 | 1.7 | 2.4 | 2.5 | 2.5 |
| ECI, hourly compensation[1] | 2.2 | 1.8 | 2.0 | 2.3 | 1.9 | 2.2 | 2.6 | 2.5 | 2.8 | 3.0 |
| *Previous Tealbook[1]* | 2.2 | 1.8 | 2.0 | 2.3 | 1.9 | 2.2 | 2.8 | 2.5 | 2.7 | 2.7 |
| Business sector | | | | | | | | | | |
| Output per hour | -.1 | -.1 | 1.9 | .1 | .7 | 1.0 | .9 | 1.2 | .9 | .9 |
| *Previous Tealbook* | -.1 | -.1 | 1.9 | .1 | .7 | 1.0 | 1.0 | 1.1 | .8 | .9 |
| Compensation per hour | .5 | 5.9 | -.1 | 2.9 | 3.1 | -.2 | 2.7 | 3.6 | 4.1 | 4.3 |
| *Previous Tealbook* | .5 | 5.9 | -.1 | 2.9 | 3.1 | -.1 | 2.4 | 3.8 | 3.9 | 3.9 |
| Unit labor costs | .6 | 6.0 | -2.0 | 2.8 | 2.4 | -1.2 | 1.8 | 2.4 | 3.1 | 3.4 |
| *Previous Tealbook* | .6 | 6.0 | -2.0 | 2.8 | 2.4 | -1.2 | 1.3 | 2.7 | 3.1 | 3.0 |
| Core goods imports chain-wt. price index[2] | 4.3 | .1 | -1.5 | .3 | -3.7 | -.2 | 1.3 | 2.1 | .7 | .6 |
| *Previous Tealbook[2]* | 4.3 | .1 | -1.5 | .3 | -3.7 | -.2 | 1.3 | 1.8 | .6 | .6 |

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

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**Other Macroeconomic Indicators**

| Item | 2017 Q2 | 2017 Q3 | 2017 Q4 | 2018 Q1 | 2018 Q2 | 2018 Q3 | 2018 Q4 | 2019 Q1 | 2019 Q2 | 2019 Q3 | 2019 Q4 | 2017¹ | 2018¹ | 2019¹ | 2020¹ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Employment and production* | | | | | | | | | | | | | | | |
| Nonfarm payroll employment[2] | 190 | 142 | 221 | 254 | 210 | 195 | 196 | 192 | 191 | 180 | 180 | 182 | 214 | 186 | 165 |
| Unemployment rate[3] | 4.3 | 4.3 | 4.1 | 4.1 | 3.9 | 3.7 | 3.5 | 3.3 | 3.2 | 3.2 | 3.1 | 4.1 | 3.5 | 3.1 | 3.1 |
| *Previous Tealbook[3]* | 4.3 | 4.3 | 4.1 | 3.9 | 3.8 | 3.6 | 3.4 | 3.3 | 3.2 | 3.2 | 3.2 | 4.1 | 3.4 | 3.2 | 3.2 |
| Natural rate of unemployment[3] | 4.8 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 |
| *Previous Tealbook[3]* | 4.8 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 |
| Employment-to-Population Ratio[3] | 60.1 | 60.2 | 60.1 | 60.3 | 60.4 | 60.5 | 60.5 | 60.6 | 60.7 | 60.8 | 60.8 | 60.1 | 60.5 | 60.8 | 60.8 |
| Employment-to-Population Trend[3] | 59.8 | 59.7 | 59.7 | 59.6 | 59.6 | 59.5 | 59.5 | 59.5 | 59.4 | 59.4 | 59.4 | 59.7 | 59.5 | 59.4 | 59.2 |
| Output gap[4] | .8 | 1.2 | 1.4 | 1.6 | 1.9 | 2.3 | 2.7 | 3.0 | 3.2 | 3.3 | 3.5 | 1.4 | 2.7 | 3.5 | 3.6 |
| *Previous Tealbook[4]* | .8 | 1.2 | 1.5 | 1.7 | 2.1 | 2.4 | 2.7 | 2.9 | 3.1 | 3.2 | 3.3 | 1.5 | 2.7 | 3.3 | 3.3 |
| Industrial production[5] | 5.6 | -1.2 | 8.3 | 5.0 | 4.4 | 3.4 | 2.5 | 2.1 | 1.6 | .9 | 1.3 | 3.5 | 3.8 | 1.5 | 1.5 |
| *Previous Tealbook[5]* | 5.6 | -1.3 | 8.2 | 5.0 | 3.4 | 2.6 | .9 | 1.8 | 1.6 | 1.1 | 1.1 | 3.5 | 3.0 | 1.4 | 1.1 |
| Manufacturing industr. prod.[5] | 2.6 | -2.0 | 6.3 | 4.3 | 2.9 | 2.9 | 2.3 | 2.2 | 2.2 | 1.8 | 1.4 | 2.2 | 3.1 | 1.9 | 1.3 |
| *Previous Tealbook[5]* | 2.6 | -2.0 | 7.0 | 3.1 | 3.6 | 2.7 | .7 | 1.4 | 1.6 | 1.4 | .8 | 2.4 | 2.5 | 1.3 | .9 |
| Capacity utilization rate - mfg.[3] | 75.7 | 75.2 | 76.3 | 76.8 | 77.1 | 77.4 | 77.5 | 77.7 | 77.9 | 78.0 | 78.1 | 76.3 | 77.5 | 78.1 | 78.3 |
| *Previous Tealbook[3]* | 75.7 | 75.2 | 76.4 | 76.8 | 77.4 | 77.8 | 77.8 | 77.9 | 78.1 | 78.2 | 78.2 | 76.4 | 77.8 | 78.2 | 78.3 |
| Housing starts[6] | 1.2 | 1.2 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.2 | 1.3 | 1.3 | 1.3 |
| Light motor vehicle sales[6] | 16.8 | 17.1 | 17.7 | 17.0 | 17.3 | 17.2 | 17.1 | 17.1 | 17.1 | 17.0 | 16.9 | 17.1 | 17.2 | 17.0 | 16.8 |
| *Income and saving* | | | | | | | | | | | | | | | |
| Nominal GDP[5] | 4.1 | 5.3 | 5.3 | 4.4 | 4.9 | 5.3 | 5.1 | 5.1 | 4.8 | 4.6 | 4.4 | 4.5 | 4.9 | 4.7 | 4.3 |
| Real disposable pers. income[5] | 2.7 | .7 | 1.1 | 6.4 | 3.0 | 2.1 | 2.2 | 4.5 | 2.2 | 1.8 | 2.2 | 1.8 | 3.4 | 2.7 | 2.1 |
| *Previous Tealbook[5]* | 2.7 | .5 | 2.0 | 5.6 | 2.8 | 2.0 | 2.7 | 4.8 | 2.5 | 2.0 | 2.3 | 2.0 | 3.3 | 2.9 | 2.1 |
| Personal saving rate[3] | 3.7 | 3.4 | 2.6 | 3.7 | 3.8 | 3.6 | 3.5 | 3.9 | 3.8 | 3.6 | 3.5 | 2.6 | 3.5 | 3.5 | 3.2 |
| *Previous Tealbook[3]* | 3.7 | 3.3 | 2.9 | 3.6 | 3.6 | 3.4 | 3.3 | 3.7 | 3.7 | 3.5 | 3.4 | 2.9 | 3.3 | 3.4 | 3.1 |
| Corporate profits[7] | 2.8 | 18.1 | 15.1 | 3.3 | 3.3 | 7.4 | 4.6 | 6.8 | 5.6 | 5.1 | 4.2 | 6.4 | 4.6 | 5.4 | 3.2 |
| Profit share of GNP[3] | 10.9 | 11.2 | 11.5 | 11.5 | 11.4 | 11.5 | 11.5 | 11.6 | 11.6 | 11.6 | 11.6 | 11.5 | 11.5 | 11.6 | 11.6 |
| Gross national saving rate[3] | 17.2 | 17.7 | 17.0 | 17.3 | 17.4 | 17.4 | 17.4 | 17.3 | 17.3 | 17.2 | 17.1 | 17.0 | 17.4 | 17.1 | 16.6 |
| Net national saving rate[3] | 2.0 | 2.6 | 1.9 | 2.4 | 2.5 | 2.5 | 2.5 | 2.4 | 2.3 | 2.2 | 2.0 | 1.9 | 2.5 | 2.0 | 1.4 |

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

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### Other Macroeconomic Indicators

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

| Item | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Employment and production* | | | | | | | | | | |
| Nonfarm payroll employment[1] | 174 | 179 | 192 | 250 | 226 | 195 | 182 | 214 | 186 | 165 |
| Unemployment rate[2] | 8.7 | 7.8 | 7.0 | 5.7 | 5.0 | 4.7 | 4.1 | 3.5 | 3.1 | 3.1 |
| *Previous Tealbook[2]* | 8.7 | 7.8 | 7.0 | 5.7 | 5.0 | 4.7 | 4.1 | 3.4 | 3.2 | 3.2 |
| Natural rate of unemployment[2] | 5.9 | 5.6 | 5.4 | 5.1 | 4.9 | 4.8 | 4.7 | 4.7 | 4.7 | 4.7 |
| *Previous Tealbook[2]* | 5.9 | 5.6 | 5.4 | 5.1 | 4.9 | 4.8 | 4.7 | 4.7 | 4.7 | 4.7 |
| Employment-to-Population Ratio[2] | 58.5 | 58.7 | 58.5 | 59.3 | 59.4 | 59.8 | 60.1 | 60.5 | 60.8 | 60.8 |
| Employment-to-Population Trend[2] | 60.7 | 60.3 | 60.2 | 60.1 | 59.9 | 59.8 | 59.7 | 59.5 | 59.4 | 59.2 |
| Output gap[3] | -3.7 | -3.7 | -2.5 | -.9 | -.1 | .3 | 1.4 | 2.7 | 3.5 | 3.6 |
| *Previous Tealbook[3]* | -3.7 | -3.7 | -2.5 | -.9 | -.1 | .3 | 1.5 | 2.7 | 3.3 | 3.3 |
| Industrial production[4] | 2.8 | 2.3 | 2.2 | 3.4 | -2.7 | -.1 | 3.5 | 3.8 | 1.5 | 1.5 |
| *Previous Tealbook[4]* | 2.8 | 2.3 | 2.2 | 3.4 | -2.7 | -.1 | 3.5 | 3.0 | 1.4 | 1.1 |
| Manufacturing industr. prod.[4] | 2.5 | 1.7 | .9 | 1.5 | -.6 | .3 | 2.2 | 3.1 | 1.9 | 1.3 |
| *Previous Tealbook[4]* | 2.5 | 1.7 | .9 | 1.5 | -.6 | .3 | 2.4 | 2.5 | 1.3 | .9 |
| Capacity utilization rate - mfg.[2] | 74.4 | 74.6 | 74.7 | 75.9 | 75.4 | 75.1 | 76.3 | 77.5 | 78.1 | 78.3 |
| *Previous Tealbook[2]* | 74.4 | 74.6 | 74.7 | 75.9 | 75.4 | 75.1 | 76.4 | 77.8 | 78.2 | 78.3 |
| Housing starts[5] | .6 | .8 | .9 | 1.0 | 1.1 | 1.2 | 1.2 | 1.3 | 1.3 | 1.3 |
| Light motor vehicle sales[5] | 12.7 | 14.4 | 15.5 | 16.5 | 17.4 | 17.5 | 17.1 | 17.2 | 17.0 | 16.8 |
| *Income and saving* | | | | | | | | | | |
| Nominal GDP[4] | 3.6 | 3.2 | 4.3 | 4.3 | 3.1 | 3.4 | 4.5 | 4.9 | 4.7 | 4.3 |
| Real disposable pers. income[4] | 1.7 | 5.1 | -2.8 | 4.9 | 3.2 | .2 | 1.8 | 3.4 | 2.7 | 2.1 |
| *Previous Tealbook[4]* | 1.7 | 5.1 | -2.8 | 4.9 | 3.2 | .2 | 2.0 | 3.3 | 2.9 | 2.1 |
| Personal saving rate[2] | 5.8 | 9.2 | 4.7 | 5.9 | 6.1 | 3.6 | 2.6 | 3.5 | 3.5 | 3.2 |
| *Previous Tealbook[2]* | 5.8 | 9.2 | 4.7 | 5.9 | 6.1 | 3.6 | 2.9 | 3.3 | 3.4 | 3.1 |
| Corporate profits[6] | 6.8 | .6 | 4.7 | 7.4 | -11.1 | 8.7 | 6.4 | 4.6 | 5.4 | 3.2 |
| Profit share of GNP[2] | 12.3 | 12.0 | 12.0 | 12.4 | 10.7 | 11.3 | 11.5 | 11.5 | 11.6 | 11.6 |
| Gross national saving rate[2] | 16.1 | 18.0 | 18.2 | 19.5 | 19.0 | 17.2 | 17.0 | 17.4 | 17.1 | 16.6 |
| Net national saving rate[2] | .8 | 2.9 | 3.1 | 4.7 | 4.1 | 2.1 | 1.9 | 2.5 | 2.0 | 1.4 |

1. Average monthly change, thousands.
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.

**Staff Projections of Government-Sector Accounts and Related Items**

| Item | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2017 Q3 | 2017 Q4 | 2018 Q1 | 2018 Q2 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Unified federal budget[1]** | | | | | Billions of dollars | | | | | |
| Receipts | 3,250 | 3,268 | 3,316 | 3,310 | 3,448 | 3,705 | 807 | 770 | 727 | 1,028 |
| Outlays | 3,688 | 3,853 | 3,982 | 4,109 | 4,451 | 4,788 | 950 | 994 | 1,115 | 1,030 |
| Surplus/deficit | -438 | -585 | -665 | -799 | -1,003 | -1,084 | -143 | -225 | -388 | -2 |
| *Percent of GDP* | | | | | Percent of GDP | | | | | |
| Surplus/deficit | -2.4 | -3.2 | -3.5 | -4.0 | -4.8 | -4.9 | -2.9 | -4.6 | -7.8 | .0 |
| *Previous Tealbook* | -2.4 | -3.2 | -3.5 | -4.2 | -4.5 | -4.5 | -2.9 | -4.6 | -9.2 | .0 |
| Primary surplus/deficit | -1.2 | -1.9 | -2.1 | -2.4 | -2.8 | -2.4 | -2.0 | -2.9 | -6.1 | 1.8 |
| Net interest | 1.2 | 1.3 | 1.4 | 1.6 | 2.0 | 2.5 | .9 | 1.7 | 1.7 | 1.9 |
| Cyclically adjusted surplus/deficit | -1.9 | -2.8 | -3.3 | -4.4 | -5.8 | -6.2 | -3.0 | -4.8 | -8.0 | -.5 |
| Federal debt held by public | 72.9 | 76.7 | 76.5 | 77.6 | 79.2 | 81.3 | 75.2 | 74.9 | 76.5 | 76.1 |
| **Government in the NIPA[2]** | | | | | Real percent change, annual rate | | | | | |
| Purchases | 1.6 | .4 | .7 | 1.2 | 2.1 | 1.8 | .7 | 3.0 | -.3 | .8 |
| Consumption | 1.9 | .6 | .4 | .8 | 1.6 | 1.4 | 1.6 | 1.3 | -.3 | .4 |
| Investment | .4 | -.5 | 2.3 | 3.0 | 4.4 | 3.7 | -1.5 | 10.3 | .1 | 2.8 |
| State and local construction | .0 | -2.3 | -2.2 | 1.5 | 1.0 | 1.0 | -4.2 | 19.1 | 2.0 | 2.0 |
| Real disposable personal income | 3.2 | .2 | 1.8 | 3.4 | 2.7 | 2.1 | .7 | 1.1 | 6.3 | 2.9 |
| Contribution from transfers[3] | .7 | .3 | .2 | .6 | .8 | .7 | .3 | .0 | 1.0 | 1.6 |
| Contribution from taxes[3] | -1.4 | .2 | -1.1 | .1 | -.7 | -1.0 | -1.5 | -1.2 | 3.3 | -.8 |
| **Government employment** | | | | | Average net change in monthly payrolls, thousands | | | | | |
| Federal | 3 | 3 | -1 | 1 | 2 | 9 | -1 | -2 | 1 | -1 |
| State and local | 10 | 14 | 3 | 7 | 9 | 9 | 5 | -2 | 4 | 6 |
| **Fiscal indicators[2]** | | | | | Percentage point contribution to change in real GDP, annual rate | | | | | |
| Fiscal effect (FE)[4] | .4 | .4 | -.1 | .5 | .9 | .7 | -.1 | .2 | .1 | .7 |
| Discretionary policy actions (FI) | .4 | .1 | .2 | .6 | .8 | .5 | .2 | .6 | .3 | .5 |
| *Previous Tealbook* | .4 | .2 | .7 | .5 | .5 | .4 | .2 | .5 | .3 | .4 |
| Federal purchases | .1 | .0 | .1 | .1 | .3 | .2 | .1 | .2 | -.1 | .0 |
| State and local purchases | .2 | .1 | .1 | .1 | .1 | .1 | .0 | .3 | .1 | .1 |
| Taxes and transfers | .1 | .1 | .1 | .4 | .4 | .2 | .1 | .1 | .3 | .1 |
| Cyclical | -.2 | .0 | -.2 | -.2 | -.2 | -.1 | -.3 | -.2 | -.1 | -.2 |
| Other | .2 | .2 | -.3 | .2 | .4 | .2 | -.1 | -.3 | -.1 | .4 |

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

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

| Measure and country | 2017 Q1 | 2017 Q2 | 2017 Q3 | 2017 Q4 | 2018 Q1 | 2018 Q2 | 2018 Q3 | 2018 Q4 | 2019 Q1 | 2019 Q2 | 2019 Q3 | 2019 Q4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Real GDP[1]** | | | | | | | | | | | | |
| Total foreign | 3.2 | 3.1 | 2.5 | 2.7 | 3.0 | 3.0 | 2.9 | 2.9 | 2.9 | 2.8 | 2.9 | 2.6 |
| *Previous Tealbook* | 3.0 | 3.1 | 2.4 | 3.0 | 3.1 | 3.0 | 2.9 | 2.9 | 2.8 | 2.8 | 2.9 | 2.5 |
| Advanced foreign economies | 2.9 | 3.3 | 2.1 | 1.9 | 2.2 | 2.2 | 2.1 | 2.1 | 1.9 | 1.9 | 2.1 | 1.3 |
| Canada | 4.0 | 4.4 | 1.5 | 1.7 | 2.4 | 2.4 | 2.3 | 2.3 | 2.1 | 2.1 | 2.0 | 2.0 |
| Japan | 1.9 | 2.4 | 2.4 | 1.6 | 1.3 | 1.2 | 1.0 | 1.0 | .9 | .9 | 3.3 | -3.6 |
| United Kingdom | .9 | 1.1 | 2.0 | 1.6 | 1.5 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 |
| Euro area | 2.5 | 3.0 | 2.8 | 2.4 | 2.4 | 2.3 | 2.2 | 2.1 | 1.9 | 1.8 | 1.8 | 1.7 |
| Germany | 3.6 | 2.6 | 3.0 | 2.5 | 2.3 | 2.1 | 1.9 | 1.7 | 1.6 | 1.5 | 1.4 | 1.4 |
| Emerging market economies | 3.5 | 2.8 | 2.9 | 3.4 | 3.8 | 3.7 | 3.7 | 3.7 | 3.8 | 3.8 | 3.8 | 3.8 |
| Asia | 5.5 | 5.1 | 5.8 | 4.5 | 5.2 | 5.0 | 5.0 | 4.9 | 4.8 | 4.7 | 4.7 | 4.7 |
| Korea | 4.3 | 2.4 | 6.3 | -.9 | 3.9 | 3.4 | 3.5 | 3.5 | 3.2 | 3.2 | 3.1 | 3.1 |
| China | 7.1 | 7.0 | 6.5 | 6.4 | 6.5 | 6.6 | 6.4 | 6.3 | 6.3 | 6.2 | 6.2 | 6.1 |
| Latin America | 2.4 | 1.1 | -.1 | 2.5 | 2.6 | 2.6 | 2.6 | 2.7 | 2.9 | 2.9 | 2.9 | 2.9 |
| Mexico | 2.5 | 1.0 | -.7 | 3.2 | 2.9 | 2.8 | 2.8 | 2.8 | 2.9 | 2.9 | 3.0 | 3.0 |
| Brazil | 5.3 | 2.3 | 1.0 | .2 | 2.5 | 2.5 | 2.5 | 2.5 | 3.0 | 3.0 | 3.0 | 3.0 |
| **Consumer prices[2]** | | | | | | | | | | | | |
| Total foreign | 2.9 | 2.0 | 2.3 | 3.0 | 2.6 | 2.6 | 2.6 | 2.5 | 2.5 | 2.5 | 2.4 | 2.8 |
| *Previous Tealbook* | 2.9 | 2.0 | 2.2 | 3.1 | 2.9 | 2.5 | 2.5 | 2.5 | 2.4 | 2.4 | 2.4 | 2.8 |
| Advanced foreign economies | 2.2 | .4 | 1.2 | 2.1 | 2.1 | 1.5 | 1.5 | 1.6 | 1.6 | 1.6 | 1.6 | 2.5 |
| Canada | 2.6 | .2 | 1.4 | 3.0 | 2.8 | 2.4 | 2.3 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 |
| Japan | -.3 | .1 | .7 | 1.9 | 1.3 | .5 | .5 | .6 | .8 | .9 | 1.0 | 6.3 |
| United Kingdom | 3.7 | 3.0 | 2.3 | 3.0 | 3.2 | 2.5 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 |
| Euro area | 2.7 | .3 | 1.1 | 1.7 | 1.9 | 1.2 | 1.3 | 1.4 | 1.4 | 1.5 | 1.6 | 1.6 |
| Germany | 2.2 | .3 | 1.6 | 2.3 | 2.3 | 1.6 | 1.6 | 1.8 | 1.9 | 2.0 | 2.1 | 2.2 |
| Emerging market economies | 3.4 | 3.1 | 3.1 | 3.7 | 2.9 | 3.4 | 3.3 | 3.2 | 3.1 | 3.1 | 3.0 | 2.9 |
| Asia | 1.2 | 1.6 | 2.2 | 3.0 | 2.1 | 2.9 | 2.8 | 2.8 | 2.8 | 2.7 | 2.7 | 2.7 |
| Korea | 2.6 | .7 | 2.2 | .5 | 1.6 | 3.4 | 3.4 | 3.3 | 3.2 | 3.1 | 3.1 | 3.1 |
| China | .0 | 2.1 | 2.2 | 2.9 | 1.7 | 2.7 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| Latin America | 8.6 | 6.8 | 5.6 | 5.4 | 4.9 | 4.6 | 4.6 | 4.4 | 4.1 | 4.0 | 3.6 | 3.5 |
| Mexico | 9.3 | 6.7 | 5.4 | 5.0 | 4.2 | 4.0 | 4.0 | 3.8 | 3.7 | 3.7 | 3.3 | 3.2 |
| Brazil | 3.2 | 2.3 | 2.3 | 3.6 | 3.6 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 |

*(Projected columns: 2018 Q3 onward)*

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

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

| Measure and country | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Projected | | |
| **Real GDP[1]** | | | | | | | | | | |
| Total foreign | 3.2 | 2.2 | 3.0 | 2.8 | 2.1 | 2.7 | 2.9 | 3.0 | 2.8 | 2.7 |
| *Previous Tealbook* | *3.2* | *2.2* | *3.0* | *2.8* | *2.0* | *2.7* | *2.9* | *3.0* | *2.8* | *2.8* |
| Advanced foreign economies | 1.8 | .3 | 2.5 | 2.0 | 1.2 | 1.9 | 2.6 | 2.1 | 1.8 | 1.8 |
| Canada | 3.1 | .7 | 3.6 | 2.5 | .3 | 2.0 | 2.9 | 2.3 | 2.0 | 1.9 |
| Japan | .2 | .3 | 2.8 | -.3 | 1.2 | 1.5 | 2.1 | 1.1 | .3 | .9 |
| United Kingdom | 1.3 | 1.5 | 2.6 | 3.3 | 2.1 | 2.0 | 1.4 | 1.7 | 1.8 | 1.8 |
| Euro area | .5 | -1.1 | .8 | 1.5 | 2.0 | 2.0 | 2.7 | 2.2 | 1.8 | 1.7 |
| Germany | 2.4 | .2 | 1.6 | 1.9 | 1.3 | 1.9 | 2.9 | 2.0 | 1.5 | 1.4 |
| Emerging market economies | 4.6 | 4.2 | 3.5 | 3.6 | 2.9 | 3.4 | 3.2 | 3.8 | 3.8 | 3.7 |
| Asia | 5.1 | 5.8 | 5.4 | 5.0 | 4.5 | 4.9 | 5.2 | 5.0 | 4.7 | 4.6 |
| Korea | 2.9 | 2.1 | 3.5 | 2.8 | 3.3 | 2.4 | 3.0 | 3.5 | 3.1 | 3.0 |
| China | 8.7 | 8.0 | 7.6 | 7.1 | 6.8 | 6.8 | 6.7 | 6.4 | 6.2 | 5.9 |
| Latin America | 4.0 | 3.1 | 1.7 | 2.5 | 1.6 | 2.1 | 1.4 | 2.6 | 2.9 | 2.9 |
| Mexico | 3.9 | 3.0 | 1.2 | 3.5 | 2.7 | 3.2 | 1.5 | 2.8 | 2.9 | 3.0 |
| Brazil | 2.6 | 2.6 | 2.6 | -.1 | -5.5 | -2.4 | 2.2 | 2.5 | 3.0 | 2.6 |
| **Consumer prices[2]** | | | | | | | | | | |
| Total foreign | 3.4 | 2.3 | 2.4 | 2.0 | 1.4 | 1.9 | 2.5 | 2.6 | 2.5 | 2.4 |
| *Previous Tealbook* | *3.4* | *2.3* | *2.4* | *2.0* | *1.4* | *1.9* | *2.5* | *2.6* | *2.5* | *2.4* |
| Advanced foreign economies | 2.2 | 1.3 | 1.0 | 1.2 | .4 | .9 | 1.5 | 1.7 | 1.8 | 1.7 |
| Canada | 2.7 | 1.0 | 1.0 | 2.0 | 1.3 | 1.4 | 1.8 | 2.4 | 2.0 | 2.0 |
| Japan | -.3 | -.2 | 1.4 | 2.6 | .1 | .3 | .6 | .7 | 2.2 | 1.0 |
| United Kingdom | 4.6 | 2.6 | 2.1 | .9 | .1 | 1.2 | 3.0 | 2.6 | 2.3 | 2.1 |
| Euro area | 2.9 | 2.3 | .8 | .2 | .2 | .7 | 1.4 | 1.4 | 1.5 | 1.7 |
| Germany | 2.6 | 1.9 | 1.4 | .4 | .2 | 1.0 | 1.6 | 1.8 | 2.0 | 2.2 |
| Emerging market economies | 4.3 | 3.1 | 3.4 | 2.7 | 2.1 | 2.6 | 3.3 | 3.2 | 3.0 | 2.9 |
| Asia | 4.4 | 2.6 | 3.1 | 1.8 | 1.5 | 2.0 | 2.0 | 2.6 | 2.7 | 2.7 |
| Korea | 3.9 | 1.7 | 1.1 | 1.0 | .9 | 1.5 | 1.5 | 2.9 | 3.2 | 3.0 |
| China | 4.6 | 2.1 | 2.9 | 1.5 | 1.5 | 2.1 | 1.8 | 2.4 | 2.5 | 2.5 |
| Latin America | 4.1 | 4.4 | 4.2 | 4.9 | 3.4 | 4.2 | 6.6 | 4.6 | 3.8 | 3.4 |
| Mexico | 3.5 | 4.1 | 3.6 | 4.2 | 2.3 | 3.3 | 6.6 | 4.0 | 3.5 | 3.2 |
| Brazil | 6.7 | 5.6 | 5.8 | 6.5 | 10.4 | 7.1 | 2.8 | 4.1 | 4.3 | 4.3 |

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

**Greensheets**

Authorized for Public Release

**Greensheets**

## U.S. Current Account

### Quarterly Data

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

| | 2017 Q1 | Q2 | Q3 | Q4 | 2018 Q1 | Q2 | Q3 | Q4 | 2019 Q1 | Q2 | Q3 | Q4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Projected | | | | |
| **U.S. current account balance** | **-453.1** | **-496.5** | **-405.9** | **-509.0** | **-574.0** | **-538.9** | **-553.9** | **-584.0** | **-648.0** | **-654.8** | **-681.6** | **-707.9** |
| *Previous Tealbook* | *-454.1* | *-497.6* | *-402.3* | *-466.1* | *-541.1* | *-513.6* | *-533.5* | *-567.4* | *-617.0* | *-614.2* | *-638.4* | *-662.0* |
| Current account as percent of GDP | -2.4 | -2.6 | -2.1 | -2.6 | -2.9 | -2.7 | -2.7 | -2.8 | -3.1 | -3.1 | -3.2 | -3.3 |
| *Previous Tealbook* | *-2.4* | *-2.6* | *-2.1* | *-2.4* | *-2.7* | *-2.5* | *-2.6* | *-2.7* | *-2.9* | *-2.9* | *-3.0* | *-3.1* |
| Net goods & services | -551.4 | -565.8 | -541.1 | -615.5 | -656.6 | -617.7 | -603.0 | -601.9 | -621.7 | -607.6 | -606.4 | -616.6 |
| Investment income, net | 213.7 | 216.3 | 242.4 | 244.5 | 222.0 | 207.3 | 183.7 | 148.5 | 113.1 | 81.3 | 59.4 | 39.3 |
| Direct, net | 295.7 | 292.8 | 312.8 | 316.0 | 308.0 | 316.2 | 316.7 | 306.9 | 296.9 | 290.5 | 294.7 | 299.9 |
| Portfolio, net | -82.1 | -76.5 | -70.4 | -71.5 | -85.9 | -109.0 | -133.0 | -158.4 | -183.7 | -209.2 | -235.2 | -260.6 |
| Other income and transfers, net | -115.4 | -147.0 | -107.2 | -137.9 | -139.5 | -128.5 | -134.6 | -130.6 | -139.5 | -128.5 | -134.6 | -130.6 |

### Annual Data

*Billions of dollars*

| | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Projected | | |
| **U.S. current account balance** | **-444.6** | **-426.2** | **-349.5** | **-373.0** | **-434.6** | **-451.7** | **-466.1** | **-562.7** | **-673.1** | **-803.2** |
| *Previous Tealbook* | *-444.6* | *-426.2* | *-349.5* | *-373.0* | *-434.6* | *-451.7* | *-455.0* | *-538.9* | *-632.9* | *-742.2* |
| Current account as percent of GDP | -2.9 | -2.6 | -2.1 | -2.1 | -2.4 | -2.4 | -2.4 | -2.8 | -3.2 | -3.6 |
| *Previous Tealbook* | *-2.9* | *-2.6* | *-2.1* | *-2.1* | *-2.4* | *-2.4* | *-2.3* | *-2.6* | *-3.0* | *-3.3* |
| Net goods & services | -548.6 | -536.8 | -461.9 | -489.5 | -500.4 | -504.8 | -568.4 | -619.8 | -613.1 | -659.8 |
| Investment income, net | 219.2 | 216.1 | 215.4 | 221.3 | 192.7 | 186.8 | 229.2 | 190.4 | 73.3 | -10.1 |
| Direct, net | 288.7 | 285.5 | 283.3 | 276.7 | 266.5 | 258.8 | 304.3 | 311.9 | 295.5 | 311.1 |
| Portfolio, net | -69.5 | -69.4 | -67.9 | -55.4 | -73.8 | -72.0 | -75.1 | -121.6 | -222.2 | -321.2 |
| Other income and transfers, net | -115.1 | -105.5 | -103.1 | -104.8 | -126.9 | -133.7 | -126.9 | -133.3 | -133.3 | -133.3 |

# Abbreviations

| | |
|---|---|
| AFE | advanced foreign economy |
| BBA 2018 | Bipartisan Budget Act of 2018 |
| BLS | Bureau of Labor Statistics |
| BOE | Bank of England |
| BOM | Bank of Mexico |
| CBO | Congressional Budget Office |
| CD | certificate of deposit |
| CHIP | Children's Health Insurance Program |
| C&I | commercial and industrial |
| CLO | collateralized loan obligation |
| CMBS | commercial mortgage-backed securities |
| CPI | consumer price index |
| CRE | commercial real estate |
| DOD | Department of Defense |
| DSGE | dynamic stochastic general equilibrium |
| DTI | debt service to income |
| DU | Desktop Underwriter |
| ECB | European Central Bank |
| ECI | employment cost index |
| E&I | equipment and intangibles |
| ELB | effective lower bound |
| EME | emerging market economy |
| ETP | exchange-traded products |
| FHA | Federal Housing Administration |
| FOMC | Federal Open Market Committee; also, the Committee |
| GDP | gross domestic product |

| IRS | Internal Revenue Service |
|---|---|
| LFPR | labor force participation rate |
| LIBOR | London interbank offered rate |
| LTV | loan to value |
| MBS | mortgage-backed securities |
| Michigan survey | University of Michigan Surveys of Consumers |
| MMF | money market fund |
| MNE | multinational enterprise |
| NAFTA | North American Free Trade Agreement |
| NIT | nominal income targeting |
| OECD | Organisation for Economic Co-operation and Development |
| OIS | overnight index swap |
| ON RRP | overnight reverse repurchase agreement |
| PCE | personal consumption expenditures |
| PMI | purchasing managers index |
| QM | qualified mortgage |
| SEP | Summary of Economic Projections |
| SLOOS | Senior Loan Officer Opinion Survey on Bank Lending Practices |
| SOE | state-owned enterprise |
| SOMA | System Open Market Account |
| S&P | Standard & Poor's |
| SPF | Survey of Professional Forecasters |
| TCJA | Tax Cuts and Jobs Act |
| TIPS | Treasury Inflation-Protected Securities |
| VAR | vector autoregressive |
| VIX | one-month-ahead option-implied volatility on the S&P 500 index |
| WFSBI | Wells Fargo Small Business Index |

## 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 B
### Monetary Policy Alternatives

March 15, 2018

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

**Alternatives**

Figure 1: Market–Implied Probability Distribution of the Number of 25–Basis–Point Rate Hikes by Mid–2018
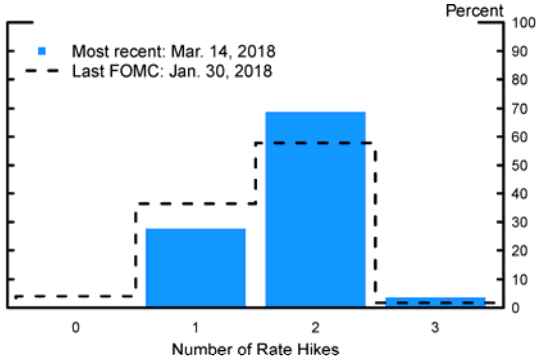


Note: Probabilities implied by a binomial tree fitted to settlement prices on federal funds futures contracts, assuming the next policy action is either no change or a 25–basis–point increase in rates, and no intermeeting moves. The effective federal funds rate until the next FOMC meeting is assumed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

Figure 2: Market–Implied Probability Distribution of the Federal Funds Rate, Year–End 2018
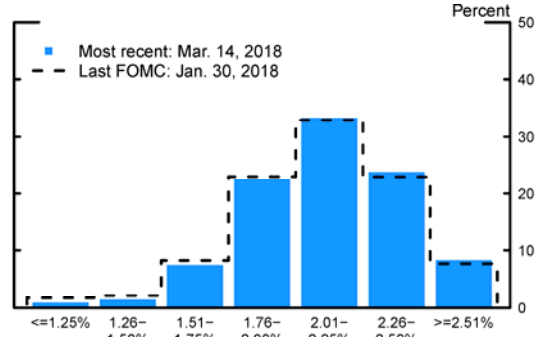


Note: Estimated from Eurodollar futures options, accounting for the differences in the levels and option–implied volatilities of LIBOR and the federal funds rate, but not adjusted for term premiums.
Source: CME Group; Federal Reserve Board staff estimates.

Figure 3: Desk Survey Average Probability Distribution of the Federal Funds Rate, Year–End 2018
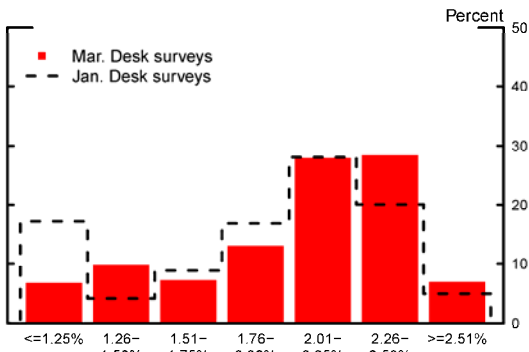


Note: Probabilities are averages of the probabilities assigned by respondents to different ranges of the federal funds rate at the end of 2018.
Source: FRBNY.

Figure 4: Historical Federal Funds Rate Expectations for the End of 2018
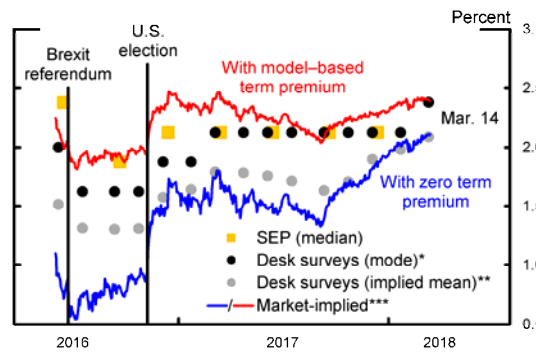


* Median of the respondents' modal forecasts for the federal funds rate.
** Estimated from respondents' year–end probability distributions.
*** Zero term premium path is estimated using overnight index swap quotes with a spline approach and no term premium adjustment. Model–based term premium path is estimated using a term structure model maintained by Board staff and corrects for term premiums.
Source: Bloomberg; Blue Chip Financial Forecasts; FRBNY; Federal Reserve Board staff estimates.

Figure 5: Market–Implied Federal Funds Rate Expectations
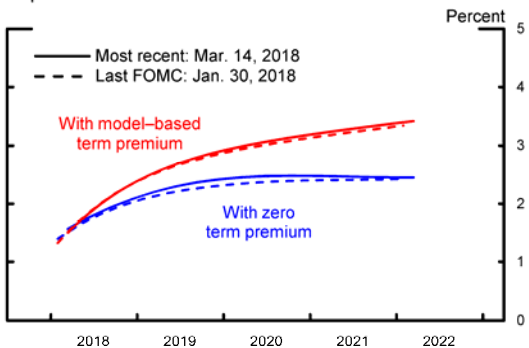


Note: Zero term premium path is estimated using overnight index swap quotes with a spline approach and no term premium adjustment. Model–based term premium path is estimated using a term structure model maintained by Board staff and corrects for term premiums.
Source: Bloomberg; Federal Reserve Board staff estimates.

Figure 6: Median Macroeconomic Forecasts from the Desk's Primary Dealer Survey
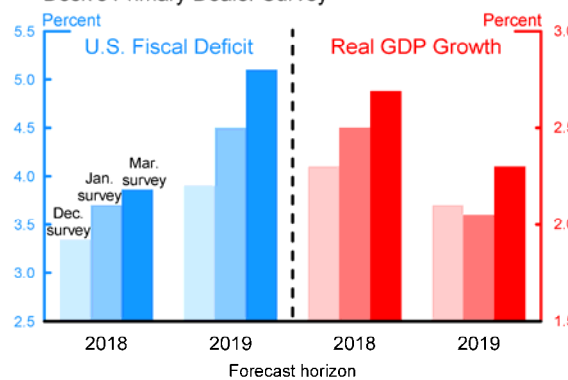


Note: Deficit estimates are for the U.S. federal fiscal deficit, as a percentage of GDP, for the fiscal year indicated in the forecast horizon. Real GDP growth is for Q4 of the forecast horizon over Q4 of the preceding year.
Source: FRBNY.

# Redemptions and Reinvestments of SOMA Principal Payments

## Projections for Treasury Securities
### (Billions of dollars)

|  | Redemptions | | Reinvestments | |
|---|---|---|---|---|
|  | Period | Cumulative* | Period | Cumulative* |
| 2018: Q1 | 36.0 | 54.0 | 74.8 | 102.5 |
| 2018: Q2 | 54.0 | 108.0 | 65.7 | 168.2 |
| 2018: Q3 | 67.0 | 175.0 | 27.4 | 195.6 |
| 2018: Q4 | 72.0 | 247.1 | 29.2 | 224.9 |
| 2019 | 270.8 | 517.8 | 114.2 | 339.1 |
| 2020 | 209.1 | 726.9 | 85.4 | 424.5 |
| 2021 | 271.1 | 998.1 | 69.8 | 494.3 |

\* Since October 2017.

## Projections for Agency Securities
### (Billions of dollars)

|  | Redemptions | | Reinvestments | |
|---|---|---|---|---|
|  | Period | Cumulative* | Period | Cumulative* |
| 2018: Q1 | 24.0 | 36.0 | 40.7 | 101.8 |
| 2018: Q2 | 36.0 | 72.0 | 17.7 | 119.5 |
| 2018: Q3 | 43.8 | 115.8 | 0.6 | 120.1 |
| 2018: Q4 | 38.2 | 154.1 | 0.0 | 120.1 |
| 2019 | 143 | 297.0 | 0.0 | 120.1 |
| 2020 | 128.1 | 425.1 | 0.0 | 120.1 |
| 2021 | 118.4 | 543.5 | 0.0 | 120.1 |

\* Since October 2017.

## SOMA Treasury Securities Principal Payments



Note: Projection dependent on assumed distribution of future Treasury issuance.
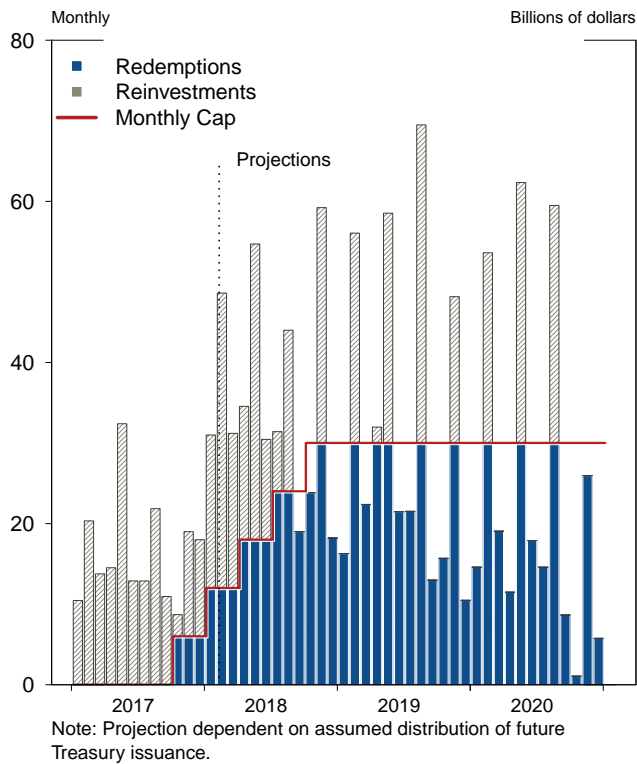
## SOMA Agency Debt and MBS Principal Payments



Note: Projection dependent on future interest rates and housing market developments.
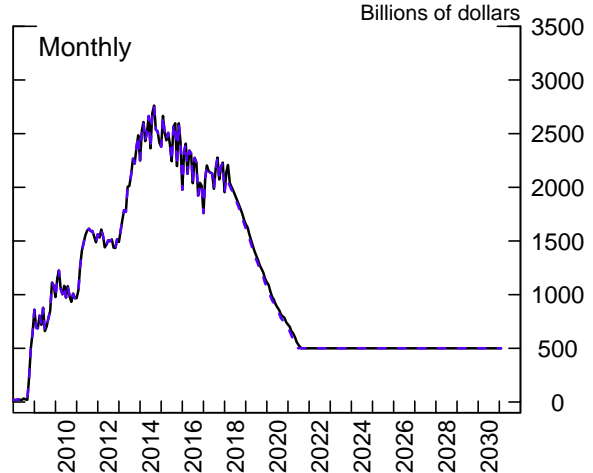
Balance Sheet & Income
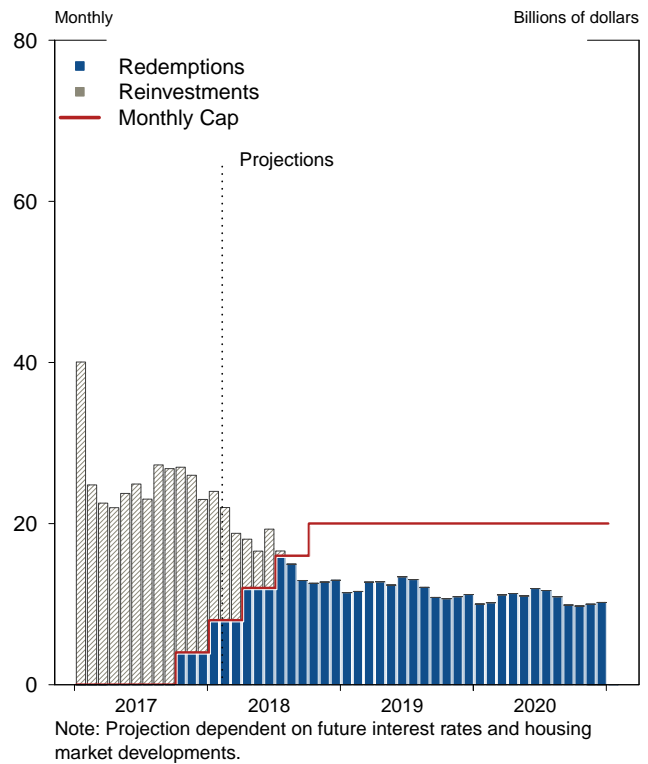
## Total Assets and Selected Balance Sheet Items

—— March Tealbook baseline          – – January Tealbook baseline

**Total Assets**
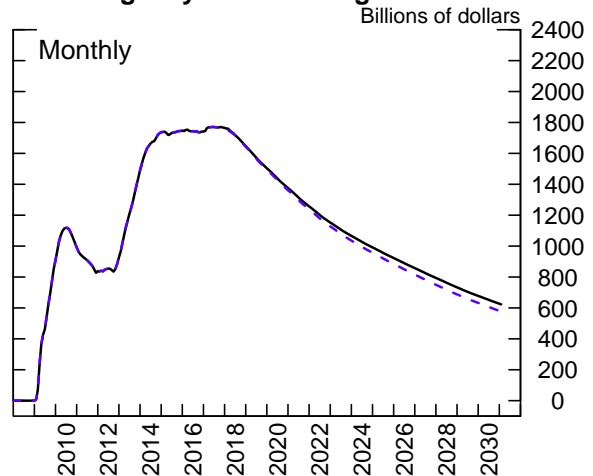
Monthly

Billions of dollars



**Reserve Balances**

Monthly
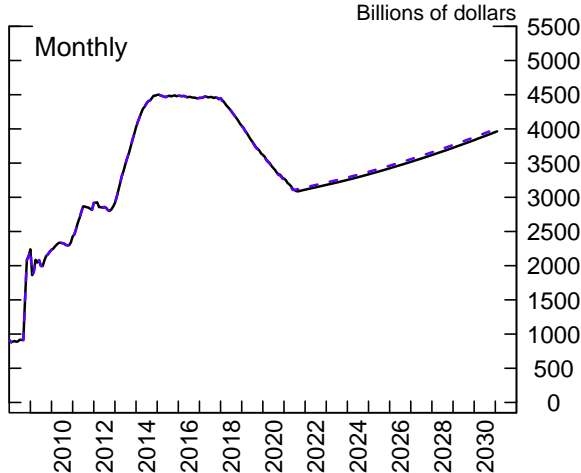
Billions of dollars



**SOMA Treasury Holdings**

Monthly

Billions of dollars
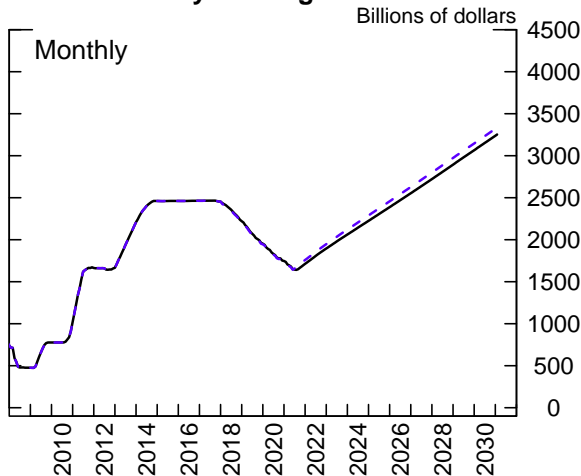


**SOMA Agency MBS Holdings**

Monthly

Billions of dollars



**Assets as a Share of GDP**

Percent

- Treasury Securities
- Agency Securities
- Other Assets
- Loans
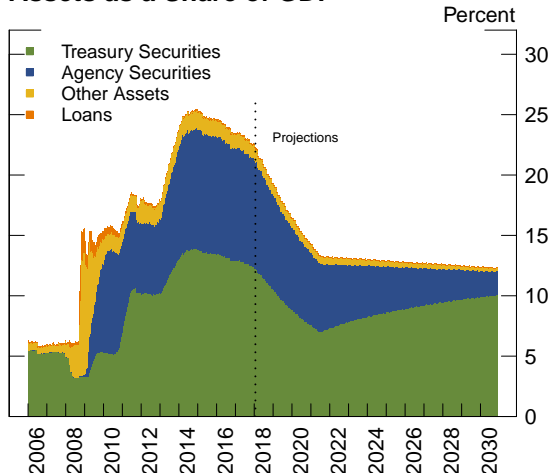
Projections



**Liabilities as a Share of GDP**

Percent

- Federal Reserve notes in circulation
- Treasury General Account
- Other Liabilities
- Total Reserves

Projections



Balance Sheet & Income
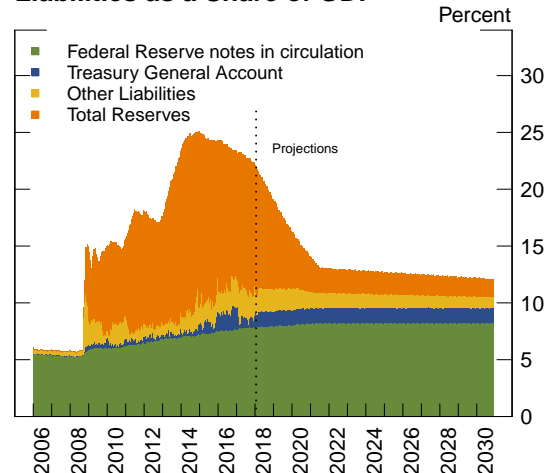
### Federal Reserve Balance Sheet
### End-of-Year Projections -- March Tealbook
(Billions of dollars)

| | Feb 28, 2018 | 2018 | 2020 | 2022 | 2024 | 2026 | 2030 |
|---|---|---|---|---|---|---|---|
| Total assets | 4,393 | 4,045 | 3,273 | 3,181 | 3,335 | 3,518 | 3,954 |
| Selected assets | | | | | | | |
| Loans and other credit extensions* | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Securities held outright | 4,189 | 3,869 | 3,124 | 3,050 | 3,218 | 3,413 | 3,867 |
| U.S. Treasury securities | 2,424 | 2,220 | 1,747 | 1,895 | 2,224 | 2,553 | 3,237 |
| Agency debt securities | 4 | 2 | 2 | 2 | 2 | 2 | 2 |
| Agency mortgage-backed securities | 1,760 | 1,646 | 1,375 | 1,152 | 991 | 857 | 627 |
| Unamortized premiums | 156 | 141 | 111 | 91 | 76 | 63 | 43 |
| Unamortized discounts | -14 | -13 | -10 | -8 | -7 | -6 | -4 |
| Total other assets | 61 | 48 | 48 | 48 | 48 | 48 | 48 |
| | | | | | | | |
| Total liabilities | 4,354 | 4,006 | 3,233 | 3,137 | 3,287 | 3,465 | 3,890 |
| Selected liabilities | | | | | | | |
| Federal Reserve notes in circulation | 1,580 | 1,663 | 1,874 | 2,003 | 2,132 | 2,286 | 2,652 |
| Reverse repurchase agreements | 277 | 330 | 255 | 230 | 230 | 230 | 230 |
| Deposits with Federal Reserve Banks | 2,484 | 2,008 | 1,099 | 898 | 919 | 944 | 1,003 |
| Reserve balances held by depository institutions | 2,208 | 1,656 | 721 | 500 | 500 | 500 | 500 |
| U.S. Treasury, General Account | 199 | 277 | 302 | 323 | 344 | 369 | 428 |
| Other deposits | 77 | 75 | 75 | 75 | 75 | 75 | 75 |
| Earnings remittances due to the U.S. Treasury | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | |
| Total Federal Reserve Bank capital** | 39 | 39 | 40 | 44 | 48 | 53 | 63 |

Source: Federal Reserve H.4.1 statistical releases and staff calculations.
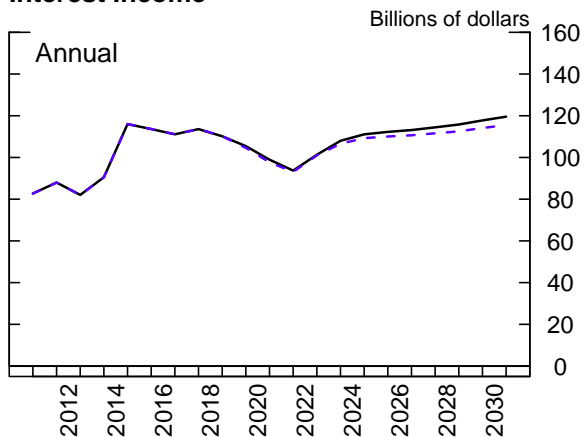Note: Components may not sum to totals due to rounding.
*Loans and other credit extensions includes primary, secondary, and seasonal credit; central bank liquidity swaps; and net portfolio holdings of Maiden Lane LLC.
**Total capital includes capital paid-in and capital surplus accounts.
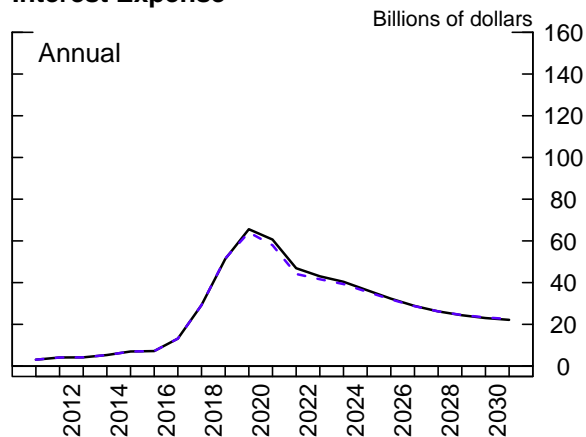
# Income Projections
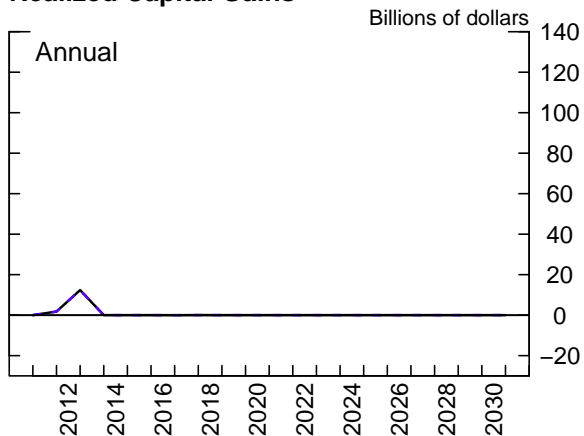
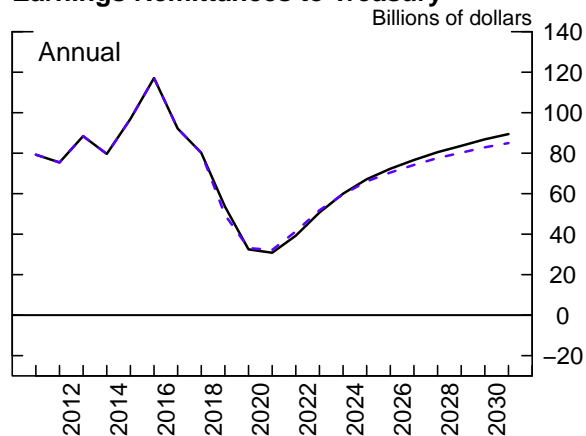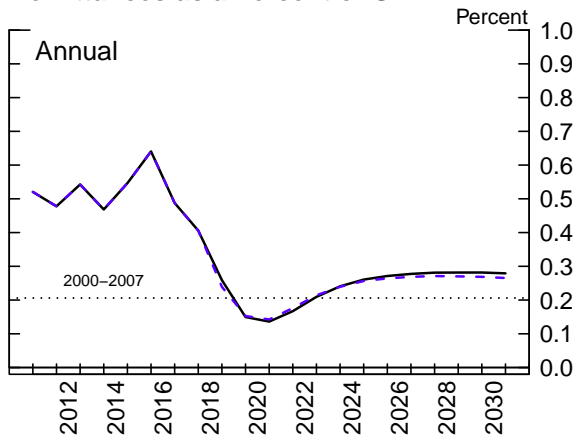—— March Tealbook baseline    – – January Tealbook baseline

**Interest Income**

Annual

Billions of dollars



**Interest Expense**

Annual

Billions of dollars



**Realized Capital Gains**

Annual

Billions of dollars



**Earnings Remittances to Treasury**

Annual

Billions of dollars



**Remittances as a Percent of GDP**

Annual

Percent

2000–2007



**Memo: Unrealized Gains/Losses**

End of year

Billions of dollars
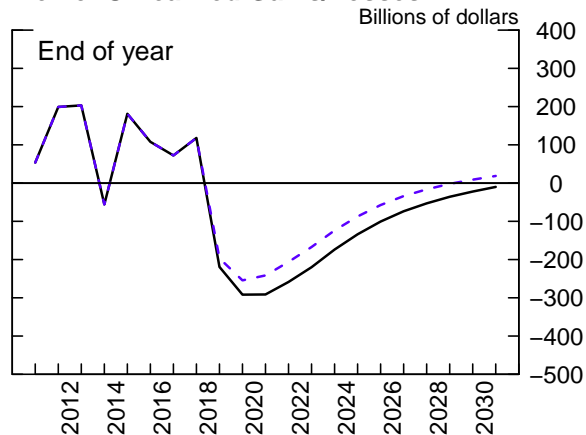
**Projections for the 10-Year Treasury Term Premium Effect**
(Basis Points)

| Date | March Tealbook | January Tealbook |
|---|---|---|
| Quarterly Averages | | |
| 2018:Q1 | -86 | -84 |
| Q2 | -83 | -81 |
| Q3 | -80 | -79 |
| Q4 | -77 | -76 |
| 2019:Q4 | -66 | -66 |
| 2020:Q4 | -58 | -58 |
| 2021:Q4 | -53 | -52 |
| 2022:Q4 | -49 | -49 |
| 2023:Q4 | -46 | -46 |
| 2024:Q4 | -43 | -43 |
| 2025:Q4 | -40 | -40 |
| 2026:Q4 | -37 | -37 |
| 2027:Q4 | -35 | -35 |
| 2028:Q4 | -33 | -33 |
| 2029:Q4 | -31 | -31 |
| 2030:Q4 | -29 | -30 |

**Balance Sheet & Income**

## Projections for the Characteristics of SOMA Treasury Securities Holdings

**SOMA Weighted–Average Treasury Duration**

Monthly                                                                                          Years
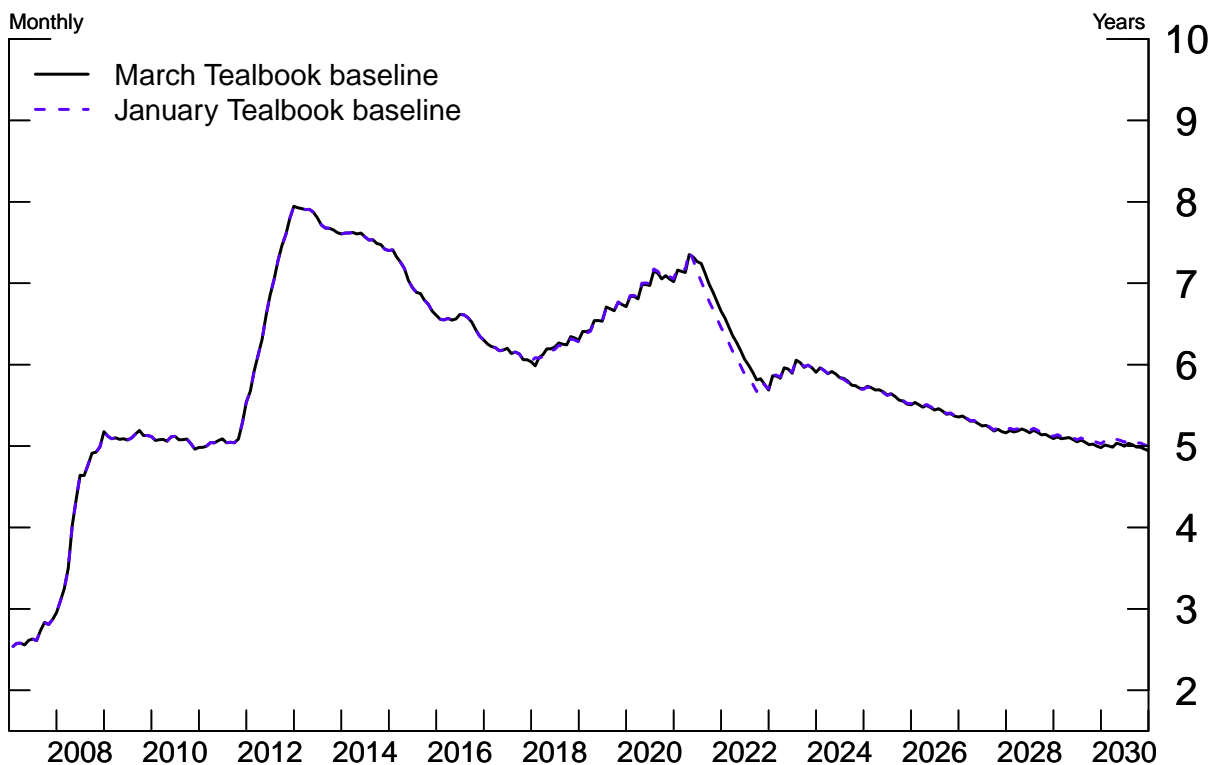


**Maturity Composition of SOMA Treasury Portfolio**

March Tealbook baseline                                                          Billions of Dollars
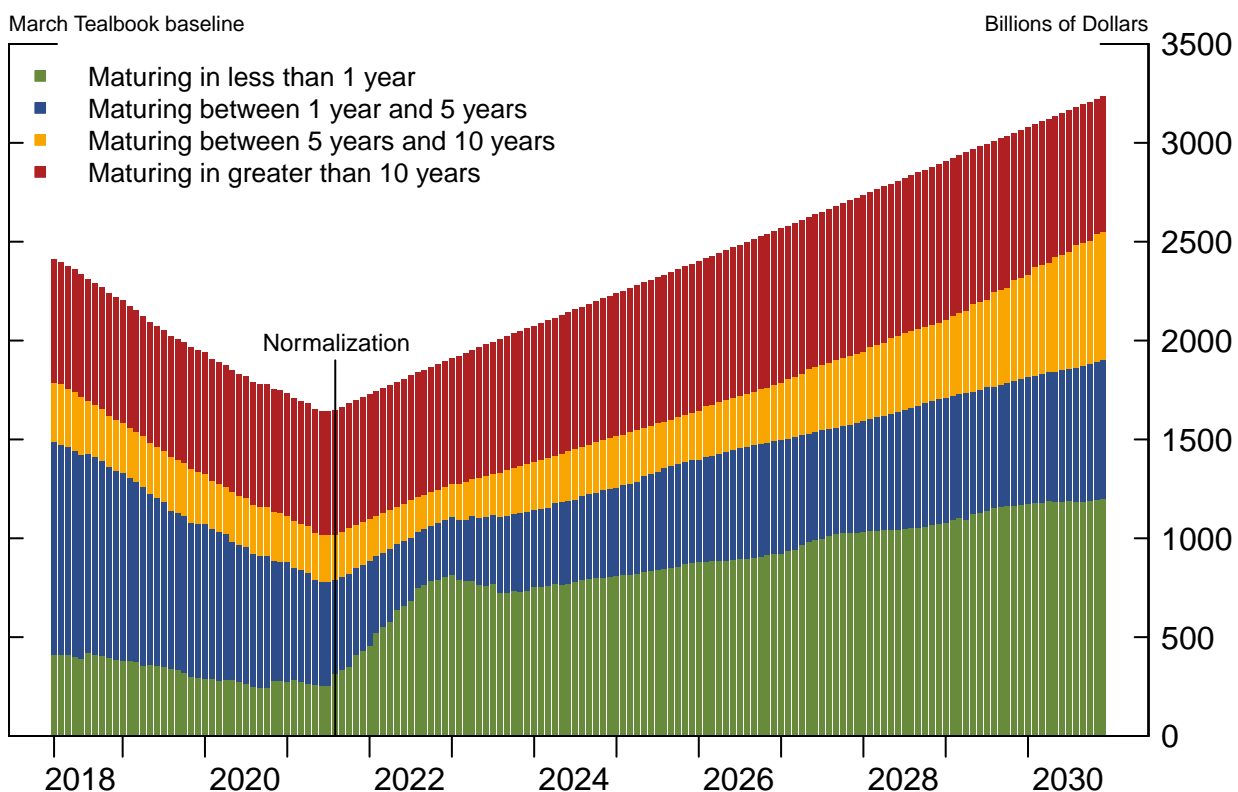
# **Abbreviations**

ABS            asset-backed securities

AFE            advanced foreign economy

BEA            Bureau of Economic Analysis, Department of Commerce

BHC            bank holding company

CDS            credit default swaps

CFTC           Commodity Futures Trading Commission

C&I             commercial and industrial

CLO            collateralized loan obligation

CMBS         commercial mortgage-backed securities

CPI             consumer price index

CRE            commercial real estate

DEDO         section in Tealbook A, "Domestic Economic Developments and Outlook"

Desk           Open Market Desk

DFMU         Designated Financial Market Utilities

ECB            European Central Bank

ELB            effective lower bound

EME           emerging market economy

EU              European Union

FAST Act      Fixing America's Surface Transportation Act

FDIC           Federal Deposit Insurance Corporation

FOMC         Federal Open Market Committee; also, the Committee

GCF            general collateral finance

GDI            gross domestic income

GDP           gross domestic product

GSIBs         globally systemically important banking organizations

HQLA         high-quality liquid assets

IOER          interest on excess reserves

ISM            Institute for Supply Management

| | |
|---|---|
| LIBOR | London interbank offered rate |
| LSAPs | large-scale asset purchases |
| MBS | mortgage-backed securities |
| MMFs | money market funds |
| NBER | National Bureau of Economic Research |
| NI | nominal income |
| NIPA | national income and product accounts |
| OIS | overnight index swap |
| ON RRP | overnight reverse repurchase agreement |
| PCE | personal consumption expenditures |
| QS | Quantitative Surveillance |
| repo | repurchase agreement |
| RMBS | residential mortgage-backed securities |
| RRP | reverse repurchase agreement |
| SCOOS | Senior Credit Officer Opinion Survey on Dealer Financing Terms |
| SEP | Summary of Economic Projections |
| SFA | Supplemental Financing Account |
| SLOOS | Senior Loan Officer Opinion Survey on Bank Lending Practices |
| SOMA | System Open Market Account |
| TBA | to be announced (for example, TBA market) |
| TCJA | Tax Cuts and Jobs Act of 2017 |
| TGA | U.S. Treasury's General Account |
| TIPS | Treasury inflation-protected securities |
| TPE | Term premium effects |
| ZLB | zero lower bound |