

### **Prefatory Note**

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Class II FOMC – Restricted (FR)

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# Report to the FOMC on Economic Conditions and Monetary Policy



## Book A

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

April 20, 2018

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

Authorized for Public Release

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## Comparing the Staff Projection with Other Forecasts

The staff's projection for real GDP growth is  $\frac{1}{4}$  percentage point lower than the projections from both the Survey of Professional Forecasters (SPF) and the Blue Chip consensus in 2018 and  $\frac{1}{4}$  percentage point higher than the Blue Chip in 2019. The staff's unemployment rate forecast is below the outside forecasts in both 2018 and 2019. The staff's projections for total CPI and PCE inflation are a little higher than the outside forecasts in 2018 but are about the same in 2019, while the staff forecast for core PCE inflation is a touch higher than the SPF in both years. (Note that the SPF projections are more than two months old.)

### Comparison of Tealbook and Outside Forecasts

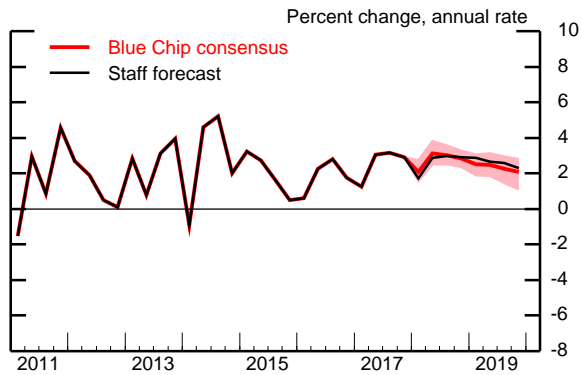
	2017	2018	2019
<b>GDP (Q4/Q4 percent change)</b>			
April Tealbook	2.6	2.6	2.6
Blue Chip (04/10/18)	2.6	2.8	2.3
SPF median (02/09/18)	2.5	2.8	n.a.
<b>Unemployment rate (Q4 level)</b>			
April Tealbook	4.1	3.6	3.3
Blue Chip (04/10/18)	4.1	3.7	3.6
SPF median (02/09/18)	4.1	3.8	n.a.
<b>CPI inflation (Q4/Q4 percent change)</b>			
April Tealbook	2.1	2.4	2.2
Blue Chip (04/10/18)	2.1	2.3	2.2
SPF median (02/09/18)	2.1	2.1	2.2
<b>PCE price inflation (Q4/Q4 percent change)</b>			
April Tealbook	1.7	2.1	1.9
SPF median (02/09/18)	1.7	1.9	2.0
<b>Core PCE price inflation (Q4/Q4 percent change)</b>			
April Tealbook	1.5	2.0	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.

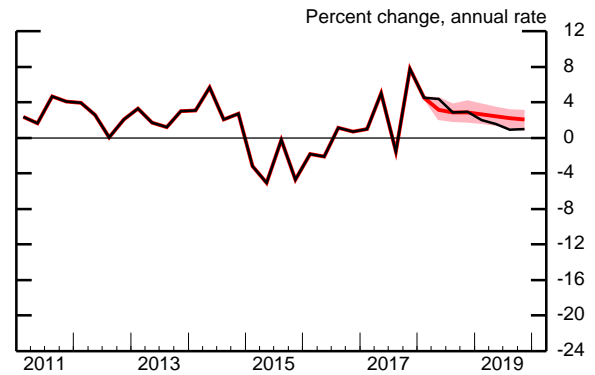
Source: Blue Chip Economic Indicators; Federal Reserve Bank of Philadelphia.

## Tealbook Forecast Compared with Blue Chip

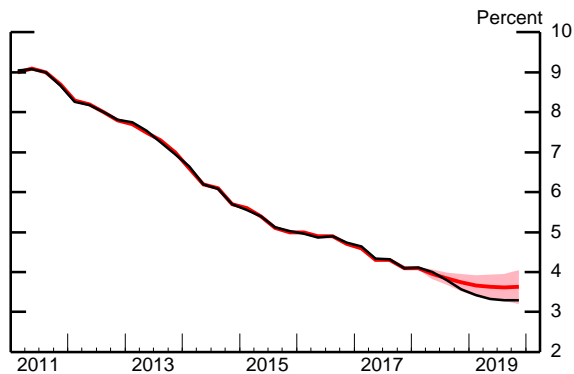
Real GDP



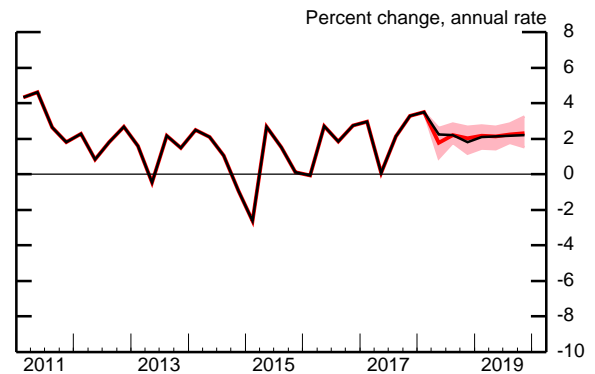
Industrial Production



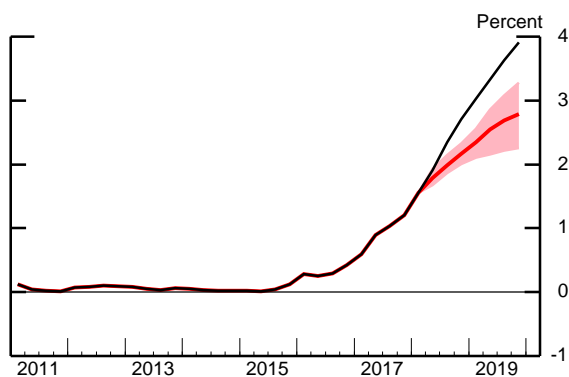
Unemployment Rate



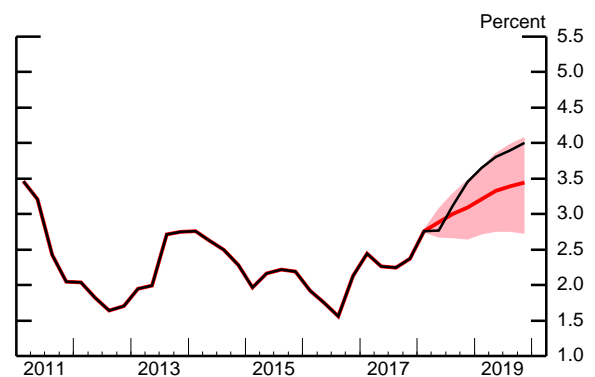
Consumer Price Index



Treasury Bill Rate



10-Year Treasury Yield

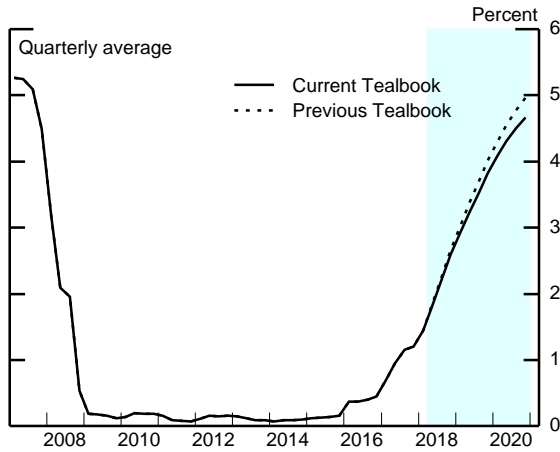


Note: The yield is for on-the-run Treasury securities. Over the forecast period, the staff's projected yield is assumed to be 15 basis points below the off-the-run yield.

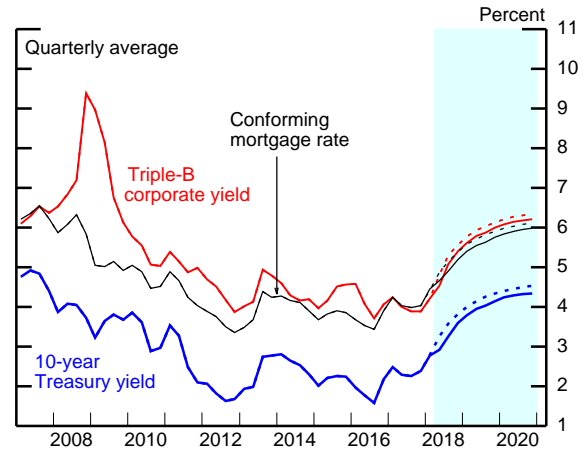
Note: The shaded area represents the area between the Blue Chip top 10 and bottom 10 averages.

## Key Background Factors underlying the Baseline Staff Projection

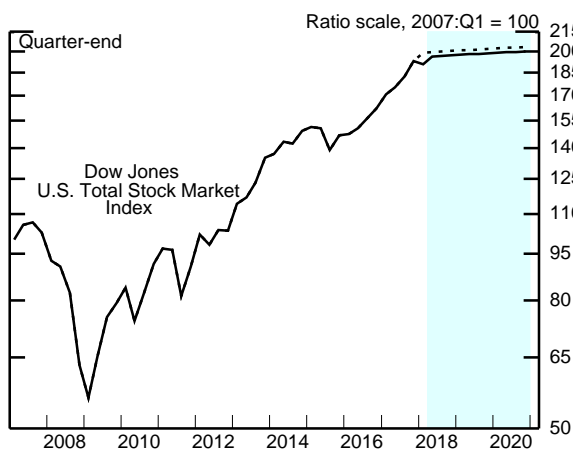
Federal Funds Rate



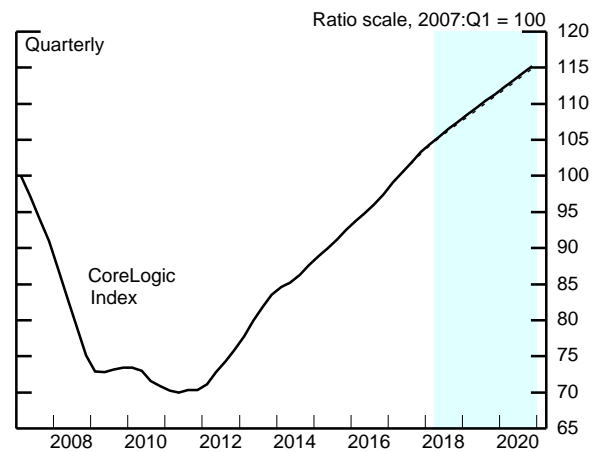
Long-Term Interest Rates



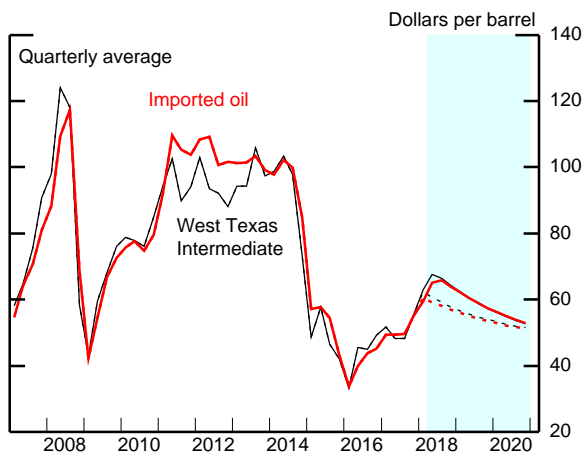
Equity Prices



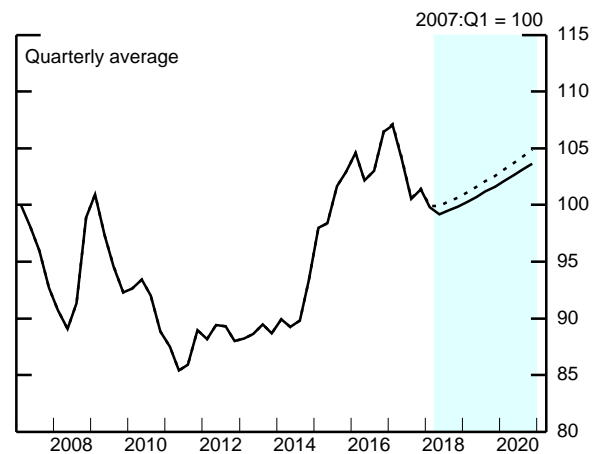
House Prices



Crude Oil Prices



Broad Real Dollar



**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 April 18, 2018
Federal Reserve Bank		
Boston	<ul style="list-style-type: none"> <li>Mixed-frequency BVAR</li> </ul>	2.8
New York	<ul style="list-style-type: none"> <li>Factor-augmented autoregressive model combination</li> <li>Factor-augmented autoregressive model combination, financial factors only</li> <li>Dynamic factor model</li> </ul>	2.3 2.5 2.9
Cleveland	<ul style="list-style-type: none"> <li>Bayesian regressions with stochastic volatility</li> <li>Tracking model</li> </ul>	3.3 0.5
Atlanta	<ul style="list-style-type: none"> <li>Tracking model combined with Bayesian vector autoregressions (VARs), dynamic factor models, and factor-augmented autoregressions (known as GDPNow)</li> </ul>	2.0
Chicago	<ul style="list-style-type: none"> <li>Dynamic factor models</li> <li>Bayesian VARs</li> </ul>	2.0 2.0
St. Louis	<ul style="list-style-type: none"> <li>Dynamic factor models</li> <li>News index model</li> <li>Let-the-data-decide regressions</li> </ul>	2.8 3.4 2.7
Kansas City	<ul style="list-style-type: none"> <li>Accounting-based tracking estimate</li> </ul>	1.4
Board of Governors	<ul style="list-style-type: none"> <li>Board staff's forecast (judgmental tracking model)</li> <li>Monthly dynamic factor models (DFM-45)</li> <li>Mixed-frequency dynamic factor model (DFM-BM)</li> </ul>	1.7 3.2 2.7
Memo: Median of Federal Reserve System nowcasts		2.6

## Summary of the Near-Term Outlook

(Percent change at annual rate except as noted)

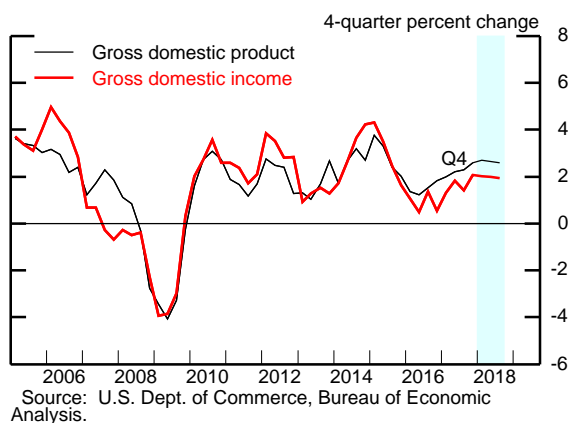
Measure	2018:Q1		2018:Q2		2018:H2	
	Previous Tealbook	Current Tealbook	Previous Tealbook	Current Tealbook	Previous Tealbook	Current Tealbook
<b>Real GDP</b>	<b>2.1</b>	<b>1.7</b>	<b>3.1</b>	<b>2.9</b>	<b>3.3</b>	<b>2.9</b>
Private domestic final purchases	1.6	1.6	3.4	2.8	3.4	3.1
Personal consumption expenditures	1.5	1.2	2.6	2.2	2.9	2.5
Residential investment	-4.4	-4.1	2.7	-2.1	4.1	5.0
Nonres. private fixed investment	4.2	5.7	8.2	8.0	5.9	5.6
Government purchases	-.3	-1.2	.8	1.2	2.2	2.4
<i>Contributions to change in real GDP</i>						
Inventory investment <sup>1</sup>	.8	1.0	-.2	.1	-.1	-.4
Net exports <sup>1</sup>	.0	-.5	.2	.1	.1	.2
<b>Unemployment rate<sup>2</sup></b>	<b>4.1</b>	<b>4.1</b>	<b>3.9</b>	<b>4.0</b>	<b>3.5</b>	<b>3.6</b>
<b>PCE chain price index</b>	<b>2.5</b>	<b>2.8</b>	<b>1.5</b>	<b>2.2</b>	<b>1.6</b>	<b>1.7</b>
Ex. food and energy	2.3	2.5	2.0	2.2	1.8	1.7

1. Percentage points.

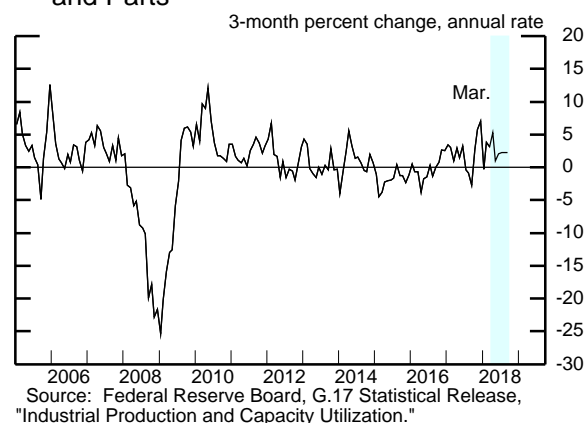
2. Percent, average for the final quarter in the period.

### Recent Nonfinancial Developments (1)

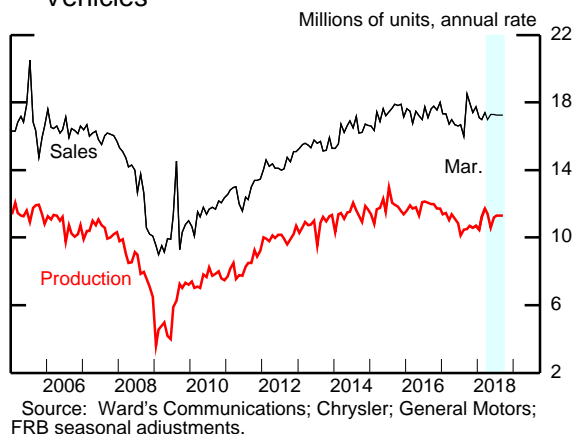
Real GDP and GDI



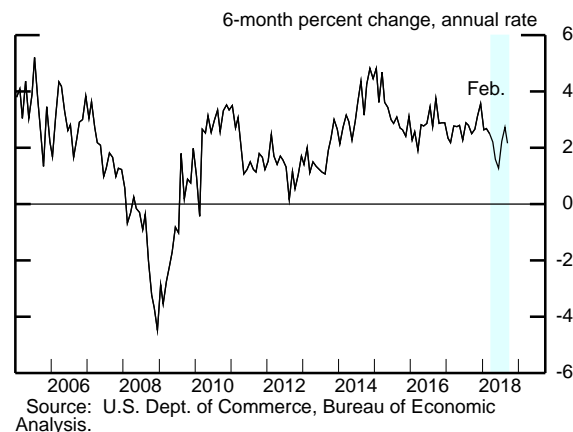
Manufacturing IP ex. Motor Vehicles and Parts



Sales and Production of Light Motor Vehicles

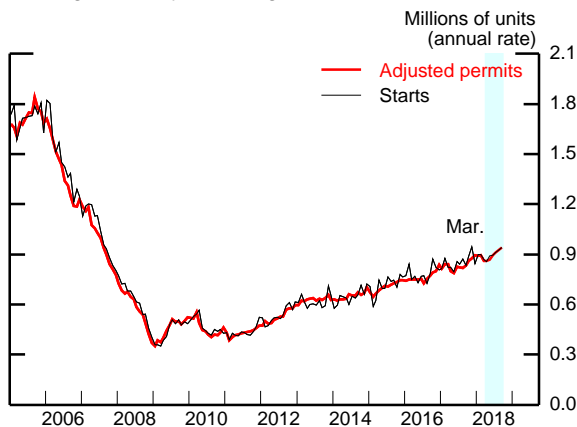


Real PCE Growth



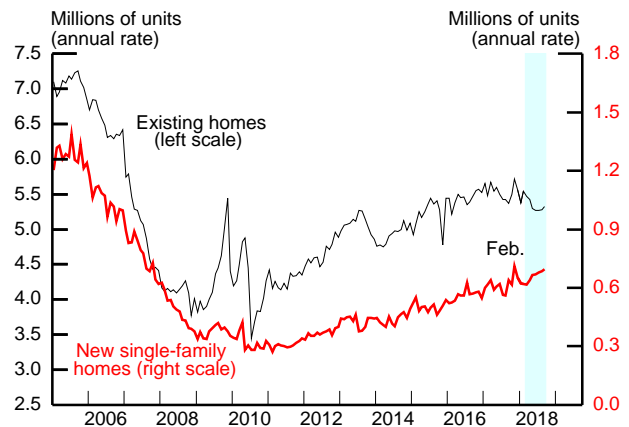
## Recent Nonfinancial Developments (2)

Single-Family Housing Starts and Permits



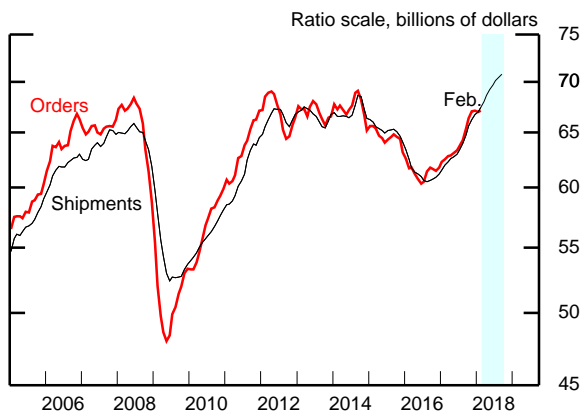
Note: Adjusted permits equal permit issuance plus starts outside of permit-issuing areas.  
Source: U.S. Census Bureau.

Home Sales



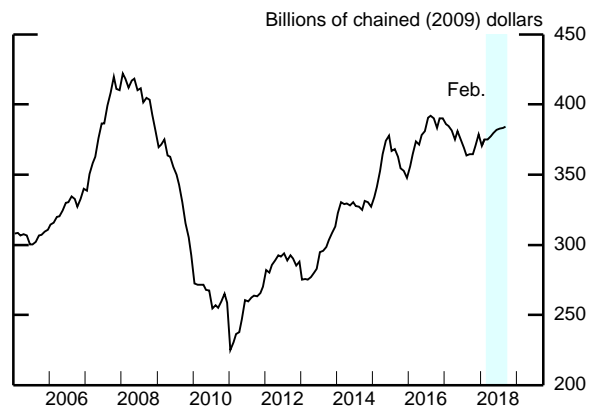
Source: For existing, National Association of Realtors; for new, U.S. Census Bureau.

Nondefense Capital Goods ex. Aircraft



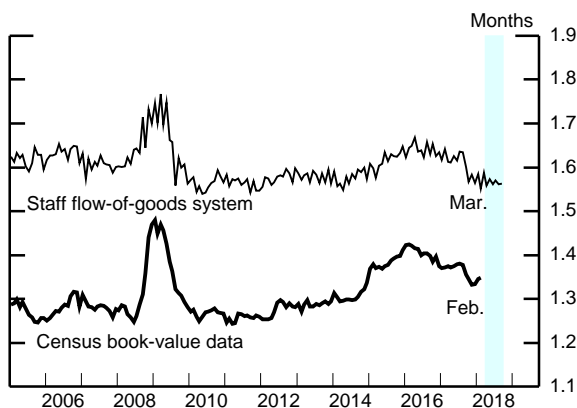
Note: Data are 3-month moving averages.  
Source: U.S. Census Bureau.

Nonresidential Construction Put in Place



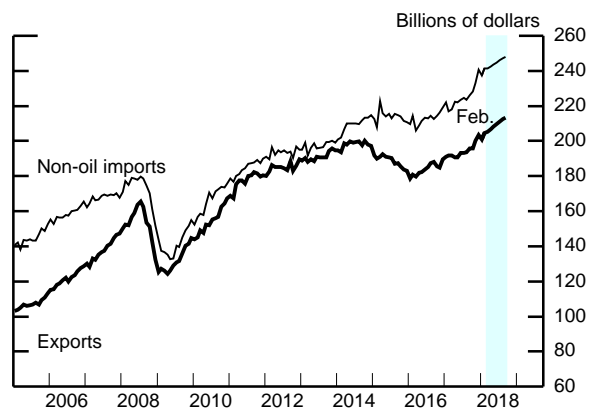
Note: Nominal CIPPI deflated by BEA prices through 2017:Q4 and by the staff's estimated deflator thereafter.  
Source: U.S. Census Bureau.

Inventory Ratios



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

Exports and Non-oil Imports

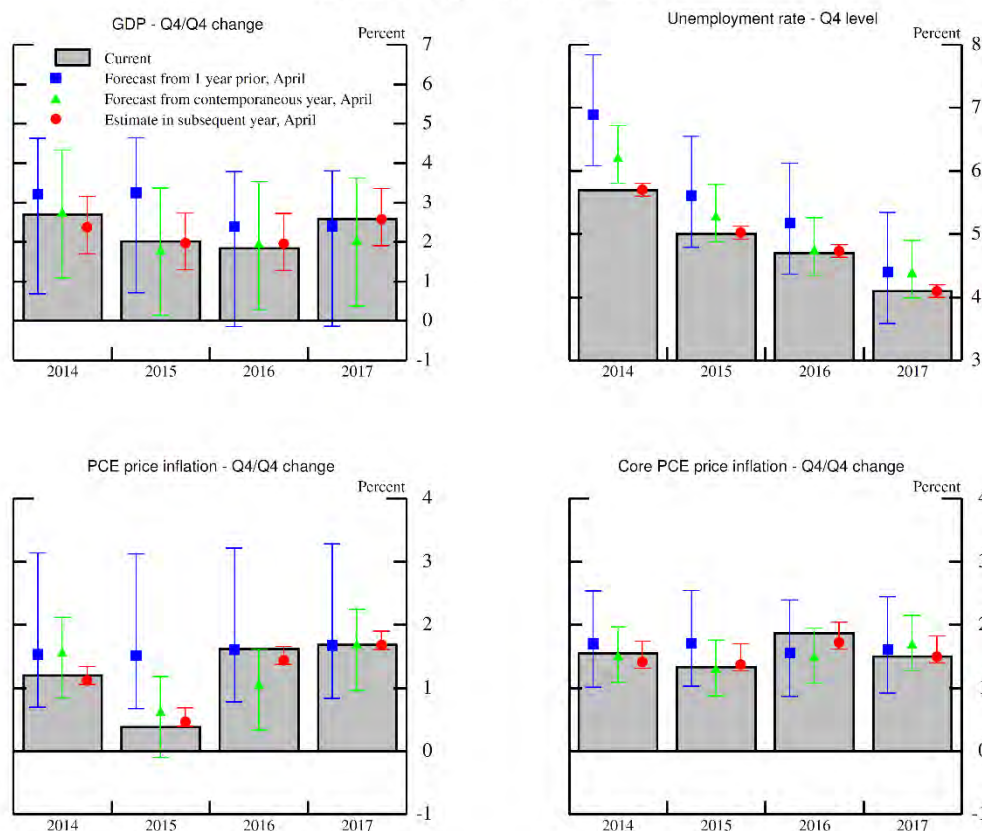


Note: Forecasts are linear interpolations of quarterly values.  
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis; U.S. Census Bureau.

though the forecast errors for real GDP growth and the unemployment rate suggest that the economy tightened more than the staff expected last year, staff forecasts of the Q4/Q4 percent change in core PCE prices in 2017 were a little too high, as shown in the bottom-right panel. The error in forecasting core PCE price inflation is entirely explained by lower-than-expected core goods prices, which fell notably again last year despite a pickup in core goods import price inflation.<sup>2</sup> In contrast, the staff's projection of total PCE price inflation in 2017 was accurate, as higher-than-expected PCE energy prices in the last few months of the year offset lower-than-expected food and core goods prices.

Finally, the faster-than-expected fall in the unemployment rate occurred at the same time that core PCE price inflation was lower than the staff could explain. In response, the staff edged down its estimate of the natural rate of unemployment last year, 0.2 percentage point cumulatively.

Tealbook Forecasts, 2014-2017

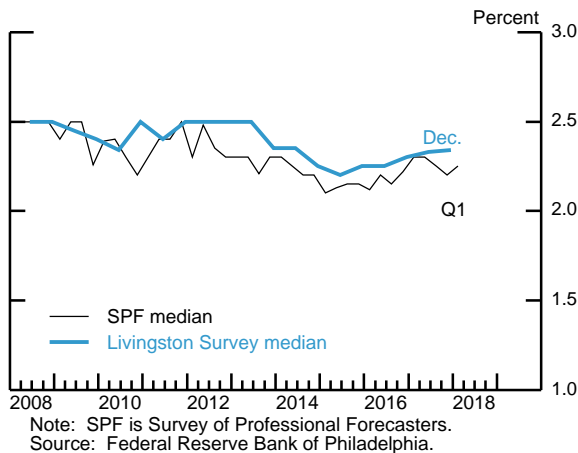


Source: Staff forecast, Bureau of Economic Analysis, and Bureau of Labor Statistics.

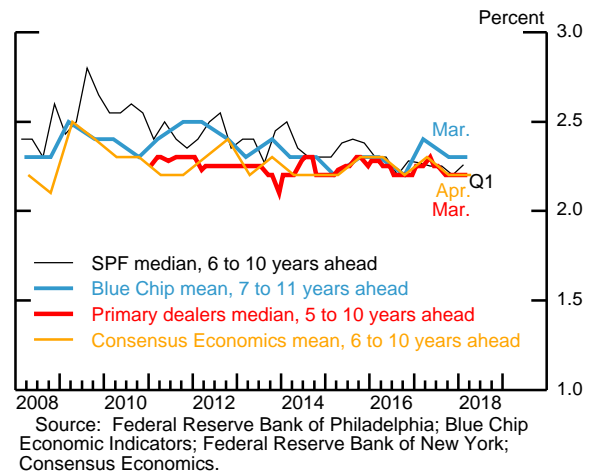
<sup>2</sup> The April 2017 Tealbook projection had already incorporated the large downward surprise to wireless telephone services prices seen in the March 2017 CPI release.

# Survey Measures of Longer-Term Inflation Expectations

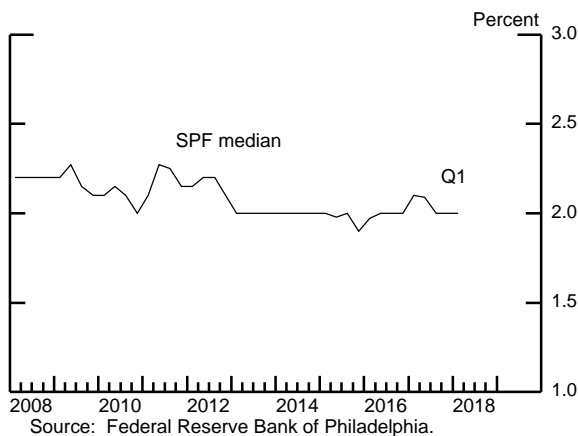
CPI Next 10 Years



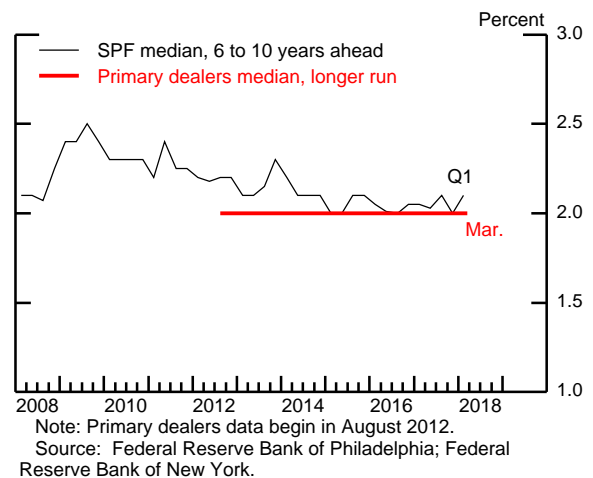
CPI Forward Expectations



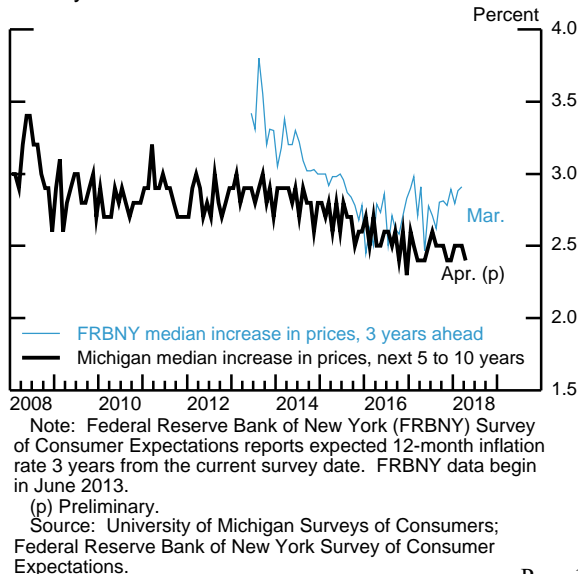
PCE Next 10 Years



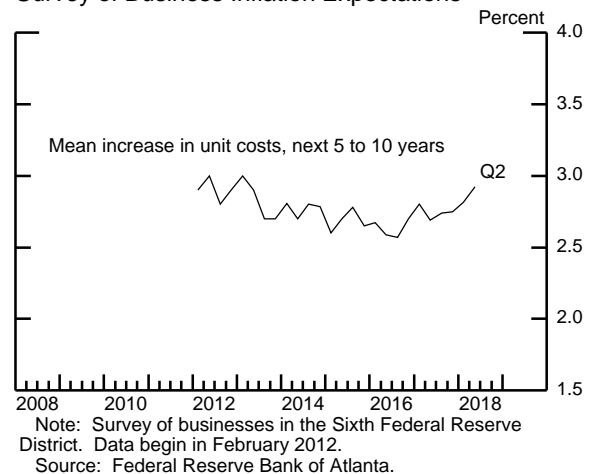
PCE Forward Expectations



Surveys of Consumers



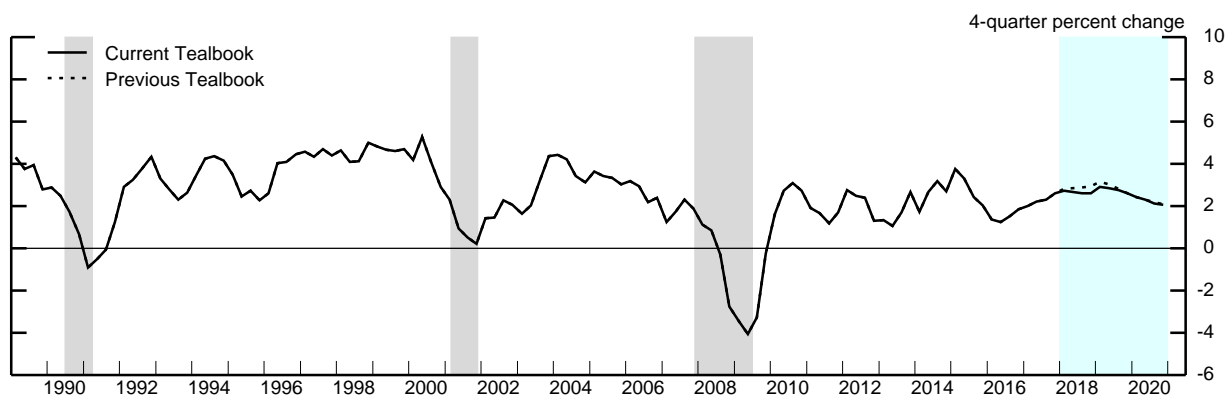
Survey of Business Inflation Expectations



**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			
<b>Real GDP</b>	<b>2.6</b>	<b>2.3</b>	<b>2.9</b>	<b>2.6</b>	<b>2.6</b>	<b>2.1</b>
Previous Tealbook	2.6	2.6	3.3	2.9	2.6	2.1
Final sales	2.9	1.7	3.3	2.5	2.7	2.1
Previous Tealbook	2.9	2.3	3.4	2.8	2.7	2.1
Personal consumption expenditures	2.8	1.7	2.5	2.1	2.7	2.5
Previous Tealbook	2.9	2.0	2.9	2.4	2.8	2.5
Residential investment	2.6	-3.1	5.0	.9	1.7	3.3
Previous Tealbook	2.5	-.9	4.1	1.6	.5	4.2
Nonresidential structures	5.0	9.5	5.9	7.7	2.0	.5
Previous Tealbook	4.9	7.4	3.4	5.4	2.8	.9
Equipment and intangibles	6.7	6.1	5.5	5.8	4.2	2.0
Previous Tealbook	6.8	5.9	6.6	6.2	4.1	2.1
Federal purchases	1.0	-1.2	4.8	1.8	4.1	3.3
Previous Tealbook	1.0	-.8	4.4	1.8	4.1	3.2
State and local purchases	.5	.7	1.0	.9	1.0	1.0
Previous Tealbook	.5	.9	1.0	.9	1.0	1.0
Exports	5.0	4.2	6.3	5.2	5.2	3.6
Previous Tealbook	4.9	4.1	6.2	5.2	5.0	3.4
Imports	4.7	4.4	3.5	3.9	4.4	4.8
Previous Tealbook	4.6	2.7	4.1	3.4	4.7	4.9
Contributions to change in real GDP (percentage points)						
Inventory change	-.3	.6	-.4	.1	-.1	.0
Previous Tealbook	-.3	.3	-.1	.1	-.1	-.1
Net exports	-.1	-.2	.2	.0	.0	-.3
Previous Tealbook	-.1	.1	.1	.1	-.1	-.3

### Real GDP

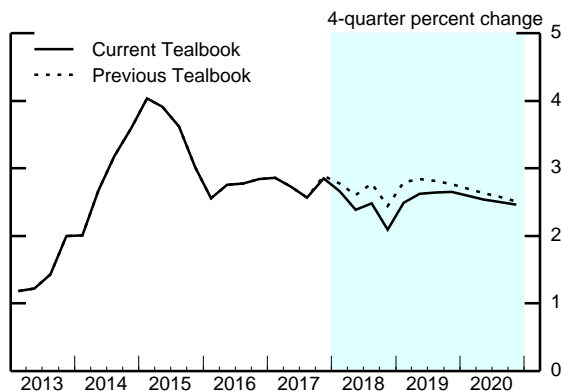


Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.

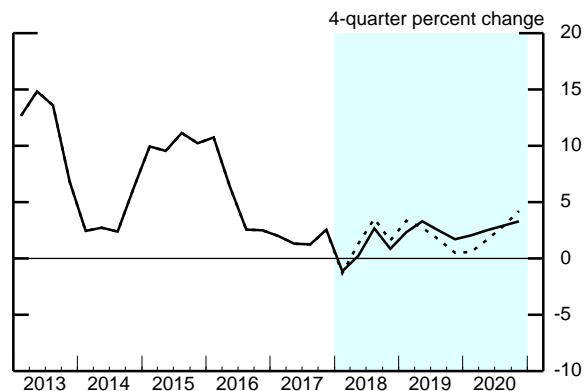
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

## Components of Final Demand

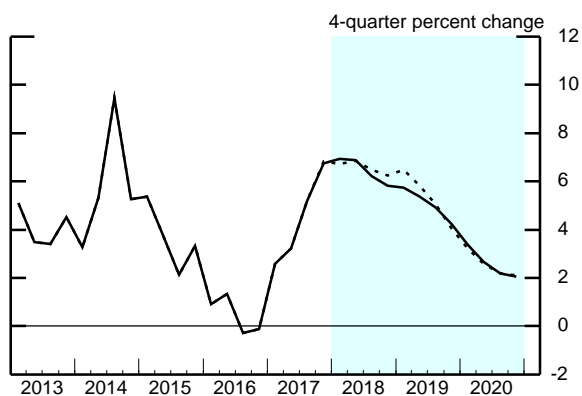
Personal Consumption Expenditures



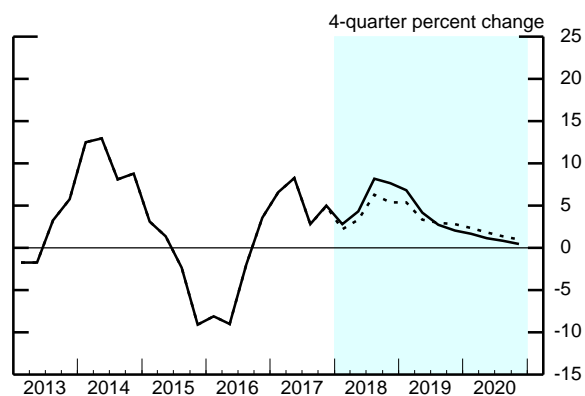
Residential Investment



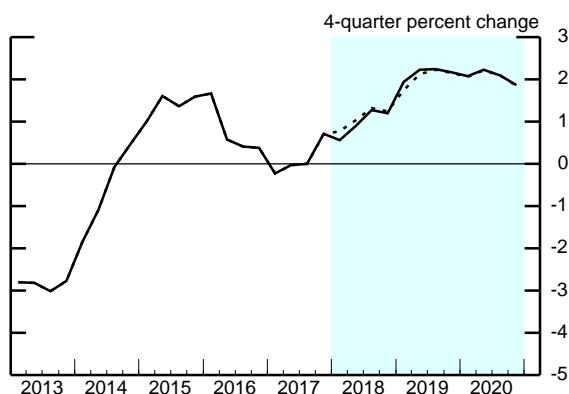
Equipment and Intangibles



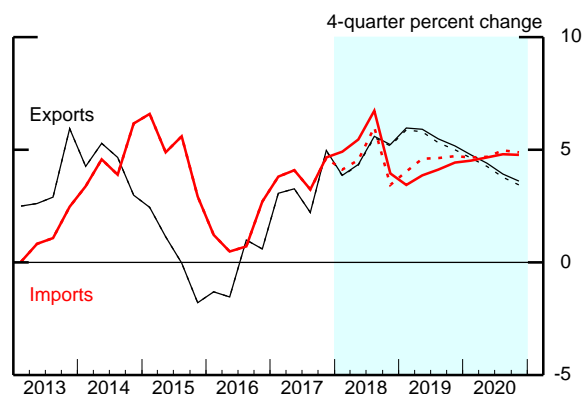
Nonresidential Structures



Government Consumption and Investment



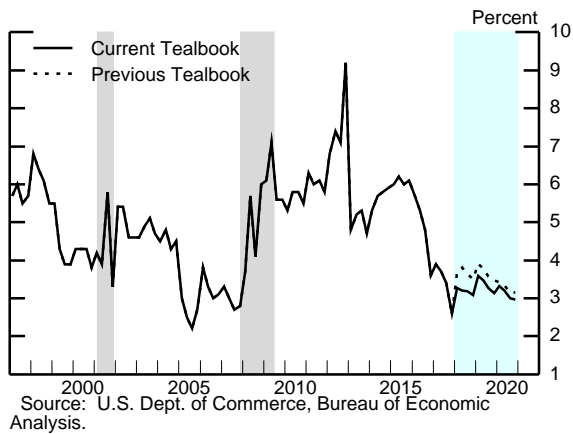
Exports and Imports



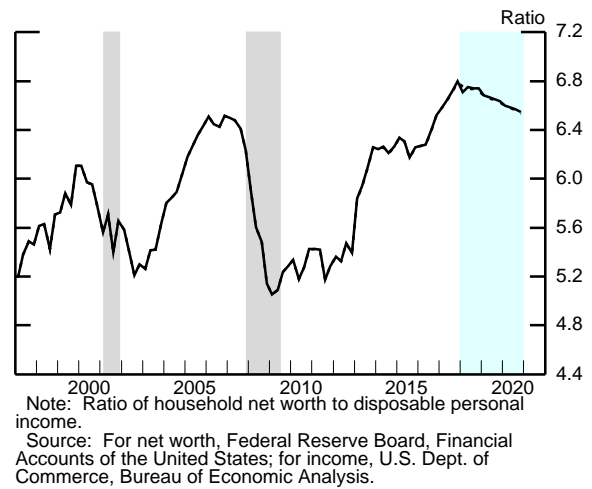
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

## Aspects of the Medium-Term Projection

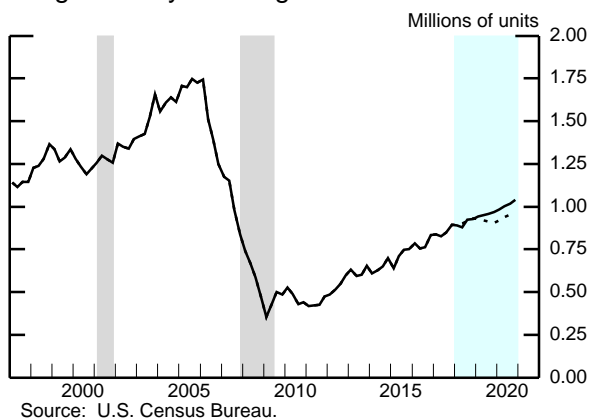
Personal Saving Rate



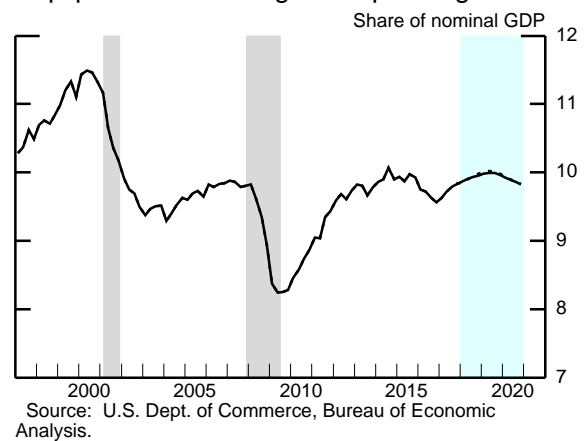
Wealth-to-Income Ratio



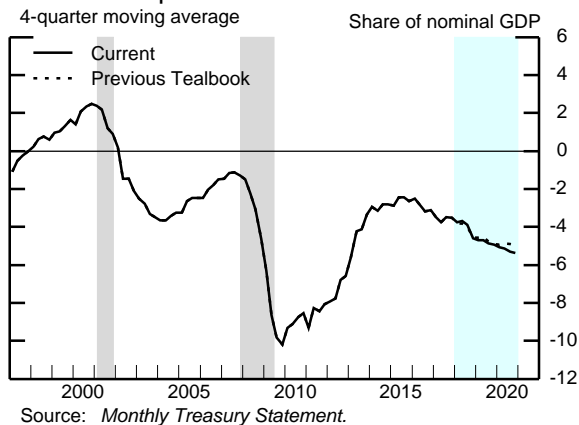
Single-Family Housing Starts



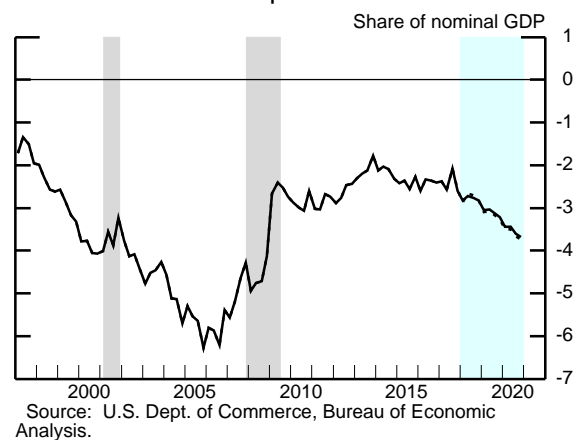
Equipment and Intangibles Spending



Federal Surplus/Deficit



Current Account Surplus/Deficit



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

### Decomposition of Potential GDP

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

Measure	1974-95	1996-2000	2001-07	2008-10	2011-15	2016	2017	2018	2019	2020
Potential real GDP	3.1	3.4	2.6	1.6	1.2	1.4	1.5	1.7	1.9	1.9
Previous Tealbook	3.1	3.4	2.6	1.6	1.2	1.4	1.5	1.6	1.9	1.9
<i>Selected contributions<sup>1</sup></i>										
Structural labor productivity <sup>2</sup>	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	1.0	1.1	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	.7	.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 <sup>3</sup>	-1.9	2.4	.8	-4.2	-.1	.3	1.4	2.4	3.1	3.2
Previous Tealbook	-1.9	2.4	.8	-4.2	-.1	.3	1.4	2.7	3.5	3.6

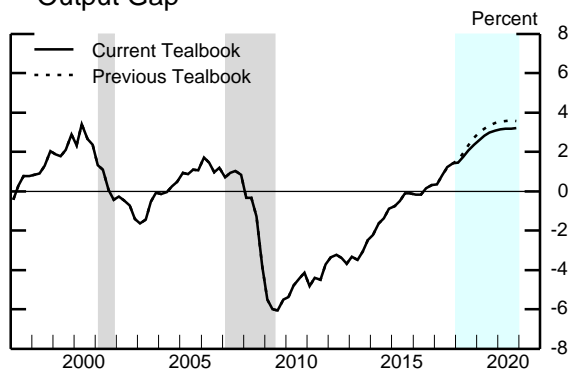
Note: For multiyear periods, the percent change is the annual average from Q4 of the year preceding the first year shown to Q4 of the last year shown.

1. Percentage points.

2. Total business sector.

3. Percent difference between actual and potential GDP in the final quarter of the period indicated. A negative number indicates that the economy is operating below potential.

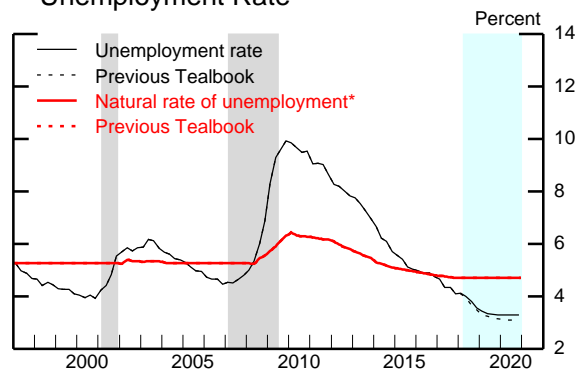
#### Output Gap



Note: The output gap is the percent difference between actual and potential GDP; a negative number indicates that the economy is operating below potential.

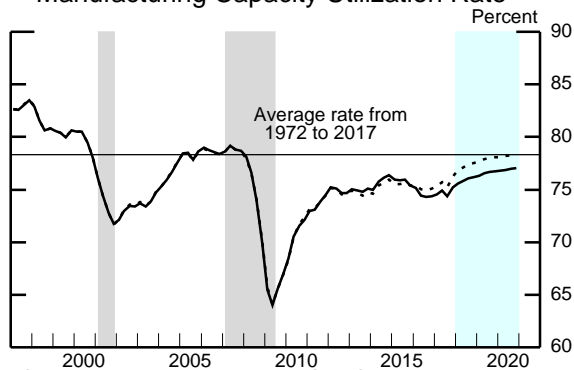
Source: U.S. Department of Commerce, Bureau of Economic Analysis; staff assumptions.

#### Unemployment Rate



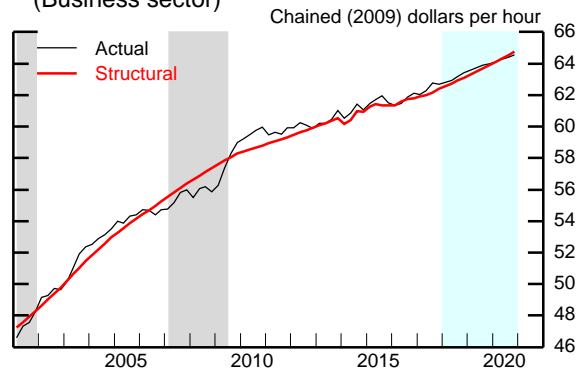
Source: U.S. Department of Labor, Bureau of Labor Statistics; staff assumptions. \*Staff estimate including the effect of EEB.

#### 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 <sup>1</sup>	.9	.7	1.6	1.2	.9	.9
Previous Tealbook	.9	.5	1.9	1.2	.9	.9
Nonfarm payroll employment <sup>2</sup>	183	199	191	195	181	160
Previous Tealbook	183	232	196	214	186	165
Private employment <sup>2</sup>	180	197	180	188	170	150
Previous Tealbook	180	224	185	205	175	155
Labor force participation rate <sup>3</sup>	62.7	62.8	62.7	62.7	62.7	62.7
Previous Tealbook	62.7	62.8	62.7	62.7	62.7	62.7
Civilian unemployment rate <sup>3</sup>	4.1	4.0	3.6	3.6	3.3	3.3
Previous Tealbook	4.1	3.9	3.5	3.5	3.1	3.1

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			
<i>Percent change at annual rate from final quarter of preceding period</i>						
PCE chain-weighted price index	1.7	2.5	1.7	2.1	1.9	2.0
Previous Tealbook	1.7	2.0	1.6	1.8	2.0	2.1
Food and beverages	.7	.9	2.1	1.5	2.3	2.3
Previous Tealbook	.7	1.4	2.2	1.8	2.4	2.4
Energy	7.6	7.6	-.4	3.5	-1.9	-1.1
Previous Tealbook	7.6	.8	-1.6	-.4	-.7	-.1
Excluding food and energy	1.5	2.4	1.7	2.0	2.1	2.1
Previous Tealbook	1.5	2.1	1.8	1.9	2.1	2.2
Prices of core goods imports <sup>1</sup>	1.3	3.2	1.3	2.3	.6	.6
Previous Tealbook	1.3	3.1	1.1	2.1	.7	.6
	Mar. 2018 <sup>2</sup>	Apr. 2018 <sup>2</sup>	May 2018 <sup>2</sup>	June 2018 <sup>2</sup>	July 2018 <sup>2</sup>	Aug. 2018 <sup>2</sup>
<i>12-month percent change</i>						
PCE chain-weighted price index	2.1	2.1	2.4	2.5	2.5	2.4
Previous Tealbook	2.0	1.9	2.1	2.2		
Excluding food and energy	1.9	1.9	2.0	2.1	2.1	2.1
Previous Tealbook	1.8	1.8	1.9	1.9		

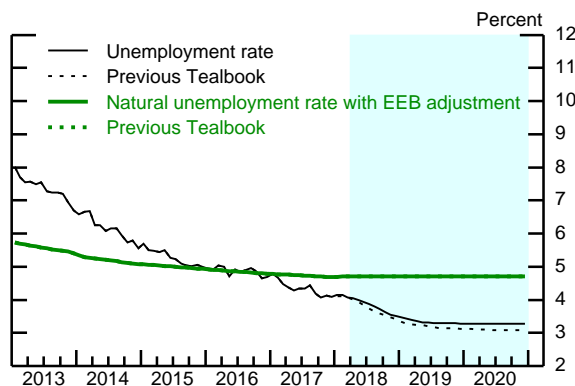
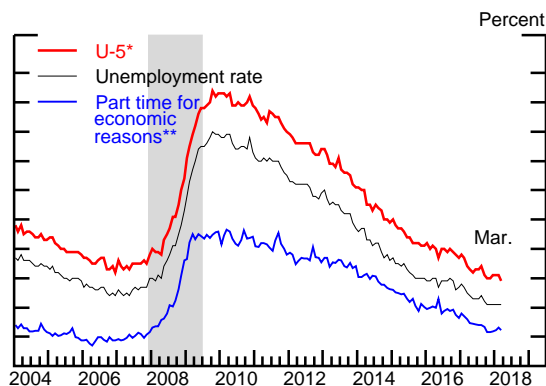
1. Core goods imports exclude computers, semiconductors, oil, and natural gas.

2. Staff forecast.

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

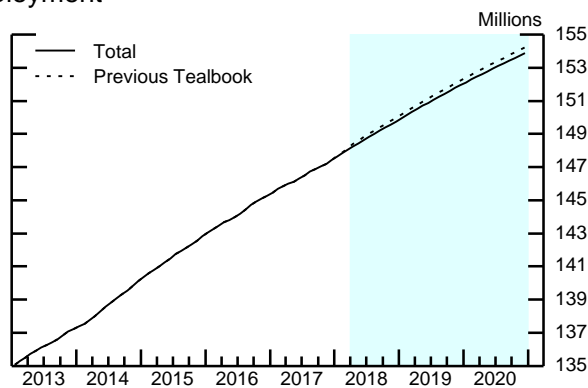
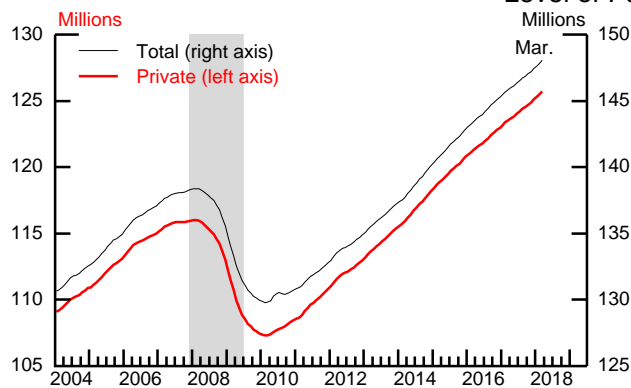
## Labor Market Developments and Outlook (1)

### Measures of Labor Underutilization



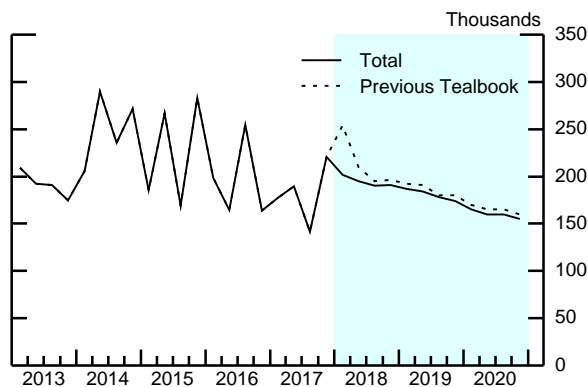
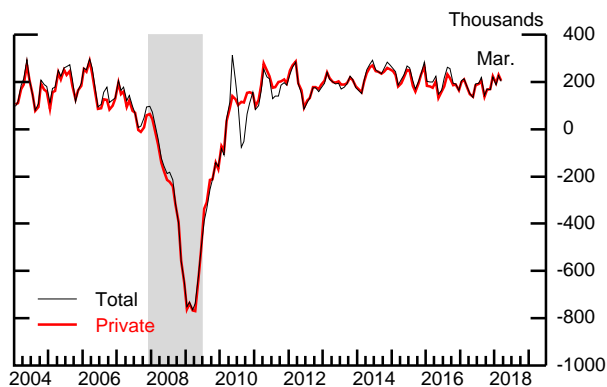
\* U-5 measures total unemployed persons plus all marginally attached to the labor force, as a percent of the labor force plus persons marginally attached to the labor force.  
 \*\* Percent of Current Population Survey employment.  
 EEB Extended and emergency unemployment benefits.  
 Source: U.S.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

### Level of Payroll Employment\*



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

### Change in Payroll Employment\*

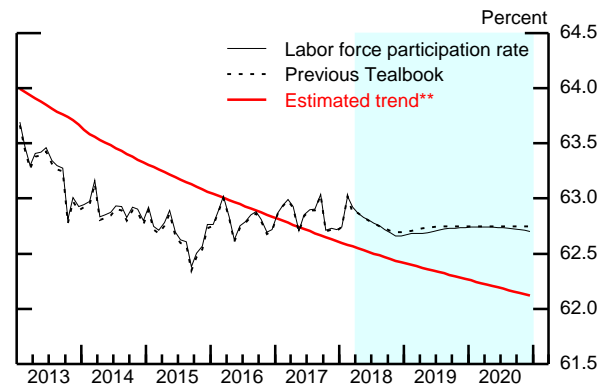


\* 3-month moving averages.  
 Source: U.S. Department of Labor, Bureau of Labor Statistics.

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

## Labor Market Developments and Outlook (2)

### Labor Force Participation Rate\*

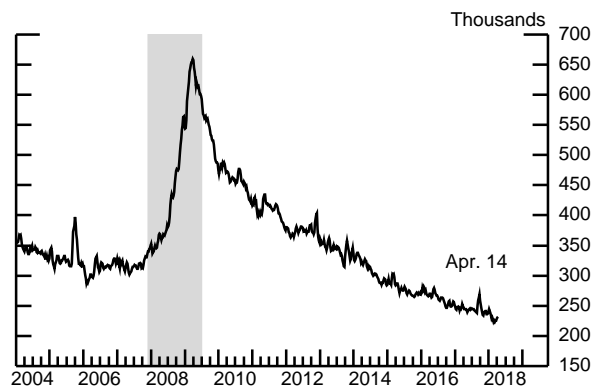


\* Published data adjusted by staff to account for changes in population weights.

\*\* Includes staff estimate of the effect of extended and emergency unemployment benefits.

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

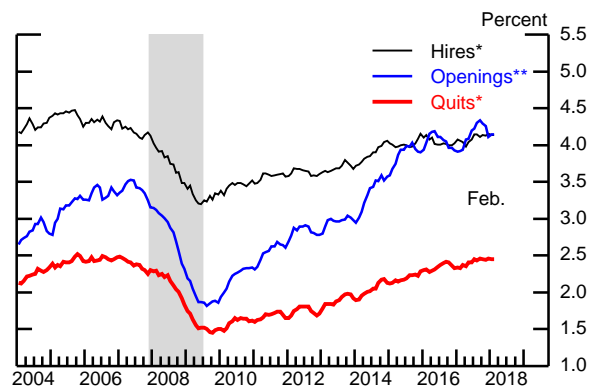
### Initial Unemployment Insurance Claims\*



\* 4-week moving average.

Source: U.S. Department of Labor, Employment and Training Administration.

### Hires, Quits, and Job Openings

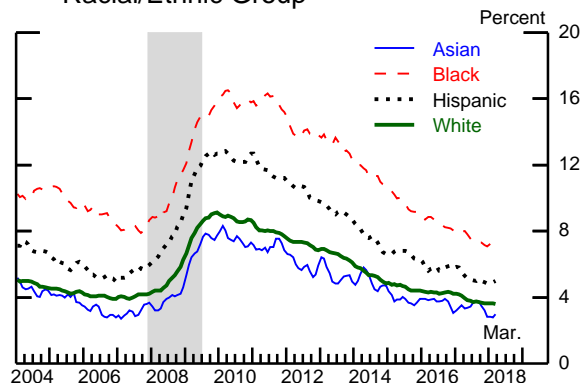


\* Percent of private nonfarm payroll employment, 3-month moving average.

\*\* Percent of private nonfarm payroll employment plus unfilled jobs, 3-month moving average.

Source: Job Openings and Labor Turnover Survey.

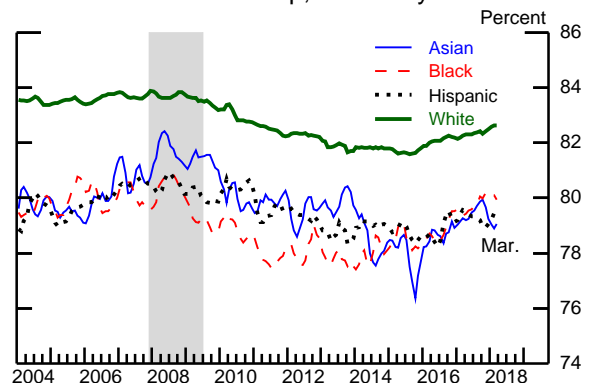
### Unemployment Rate by Racial/Ethnic Group



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

Source: U.S. Department of Labor, Bureau of Labor Statistics, Current Population Survey.

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



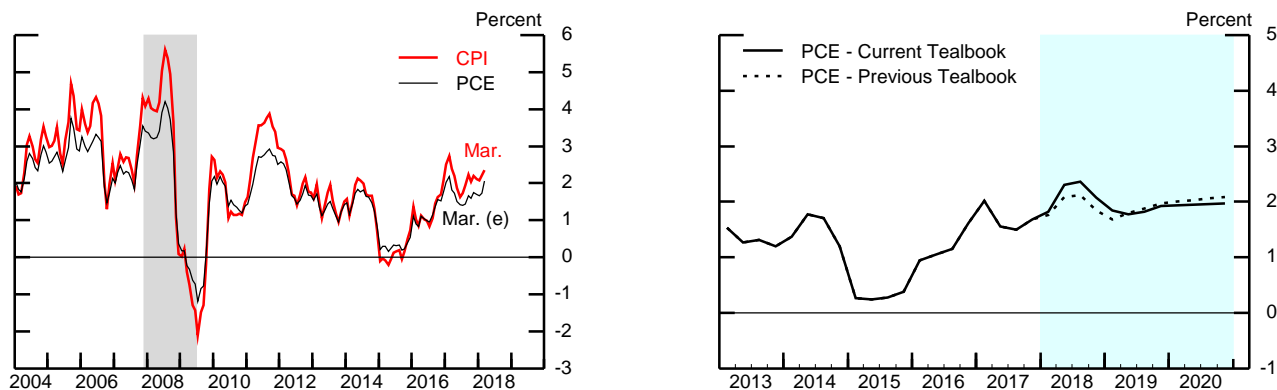
Note: These categories are not mutually exclusive, as the ethnicity Hispanic may include people of any race. The Current Population Survey defines Hispanic ethnicity as those who report their origin is Mexican, Puerto Rican, Cuban, Central American, or South American (and some others). 3-month moving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

Source: U.S. Department of Labor, Bureau of Labor Statistics, Current Population Survey.

## Inflation Developments and Outlook (1)

(Percent change from year-earlier period)

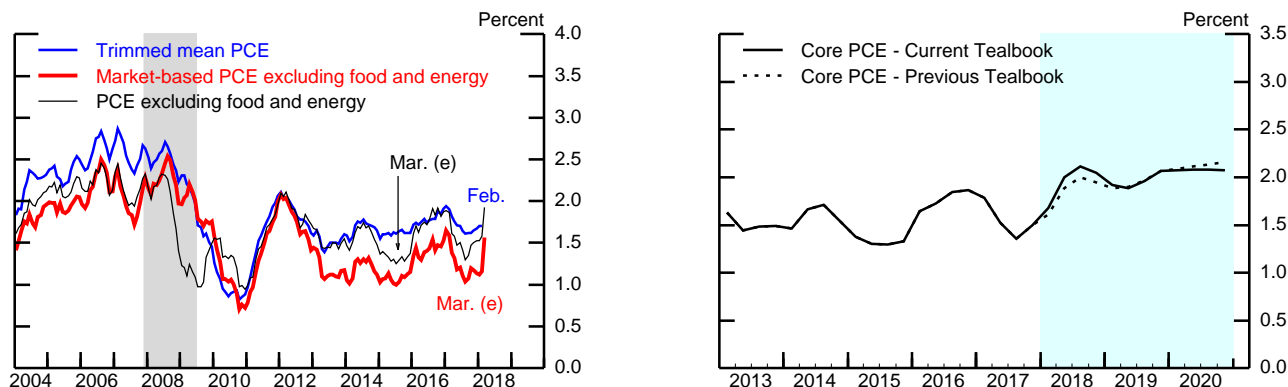
### Headline Consumer Price Inflation



Note: PCE prices from January to March 2018 are staff estimates (e).

Source: For CPI, U.S. Department of Labor, Bureau of Labor Statistics; for PCE, U.S. Department of Commerce, Bureau of Economic Analysis.

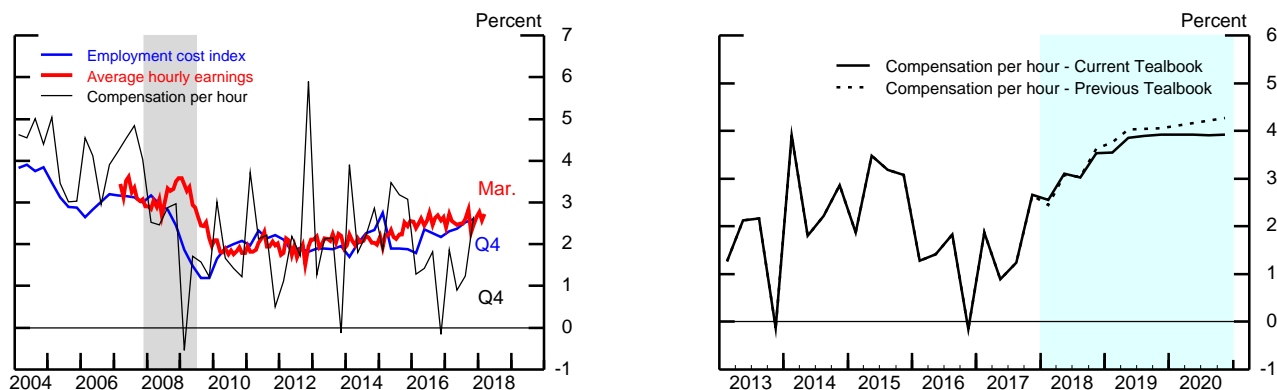
### Measures of Underlying PCE Price Inflation



Note: Core PCE prices from January to March 2018 are staff estimates (e).

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

### Labor Cost Growth



Note: Compensation per hour is for the business sector. Average hourly earnings are for the private nonfarm sector. The employment cost index is for the private sector.

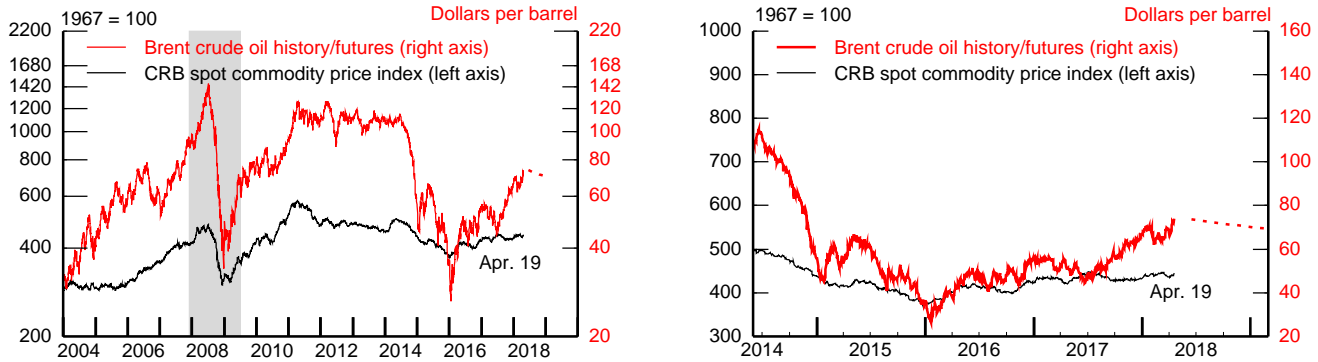
Source: U.S. Department of Labor, Bureau of Labor Statistics.

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

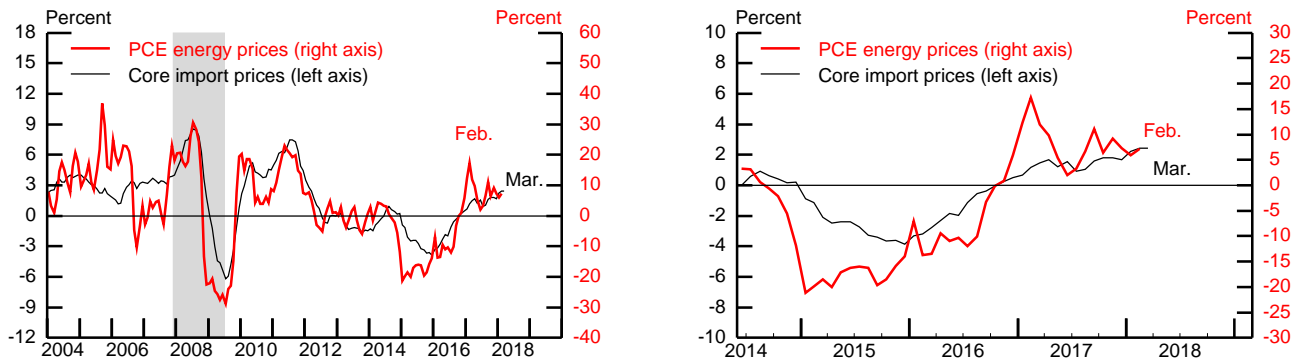
## Inflation Developments and Outlook (2)

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

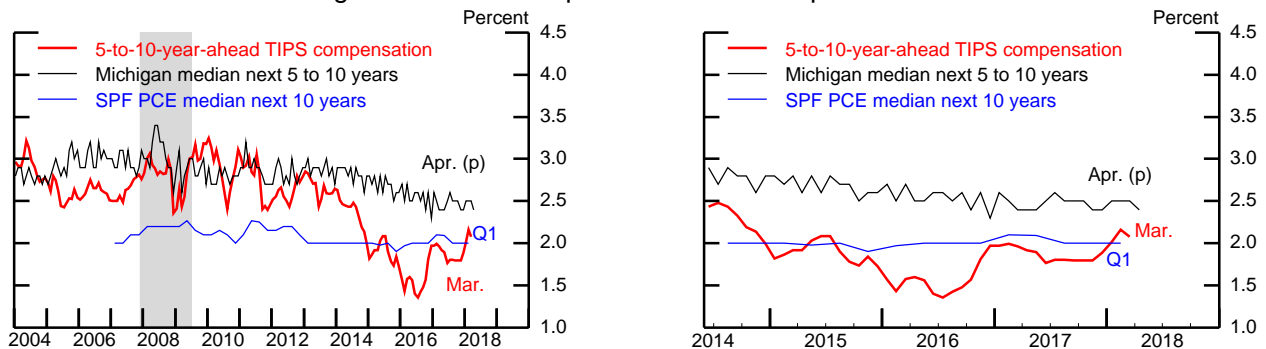
### Commodity and Oil Price Levels



### Energy and Import Price Inflation



### Long-Term Inflation Expectations and Compensation



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

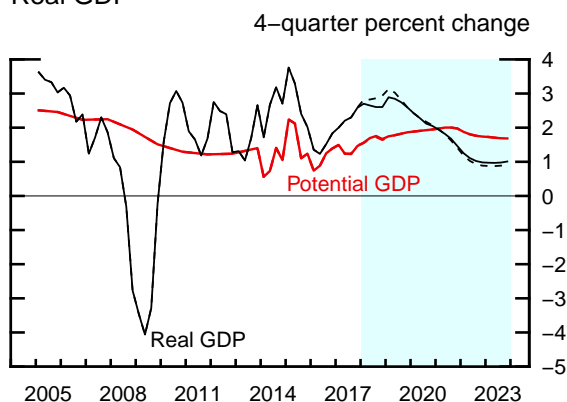
## The Long–Term Outlook

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

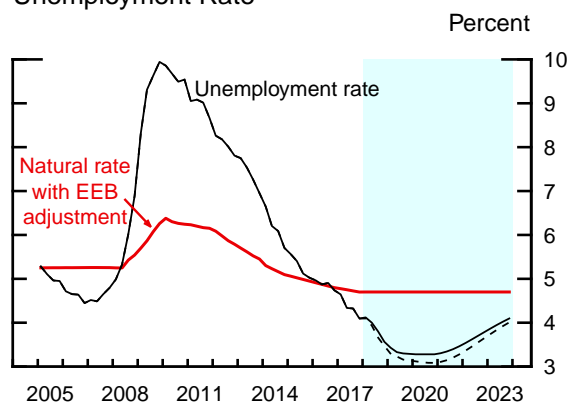
Measure	2018	2019	2020	2021	2022	2023	Longer run
Real GDP	2.6	2.6	2.1	1.5	1.0	1.0	1.7
Previous Tealbook	2.9	2.6	2.1	1.4	.9	.9	1.7
Civilian unemployment rate <sup>1</sup>	3.6	3.3	3.3	3.5	3.8	4.1	4.7
Previous Tealbook	3.5	3.1	3.1	3.3	3.6	4.0	4.7
PCE prices, total	2.1	1.9	2.0	2.0	2.1	2.1	2.0
Previous Tealbook	1.8	2.0	2.1	2.2	2.2	2.2	2.0
Core PCE prices	2.0	2.1	2.1	2.1	2.2	2.2	2.0
Previous Tealbook	1.9	2.1	2.2	2.2	2.2	2.2	2.0
Federal funds rate <sup>1</sup>	2.59	3.82	4.66	4.97	4.85	4.48	2.50
Previous Tealbook	2.66	4.01	4.96	5.35	5.22	4.79	2.50
10-year Treasury yield <sup>1</sup>	3.6	4.2	4.4	4.3	4.1	3.9	3.4
Previous Tealbook	3.8	4.3	4.5	4.4	4.2	4.0	3.4

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

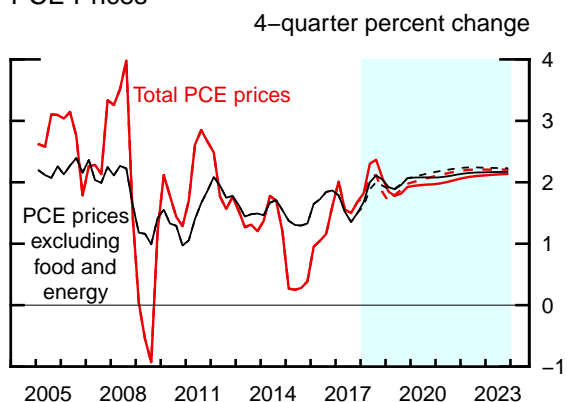
Real GDP



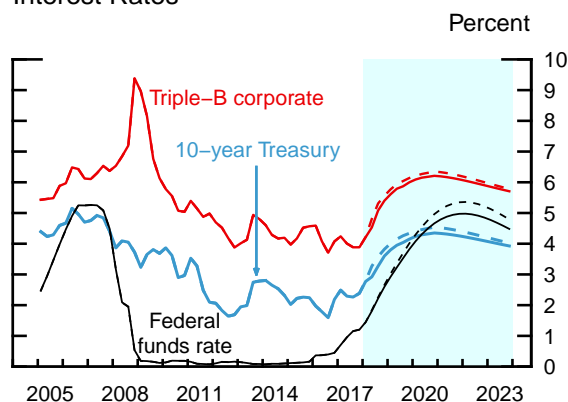
Unemployment Rate



PCE Prices



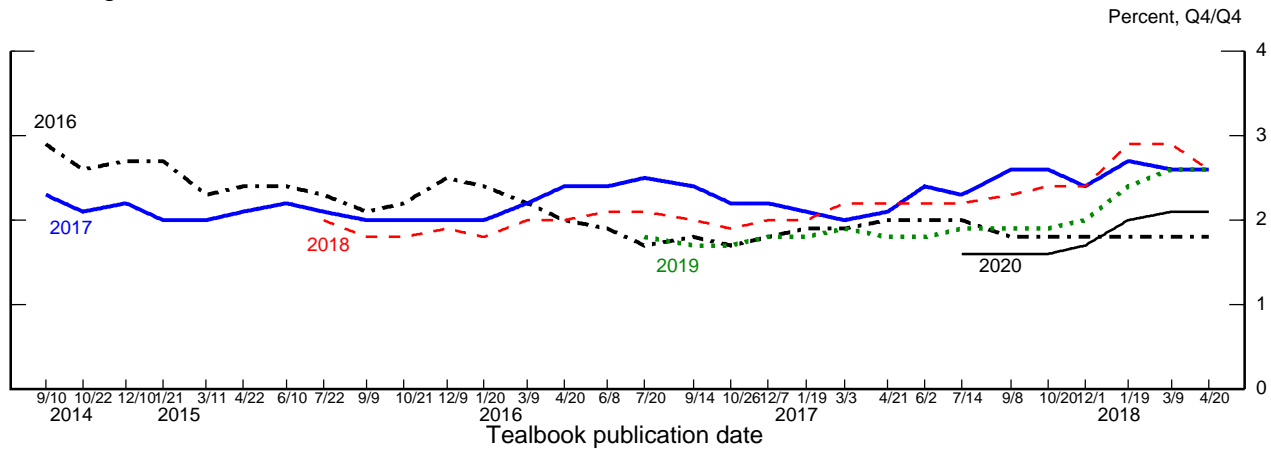
Interest Rates



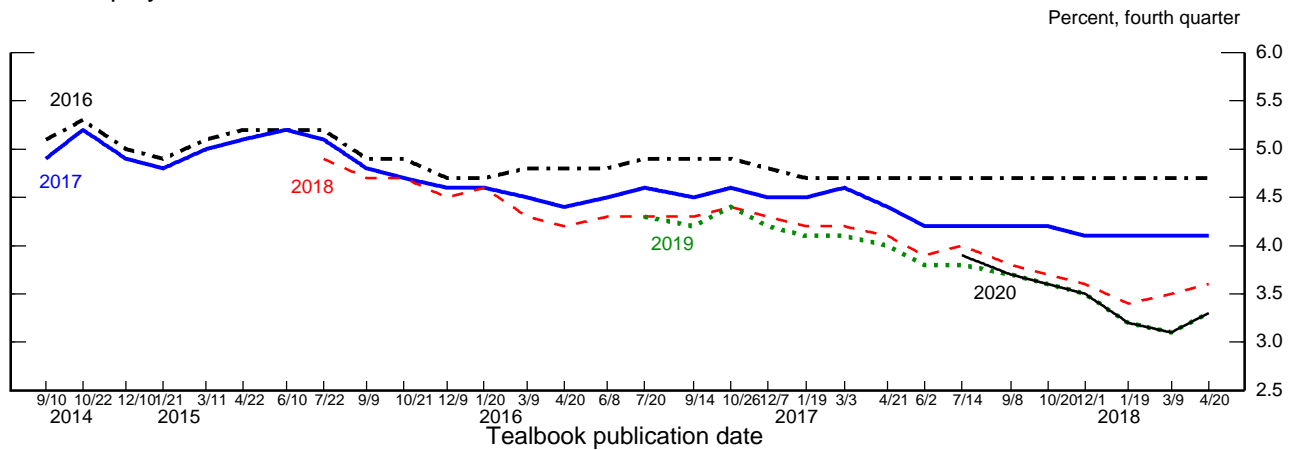
Note: In each panel, shading represents the projection period, and dashed lines are the previous Tealbook.

## Evolution of the Staff Forecast

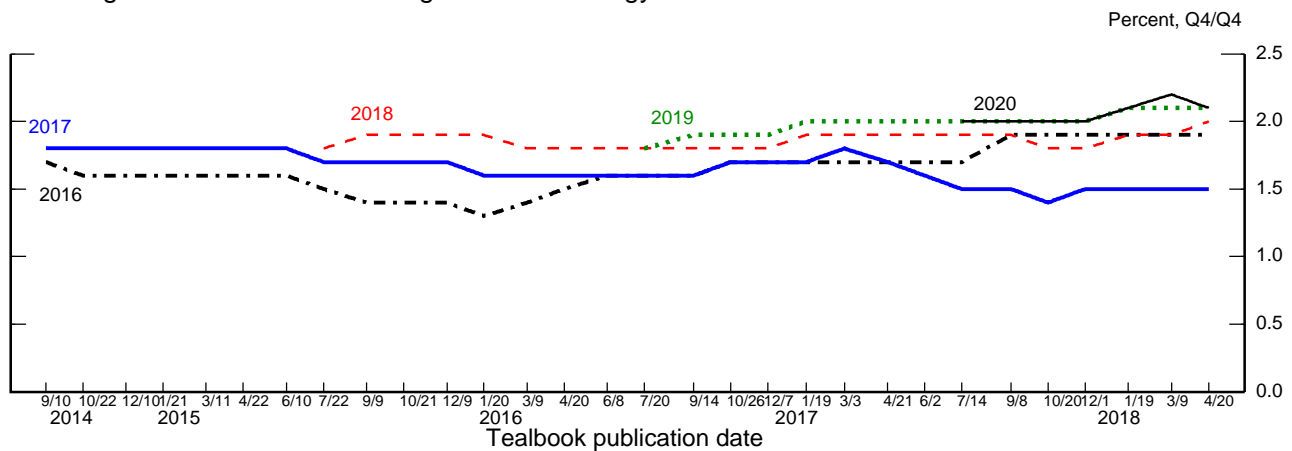
Change in Real GDP



Unemployment Rate



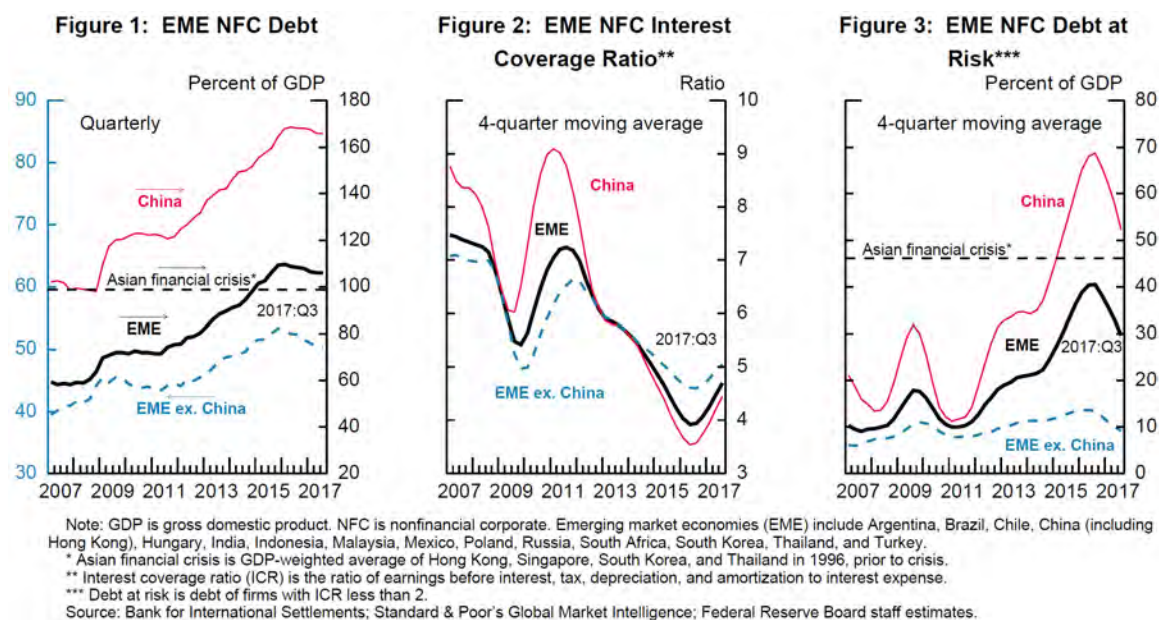
Change in PCE Prices excluding Food and Energy



## How Risky Is Corporate Debt in Emerging Market Economies?

Since 2007, nonfinancial corporate (NFC) debt in emerging markets (EMEs) has tripled in dollar value, reaching \$28 trillion in the third quarter of 2017. Although EME corporate debt as a share of GDP has declined slightly since 2016, it remains elevated at around 110 percent of GDP (figure 1). A large majority of the increase since 2007 is accounted for by China (the red line), where NFC debt has risen to 170 percent of GDP. But NFC debt in the other EMEs has also risen notably (note the different scale). The rapid increase in corporate debt has raised concerns about the risks this debt might pose to EMEs and the global economy. In particular, rising global interest rates, in part as advanced economies tighten monetary policy, could lead to higher EME debt-servicing burdens, weaker currencies, capital outflows, and lower earnings. Such developments could weigh on EME corporates, especially those that are highly leveraged or have high levels of dollar-denominated debt, potentially triggering loan losses, bond defaults, and broader financial stress.

We evaluate the overall riskiness of EME corporate debt using the interest coverage ratio (ICR), or the ratio of earnings to interest expense, which measures the capacity of firms to meet their interest payments out of earnings. Firms that are more profitable, are less leveraged, or have lower borrowing costs will have higher ICRs, indicating a greater capacity to service their debt. An ICR of 2 or less is typically associated with an increased likelihood of distress.<sup>1</sup> As shown in figure 2, since 2008, the ICR for EME corporates has declined, on average, amid weaker earnings and higher leverage. As a result, risky debt of EME corporates—measured as the debt of firms with ICRs less than 2—has increased as a share of GDP, with most of that rise occurring in China (figure 3). Over the past two years, the firming of global growth has improved earnings, lowering the amount of risky debt and facilitating the orderly deleveraging process currently under way.



<sup>1</sup> For example, just before the Asian financial crisis, firms in Korea, Thailand, and Indonesia had an average ICR of 2; see Michael Pomerleano (1998) "Corporate Finance Lessons from the East Asian Crisis," Viewpoint: Public Policy for the Private Sector Note 155 (Washington: World Bank, October), <https://openknowledge.worldbank.org/handle/10986/11531>.

Nevertheless, the share of risky debt in China remains above what was observed in the East Asian economies before the Asian financial crisis. In other EMEs, debt at risk appears manageable at less than 10 percent of GDP. However, the threshold at which debt at risk starts to be problematic can differ across countries. For example, while a country may not have as much vulnerability with respect to its corporate debt as, say, China, it may also have relatively less resources to address problems that may arise.

How vulnerable are EME NFCs to an increase in borrowing costs, perhaps related to monetary policy tightening in the advanced economies? To gauge these effects, we use firm-level data and stress each firm's financials by increasing the average borrowing cost 1 percentage point (the effects of which are shown by the solid red portion of the bars in figure 4).<sup>2</sup> Except for China, where debt at risk is estimated to rise 20 percentage points of GDP, this increase in borrowing costs by itself would not be problematic. But higher global interest rates might be accompanied by broader financial stress and slower EME growth, similar to what is presented in our “Global Tightening Tantrum” alternative scenario in the Risks and Uncertainty section. To model these effects, we consider two additional shocks: reducing earnings 20 percent (the effects are shown by the red cross-hatched portion of the bars) and imposing a 20 percent exchange rate devaluation on the amount of debt that is denominated in foreign currency (the red hatched portion of the bars). Taken together, the shocks double the share of overall EME risky debt in GDP to around the level observed for the East Asian economies before the Asian financial crisis. The increase mostly reflects China. But even outside of China, the shocks more than double the amount of risky debt in many EMEs.

All told, a gradual normalization of monetary policy in the advanced economies, driven by faster economic growth, is not likely to cause significant financing problems for EME corporates. But a sharper rise in interest rates accompanied by broader financial stress could be quite severe for EME corporates. Such problems could threaten financial stability if they spill over to banks and create an adverse feedback loop that the authorities have trouble containing.

**Figure 4: Emerging Market Nonfinancial Corporate Debt at Risk, 2017:Q3**



Note: GDP is gross domestic product. Debt at risk is debt of firms with ratio of earnings before interest, tax, depreciation, and amortization to interest expense less than 2.

\* Exchange rate shock is 20 percent depreciation of the local currency against the dollar.

\*\* Asian financial crisis is GDP-weighted average of Hong Kong, Singapore, South Korea, and Thailand in 1996, prior to crisis.

Source: Diana Ayala, Milan Nedeljkovic, and Christian Saborowski (2015), "What Slice of the Pie? The Corporate Bond Market Boom in Emerging Economies," IMF Working Paper WP/15/148 (Washington: International Monetary Fund, July).

<https://www.imf.org/en/Publications/WP/Issues/2016/12/31/What-Slice-of-the-Pie-The-Corporate-Bond-Market-Boom-in-Emerging-Economies-43060>; Bank for International Settlements; Standard & Poor's Global Market Intelligence; Federal Reserve Board staff estimates.

<sup>2</sup> Although on the face of it this shock does not seem too large, it is applied to the average interest rate on the entire existing debt, not just on new debt. Given that the average interest rate for EME firms is about 4¾ percent, a 1 percentage point rise increases the interest expense about one-fifth.

## The Foreign GDP Outlook

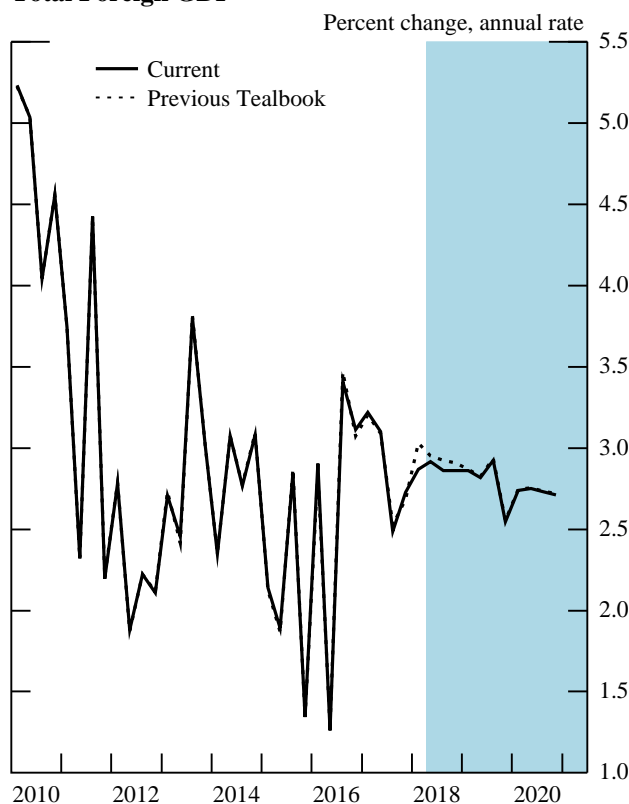
Real GDP\*

Percent change, annual rate

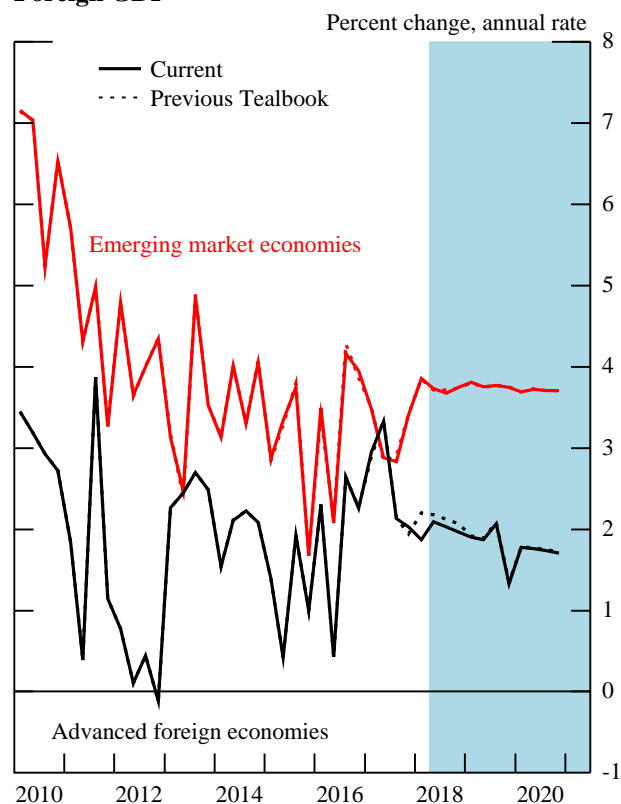
	2017			2018			2019	2020
	H1	Q3	Q4	Q1	Q2	H2		
1. Total Foreign	3.2	2.5	2.7	2.9	2.9	2.9	2.8	2.7
Previous Tealbook	3.1	2.5	2.7	3.0	3.0	2.9	2.8	2.7
2. Advanced Foreign Economies	3.1	2.1	2.0	1.9	2.1	2.0	1.8	1.7
Previous Tealbook	3.1	2.1	1.9	2.2	2.2	2.1	1.8	1.8
3. Canada	4.2	1.5	1.7	2.0	2.3	2.1	2.0	1.9
4. Euro Area	2.8	2.8	2.7	1.9	2.2	2.1	1.8	1.7
5. Japan	2.1	2.4	1.6	1.2	1.1	1.0	.3	.9
6. United Kingdom	1.1	1.9	1.6	1.3	1.7	1.7	1.6	1.7
7. Emerging Market Economies	3.2	2.8	3.4	3.9	3.7	3.7	3.8	3.7
Previous Tealbook	3.2	2.9	3.4	3.8	3.7	3.7	3.8	3.7
8. China	7.0	6.6	6.4	7.1	6.8	6.3	6.2	5.9
9. Emerging Asia ex. China	4.2	5.1	3.2	4.4	3.9	4.0	3.8	3.7
10. Mexico	1.7	-.7	3.2	2.7	2.8	2.8	2.9	3.0
11. Brazil	3.8	1.0	.2	2.3	2.5	2.5	3.0	2.6

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

### Total Foreign GDP



### Foreign GDP



## The Foreign Inflation Outlook

### Consumer Prices\*

Percent change, annual rate

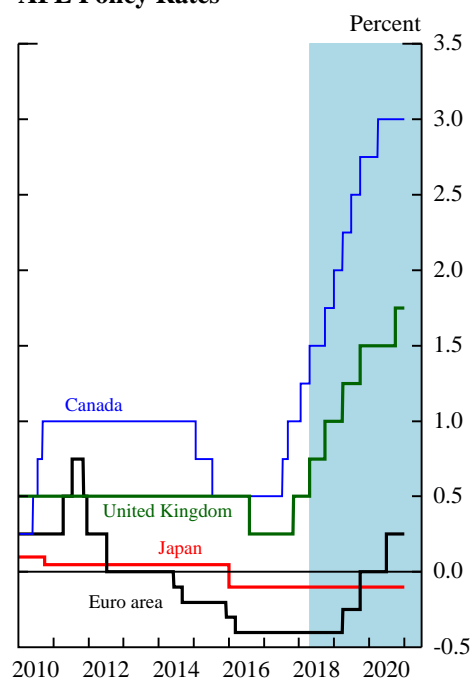
	2017			2018			2019	2020
	H1	Q3	Q4	Q1	Q2	H2		
1. Total Foreign	2.5	2.3	3.0	2.6	2.6	2.5	2.5	2.4
Previous Tealbook	2.4	2.3	3.0	2.6	2.6	2.5	2.5	2.4
2. Advanced Foreign Economies	1.3	1.2	2.1	2.6	1.9	1.6	1.8	1.7
Previous Tealbook	1.3	1.2	2.1	2.1	1.5	1.5	1.8	1.7
3. Canada	1.4	1.4	3.0	3.6	2.6	2.1	2.0	2.0
4. Euro Area	1.5	1.1	1.7	2.1	1.9	1.4	1.5	1.7
5. Japan	-.1	.7	1.9	2.5	.7	.7	2.3	1.0
6. United Kingdom	3.4	2.4	3.0	2.5	2.3	2.3	2.2	2.1
7. Emerging Market Economies	3.3	3.1	3.7	2.7	3.1	3.2	3.0	2.9
Previous Tealbook	3.2	3.1	3.7	2.9	3.4	3.3	3.0	2.9
8. China	1.0	2.2	2.9	1.5	2.2	2.6	2.5	2.5
9. Emerging Asia ex. China	2.0	2.0	3.2	2.3	3.0	3.2	3.1	3.0
10. Mexico	8.0	5.4	5.0	4.1	4.0	3.7	3.3	3.2
11. Brazil	2.7	2.3	3.6	3.1	3.4	4.3	4.3	4.3

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

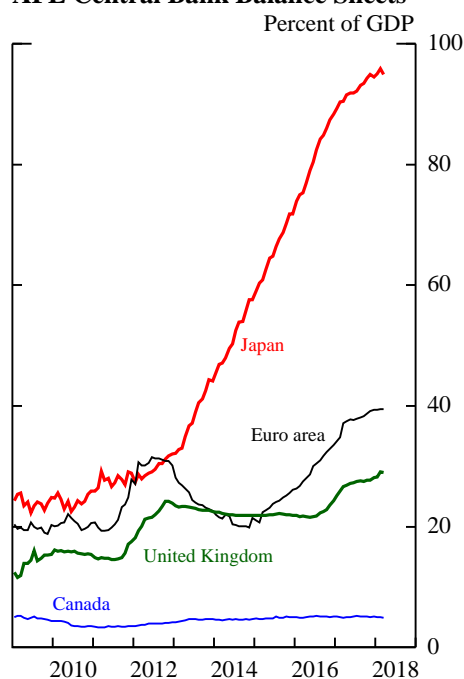
Int'l Econ Devel &amp; Outlook

## Foreign Monetary Policy

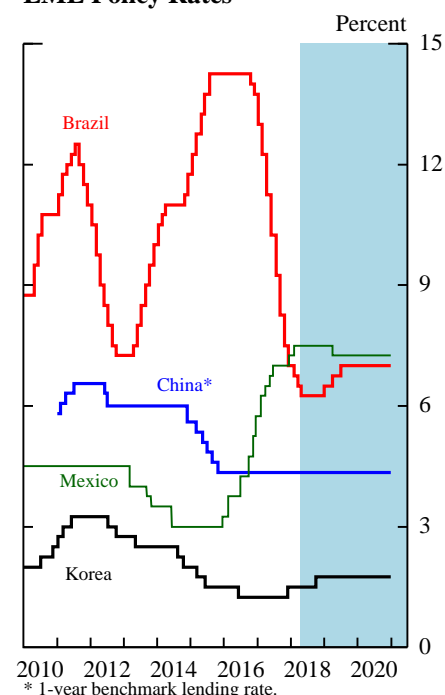
### AFE Policy Rates



### AFE Central Bank Balance Sheets

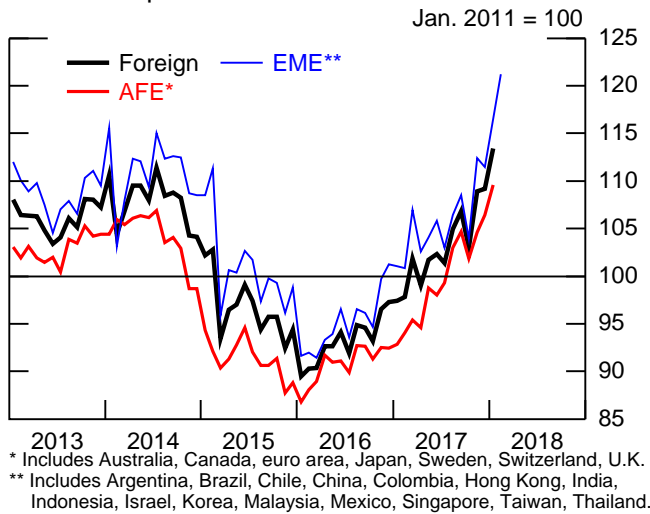


### EME Policy Rates

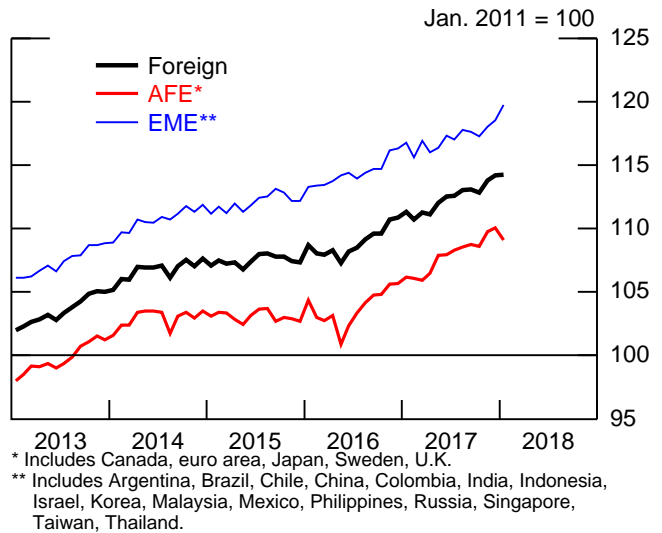


## Recent Foreign Indicators

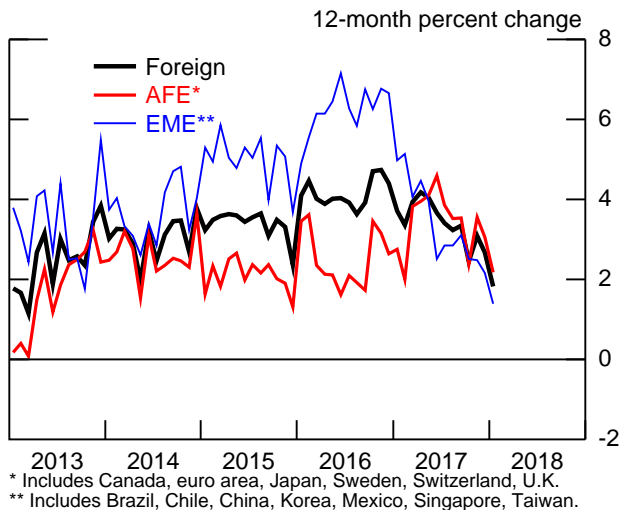
Nominal Exports



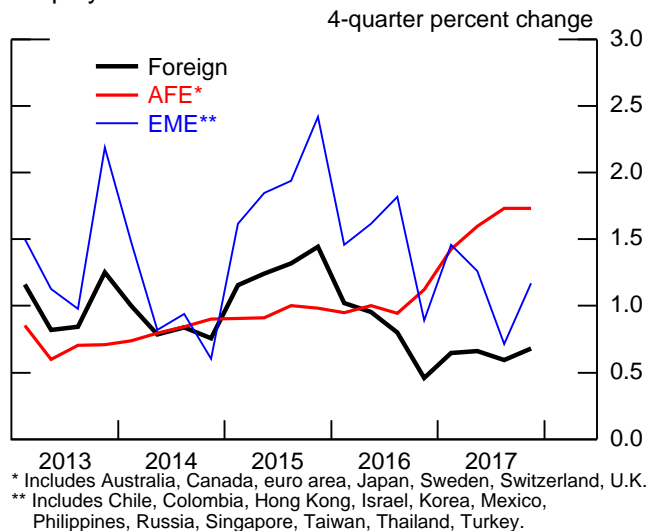
Industrial Production



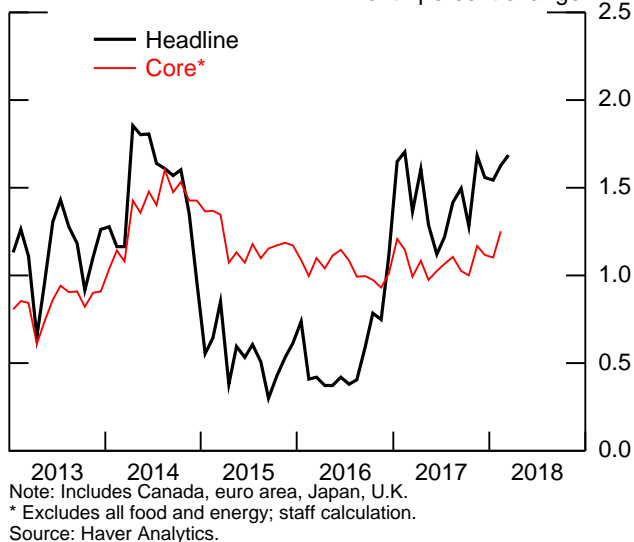
Retail Sales



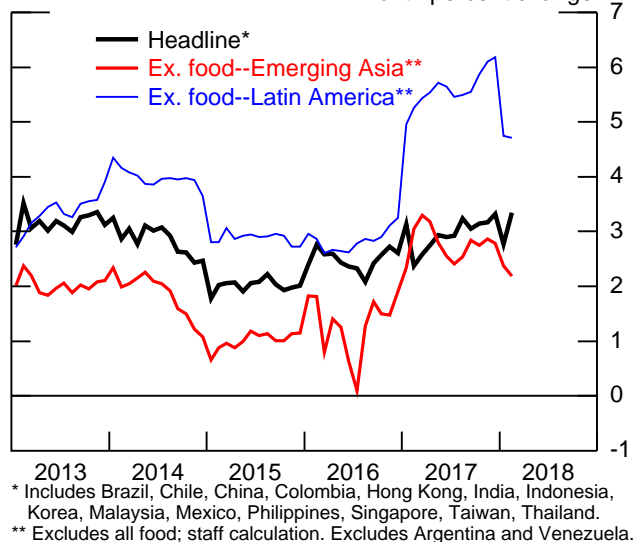
Employment



Consumer Prices: Advanced Foreign Economies

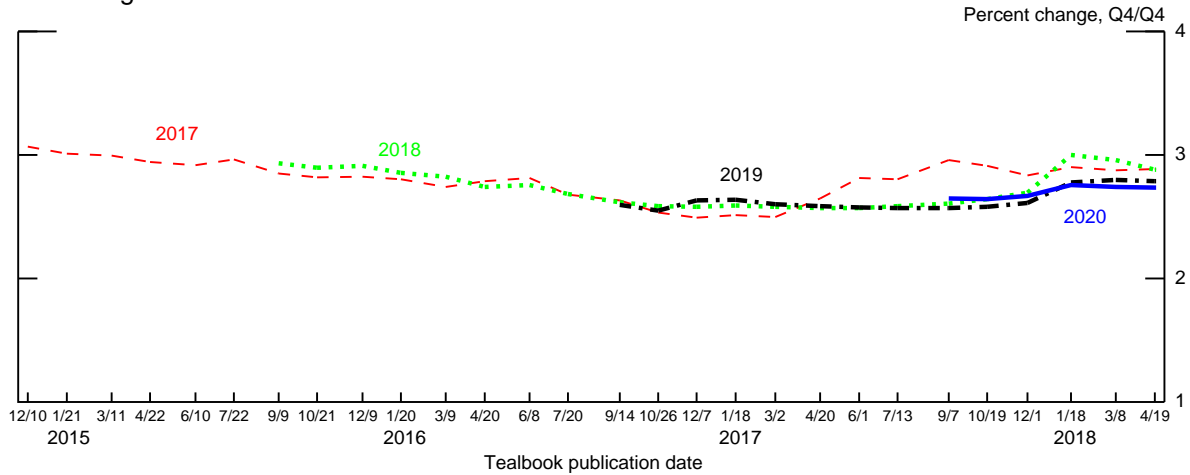


Consumer Prices: Emerging Market Economies

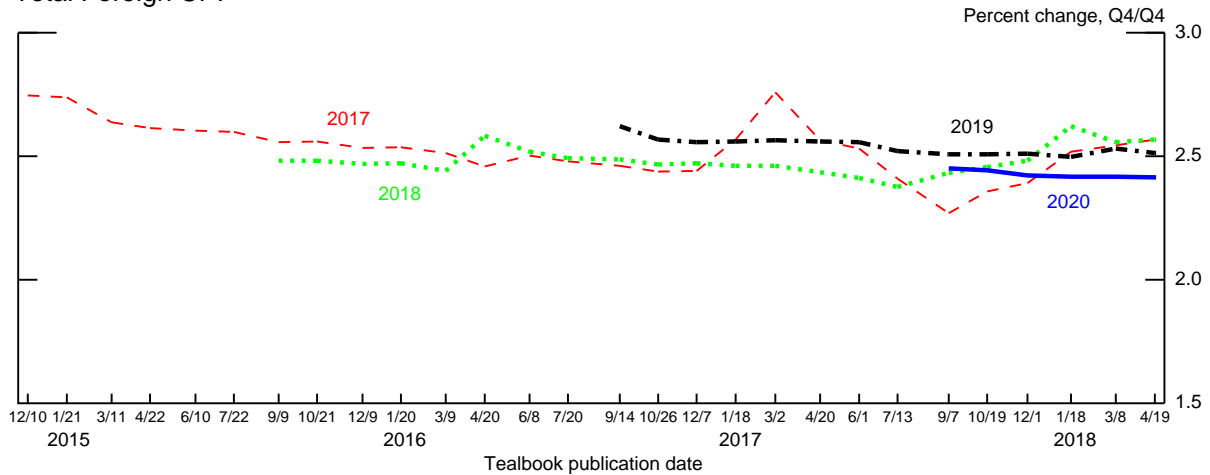


## Evolution of Staff's International Forecast

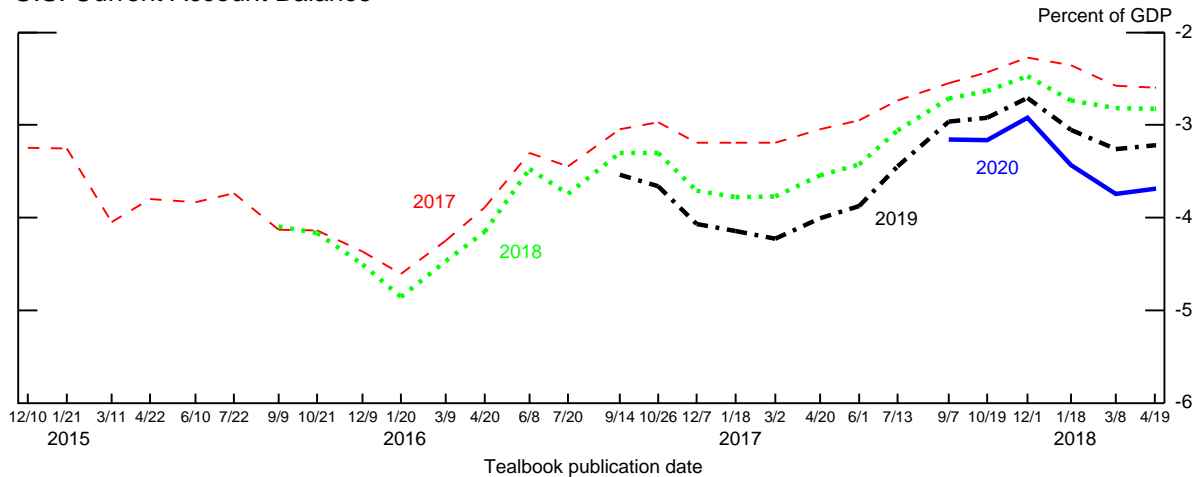
Total Foreign GDP



Total Foreign CPI

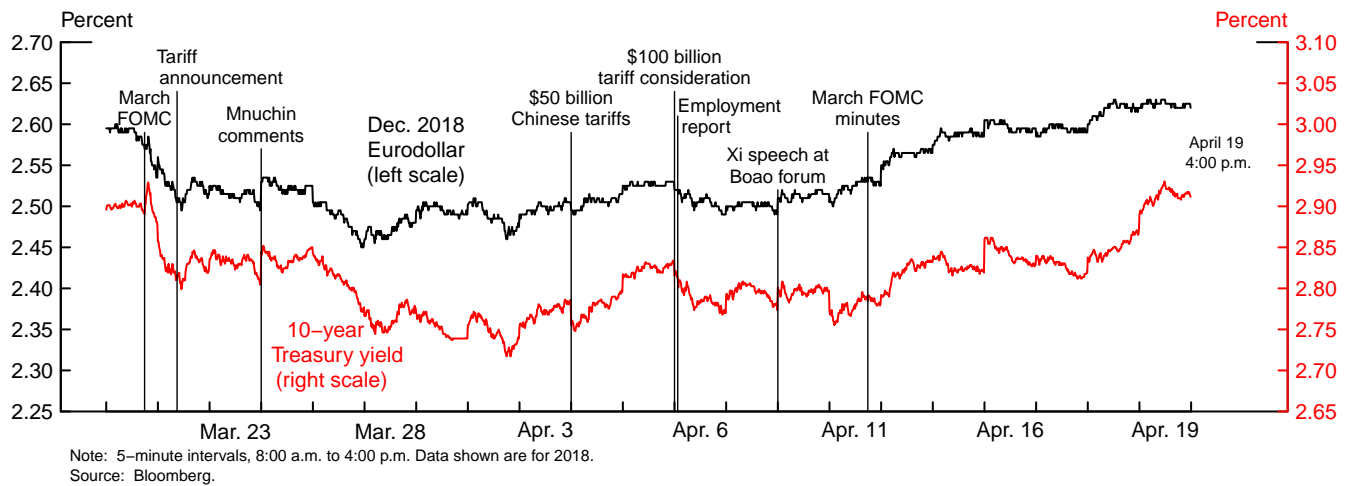


U.S. Current Account Balance

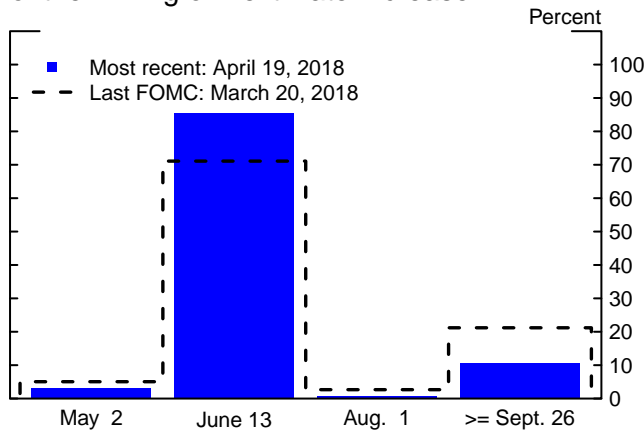


## Policy Expectations and Treasury Yields

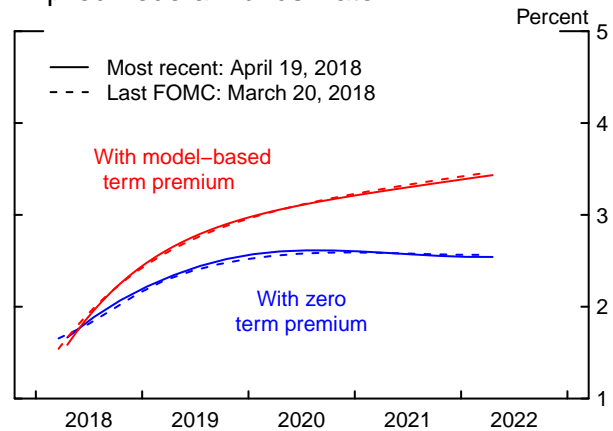
### Selected Interest Rates



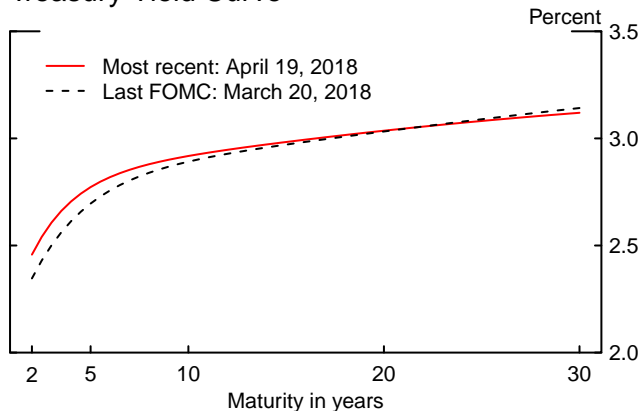
### Market-Implied Probability Distribution of the Timing of Next Rate Increase



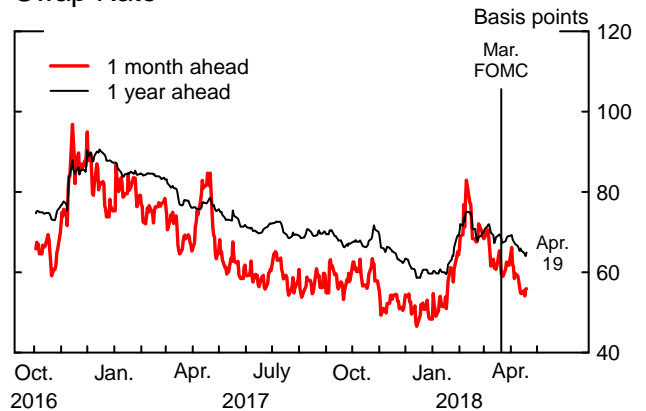
### Implied Federal Funds Rate



### Treasury Yield Curve

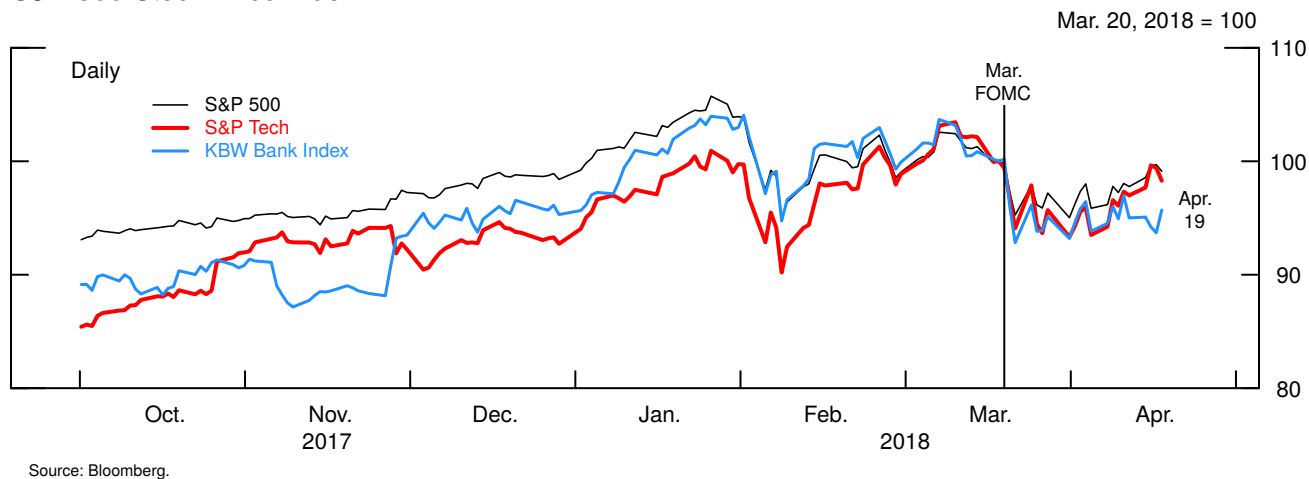


### Option-Implied Volatilities on 10-Year Swap Rate

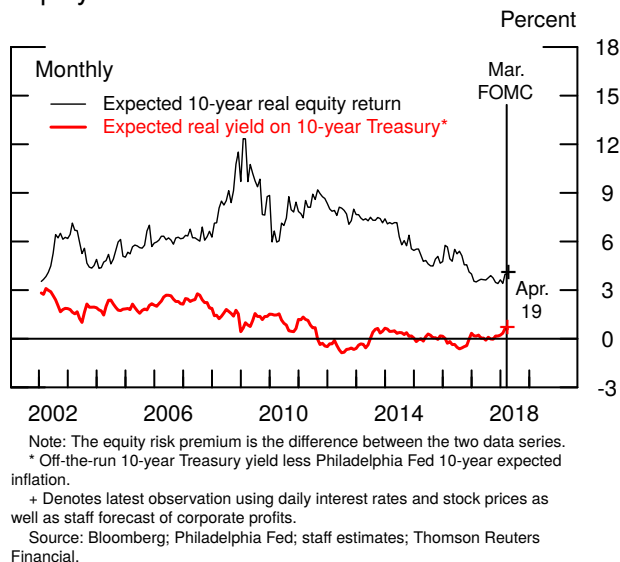


## Corporate Asset Market Developments

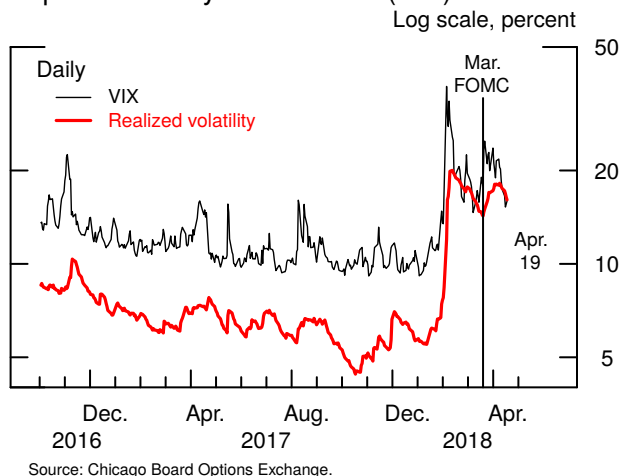
### S&P 500 Stock Price Index



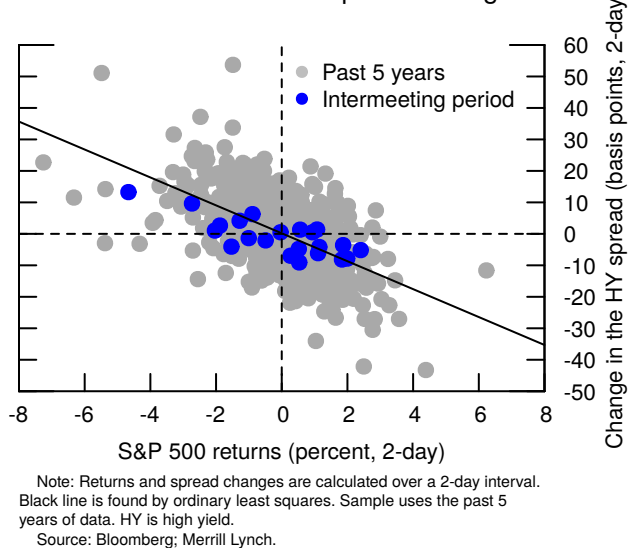
### Equity Risk Premium



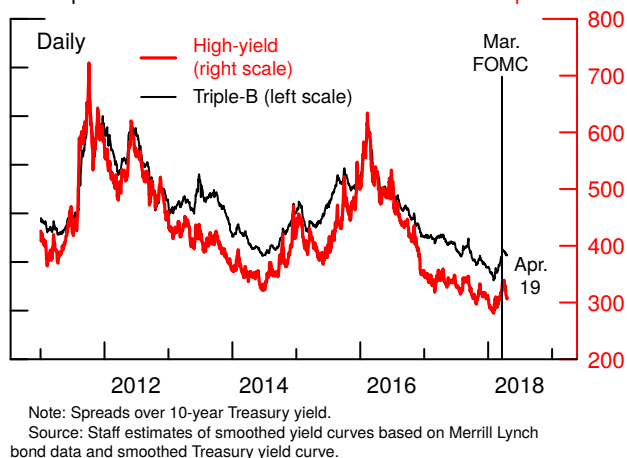
### Implied Volatility on S&P 500 (VIX)



### S&P 500 Returns vs. HY Spread Changes

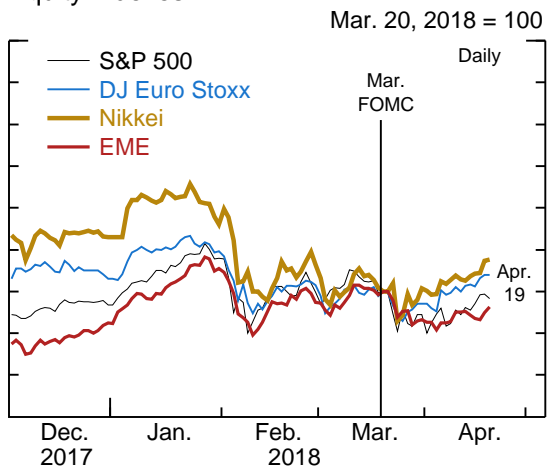


### 10-Year Corporate Bond Spreads

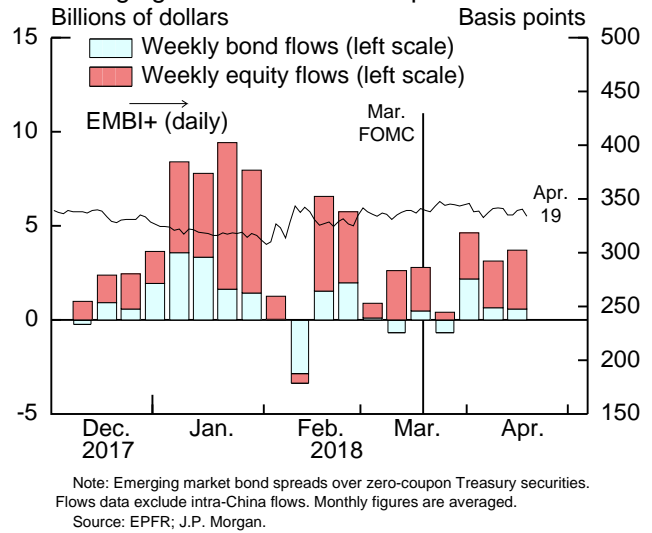


## Foreign Developments

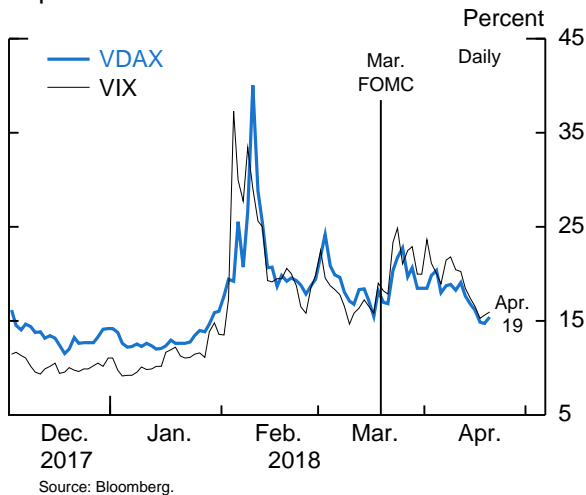
### Equity Indexes



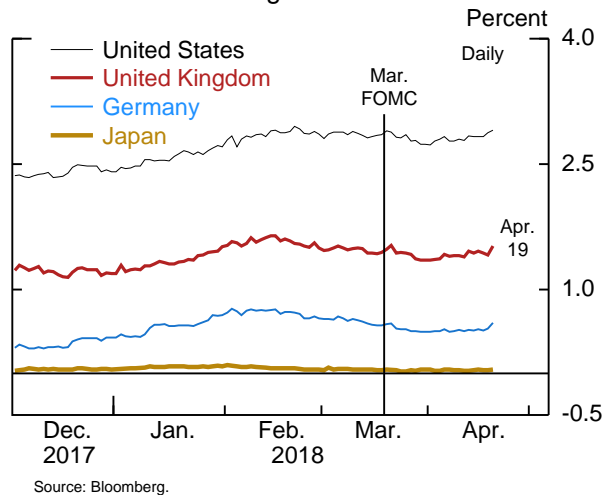
### Emerging Market Flows and Spreads



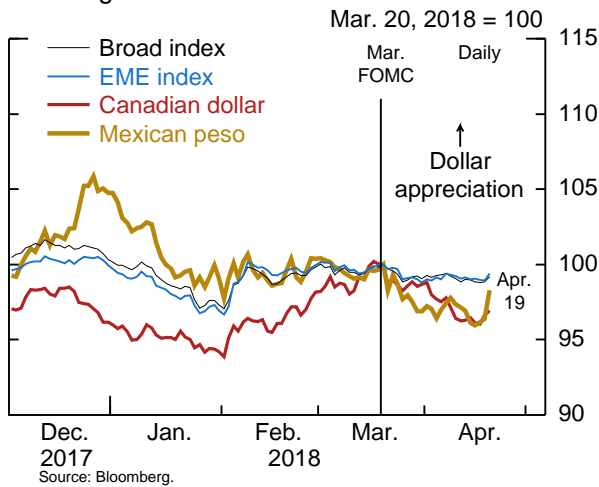
### Implied Volatilities



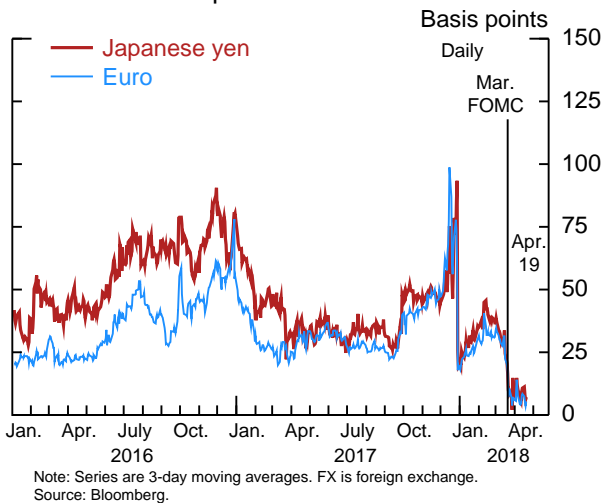
### 10-Year AFE Sovereign Yields



### Exchange Rates

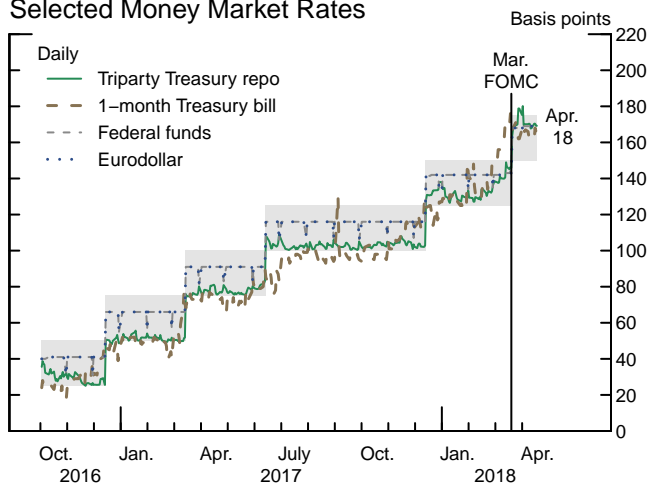


### 3-Month FX Swap Bases



## Short-Term Funding Markets and Federal Reserve Operations

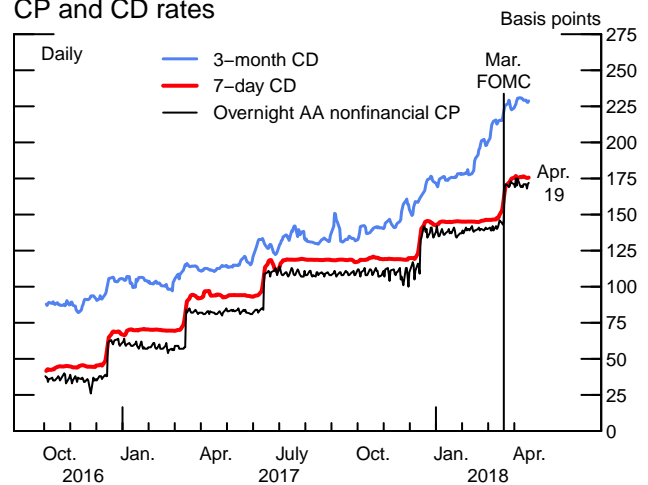
### Selected Money Market Rates



Note: Federal funds rate is a weighted median. Shaded area is the target range for the federal funds rate. Repo is repurchase agreement.

Source: Federal Reserve Bank of New York; Federal Reserve Board, Form FR 2420, Report of Selected Money Market Rates.

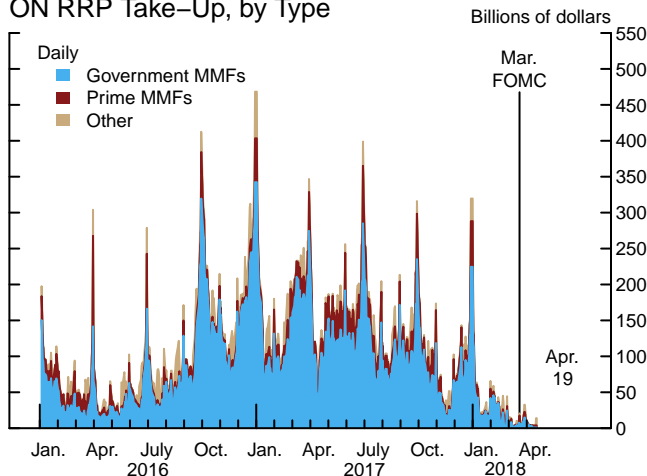
### CP and CD rates



Note: CD rates are a 5-day moving average. CP is commercial paper; CD is certificate of deposit.

Source: Depository Trust & Clearing Corporation.

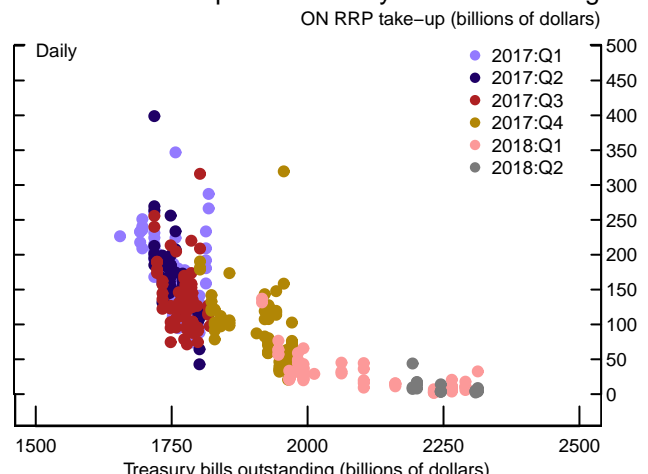
### ON RRP Take-Up, by Type



Note: ON RRP is reverse repurchase agreement; MMF is money market fund.

Source: Federal Reserve Bank of New York.

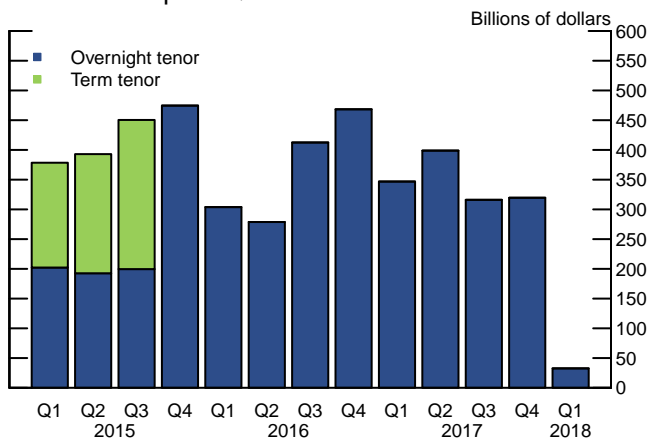
### ON RRP Take-Up and Treasury Bills Outstanding



Note: ON RRP is overnight reverse repurchase agreement. Treasury bills outstanding = gross amount issued – gross amount matured + outstanding; calculated between Jan. 2017 and Apr. 2018.

Source: Federal Reserve Bank of New York; Department of the Treasury.

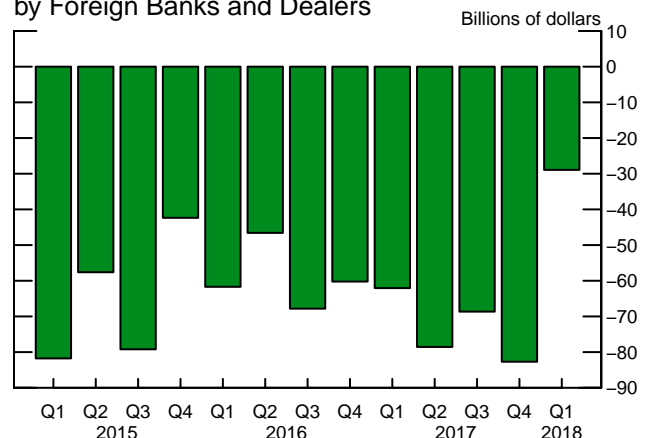
### RRP Take-Up on Quarter-Ends



Note: RRP is reverse repurchase agreement.

Source: Federal Reserve Bank of New York.

### Drops in Outstanding Volumes on Quarter-Ends, by Foreign Banks and Dealers



Note: The drop in outstanding volumes equals the sum of triparty Treasury repo and federal funds volumes. The drop on quarter-end is calculated as positions on quarter-end less positions on the business day immediately before quarter-end. This graph considers March 29, 2018, as the quarter-end date of 2018:Q1.

Source: Federal Reserve Bank of New York.

## Recent Pressures in Money Markets

The upward pressure on private money market rates, beyond that driven by expected monetary policy, persisted over the intermeeting period. In unsecured markets, the London interbank offered rate (LIBOR) and rates on commercial paper (CP) and negotiable certificates of deposit (CDs) remained abnormally high relative to overnight index swap (OIS) rates of comparable maturities, particularly at tenors exceeding one month. In secured markets, Treasury repo rates remained elevated relative to the effective federal funds rate, and the spread is also very high by historical standards. Table 1 shows that a variety of private spreads are currently near the top ends of their historical ranges. Since the March FOMC meeting, however, spreads on Treasury bills narrowed some, widening the gap between private money market rates and those on Treasury bills, as shown in figure 1.

Several factors may have contributed to the wide spreads for private instruments, although none appears to fully explain the unusually high level of current spreads. First, the surge in Treasury bill supply in the first quarter appears to have pushed Treasury and unsecured private rates higher, and the effects on private rates may be lingering temporarily even as bill issuance has slowed and rates have edged down. Consistent with such a view, spreads on forward rate agreements, or FRAs, over

Table 1. Current Private Spreads and Historical Ranges

Spread	Value as of 4/16/2018 (bps)	Percentile of Historical Distribution (%) <sup>1</sup>
1. 3m LIBOR—3m OIS	59	90
2. 3m T-bill—3m OIS	-3	92
3. 3m A2/P2 nonfin CP—3m OIS <sup>2</sup>	94	92
4. 3m AA nonfin CP—3m OIS	20	96
5. 3m CD—3m OIS	57	99
6. BBG: 3m CD—3m OIS	56	88
7. PD Treas. Repo—EFFR	4	90

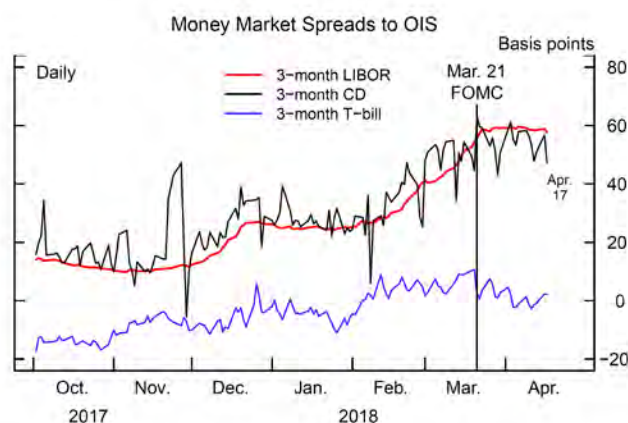
<sup>1</sup> The sample periods begin on 12/4/2001 for lines 1 to 4 and line 6, 12/14/2015 for line 5, and 1/3/1972 for line 7.

<sup>2</sup> Data as of 4/9/2018.

Note: BBG is Bloomberg, PD is Primary Dealer, and EFFR is effective federal funds rate.

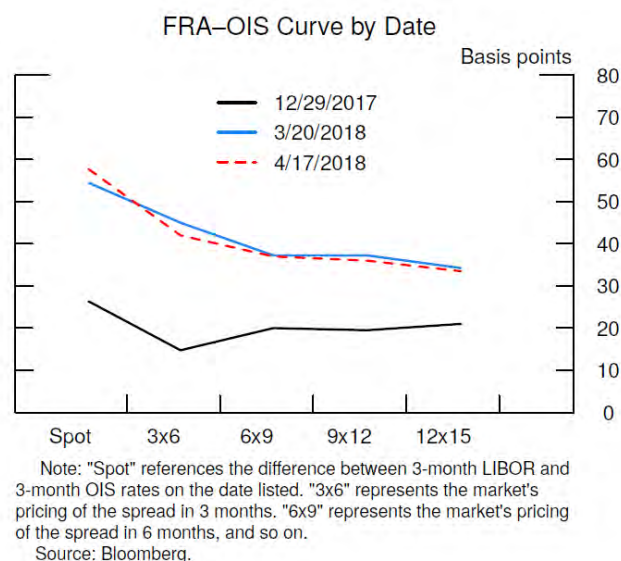
Source: Depository Trust & Clearing Corporation; Federal Reserve Board, H.15.

Figure 1



Source: Depository Trust & Clearing Corporation; Federal Reserve Board.

Figure 2



OIS, shown in figure 2, suggest that the LIBOR–OIS spread is expected to narrow in coming months. Increased Treasury supply also appears to be an important factor in pressuring secured rates higher, as dealers had to finance sizable issuance in February and March.

In unsecured markets, a second possible factor is that anticipated tax-induced repatriation flows may have reduced offshore demand for private money market securities with longer tenors, and aggregate demand for these securities would fall if repatriated cash is put to other uses. Anecdotal reports from dealers suggest that cash-rich nonfinancial firms have shifted holdings toward very short-dated instruments. In contrast, data from the offshore money market fund (OMMF) sector only weakly support the repatriation story. OMMF assets under management have declined in recent weeks, but the funds do not appear to be shifting away from longer-dated assets in anticipation of further outflows, as weighted average maturities are little changed.

Other possible explanations are less compelling. Some market participants have suggested that the base erosion anti-abuse tax, or BEAT, which may effectively penalize foreign banks that raise funds through foreign affiliates—and thus encourage raising short-term funds in U.S. markets—might eventually boost unsecured rates. But the effects of the tax are unlikely to have materialized yet, and issuance of CP and CDs has not increased in recent months. Another possibility is that credit risk has driven rates higher. However, staff analysis of the historical relationship between changes in three-month LIBOR–OIS spreads and aggregate credit default swap (CDS) spreads of the largest banks indicates that the recent modest widening of these CDS spreads explains only a trivial fraction of the LIBOR–OIS widening. Moreover, conversations with market participants have not suggested any heightened credit-risk concerns.

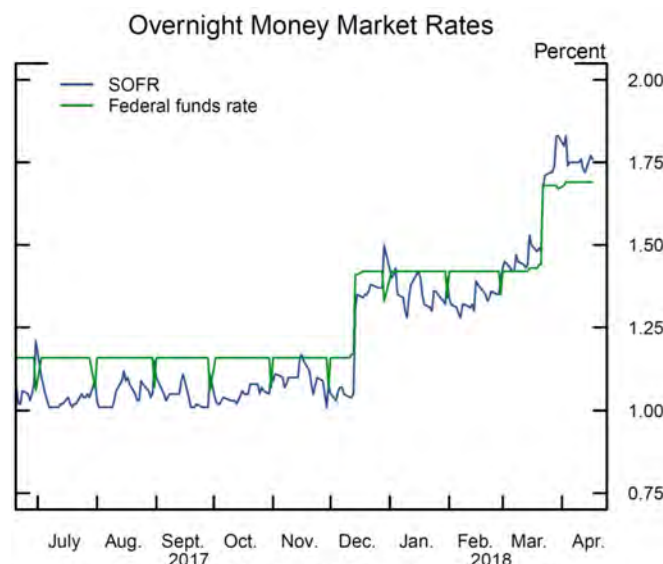
## New Overnight Treasury Repo Rates

On April 3, 2018, the Federal Reserve Bank of New York began publishing three new overnight Treasury repo rates. The purpose of the new rates is to increase the transparency of repo market trading by providing interest rate and volume measures that cross the major repo market segments. All of the repo rates exclude transactions in which the Federal Reserve is a counterparty, such as take-up at the ON RRP facility.

The Tri-Party General Collateral Rate (TGCR) covers the “triparty” segment in which securities dealers borrow cash directly from investors, including money market funds, in trades facilitated by a third-party clearing bank. The Broad General Collateral Rate (BGCR) includes all transactions in the TGCR and also includes blind-brokered transactions between dealers that occur on the Fixed Income Clearing Corporation’s (FICC) GCF Repo service.

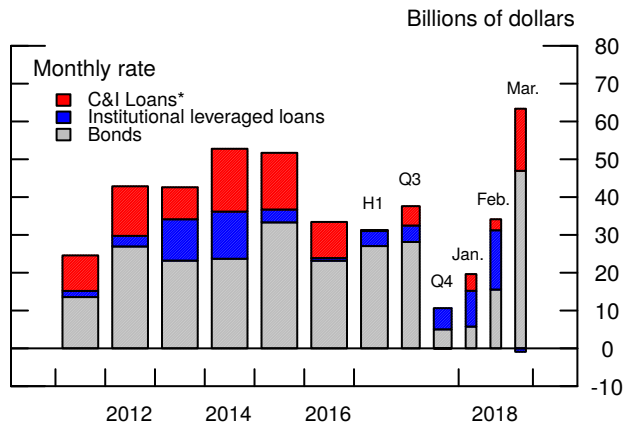
The Secured Overnight Financing Rate (SOFR)—the blue line in the chart—measures the general cost of financing Treasury securities overnight across all repo market segments for which data are available, providing the broadest coverage of the repo market. A broad Treasury repo rate was previously not available to the public. The SOFR is calculated from all transactions in the BGCR, as well as bilateral transactions that are cleared by the FICC. The SOFR excludes bilateral transactions that are executed at very low rates because such trades tend to be motivated by the lender’s need to obtain a specific security as collateral rather than the need to invest cash.

In June 2017, the Alternative Reference Rates Committee selected the SOFR as its recommended alternative to U.S. dollar LIBOR, which is currently referenced in derivatives contracts with about \$190 trillion of notional value as well as \$10 trillion of loans and securities. The transition from LIBOR to SOFR is expected to take a number of years, and daily publication of the rate is a key step in the process.



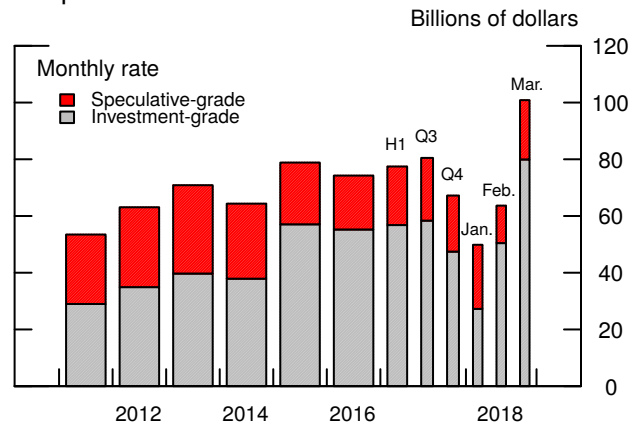
## Business Finance

### Selected Components of Net Debt Financing, Nonfinancial Firms



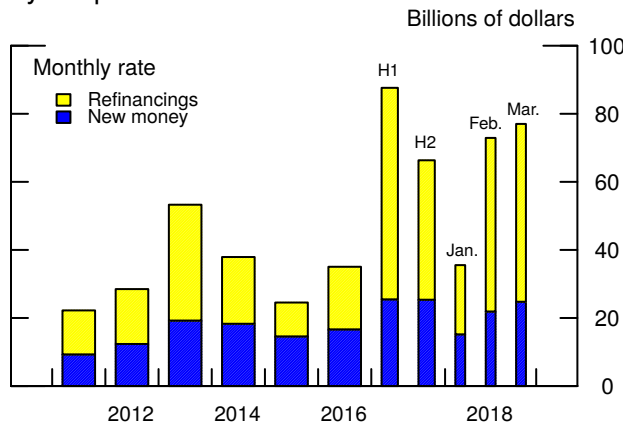
Note: C&I is commercial and industrial.  
 \* Period-end basis.  
 Source: Depository Trust & Clearing Corporation; Mergent Fixed Income Securities Database; Federal Reserve Board.

### Gross Issuance of Nonfinancial Corporate Bonds



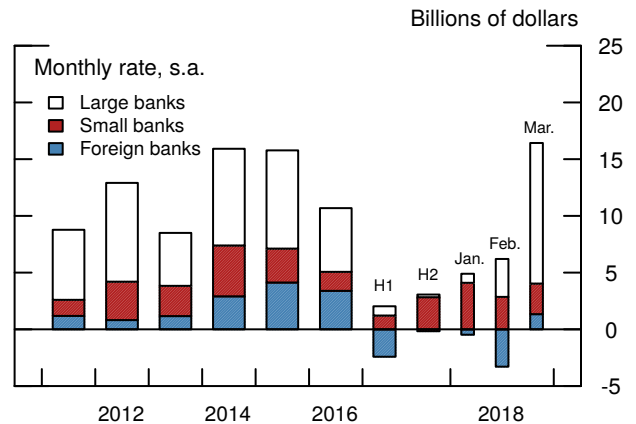
Note: Bonds are categorized by Moody's, Standard & Poor's, and Fitch.  
 Source: Mergent Fixed Income Securities Database.

### Institutional Leveraged Loan Issuance, by Purpose



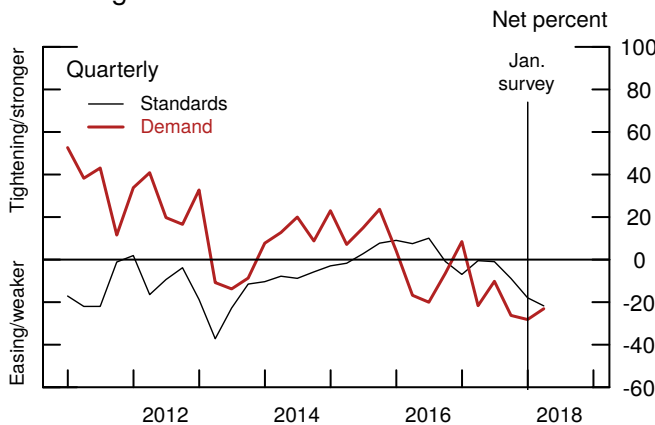
Source: Thomson Reuters LPC LoanConnector.

### Commercial and Industrial Loans



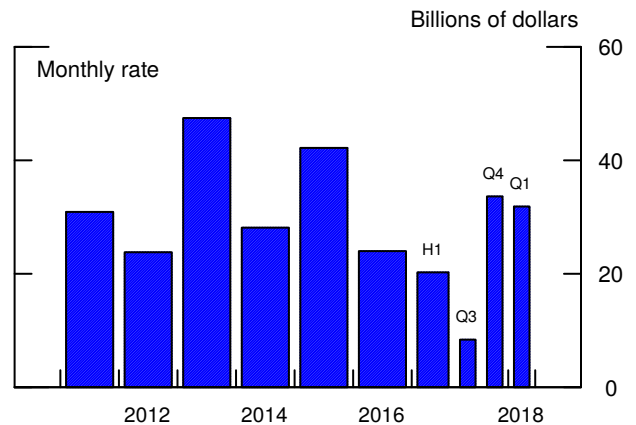
Source: Staff calculations, Federal Reserve Board, Form FR 2644, Weekly Report of Selected Assets and Liabilities of Domestically Chartered Commercial Banks and U.S. Branches and Agencies of Foreign Banks.

### Commercial and Industrial Loans: Changes in Standards and Demand



Note: Banks' responses are weighted by their sizes in the relevant loan categories.  
 Source: Federal Reserve Board, Senior Loan Officer Opinion Survey on Bank Lending Practices.

### Announced Share Repurchases, Nonfinancial Firms



Source: Securities Data Company.

Overall, while some businesses have experienced higher financing costs, the recent increase in some short rates will not likely result in a large, direct increase in debt service burdens. Staff analysis on the potential effects of a larger and more persistent rise in short-term rates than has actually occurred indicates that debt service burdens for businesses and households would only rise a modest amount.<sup>2</sup> Moreover, borrowers who do rely more heavily on floating-rate debt could potentially substitute toward fixed-rate debt or switch to floating-rate debt tied to short-term rates not experiencing the same upward pressures, such as the one-month LIBOR, serving to reduce the effects of elevated short-term spreads on direct financing costs.

A second, less direct channel through which the recent upward pressure on short-term rates could tighten financing conditions is reduced lending or higher-cost lending by financial institutions experiencing higher funding costs. For example, financial institutions originating new loans could set loan rates higher to offset any increase in their funding costs or could choose to originate less loans. The extent to which this may occur depends on how much of an increase in funding costs financial institutions experience. At present, it does not appear that banks' funding costs have risen appreciably, as most such funding comes in the form of deposits, but banks and other financial institutions that are more reliant on wholesale funding could see an increase in their funding costs.

Overall, the recent upward pressure on short-term rates does not appear to have affected the borrowing costs or capacity of most households and businesses, and staff analysis suggests that elevated short-term rates will not have a long-term effect on financing conditions. The staff will continue to track developments in short-term funding markets and monitor changes in financing conditions.

**Percentage of Outstanding Bank Business Loans with Floating Rates**

	C&I Loans	CRE Loans
Share of outstanding loans with floating rates	78	80
Share of loans with floating rates indexed to:		
LIBOR	83	91
Prime rate	6	4
Treasury index	1	1
Other	10	4

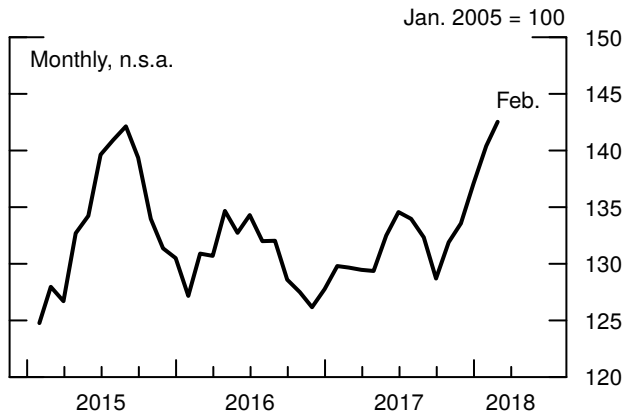
Note: Figures have been weighted by loan amounts outstanding.

Source: Federal Reserve Board, Form FR Y-14Q, Capital Assessments and Stress Testing, as of 2017:Q4.

<sup>2</sup> See John Driscoll, Aurel Hizmo, Ashish Kumbhat, Francisco Palomino, Ander Perez-Orive, and Maya Shaton (2017), "The Response of Consumer and Corporate Debt Interest Payments to Changes in the Target Range for the Federal Funds Rate," memorandum, Board of Governors of the Federal Reserve System, Divisions of Monetary Affairs and Research and Statistics, April 7; and Christine Dobridge, Francisco Palomino, Ander Perez-Orive, Charles Press, Gustavo Suarez, and Jason Wu (2018), "Assessing Vulnerabilities in Nonfinancial Corporate Credit," memorandum, Board of Governors of the Federal Reserve System, Divisions of Monetary Affairs and Research and Statistics, April 13.

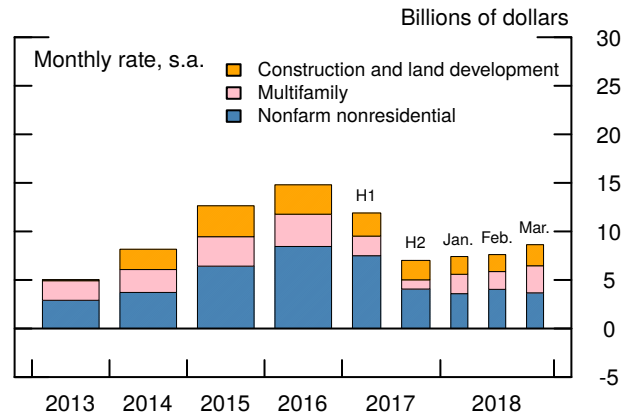
## Small Business Finance and Commercial Real Estate Lending

Thomson Reuters/PayNet Small Business Lending Index



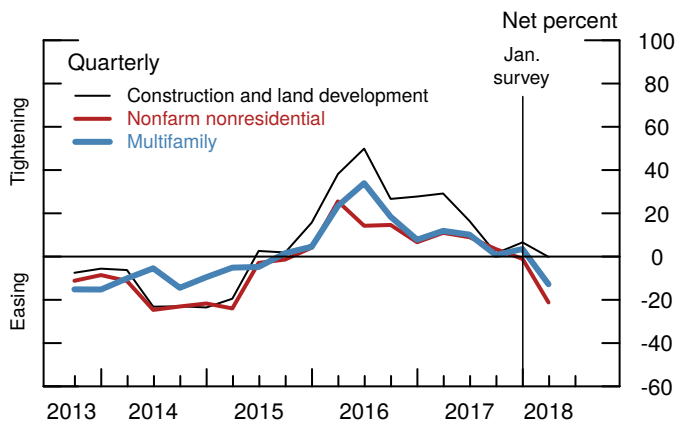
Note: 3-month moving average.  
Source: Thomson Reuters, Thomson Reuters/PayNet Small Business Lending Index.

Commercial Real Estate Loans



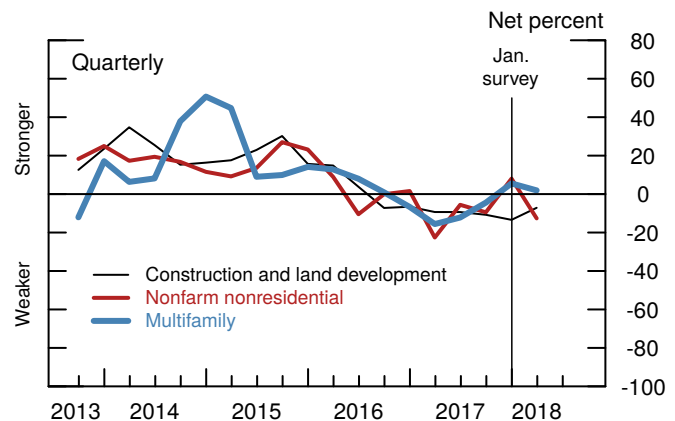
Source: Staff calculations, Federal Reserve Board, Form FR 2644, Weekly Report of Selected Assets and Liabilities of Domestically Chartered Commercial Banks and U.S. Branches and Agencies of Foreign Banks.

Changes in Standards for CRE Loans



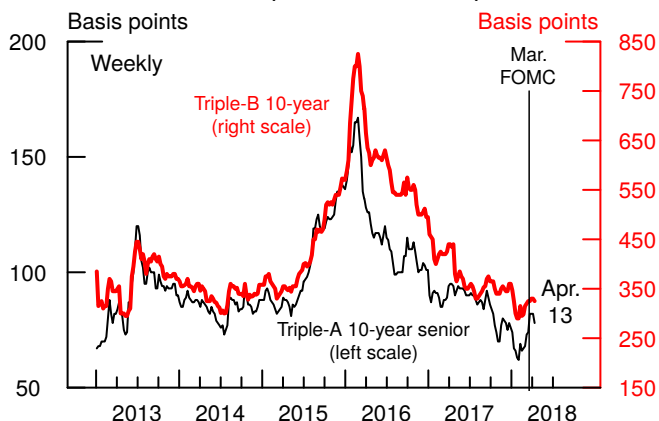
Note: Banks' responses are weighted by their sizes in the relevant loan categories. CRE is commercial real estate.  
Source: Federal Reserve Board, Senior Loan Officer Opinion Survey on Bank Lending Practices.

Changes in Demand for CRE Loans



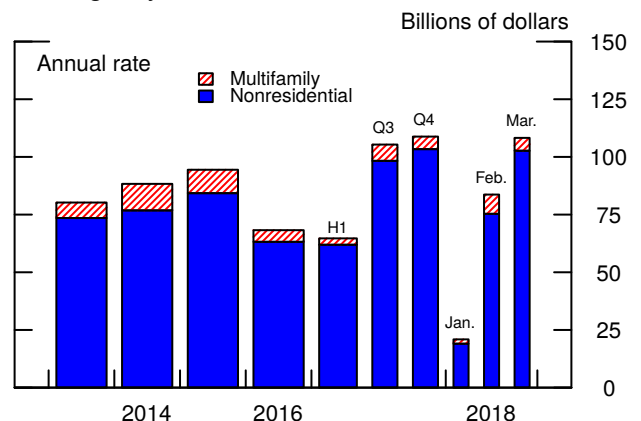
Note: Banks' responses are weighted by their sizes in the relevant loan categories. CRE is commercial real estate.  
Source: Federal Reserve Board, Senior Loan Officer Opinion Survey on Bank Lending Practices.

10-Year CMBS Spreads over Swaps

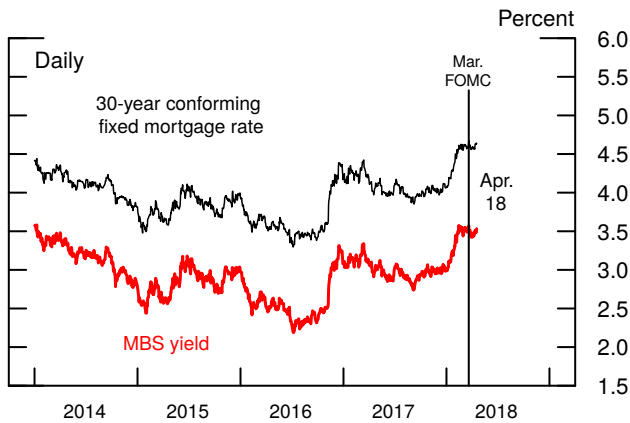


Note: CMBS is commercial mortgage-backed securities.  
Source: J.P. Morgan.

Non-agency CMBS Issuance

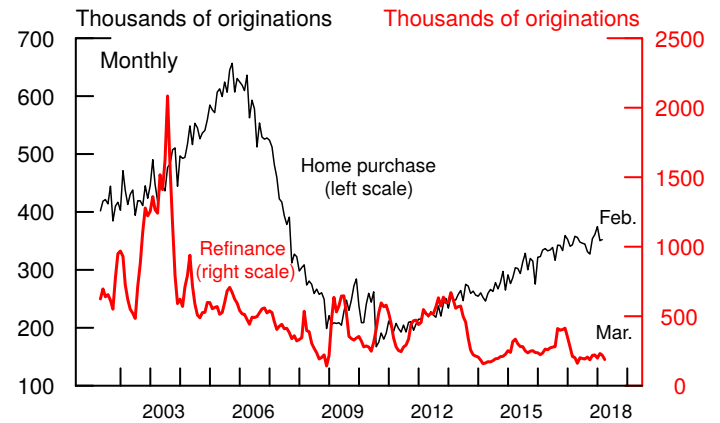


Note: Multifamily excludes agency issuance. CMBS is commercial mortgage-backed securities.  
Source: Consumer Mortgage Alert.

**Household Finance****Mortgage Rate and MBS Yield**

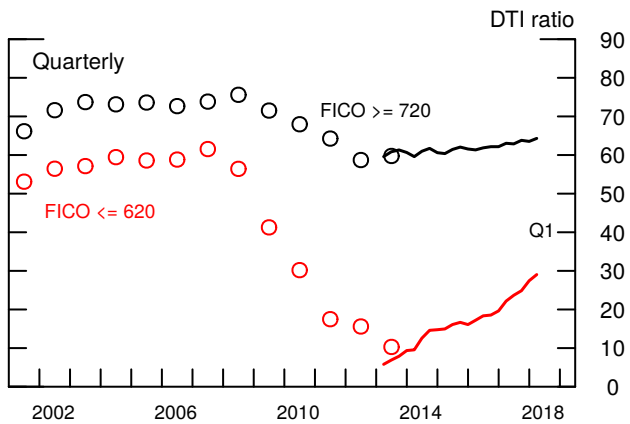
Note: The mortgage-backed securities (MBS) yield is the Fannie Mae 30-year current-coupon rate.

Source: For MBS yield, Barclays; for mortgage rate, Optimal Blue.

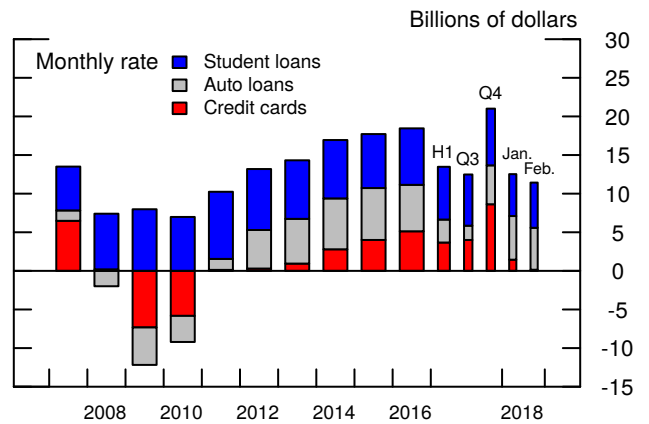
**Purchase and Refinance Activity**

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.

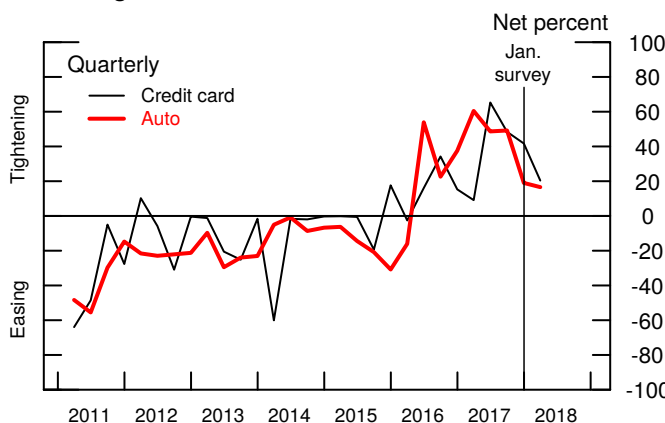
**Maximum Allowed Debt-Service-to-Income Ratio for Residential Mortgages**

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

**Consumer Credit Flows**

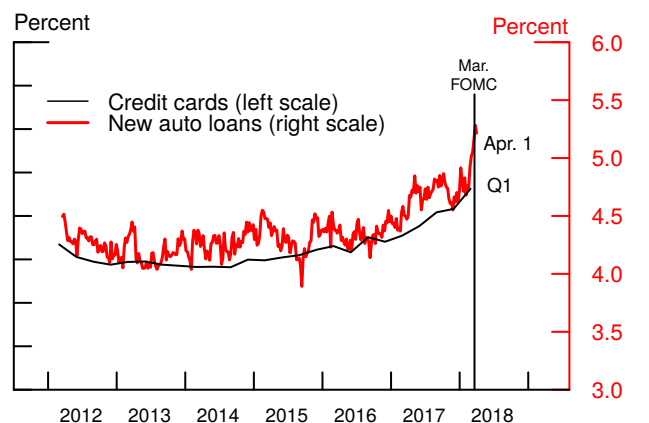
Note: The data are seasonally adjusted by Federal Reserve Board staff.

Source: Federal Reserve Board.

**Changes in Standards for Consumer Loans**

Note: Banks' responses are weighted by their sizes in the relevant loan categories.

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

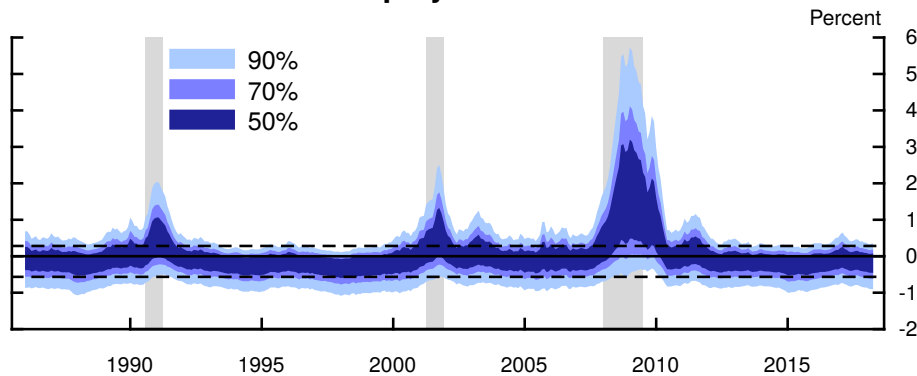
**Consumer Interest Rates**

Note: Credit card data reflect rates at commercial banks on all credit card plans; data are reported quarterly and not seasonally adjusted. Auto loans data are reported weekly and seasonally adjusted.

Source: For credit cards, Federal Reserve Board; for auto loans, J.D. Power.

## Time-Varying Macroeconomic Risk

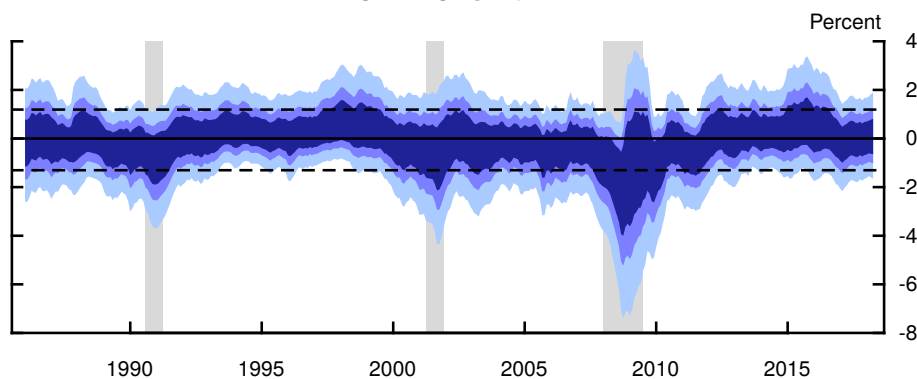
### Unemployment Rate



#### April 2018

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

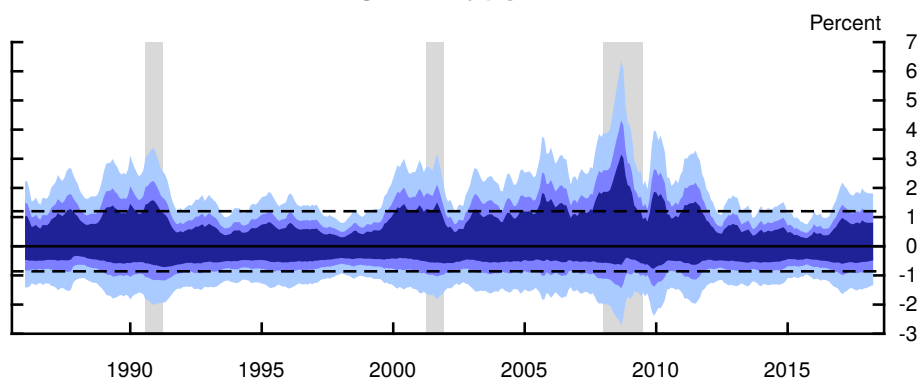
### GDP Growth



#### April 2018

95th	1.9
85th	1.2
50th	0.1
15th	-1.0
5th	-1.7

### CPI Inflation

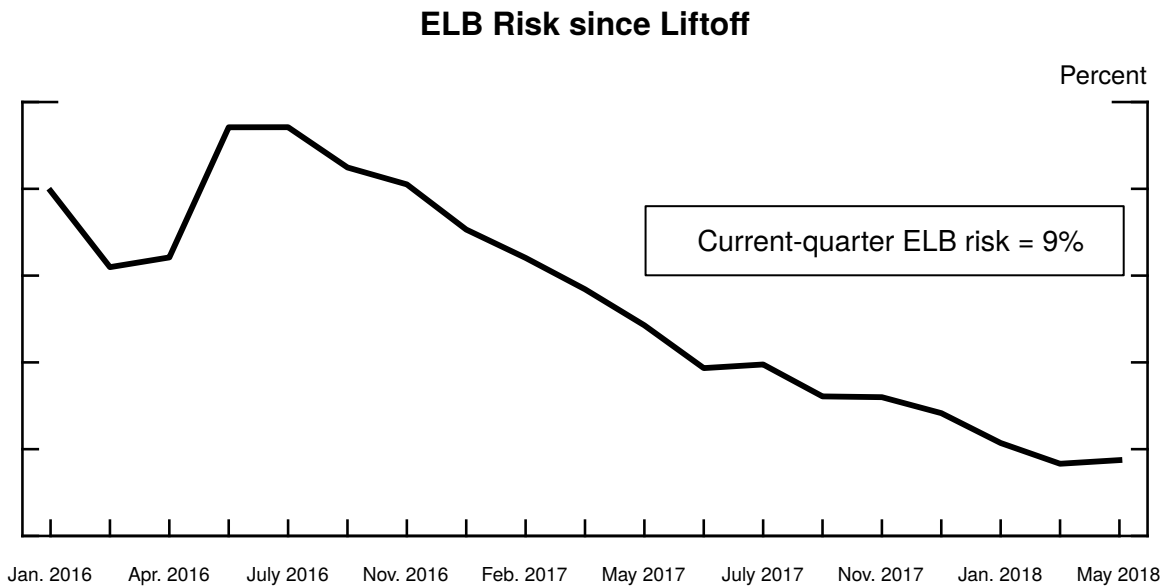


#### April 2018

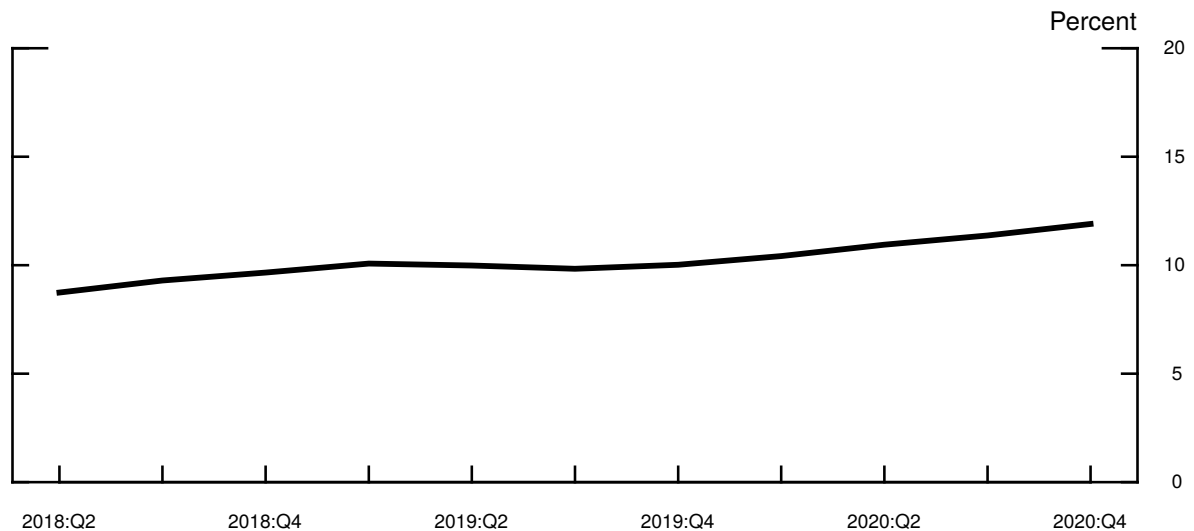
95th	1.8
85th	1.2
50th	0.1
15th	-0.8
5th	-1.3

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

## Effective Lower Bound Risk Estimate



## ELB Risk over the Projection Period



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

**Alternative Scenarios**

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

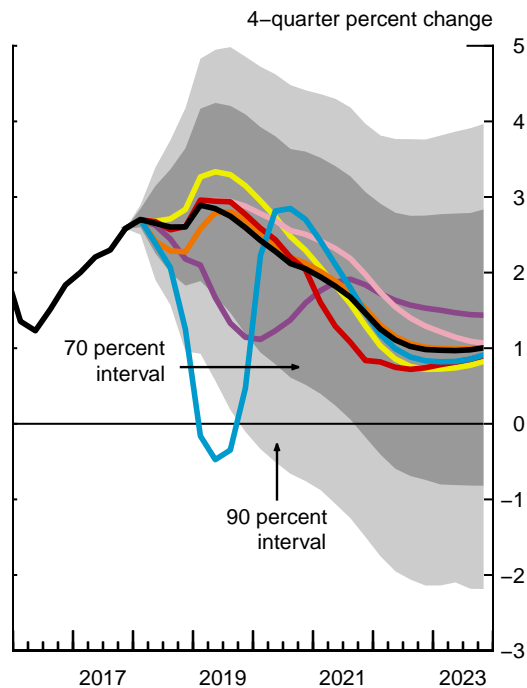
Measure and scenario	2018		2019	2020	2021	2022	2023
	H1	H2					
<i>Real GDP</i>							
Extended Tealbook baseline	2.3	2.9	2.6	2.1	1.5	1.0	1.0
Financial-based recession	1.8	.7	.5	2.7	1.5	.8	.9
Supply constraints	2.3	2.9	2.8	2.0	.8	.7	.9
Positive hysteresis	2.3	2.9	2.9	2.5	2.0	1.3	1.1
Lower inflation expectations	1.8	2.7	2.7	2.1	1.5	1.0	1.0
Global tightening tantrum	2.2	2.1	1.1	1.6	1.8	1.5	1.4
Strong foreign growth and weaker dollar	2.3	3.3	3.1	2.3	1.3	.7	.8
<i>Unemployment rate<sup>1</sup></i>							
Extended Tealbook baseline	4.0	3.6	3.3	3.3	3.5	3.8	4.1
Financial-based recession	4.0	4.1	6.7	4.9	4.3	4.4	4.7
Supply constraints	4.1	3.9	3.9	3.9	4.2	4.5	4.8
Positive hysteresis	4.0	3.6	3.2	3.1	3.1	3.4	3.8
Lower inflation expectations	4.1	3.7	3.4	3.4	3.5	3.8	4.1
Global tightening tantrum	4.0	3.7	4.0	4.3	4.4	4.5	4.6
Strong foreign growth and weaker dollar	4.0	3.5	3.0	2.8	3.0	3.4	3.7
<i>Total PCE prices</i>							
Extended Tealbook baseline	2.5	1.7	1.9	2.0	2.0	2.1	2.1
Financial-based recession	2.5	1.5	1.7	1.9	1.9	2.0	2.0
Supply constraints	2.6	2.2	2.9	3.1	2.9	2.8	2.8
Positive hysteresis	2.5	1.7	1.9	2.0	2.1	2.1	2.1
Lower inflation expectations	2.3	1.3	1.6	1.6	1.7	1.8	1.8
Global tightening tantrum	2.6	2.3	2.3	2.2	2.2	2.2	2.2
Strong foreign growth and weaker dollar	2.6	2.2	2.5	2.3	2.2	2.2	2.2
<i>Core PCE prices</i>							
Extended Tealbook baseline	2.4	1.7	2.1	2.1	2.1	2.2	2.2
Financial-based recession	2.3	1.6	1.8	2.0	2.0	2.0	2.0
Supply constraints	2.5	2.3	3.0	3.2	3.0	2.9	2.9
Positive hysteresis	2.4	1.7	2.1	2.1	2.2	2.2	2.2
Lower inflation expectations	2.2	1.4	1.7	1.7	1.8	1.8	1.8
Global tightening tantrum	2.5	2.5	2.7	2.3	2.2	2.2	2.2
Strong foreign growth and weaker dollar	2.4	2.1	2.5	2.4	2.3	2.3	2.3
<i>Federal funds rate<sup>1</sup></i>							
Extended Tealbook baseline	1.8	2.6	3.8	4.7	5.0	4.9	4.5
Financial-based recession	1.8	2.3	.7	1.0	2.1	2.6	2.7
Supply constraints	1.8	2.5	3.9	4.9	5.0	4.7	4.2
Positive hysteresis	1.8	2.6	3.8	4.6	4.9	4.8	4.3
Lower inflation expectations	1.8	2.4	3.4	4.1	4.4	4.3	3.9
Global tightening tantrum	1.8	3.0	4.1	4.0	3.8	3.8	3.7
Strong foreign growth and weaker dollar	1.8	2.8	4.5	5.5	5.8	5.5	5.0
1. Percent, average for the final quarter of the period.							

## Forecast Confidence Intervals and Alternative Scenarios

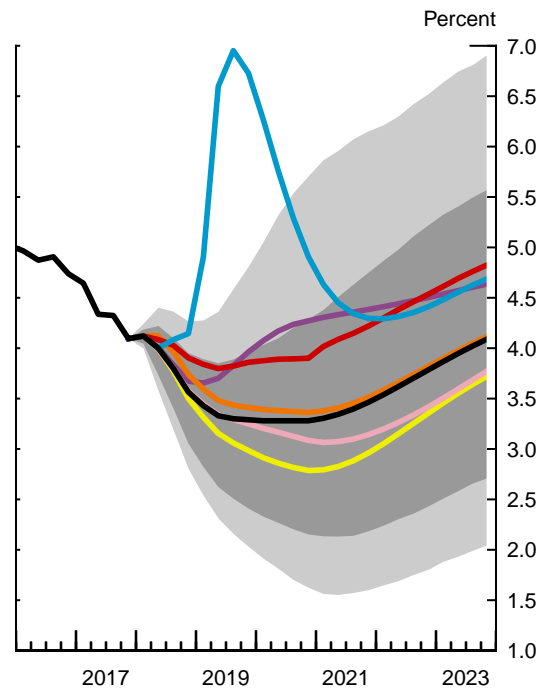
Confidence Intervals Based on FRB/US Stochastic Simulations

- Extended Tealbook baseline
- Financial-based recession
- Supply constraints
- Positive hysteresis
- Lower inflation expectations
- Global tightening tantrum
- Strong foreign growth and weaker dollar

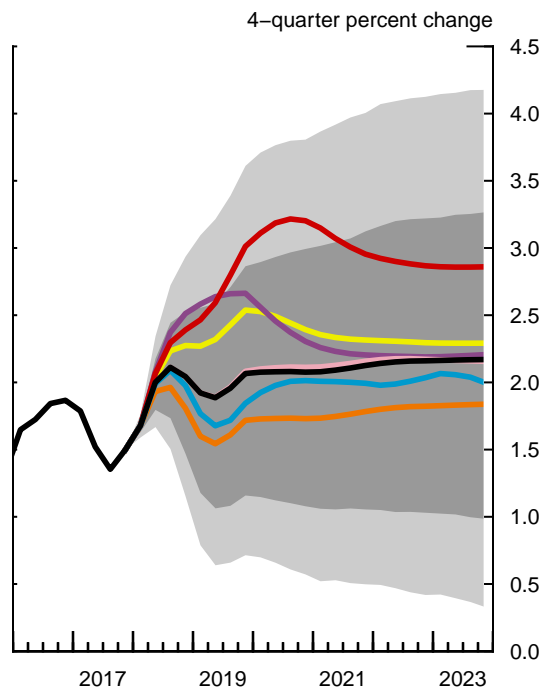
Real GDP



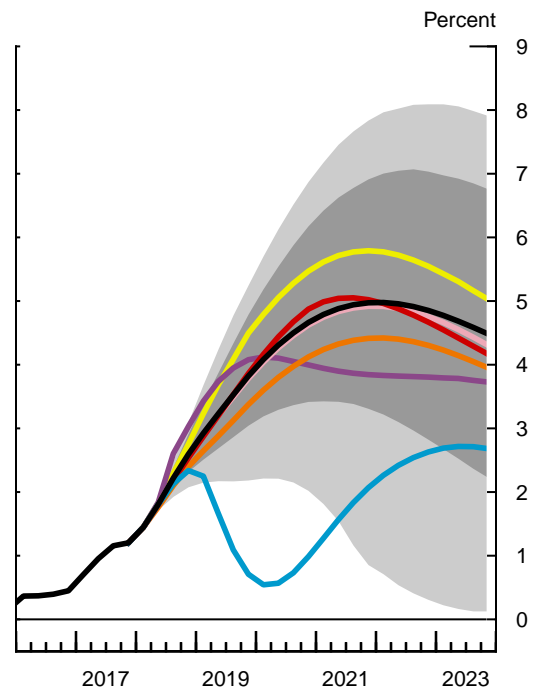
Unemployment Rate



PCE Prices excluding Food and Energy



Federal Funds Rate



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

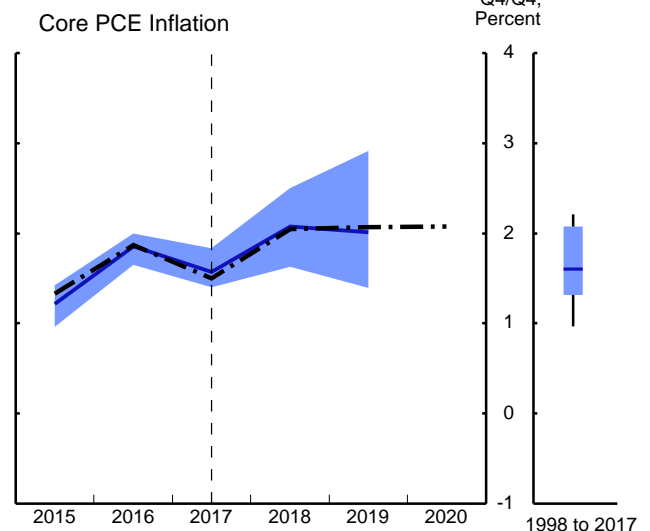
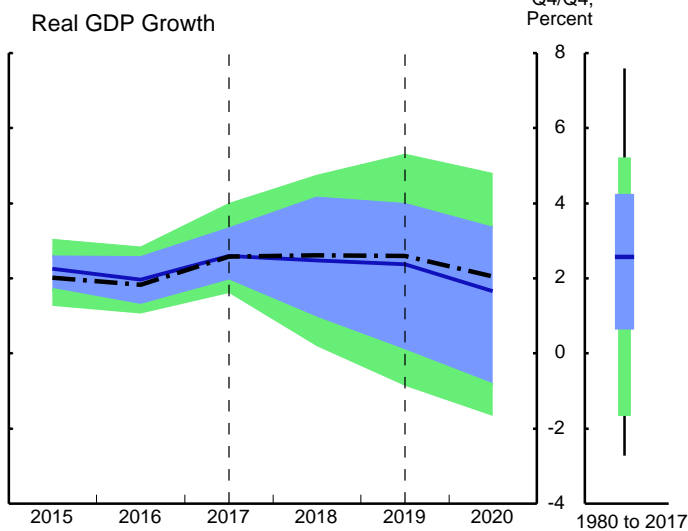
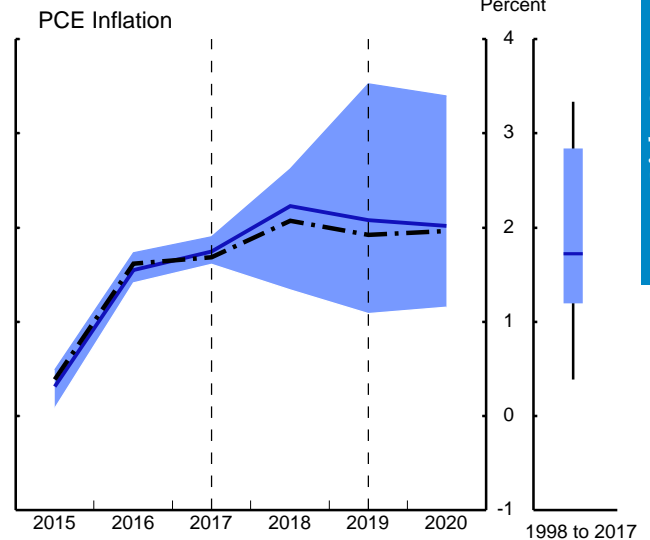
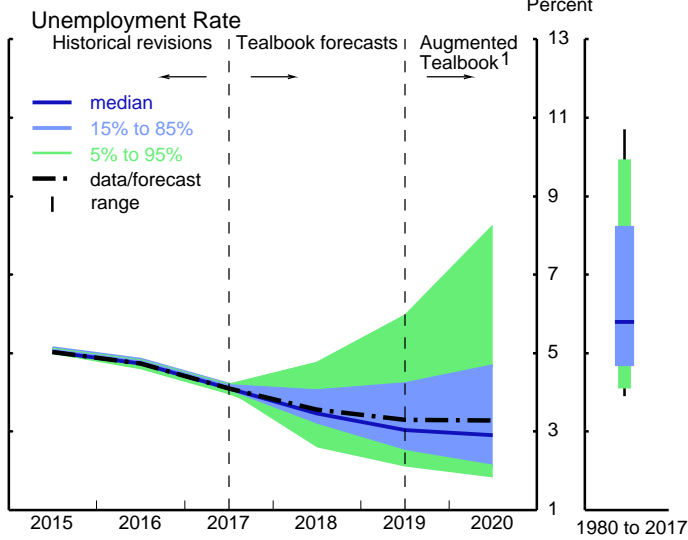
Measure	2018	2019	2020	2021	2022	2023
<i>Real GDP</i> (percent change, Q4 to Q4)						
Projection	2.6	2.6	2.1	1.5	1.0	1.0
Confidence interval						
Tealbook forecast errors	.9–4.2	.1–4.0	-.9–3.4	...	...	...
FRB/US stochastic simulations	1.8–3.6	1.2–4.1	.5–3.6	-.2–3.1	-.7–2.8	-.8–2.8
<i>Civilian unemployment rate</i> (percent, Q4)						
Projection	3.6	3.3	3.3	3.5	3.8	4.1
Confidence interval						
Tealbook forecast errors	3.1–4.1	2.5–4.2	2.1–4.7	...	...	...
FRB/US stochastic simulations	3.1–3.9	2.4–4.0	2.2–4.3	2.2–4.7	2.4–5.2	2.7–5.6
<i>PCE prices, total</i> (percent change, Q4 to Q4)						
Projection	2.1	1.9	2.0	2.0	2.1	2.1
Confidence interval						
Tealbook forecast errors	1.3–2.6	1.1–3.5	1.2–3.4	...	...	...
FRB/US stochastic simulations	1.4–2.6	.9–2.8	.9–3.0	.9–3.1	.9–3.2	.9–3.3
<i>PCE prices excluding food and energy</i> (percent change, Q4 to Q4)						
Projection	2.0	2.1	2.1	2.1	2.2	2.2
Confidence interval						
Tealbook forecast errors	1.6–2.5	1.4–2.9	...	...	...	...
FRB/US stochastic simulations	1.5–2.5	1.2–2.9	1.1–3.0	1.1–3.1	1.0–3.2	1.0–3.3
<i>Federal funds rate</i> (percent, Q4)						
Projection	2.6	3.8	4.7	5.0	4.9	4.5
Confidence interval						
FRB/US stochastic simulations	2.3–2.9	3.0–4.8	3.4–6.2	3.3–6.9	2.8–7.0	2.2–6.8

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.

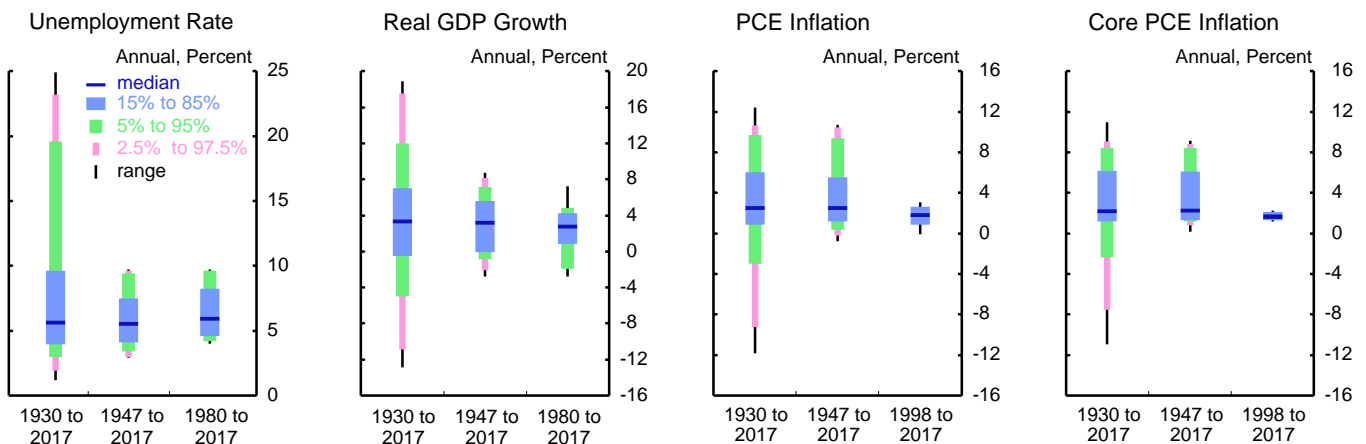
... Not applicable.

# 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.

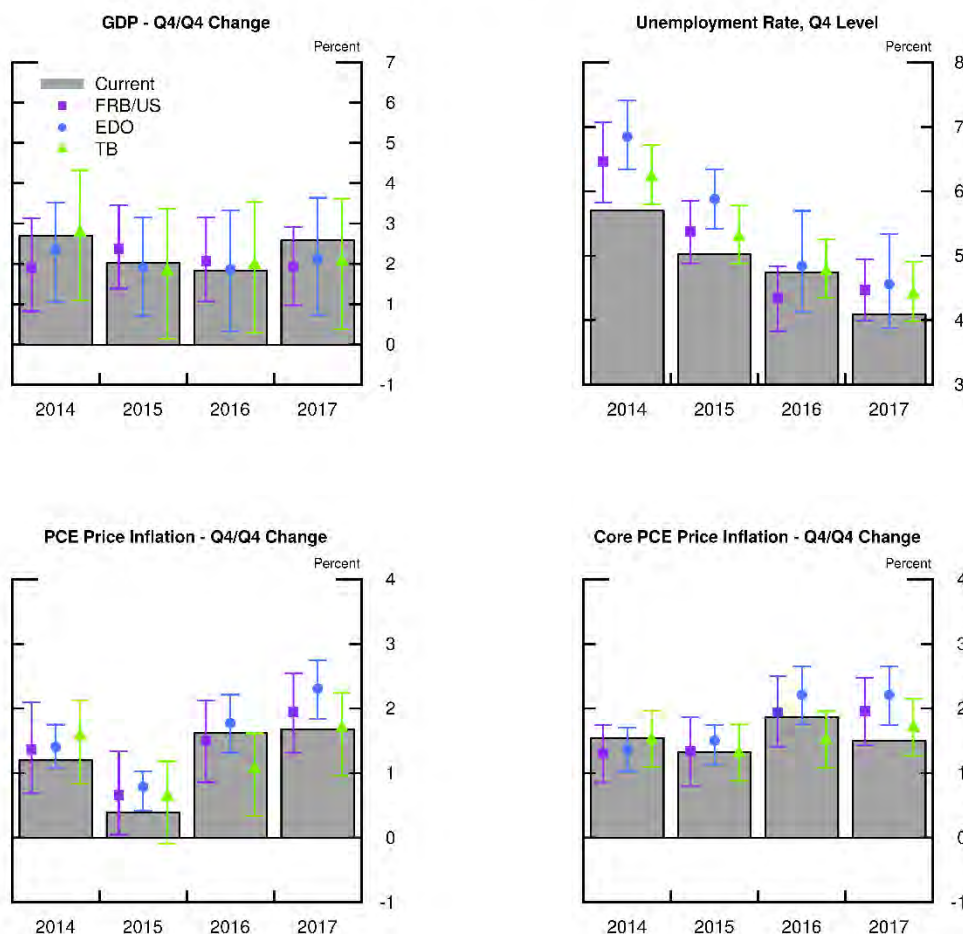
1. Augmented Tealbook prediction intervals use 1- and 2-year-ahead forecast errors from Blue Chip, CBO, and CEA to extend the Tealbook prediction intervals through 2020.

## FRB/US and EDO Forecast Errors

This discussion reports real-time forecast errors for the FRB/US and EDO models over the past four years and compares them with the errors in the judgmental Tealbook projection. The forecast errors from the models are then decomposed into contributions from the structural shocks inferred by the models to identify the key drivers of the misses.

The figure reports the point forecasts and 70 percent confidence intervals of the Tealbook projection and of the FRB/US and EDO model projections of real GDP growth, the unemployment rate, and total and core PCE inflation for 2014 through 2017, computed using the Tealbook and model forecasts as of the April Tealbook of the corresponding year.

Model Forecasts



Note: Green triangles and whisker bands correspond to those shown in the box "Tealbook Forecast Errors: An Update through 2017" in the Domestic Economic Developments and Outlook section.

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

**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
<i>Greater than 3 percent</i>				
Current Tealbook	.06	.07	.05	.09
Previous Tealbook	.05	.05	.04	.07
<i>Less than 1 percent</i>				
Current Tealbook	.13	.10	.06	.12
Previous Tealbook	.19	.15	.09	.15

**Probability of Unemployment Events**

(4 quarters ahead)

Probability that the unemployment rate will . . .	Staff	FRB/US	EDO	BVAR
<i>Increase by 1 percentage point</i>				
Current Tealbook	.00	.02	.16	.06
Previous Tealbook	.00	.01	.20	.06
<i>Decrease by 1 percentage point</i>				
Current Tealbook	.35	.04	.05	.02
Previous Tealbook	.45	.07	.03	.03

**Probability of Near-Term Recession**

Probability that real GDP declines in the next two quarters	Staff	FRB/US	EDO	BVAR	Factor Model
Current Tealbook	.01	.02	.05	.05	.02
Previous Tealbook	.00	.02	.06	.04	.00

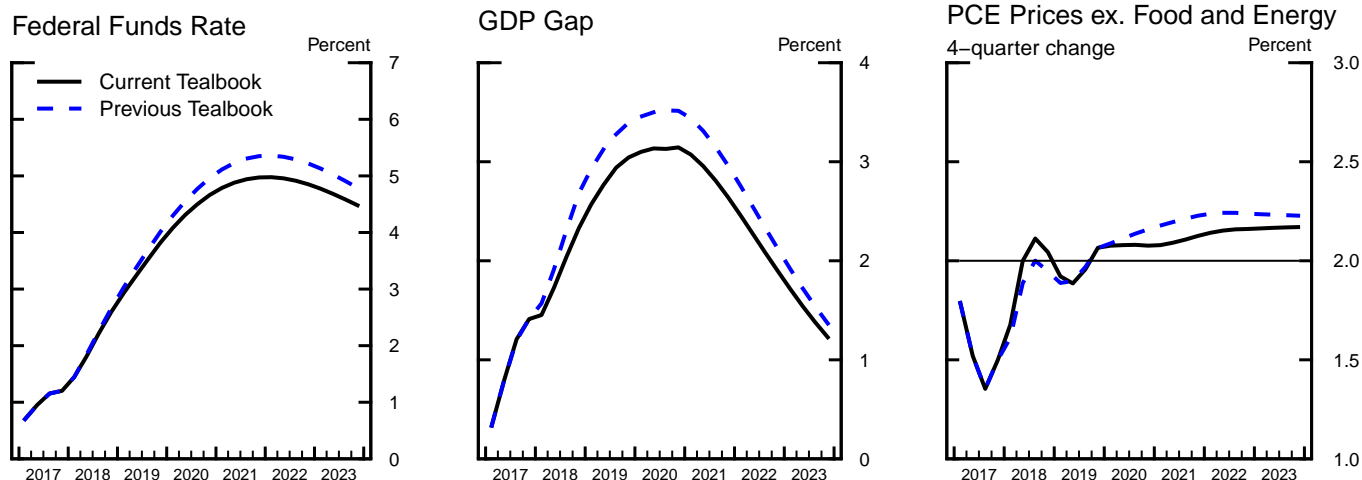
Note: “Staff” represents stochastic simulations in FRB/US around the staff baseline; baselines for FRB/US, BVAR, EDO, and the factor model are generated by those models themselves, up to the current-quarter estimate. Data for the current quarter are taken from the staff estimate for the second Tealbook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

## Policy Rules and the Staff Projection

### Near-Term Prescriptions of Selected Simple Policy Rules<sup>1</sup>

	(Percent)	
	2018:Q2	2018:Q3
Taylor (1999) rule	<b>4.12</b>	<b>4.57</b>
<i>Previous Tealbook</i>	4.14	4.67
Taylor (1993) rule	<b>3.30</b>	<b>3.60</b>
<i>Previous Tealbook</i>	3.23	3.58
First-difference rule	<b>1.94</b>	<b>2.38</b>
<i>Previous Tealbook projection</i>	2.04	2.57
Nominal income targeting rule	<b>1.52</b>	<b>1.64</b>
<i>Previous Tealbook projection</i>	1.52	1.65
<i>Addendum:</i>		
Tealbook baseline	<b>1.81</b>	<b>2.22</b>

### Key Elements of the Staff Projection



### A Medium-Term Notion of the Equilibrium Real Federal Funds Rate<sup>2</sup>

	(Percent)		
	Current Value	Current-Quarter Estimate Based on Previous Tealbook	Previous Tealbook
Tealbook baseline			
FRB/US $r^*$	3.40	3.83	3.62
Average projected real federal funds rate	1.53	1.71	1.45
SEP-consistent baseline			
FRB/US $r^*$	1.49		
Average projected real federal funds rate	.61		

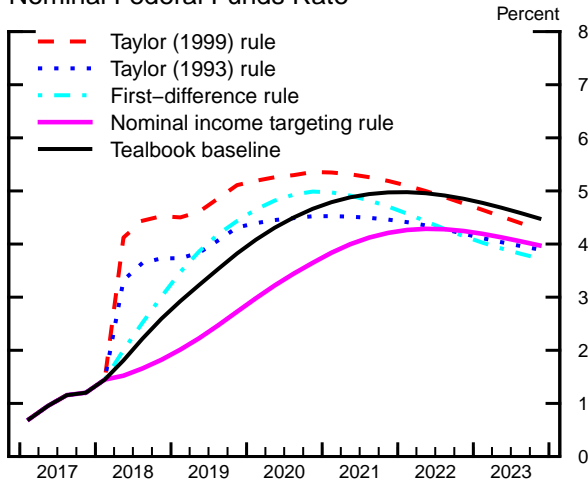
1. For rules that have a lagged policy rate as a right-hand-side variable, the lines denoted "Previous Tealbook projection" report prescriptions based on the previous Tealbook's staff outlook for inflation and the output gap, but conditional on the current-Tealbook value of the lagged policy rate.

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 March 2018 median SEP responses. The "Average projected real federal funds rate" is calculated under the Tealbook and SEP-consistent baseline projections over the same 12-quarter period as FRB/US  $r^*$ .

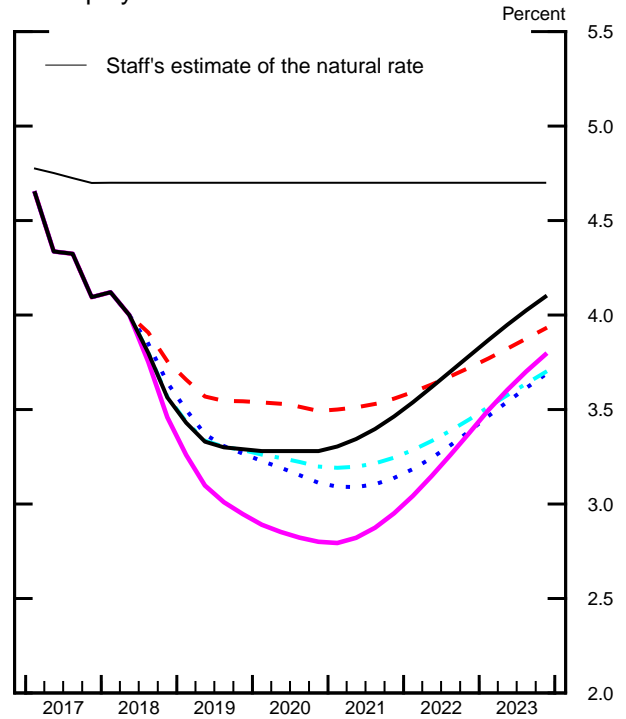
## Simple Policy Rule Simulations

Monetary Policy Strategies

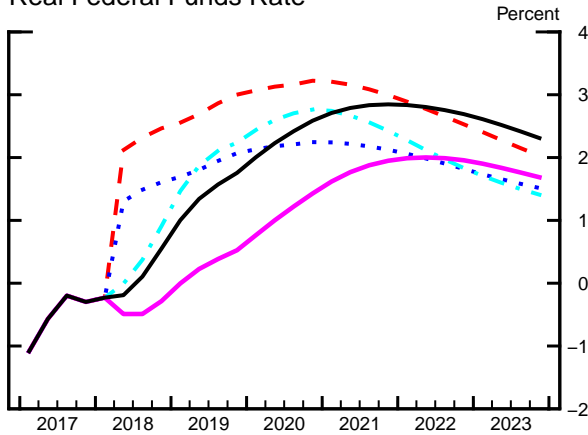
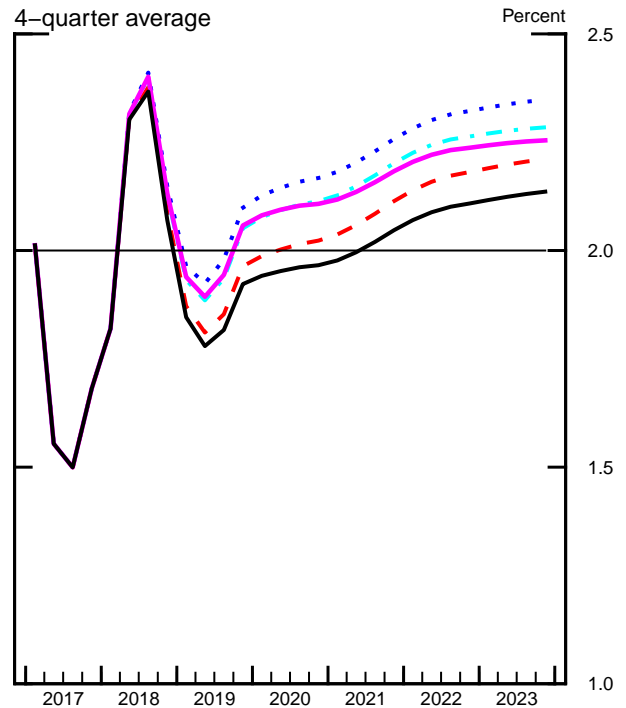
Nominal Federal Funds Rate



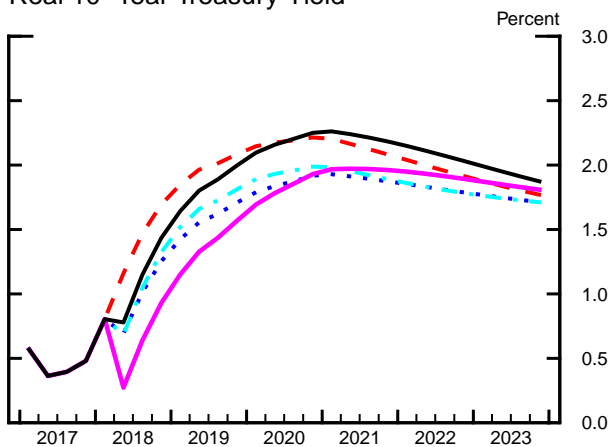
Unemployment Rate



Real Federal Funds Rate

PCE Inflation  
4-quarter average

Real 10-Year Treasury Yield

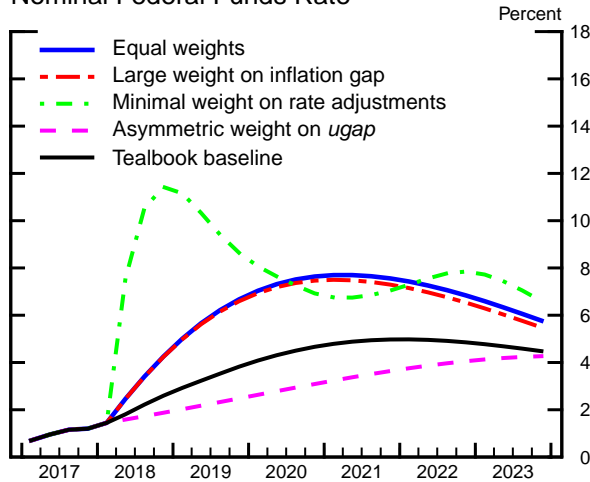


Note: The policy rule simulations in this exhibit are based on rules that respond to core inflation rather than to headline inflation. This choice of rule specification was made in light of a tendency for current and near-term core inflation rates to outperform headline inflation rates as predictors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

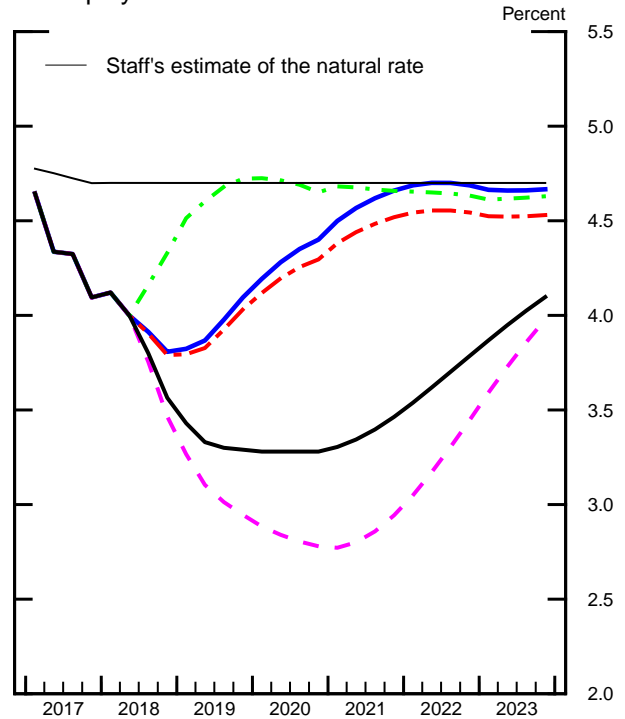
## Optimal Control Simulations under Commitment

Monetary Policy Strategies

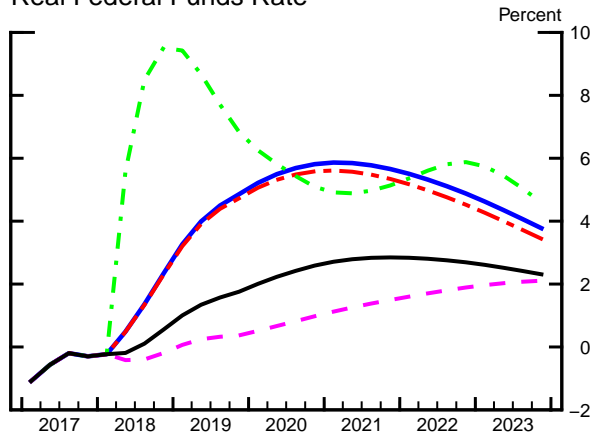
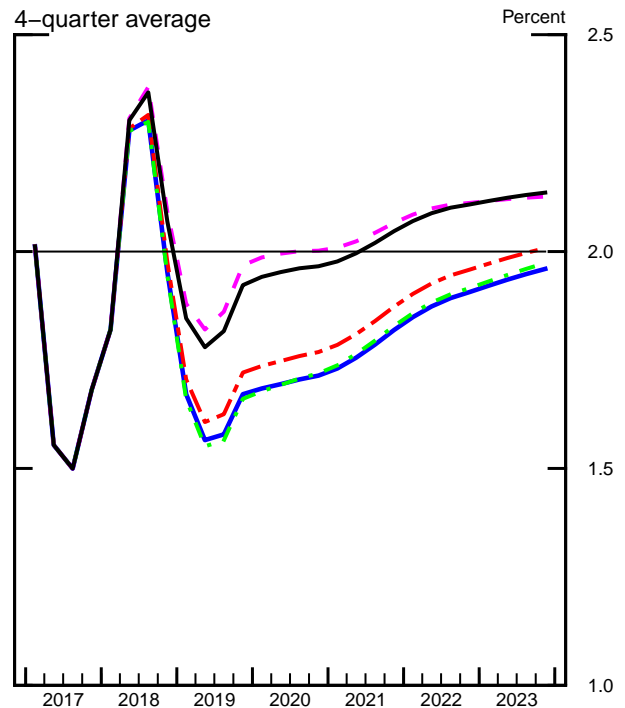
Nominal Federal Funds Rate



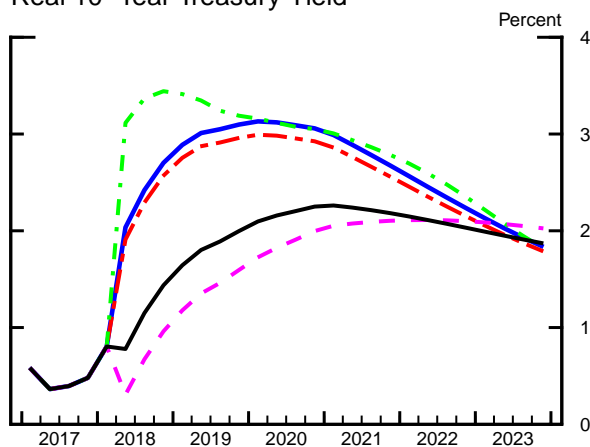
Unemployment Rate



Real Federal Funds Rate

PCE Inflation  
4-quarter average

Real 10-Year Treasury Yield

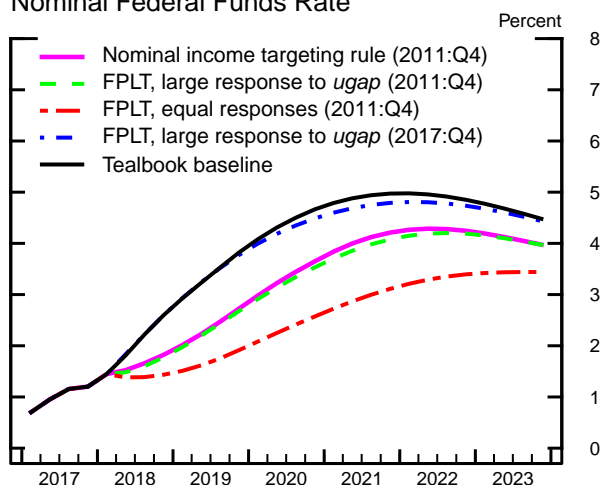


Note: Each set of lines corresponds to an optimal control policy under commitment in which policymakers minimize a discounted weighted sum of squared deviations of 4-quarter headline PCE inflation from the Committee's 2 percent objective, of squared deviations of the unemployment rate from the staff's 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.

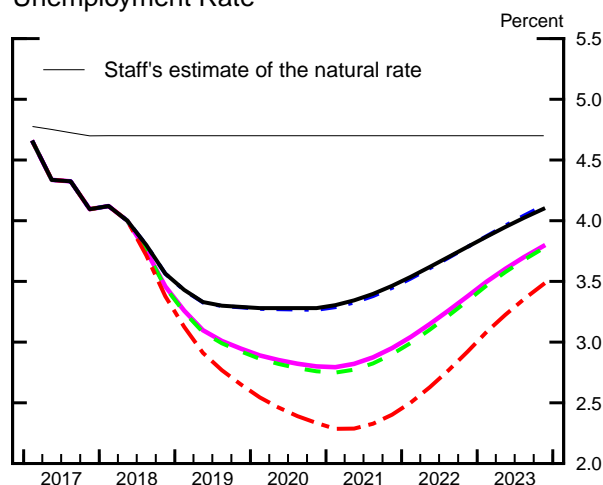
## Illustrating Flexible Price–Level Targeting Rules

Monetary Policy Strategies

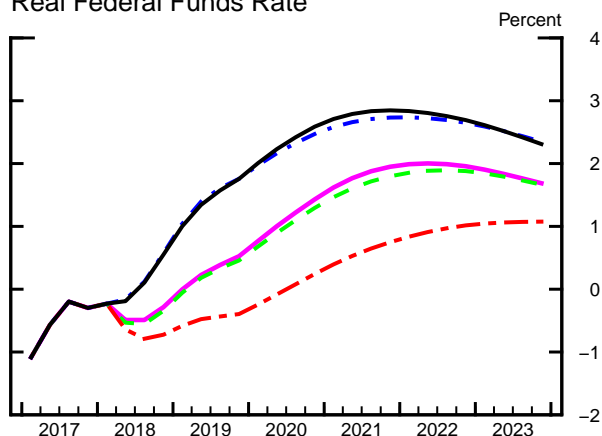
Nominal Federal Funds Rate



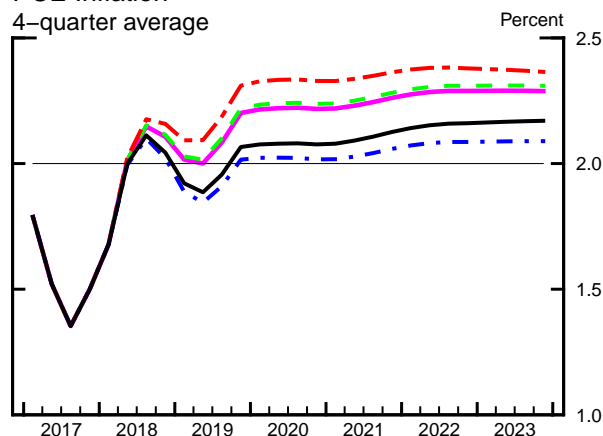
Unemployment Rate



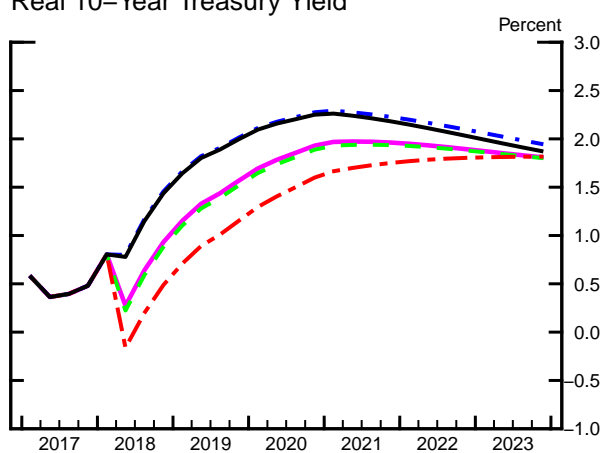
Real Federal Funds Rate



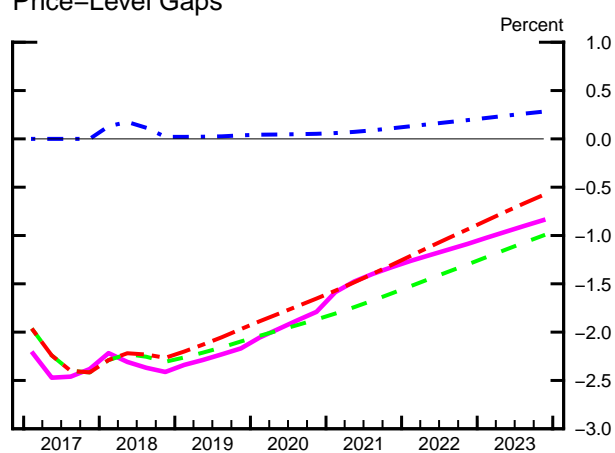
PCE Inflation  
4-quarter average



Real 10–Year Treasury Yield



Price–Level Gaps



**Outcomes of Simple Policy Rule Simulations**

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

Outcome and strategy	2018	2019	2020	2021	2022	2023
<i>Nominal federal funds rate<sup>1</sup></i>						
Taylor (1999)	4.5	5.1	5.4	5.2	4.8	4.3
Taylor (1993)	3.7	4.3	4.5	4.5	4.2	3.9
First-difference	3.0	4.4	5.0	4.7	4.1	3.7
Nominal income targeting	1.8	2.7	3.6	4.2	4.2	4.0
Extended Tealbook baseline	2.6	3.8	4.7	5.0	4.9	4.5
<i>Real GDP</i>						
Taylor (1999)	2.3	2.4	2.1	1.7	1.2	1.2
Taylor (1993)	2.5	2.8	2.3	1.7	1.1	1.1
First-difference	2.6	2.7	2.2	1.7	1.2	1.2
Nominal income targeting	2.8	3.1	2.3	1.5	.9	.9
Extended Tealbook baseline	2.6	2.6	2.1	1.5	1.0	1.0
<i>Unemployment rate<sup>1</sup></i>						
Taylor (1999)	3.8	3.5	3.5	3.6	3.7	3.9
Taylor (1993)	3.6	3.3	3.1	3.1	3.4	3.7
First-difference	3.6	3.3	3.2	3.2	3.4	3.7
Nominal income targeting	3.5	2.9	2.8	3.0	3.4	3.8
Extended Tealbook baseline	3.6	3.3	3.3	3.5	3.8	4.1
<i>Total PCE prices</i>						
Taylor (1999)	2.1	2.0	2.0	2.1	2.2	2.2
Taylor (1993)	2.1	2.1	2.2	2.3	2.3	2.3
First-difference	2.1	2.1	2.1	2.2	2.3	2.3
Nominal income targeting	2.1	2.1	2.1	2.2	2.2	2.3
Extended Tealbook baseline	2.1	1.9	2.0	2.0	2.1	2.1
<i>Core PCE prices</i>						
Taylor (1999)	2.1	2.1	2.1	2.2	2.2	2.2
Taylor (1993)	2.1	2.2	2.3	2.3	2.4	2.4
First-difference	2.1	2.2	2.2	2.3	2.3	2.3
Nominal income targeting	2.1	2.2	2.2	2.3	2.3	2.3
Extended Tealbook baseline	2.0	2.1	2.1	2.1	2.2	2.2

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

**Outcomes of Simple Policy Rule Simulations, Quarterly**

(4-quarter percent change, except as noted)

Outcome and strategy	2018				2019			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
<i>Nominal federal funds rate<sup>1</sup></i>								
Taylor (1999)	1.4	4.1	4.4	4.5	4.5	4.6	4.9	5.1
Taylor (1993)	1.4	3.3	3.6	3.7	3.7	3.8	4.1	4.3
First-difference	1.4	2.0	2.5	3.0	3.5	3.9	4.2	4.4
Nominal income targeting	1.4	1.5	1.7	1.8	2.0	2.2	2.5	2.7
Extended Tealbook baseline	1.4	1.8	2.2	2.6	2.9	3.2	3.5	3.8
<i>Real GDP</i>								
Taylor (1999)	2.7	2.6	2.4	2.3	2.5	2.4	2.4	2.4
Taylor (1993)	2.7	2.6	2.6	2.5	2.8	2.8	2.8	2.8
First-difference	2.7	2.6	2.6	2.6	2.9	2.9	2.8	2.7
Nominal income targeting	2.7	2.6	2.7	2.8	3.3	3.3	3.3	3.1
Extended Tealbook baseline	2.7	2.6	2.6	2.6	2.9	2.8	2.7	2.6
<i>Unemployment rate<sup>1</sup></i>								
Taylor (1999)	4.1	4.0	3.9	3.8	3.7	3.6	3.5	3.5
Taylor (1993)	4.1	4.0	3.8	3.6	3.5	3.4	3.3	3.3
First-difference	4.1	4.0	3.8	3.6	3.4	3.3	3.3	3.3
Nominal income targeting	4.1	4.0	3.8	3.5	3.3	3.1	3.0	2.9
Extended Tealbook baseline	4.1	4.0	3.8	3.6	3.4	3.3	3.3	3.3
<i>Total PCE prices</i>								
Taylor (1999)	1.8	2.3	2.4	2.1	1.9	1.8	1.9	2.0
Taylor (1993)	1.8	2.3	2.4	2.1	2.0	1.9	2.0	2.1
First-difference	1.8	2.3	2.4	2.1	1.9	1.9	1.9	2.1
Nominal income targeting	1.8	2.3	2.4	2.1	1.9	1.9	1.9	2.1
Extended Tealbook baseline	1.8	2.3	2.4	2.1	1.8	1.8	1.8	1.9
<i>Core PCE prices</i>								
Taylor (1999)	1.7	2.0	2.1	2.1	1.9	1.9	2.0	2.1
Taylor (1993)	1.7	2.0	2.2	2.1	2.0	2.0	2.1	2.2
First-difference	1.7	2.0	2.1	2.1	2.0	2.0	2.1	2.2
Nominal income targeting	1.7	2.0	2.1	2.1	2.0	2.0	2.1	2.2
Extended Tealbook baseline	1.7	2.0	2.1	2.0	1.9	1.9	2.0	2.1

1. Percent, average for the quarter.

**Outcomes of Optimal Control Simulations under Commitment**

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

Outcome and strategy	2018	2019	2020	2021	2022	2023
<i>Nominal federal funds rate<sup>1</sup></i>						
Equal weights	4.3	6.7	7.6	7.6	6.8	5.8
Large weight on inflation gap	4.2	6.6	7.5	7.3	6.5	5.5
Minimal weight on rate adjustments	11.4	8.6	6.9	7.0	7.8	6.6
Asymmetric weight on <i>ugap</i>	1.9	2.5	3.1	3.6	4.1	4.3
Extended Tealbook baseline	2.6	3.8	4.7	5.0	4.9	4.5
<i>Real GDP</i>						
Equal weights	2.1	1.4	1.5	1.4	1.4	1.4
Large weight on inflation gap	2.1	1.5	1.5	1.5	1.4	1.4
Minimal weight on rate adjustments	1.3	1.0	2.1	1.9	1.5	1.3
Asymmetric weight on <i>ugap</i>	2.8	3.1	2.3	1.4	.7	.7
Extended Tealbook baseline	2.6	2.6	2.1	1.5	1.0	1.0
<i>Unemployment rate<sup>1</sup></i>						
Equal weights	3.8	4.1	4.4	4.7	4.7	4.7
Large weight on inflation gap	3.8	4.0	4.3	4.5	4.5	4.5
Minimal weight on rate adjustments	4.3	4.7	4.7	4.7	4.6	4.6
Asymmetric weight on <i>ugap</i>	3.5	2.9	2.8	2.9	3.4	4.0
Extended Tealbook baseline	3.6	3.3	3.3	3.5	3.8	4.1
<i>Total PCE prices</i>						
Equal weights	2.0	1.7	1.7	1.8	1.9	2.0
Large weight on inflation gap	2.0	1.7	1.8	1.9	2.0	2.0
Minimal weight on rate adjustments	1.9	1.7	1.7	1.8	1.9	2.0
Asymmetric weight on <i>ugap</i>	2.1	2.0	2.0	2.1	2.1	2.1
Extended Tealbook baseline	2.1	1.9	2.0	2.0	2.1	2.1
<i>Core PCE prices</i>						
Equal weights	1.9	1.8	1.8	1.9	2.0	2.0
Large weight on inflation gap	1.9	1.9	1.9	2.0	2.0	2.0
Minimal weight on rate adjustments	1.9	1.8	1.8	1.9	2.0	2.0
Asymmetric weight on <i>ugap</i>	2.1	2.1	2.1	2.1	2.2	2.2
Extended Tealbook baseline	2.0	2.1	2.1	2.1	2.2	2.2

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

**Outcomes of Optimal Control Simulations under Commitment, Quarterly**

(4-quarter percent change, except as noted)

Outcome and strategy	2018				2019			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
<i>Nominal federal funds rate<sup>1</sup></i>								
Equal weights	1.4	2.5	3.4	4.3	5.0	5.7	6.2	6.7
Large weight on inflation gap	1.4	2.5	3.4	4.2	5.0	5.6	6.2	6.6
Minimal weight on rate adjustments	1.4	7.6	10.5	11.4	11.2	10.3	9.4	8.6
Asymmetric weight on <i>ugap</i>	1.4	1.6	1.7	1.9	2.0	2.2	2.3	2.5
Extended Tealbook baseline	1.4	1.8	2.2	2.6	2.9	3.2	3.5	3.8
<i>Real GDP</i>								
Equal weights	2.7	2.7	2.3	2.1	2.0	1.7	1.6	1.4
Large weight on inflation gap	2.7	2.7	2.4	2.1	2.1	1.8	1.7	1.5
Minimal weight on rate adjustments	2.7	2.7	2.0	1.3	1.0	.5	.7	1.0
Asymmetric weight on <i>ugap</i>	2.7	2.6	2.7	2.8	3.3	3.3	3.2	3.1
Extended Tealbook baseline	2.7	2.6	2.6	2.6	2.9	2.8	2.7	2.6
<i>Unemployment rate<sup>1</sup></i>								
Equal weights	4.1	4.0	3.9	3.8	3.8	3.9	4.0	4.1
Large weight on inflation gap	4.1	4.0	3.9	3.8	3.8	3.8	3.9	4.0
Minimal weight on rate adjustments	4.1	4.0	4.2	4.3	4.5	4.6	4.7	4.7
Asymmetric weight on <i>ugap</i>	4.1	4.0	3.8	3.5	3.3	3.1	3.0	2.9
Extended Tealbook baseline	4.1	4.0	3.8	3.6	3.4	3.3	3.3	3.3
<i>Total PCE prices</i>								
Equal weights	1.8	2.3	2.3	2.0	1.7	1.6	1.6	1.7
Large weight on inflation gap	1.8	2.3	2.3	2.0	1.7	1.6	1.6	1.7
Minimal weight on rate adjustments	1.8	2.3	2.3	1.9	1.7	1.6	1.6	1.7
Asymmetric weight on <i>ugap</i>	1.8	2.3	2.4	2.1	1.9	1.8	1.9	2.0
Extended Tealbook baseline	1.8	2.3	2.4	2.1	1.8	1.8	1.8	1.9
<i>Core PCE prices</i>								
Equal weights	1.7	2.0	2.0	1.9	1.7	1.7	1.7	1.8
Large weight on inflation gap	1.7	2.0	2.1	1.9	1.8	1.7	1.8	1.9
Minimal weight on rate adjustments	1.7	2.0	2.0	1.9	1.7	1.7	1.7	1.8
Asymmetric weight on <i>ugap</i>	1.7	2.0	2.1	2.1	2.0	1.9	2.0	2.1
Extended Tealbook baseline	1.7	2.0	2.1	2.0	1.9	1.9	2.0	2.1

1. Percent, average for the quarter.

**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 <sup>1</sup>	
	03/09/18	04/19/18	03/09/18	04/19/18	03/09/18	04/19/18	03/09/18	04/19/18	03/09/18	04/19/18
<i>Quarterly</i>										
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	5.3	5.3	2.9	2.9	2.7	2.7	1.9	1.9	4.1	4.1
2018:Q1	4.4	4.4	2.1	1.7	2.5	2.8	2.3	2.5	4.1	4.1
Q2	4.9	4.7	3.1	2.9	1.5	2.2	2.0	2.2	3.9	4.0
Q3	5.3	4.8	3.3	3.0	1.7	1.8	1.8	1.8	3.7	3.8
Q4	5.1	4.7	3.2	2.9	1.6	1.5	1.7	1.7	3.5	3.6
2019:Q1	5.1	5.1	2.9	2.9	1.9	1.9	2.0	2.0	3.3	3.4
Q2	4.8	4.8	2.7	2.7	2.0	1.9	2.1	2.1	3.2	3.3
Q3	4.6	4.7	2.5	2.6	2.0	1.9	2.1	2.1	3.2	3.3
Q4	4.4	4.3	2.3	2.3	2.0	2.0	2.1	2.1	3.1	3.3
<i>Two-quarter<sup>2</sup></i>										
2017:Q2	3.7	3.7	2.1	2.1	1.2	1.2	1.4	1.4	-4	-4
Q4	5.3	5.3	3.0	3.0	2.1	2.1	1.6	1.6	-2	-2
2018:Q2	4.6	4.6	2.6	2.3	2.0	2.5	2.1	2.4	-2	-1
Q4	5.2	4.8	3.3	2.9	1.6	1.7	1.8	1.7	-4	-4
2019:Q2	5.0	4.9	2.8	2.8	1.9	1.9	2.0	2.1	-3	-3
Q4	4.5	4.5	2.4	2.4	2.0	1.9	2.1	2.1	-1	.0
<i>Four-quarter<sup>3</sup></i>										
2016:Q4	3.4	3.4	1.8	1.8	1.6	1.6	1.9	1.9	-3	-3
2017:Q4	4.5	4.5	2.6	2.6	1.7	1.7	1.5	1.5	-6	-6
2018:Q4	4.9	4.7	2.9	2.6	1.8	2.1	1.9	2.0	-6	-5
2019:Q4	4.7	4.7	2.6	2.6	2.0	1.9	2.1	2.1	-4	-3
2020:Q4	4.3	4.2	2.1	2.1	2.1	2.0	2.2	2.1	.0	.0
<i>Annual</i>										
2016	2.8	2.8	1.5	1.5	1.2	1.2	1.8	1.8	4.9	4.9
2017	4.1	4.1	2.3	2.3	1.7	1.7	1.5	1.5	4.4	4.4
2018	4.9	4.8	2.9	2.6	1.9	2.1	1.9	2.0	3.8	3.9
2019	4.9	4.8	2.9	2.8	1.8	1.8	2.0	2.0	3.2	3.3
2020	4.4	4.4	2.2	2.2	2.0	2.0	2.1	2.1	3.1	3.3

1. Level, except for two-quarter and four-quarter intervals.

2. Percent change from two quarters earlier; for unemployment rate, change is in percentage points.

3. Percent change from four quarters earlier; for unemployment rate, change is in percentage points.

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

Item	2017			2018				2019				2017 <sup>1</sup>	2018 <sup>1</sup>	2019 <sup>1</sup>	2020 <sup>1</sup>
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
Real GDP <i>Previous Tealbook</i>	3.1 3.1	3.2 3.2	2.9 2.9	1.7 2.1	2.9 3.1	3.0 3.3	2.9 3.2	2.9 2.9	2.7 2.7	2.6 2.5	2.3 2.3	2.6 2.6	2.6 2.9	2.6 2.6	2.1 2.1
Final sales <i>Previous Tealbook</i>	3.0 3.0	2.4 2.4	3.4 3.6	.7 1.3	2.8 3.3	3.3 3.3	3.3 3.5	3.1 3.0	2.8 2.7	2.5 2.6	2.5 2.4	2.9 2.9	2.5 2.8	2.7 2.7	2.1 2.1
Priv. dom. final purch. <i>Previous Tealbook</i>	3.3 3.3	2.2 2.2	4.8 5.0	1.6 1.6	2.8 3.4	3.2 3.4	3.0 3.3	3.0 3.1	2.9 2.9	2.7 2.7	2.5 2.4	3.3 3.4	2.6 2.9	2.8 2.8	2.4 2.5
Personal cons. expend. <i>Previous Tealbook</i>	3.3 3.3	2.2 2.2	4.0 4.2	1.2 1.5	2.2 2.6	2.6 2.9	2.5 2.9	2.8 2.8	2.7 2.8	2.6 2.7	2.5 2.6	2.8 2.9	2.1 2.4	2.7 2.8	2.5 2.5
Durables	7.6	8.6	13.7	-1.4	4.2	4.6	3.8	2.3	2.2	2.1	2.0	7.3	2.8	2.1	1.9
Nondurables	4.2	2.3	4.8	-1.2	1.0	2.3	2.7	2.8	2.8	2.7	2.6	3.1	1.2	2.7	2.6
Services	2.3	1.1	2.3	2.3	2.2	2.3	2.2	2.8	2.8	2.7	2.6	2.1	2.3	2.7	2.5
Residential investment <i>Previous Tealbook</i>	-7.3 -7.3	-4.7 -4.7	12.8 12.4	-4.1 -4.4	-2.1 2.7	5.0 4.0	5.1 4.1	1.6 2.5	1.6 .3	1.8 -1	1.8 -8	2.6 2.5	.9 1.6	1.7 .5	3.3 4.2
Nonres. priv. fixed invest. <i>Previous Tealbook</i>	6.7 6.7	4.7 4.7	6.8 7.1	5.7 4.2	8.0 8.2	6.2 6.2	5.0 5.5	4.7 4.9	4.3 4.3	3.5 3.4	2.3 2.4	6.3 6.4	6.2 6.0	3.7 3.8	1.7 1.8
Equipment & intangibles <i>Previous Tealbook</i>	6.6 6.6	8.4 8.4	7.0 7.4	5.8 4.5	6.4 7.2	5.8 6.8	5.3 6.4	5.5 5.5	4.8 4.6	4.0 3.7	2.6 2.4	6.7 6.8	5.8 6.2	4.2 4.1	2.0 2.1
Nonres. structures <i>Previous Tealbook</i>	7.0 7.0	-7.0 -7.0	6.3 6.2	5.6 3.4	13.5 11.6	7.5 4.0	4.2 2.8	2.3 3.1	2.7 3.5	1.8 2.5	1.4 2.1	5.0 4.9	7.7 5.4	2.0 2.8	.5 .9
Net exports <sup>2</sup> <i>Previous Tealbook</i> <sup>2</sup>	-614 -614	-598 -598	-654 -653	-676 -654	-671 -647	-663 -643	-651 -637	-642 -638	-650 -649	-659 -657	-663 -661	-622 -622	-665 -645	-654 -651	-696 -702
Exports	3.5	2.1	7.0	2.9	5.5	7.1	5.5	5.8	5.3	5.3	4.4	5.0	5.2	5.2	3.6
Imports	1.5	-7	14.1	5.3	3.5	4.3	2.7	3.3	5.2	5.4	3.9	4.7	3.9	4.4	4.8
Gov't. cons. & invest. <i>Previous Tealbook</i>	-2 -2	.7 .7	3.0 3.0	-1.2 -3	1.2 .8	2.2 1.8	2.7 2.7	1.7 1.7	2.3 2.3	2.2 2.2	2.4 2.4	.7 .7	1.2 1.2	2.2 2.1	1.9 1.8
Federal	1.9	1.3	3.2	-3.8	1.4	4.0	5.6	3.0	4.6	4.2	4.7	1.0	1.8	4.1	3.3
Defense	4.7	2.4	5.5	-5.3	2.4	5.2	7.0	3.1	5.8	5.1	5.5	2.3	2.2	4.9	3.6
Nondefense	-1.9	-2	-1	-1.6	.0	2.4	3.5	2.8	2.9	3.0	3.5	-9	1.1	3.0	2.7
State & local	-1.5	.2	2.9	.3	1.0	1.1	1.0	1.0	1.0	1.0	1.0	.5	.9	1.0	1.0
Change in priv. inventories <sup>2</sup> <i>Previous Tealbook</i> <sup>2</sup>	5 5	39 39	16 10	58 44	62 38	47 37	30 28	20 24	16 22	18 18	10 14	15 14	49 37	16 19	5 8

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 <i>Previous Tealbook</i>	1.7 1.7	1.3 1.3	2.7 2.7	2.7 2.7	2.0 2.0	1.8 1.8	2.6 2.6	2.6 2.9	2.6 2.6	2.1 2.1
Final sales <i>Previous Tealbook</i>	1.5	1.7	2.0	2.9	2.0	1.9	2.9	2.5	2.7	2.1
Priv. dom. final purch. <i>Previous Tealbook</i>	1.5 2.6 2.6	1.7 2.3 2.3	2.0 2.6 2.6	2.9 4.1 4.1	2.0 2.9 2.9	1.9 2.5 2.5	2.9 3.3 3.4	2.8 2.6 2.9	2.7 2.8 2.8	2.1 2.4 2.5
Personal cons. expend. <i>Previous Tealbook</i>	1.5	1.3	2.0	3.6	3.0	2.8	2.8	2.1	2.7	2.5
Durables	1.5	1.3	2.0	3.6	3.0	2.8	2.9	2.4	2.8	2.5
Nondurables	4.8	7.2	5.2	8.7	6.4	7.0	7.3	2.8	2.1	1.9
Services	.4 1.4	.8 .6	2.6 1.3	2.8 3.0	2.8 2.6	2.5 2.3	3.1 2.1	1.2 2.3	2.7 2.7	2.6 2.5
Residential investment <i>Previous Tealbook</i>	6.0 6.0	15.7 15.7	6.8 6.8	6.3 6.3	10.3 10.3	2.5 2.5	2.6 2.5	.9 1.6	1.7 .5	3.3 4.2
Nonres. priv. fixed invest. <i>Previous Tealbook</i>	9.0 9.0	5.2 5.2	4.8 4.8	6.1 6.1	.3 .3	.7 .7	6.3 6.4	6.2 6.0	3.7 3.8	1.7 1.8
Equipment & intangibles <i>Previous Tealbook</i>	9.2 9.2	5.5 5.5	4.5 4.5	5.3 5.3	3.3 3.3	-1 -1	6.7 6.8	5.8 6.2	4.2 4.1	2.0 2.1
Nonres. structures <i>Previous Tealbook</i>	8.0 8.0	4.1 4.1	5.8 5.8	8.8 8.8	-9.1 -9.1	3.5 3.5	5.0 4.9	7.7 5.4	2.0 2.8	.5 .9
Net exports <sup>1</sup> <i>Previous Tealbook</i> <sup>1</sup>	-459 -459	-447 -447	-405 -405	-428 -428	-545 -545	-586 -586	-622 -622	-665 -645	-654 -651	-696 -702
Exports	4.2	2.2	5.9	3.0	-1.8	.6	5.0	5.2	5.2	3.6
Imports	3.5	.3	2.5	6.2	2.9	2.7	4.7	3.9	4.4	4.8
Gov't. cons. & invest. <i>Previous Tealbook</i>	-3.0 -3.0	-2.2 -2.2	-2.8 -2.8	.5 .5	1.6 1.6	.4 .4	.7 .7	1.2 1.2	2.2 2.1	1.9 1.8
Federal	-4.0	-2.1	-6.7	-1.2	1.2	-3	1.0	1.8	4.1	3.3
Defense	-4.1	-3.9	-7.1	-4.0	.0	-1.4	2.3	2.2	4.9	3.6
Nondefense	-3.9	1.0	-6.0	3.5	2.9	1.2	-9	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 <sup>1</sup> <i>Previous Tealbook</i> <sup>1</sup>	38 38	55 55	79 79	68 68	101 101	33 33	15 14	49 37	16 19	5 8

1. Billions of chained (2009) dollars.

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

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

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

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

Item	2017			2018				2019				2017 <sup>1</sup>	2018 <sup>1</sup>	2019 <sup>1</sup>	2020 <sup>1</sup>
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
GDP chain-wt. price index <i>Previous Tealbook</i>	1.0 1.0	2.1 2.1	2.3 2.3	2.7 2.3	1.8 1.7	1.8 1.9	1.8 1.8	2.2 2.2	2.0 2.1	2.0 2.0	2.0 2.0	1.9 1.9	2.0 1.9	2.1 2.1	2.1 2.2
PCE chain-wt. price index <i>Previous Tealbook</i>	.3 .3	1.5 1.5	2.7 2.7	2.8 2.5	2.2 1.5	1.8 1.7	1.5 1.6	1.9 1.9	1.9 2.0	2.0 2.0	2.0 2.0	1.7 1.7	2.1 1.8	1.9 2.0	2.0 2.1
Energy <i>Previous Tealbook</i>	-16.0 -16.0	8.4 8.4	27.7 27.6	12.7 11.5	2.6 -8.9	1.4 -1.7	-2.2 -1.6	-2.3 -1.2	-1.8 -1.2	-1.7 -1.6	-1.6 -1.5	7.6 7.6	3.5 -4	-1.9 -7	-1.1 -1
Food <i>Previous Tealbook</i>	2.0 2.0	.2 .2	.2 .2	.2 .9	1.6 1.9	2.0 2.1	2.3 2.3	2.3 2.4	2.3 2.4	2.3 2.4	2.3 2.4	.7 .7	1.5 1.8	2.3 2.4	2.3 2.4
Ex. food & energy <i>Previous Tealbook</i>	.9 .9	1.3 1.3	1.9 1.9	2.5 2.3	2.2 2.0	1.8 1.8	1.7 1.7	2.0 2.0	2.1 2.1	2.1 2.1	2.1 2.1	1.5 1.5	2.0 1.9	2.1 2.1	2.1 2.2
Ex. food & energy, market based <i>Previous Tealbook</i>	.3 .3	1.0 1.0	1.5 1.5	2.3 2.2	2.2 2.0	1.7 1.5	1.4 1.5	1.8 1.8	1.9 1.9	1.9 1.9	1.9 1.9	1.2 1.2	1.9 1.8	1.9 1.9	1.9 2.0
CPI <i>Previous Tealbook</i>	.1 .1	2.1 2.1	3.3 3.3	3.5 3.6	2.2 1.6	2.2 1.9	1.8 1.9	2.1 2.1	2.2 2.2	2.2 2.2	2.2 2.3	2.1 2.1	2.4 2.3	2.2 2.2	2.3 2.4
Ex. food & energy <i>Previous Tealbook</i>	.8 .8	1.8 1.8	2.2 2.2	3.0 3.0	2.3 2.5	2.3 2.2	2.1 2.1	2.4 2.4	2.5 2.4	2.5 2.4	2.5 2.5	1.7 1.7	2.4 2.5	2.5 2.4	2.5 2.6
ECL, hourly compensation <sup>2</sup> <i>Previous Tealbook</i> <sup>2</sup>	2.2 2.2	3.1 3.1	1.9 1.9	2.6 2.7	2.4 2.4	2.4 2.4	2.4 2.4	2.6 2.7	2.7 2.7	2.7 2.8	2.7 2.8	2.6 2.6	2.5 2.5	2.7 2.8	2.7 3.0
Business sector Output per hour <i>Previous Tealbook</i>	1.6 1.6	3.2 3.2	-4 -6	.8 .4	.7 .6	1.6 2.0	1.6 1.9	.9 1.2	1.0 .9	.9 .8	.6 .6	.9 .9	1.2 1.2	.9 .9	.9 .9
Compensation per hour <i>Previous Tealbook</i>	.5 .5	4.1 4.1	1.7 1.7	3.9 3.5	2.7 3.0	3.8 4.0	3.8 4.0	3.9 4.1	3.9 4.1	3.9 4.1	3.9 4.1	2.7 2.7	3.5 3.6	3.9 4.1	3.9 4.3
Unit labor costs <i>Previous Tealbook</i>	-1.0 -1.0	.9 .9	2.2 2.3	3.0 3.1	2.0 2.4	2.2 2.0	2.1 2.0	2.9 2.9	2.9 3.1	3.0 3.3	3.3 3.4	1.8 1.8	2.3 2.4	3.0 3.1	3.0 3.4
Core goods imports chain-wt. price index <sup>3</sup> <i>Previous Tealbook</i> <sup>3</sup>	2.5 2.5	1.1 1.1	1.5 1.6	2.8 2.8	3.6 3.4	1.8 1.3	.9 .9	.7 .7	.6 .7	.6 .6	.5 .6	1.3 1.3	2.3 2.1	.6 .7	.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

## 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 <i>Previous Tealbook</i>	1.9	1.9	1.6	1.6	1.0	1.5	1.9	2.0	2.1	2.1
PCE chain-wt. price index <i>Previous Tealbook</i>	1.9	1.9	1.6	1.6	1.0	1.5	1.9	1.9	2.1	2.2
Energy <i>Previous Tealbook</i>	2.7	1.8	1.2	1.2	.4	1.6	1.7	2.1	1.9	2.0
Food <i>Previous Tealbook</i>	2.7	1.8	1.2	1.2	.4	1.6	1.7	1.8	2.0	2.1
Ex. food & energy <i>Previous Tealbook</i>	12.0	2.3	-2.5	-6.5	-16.2	2.2	7.6	3.5	-1.9	-1.1
Ex. food & energy, market based <i>Previous Tealbook</i>	12.0	2.3	-2.5	-6.5	-16.2	2.2	7.6	-4	-7	-1
CPI <i>Previous Tealbook</i>	5.1	1.2	.7	2.6	.3	-1.7	.7	1.5	2.3	2.3
Ex. food & energy <i>Previous Tealbook</i>	5.1	1.2	.7	2.6	.3	-1.7	.7	1.8	2.4	2.4
Ex. food & energy, market based <i>Previous Tealbook</i>	1.9	1.8	1.5	1.5	1.3	1.9	1.5	2.0	2.1	2.1
CPI <i>Previous Tealbook</i>	1.9	1.8	1.5	1.5	1.3	1.9	1.5	1.9	2.1	2.2
Ex. food & energy <i>Previous Tealbook</i>	1.9	1.5	1.1	1.2	1.1	1.5	1.2	1.9	1.9	1.9
Ex. food & energy, market based <i>Previous Tealbook</i>	1.9	1.5	1.1	1.2	1.1	1.5	1.2	1.8	1.9	2.0
CPI <i>Previous Tealbook</i>	3.3	1.9	1.2	1.2	.4	1.8	2.1	2.4	2.2	2.3
Ex. food & energy <i>Previous Tealbook</i>	3.3	1.9	1.2	1.2	.4	1.8	2.1	2.3	2.2	2.4
Ex. food & energy, market based <i>Previous Tealbook</i>	2.2	1.9	1.7	1.7	2.0	2.2	1.7	2.4	2.5	2.5
ECL, hourly compensation <sup>1</sup> <i>Previous Tealbook</i> <sup>1</sup>	2.2	1.9	1.7	1.7	2.0	2.2	1.7	2.5	2.4	2.6
ECL, hourly compensation <sup>1</sup> <i>Previous Tealbook</i> <sup>1</sup>	2.2	1.8	2.0	2.3	1.9	2.2	2.6	2.5	2.7	2.7
Business sector Output per hour <i>Previous Tealbook</i>	2.2	1.8	2.0	2.3	1.9	2.2	2.6	2.5	2.8	3.0
Compensation per hour <i>Previous Tealbook</i>	-1	-1	1.9	.1	.7	1.0	.9	1.2	.9	.9
Unit labor costs <i>Previous Tealbook</i>	-1	-1	1.9	.1	.7	1.0	.9	1.2	.9	.9
Core goods imports chain-wt. price index <sup>2</sup> <i>Previous Tealbook</i> <sup>2</sup>	.5	5.9	-1	2.9	3.1	-2	2.7	3.5	3.9	3.9
Core goods imports chain-wt. price index <sup>2</sup> <i>Previous Tealbook</i> <sup>2</sup>	.5	5.9	-1	2.9	3.1	-2	2.7	3.6	4.1	4.3
Unit labor costs <i>Previous Tealbook</i>	.6	6.0	-2.0	2.8	2.4	-1.2	1.8	2.3	3.0	3.0
Core goods imports chain-wt. price index <sup>2</sup> <i>Previous Tealbook</i> <sup>2</sup>	.6	6.0	-2.0	2.8	2.4	-1.2	1.8	2.4	3.1	3.4
Core goods imports chain-wt. price index <sup>2</sup> <i>Previous Tealbook</i> <sup>2</sup>	4.3	.1	-1.5	.3	-3.7	-2	1.3	2.3	.6	.6
Core goods imports chain-wt. price index <sup>2</sup> <i>Previous Tealbook</i> <sup>2</sup>	4.3	.1	-1.5	.3	-3.7	-2	1.3	2.1	.7	.7

1. Private-industry workers.

2. Core goods imports exclude computers, semiconductors, oil, and natural gas.

## Other Macroeconomic Indicators

Item	2017				2018				2019				2017 <sup>1</sup>	2018 <sup>1</sup>	2019 <sup>1</sup>	2020 <sup>1</sup>
	Q2	Q3	Q4		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
<i>Employment and production</i>																
Nonfarm payroll employment <sup>2</sup>	190	142	221		202	195	190	191	187	184	178	174	182	194	181	160
Unemployment rate <sup>3</sup>	4.3	4.3	4.1		4.1	4.0	3.8	3.6	3.4	3.3	3.3	3.3	4.1	3.6	3.3	3.3
<i>Previous Tealbook<sup>3</sup></i>	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
Natural rate of unemployment <sup>3</sup>	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
<i>Previous Tealbook<sup>3</sup></i>	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 <sup>3</sup>	60.1	60.2	60.1		60.3	60.3	60.4	60.4	60.5	60.6	60.7	60.7	60.1	60.4	60.7	60.7
Employment-to-Population Trend <sup>3</sup>	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 <sup>4</sup>	.8	1.2	1.4		1.5	1.7	2.1	2.4	2.6	2.8	3.0	3.1	1.4	2.4	3.1	3.2
<i>Previous Tealbook<sup>4</sup></i>	.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
Industrial production <sup>5</sup>	5.0	-1.5	7.8		4.5	4.4	2.9	2.9	2.0	1.5	.9	1.0	3.0	3.7	1.4	1.3
<i>Previous Tealbook<sup>5</sup></i>	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
Manufacturing industr. prod. <sup>5</sup>	2.4	-2.1	5.5		3.1	2.5	2.7	2.1	1.9	2.1	1.7	1.2	1.9	2.6	1.7	1.3
<i>Previous Tealbook<sup>5</sup></i>	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
Capacity utilization rate - mfg. <sup>3</sup>	74.9	74.4	75.2		75.6	75.8	76.0	76.2	76.3	76.5	76.7	76.7	75.2	76.2	76.7	77.1
<i>Previous Tealbook<sup>3</sup></i>	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
Housing starts <sup>6</sup>	1.2	1.2	1.3		1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.2	1.3	1.3	1.4
Light motor vehicle sales <sup>6</sup>	16.8	17.1	17.7		17.2	17.2	17.3	17.3	17.2	17.1	17.0	16.9	17.1	17.2	17.0	16.7
<i>Income and saving</i>																
Nominal GDP <sup>5</sup>	4.1	5.3	5.3		4.4	4.7	4.8	4.7	5.1	4.8	4.7	4.3	4.5	4.7	4.7	4.2
Real disposable pers. income <sup>5</sup>	2.7	.7	1.1		4.3	1.7	2.5	2.0	4.9	2.1	1.8	1.9	1.8	2.6	2.7	2.2
<i>Previous Tealbook<sup>5</sup></i>	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
Personal saving rate <sup>3</sup>	3.7	3.4	2.6		3.3	3.2	3.2	3.1	3.6	3.5	3.3	3.1	2.6	3.1	3.1	3.0
<i>Previous Tealbook<sup>3</sup></i>	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
Corporate profits <sup>7</sup>	2.8	18.1	-2		3.6	3.7	3.9	4.0	5.9	5.8	6.3	3.9	2.7	3.8	5.5	3.7
Profit share of GNP <sup>3</sup>	10.9	11.2	11.1		11.1	11.0	11.0	11.0	11.1	11.1	11.2	11.2	11.1	11.0	11.2	11.1
Gross national saving rate <sup>3</sup>	17.2	17.7	16.7		17.0	17.0	16.8	16.8	16.7	16.7	16.6	16.6	16.7	16.8	16.6	16.2
Net national saving rate <sup>3</sup>	2.0	2.6	1.6		2.0	2.0	1.8	1.8	1.7	1.6	1.5	1.4	1.6	1.8	1.4	.8

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.

## Greensheets

## 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
<i>Employment and production</i>										
Nonfarm payroll employment <sup>1</sup>	174	179	192	250	226	195	182	194	181	160
Unemployment rate <sup>2</sup>	8.7	7.8	7.0	5.7	5.0	4.7	4.1	3.6	3.3	3.3
<i>Previous Tealbook<sup>2</sup></i>	8.7	7.8	7.0	5.7	5.0	4.7	4.1	3.5	3.1	3.1
Natural rate of unemployment <sup>2</sup>	5.9	5.6	5.4	5.1	4.9	4.8	4.7	4.7	4.7	4.7
<i>Previous Tealbook<sup>2</sup></i>	5.9	5.6	5.4	5.1	4.9	4.8	4.7	4.7	4.7	4.7
Employment-to-Population Ratio <sup>2</sup>	58.5	58.7	58.5	59.3	59.4	59.8	60.1	60.4	60.7	60.7
Employment-to-Population Trend <sup>2</sup>	60.7	60.3	60.2	60.1	59.9	59.8	59.7	59.5	59.4	59.2
Output gap <sup>3</sup>	-3.7	-3.7	-2.5	-9	-1	.3	1.4	2.4	3.1	3.2
<i>Previous Tealbook<sup>3</sup></i>	-3.7	-3.7	-2.5	-9	-1	.3	1.4	2.7	3.5	3.6
Industrial production <sup>4</sup>	3.2	2.2	2.3	3.4	-3.3	-5	3.0	3.7	1.4	1.3
<i>Previous Tealbook<sup>4</sup></i>	2.8	2.3	2.2	3.4	-2.7	-1	3.5	3.8	1.5	1.5
Manufacturing industr. prod. <sup>4</sup>	2.8	1.4	1.1	1.4	-1.6	-1	1.9	2.6	1.7	1.3
<i>Previous Tealbook<sup>4</sup></i>	2.5	1.7	.9	1.5	-6	.3	2.2	3.1	1.9	1.3
Capacity utilization rate - mfg. <sup>2</sup>	74.5	74.7	75.1	76.3	75.4	74.4	75.2	76.2	76.7	77.1
<i>Previous Tealbook<sup>2</sup></i>	74.4	74.6	74.7	75.9	75.4	75.1	76.3	77.5	78.1	78.3
Housing starts <sup>5</sup>	.6	.8	.9	1.0	1.1	1.2	1.2	1.3	1.3	1.4
Light motor vehicle sales <sup>5</sup>	12.7	14.4	15.5	16.5	17.4	17.5	17.1	17.2	17.0	16.7
<i>Income and saving</i>										
Nominal GDP <sup>4</sup>	3.6	3.2	4.3	4.3	3.1	3.4	4.5	4.7	4.7	4.2
Real disposable pers. income <sup>4</sup>	1.7	5.1	-2.8	4.9	3.2	.2	1.8	2.6	2.7	2.2
<i>Previous Tealbook<sup>4</sup></i>	1.7	5.1	-2.8	4.9	3.2	.2	1.8	3.4	2.7	2.1
Personal saving rate <sup>2</sup>	5.8	9.2	4.7	5.9	6.1	3.6	2.6	3.1	3.1	3.0
<i>Previous Tealbook<sup>2</sup></i>	5.8	9.2	4.7	5.9	6.1	3.6	2.6	3.5	3.5	3.2
Corporate profits <sup>6</sup>	6.8	.6	4.7	7.4	-11.1	8.7	2.7	3.8	5.5	3.7
Profit share of GNP <sup>2</sup>	12.3	12.0	12.0	12.4	10.7	11.3	11.1	11.0	11.2	11.1
Gross national saving rate <sup>2</sup>	16.1	18.0	18.2	19.5	19.0	17.2	16.7	16.8	16.6	16.2
Net national saving rate <sup>2</sup>	.8	2.9	3.1	4.7	4.1	2.1	1.6	1.8	1.4	.8

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			2018	
							Q3	Q4	Q1	Q2	
<b>Unified federal budget<sup>1</sup></b>											
Receipts	3,250	3,268	3,316	3,310	3,435	3,611	807	770	727	1,038	
Outlays	3,688	3,853	3,982	4,093	4,460	4,774	950	994	1,102	1,029	
Surplus/deficit	-438	-585	-665	-783	-1,025	-1,164	-143	-225	-375	10	
<i>Percent of GDP</i>											
Surplus/deficit	-2.4	-3.2	-3.5	-3.9	-4.9	-5.3	-2.9	-4.6	-7.5	.2	
<i>Previous Tealbook</i>	-2.4	-3.2	-3.5	-4.0	-4.8	-4.9	-2.9	-4.6	-7.8	.0	
Primary surplus/deficit	-1.2	-1.9	-2.1	-2.3	-3.0	-2.9	-2.0	-2.9	-5.9	2.1	
Net interest	1.2	1.3	1.4	1.6	1.9	2.4	.9	1.7	1.6	1.9	
Cyclically adjusted surplus/deficit	-1.9	-2.8	-3.3	-4.2	-5.7	-6.4	-3.0	-4.8	-7.7	-2	
Federal debt held by public	72.9	76.7	76.5	78.0	79.5	81.9	75.2	75.0	77.2	76.8	
<b>Government in the NIPA<sup>2</sup></b>											
Purchases	1.6	.4	.7	1.2	2.2	1.9	.7	3.0	-1.2	1.2	
Consumption	1.9	.6	.4	.8	1.6	1.4	1.6	1.3	-.8	.6	
Investment	.4	-.5	2.4	2.8	4.4	3.7	-1.5	10.6	-2.9	3.7	
State and local construction	.0	-2.3	-1.9	1.0	1.0	1.0	-4.2	20.6	-1.5	2.2	
Real disposable personal income	3.2	.2	1.8	2.6	2.7	2.2	.7	1.1	4.3	1.7	
Contribution from transfers <sup>3</sup>	.7	.3	.2	.5	.9	.7	.3	-.1	.7	1.3	
Contribution from taxes <sup>3</sup>	-1.4	.2	-1.1	-.1	-.7	-.7	-1.5	-1.2	1.6	-.4	
<b>Government employment</b>											
Federal	3	3	-1	0	2	1	-1	-3	-2	-1	
State and local	10	14	3	6	9	9	5	1	0	6	
<b>Fiscal indicators<sup>2</sup></b>											
Fiscal effect (FE) <sup>4</sup>							Average net change in monthly payrolls, thousands				
Discretionary policy actions (FI)							Percentage point contribution to change in real GDP, annual rate				
<i>Previous Tealbook</i>	.4	.4	-.1	.4	.9	.7	-.1	.1	-.4	.6	
Federal purchases	.4	.1	.2	.6	.8	.5	.2	.6	.1	.6	
State and local purchases	.1	.0	.1	.1	.3	.2	.1	.2	-.2	.5	
Taxes and transfers	.2	.1	.1	.1	.1	.1	.0	.3	.0	.1	
Cyclical	.1	.1	.0	.4	.4	.2	.1	.1	.3	.4	
Other	-.2	.0	-.2	-.2	-.2	.0	-.3	-.2	-.1	-.1	
	.2	.2	-.3	.0	.4	.3	-.1	-.4	-.5	.1	

1. Annual values stated on a fiscal year basis. Quarterly values not seasonally adjusted.

2. Annual values refer to the change from fourth quarter of previous year to fourth quarter of year indicated.

3. Percentage point contribution to change in real disposable personal income, annual basis.

4. The FE measure captures the total contribution of the government sector to the growth of 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).

# Foreign Real GDP and Consumer Prices: Selected Countries

(Quarterly percent changes at an annual rate)

Measure and country	2017				2018				Projected			
	2017				2018				Projected			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
<b>Real GDP<sup>1</sup></b>												
Total foreign	3.2	3.1	2.5	2.7	2.9	2.9	2.9	2.9	2.9	2.8	2.9	2.5
<i>Previous Tealbook</i>	3.2	3.1	2.5	2.7	3.0	3.0	2.9	2.9	2.9	2.8	2.9	2.6
Advanced foreign economies	3.0	3.3	2.1	2.0	1.9	2.1	2.0	2.0	1.9	1.9	2.1	1.3
Canada	4.0	4.4	1.5	1.7	2.0	2.3	2.1	2.1	2.1	2.1	2.0	2.0
Japan	1.9	2.4	2.4	1.6	1.2	1.1	1.0	1.0	.9	.9	3.3	-3.6
United Kingdom	1.3	1.0	1.9	1.6	1.3	1.7	1.7	1.6	1.6	1.6	1.6	1.6
Euro area	2.6	2.9	2.8	2.7	1.9	2.2	2.2	2.1	2.0	1.9	1.8	1.7
Germany	3.6	2.6	3.0	2.5	1.9	2.0	1.9	1.7	1.6	1.5	1.4	1.4
Emerging market economies	3.5	2.9	2.8	3.4	3.9	3.7	3.7	3.7	3.8	3.8	3.8	3.8
Asia	5.4	5.1	5.7	4.5	5.4	5.0	4.9	4.9	4.8	4.7	4.7	4.7
Korea	4.0	2.6	5.7	-8	4.0	3.3	3.5	3.5	3.2	3.2	3.1	3.1
China	6.9	7.0	6.6	6.4	7.1	6.8	6.3	6.3	6.3	6.2	6.2	6.1
Latin America	2.3	1.1	.0	2.5	2.4	2.6	2.6	2.7	3.0	2.9	2.9	2.9
Mexico	2.5	1.0	-7	3.2	2.7	2.8	2.8	2.8	2.9	2.9	3.0	3.0
Brazil	5.3	2.3	1.0	.2	2.3	2.5	2.5	2.5	3.0	3.0	3.0	3.0
<b>Consumer prices<sup>2</sup></b>												
Total foreign	3.0	2.0	2.3	3.0	2.6	2.6	2.6	2.5	2.4	2.4	2.4	2.8
<i>Previous Tealbook</i>	2.9	2.0	2.3	3.0	2.6	2.6	2.6	2.5	2.5	2.5	2.4	2.8
Advanced foreign economies	2.2	.4	1.2	2.1	2.6	1.9	1.6	1.5	1.6	1.6	1.6	2.6
Canada	2.6	.2	1.4	3.0	3.6	2.6	2.2	2.1	2.1	2.0	2.0	2.0
Japan	-3	.1	.7	1.9	2.5	.7	.7	.8	.9	1.0	1.1	6.4
United Kingdom	3.7	3.0	2.4	3.0	2.5	2.3	2.3	2.2	2.2	2.2	2.3	2.2
Euro area	2.7	.2	1.1	1.7	2.1	1.9	1.4	1.4	1.4	1.4	1.5	1.6
Germany	2.2	.3	1.7	2.3	1.2	2.1	1.7	1.8	1.9	2.0	2.1	2.2
Emerging market economies	3.5	3.1	3.1	3.7	2.7	3.1	3.3	3.2	3.1	3.0	3.0	2.9
Asia	1.2	1.6	2.1	3.0	1.8	2.5	2.8	2.8	2.8	2.7	2.7	2.7
Korea	2.6	.7	2.2	.5	1.6	2.7	3.3	3.3	3.2	3.1	3.1	3.1
China	.0	2.1	2.2	2.9	1.5	2.2	2.6	2.5	2.5	2.5	2.5	2.5
Latin America	9.2	6.8	5.5	5.4	4.7	4.5	4.5	4.1	3.8	3.7	3.6	3.4
Mexico	9.3	6.7	5.4	5.0	4.1	4.0	3.9	3.4	3.4	3.4	3.2	3.2
Brazil	3.2	2.3	2.3	3.6	3.1	3.4	4.3	4.3	4.3	4.3	4.3	4.3

<sup>1</sup> Foreign GDP aggregates calculated using shares of U.S. exports.

<sup>2</sup> Foreign CPI aggregates calculated using shares of U.S. non-oil imports.

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

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

<sup>1</sup> Foreign GDP aggregates calculated using shares of U.S. exports.

<sup>2</sup> Foreign CPI aggregates calculated using shares of U.S. non-oil imports.

## Greensheets

## U.S. Current Account

## Quarterly Data

	2017				2018				Projected-----2019			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	Billions of dollars, s.a.a.r.											
<b>U.S. current account balance</b>	<b>-451.5</b>	<b>-495.0</b>	<b>-405.9</b>	<b>-512.6</b>	<b>-565.1</b>	<b>-548.3</b>	<b>-564.4</b>	<b>-583.7</b>	<b>-639.2</b>	<b>-641.8</b>	<b>-670.5</b>	<b>-696.5</b>
<i>Previous Tealbook</i>	<i>-453.1</i>	<i>-496.5</i>	<i>-405.9</i>	<i>-509.0</i>	<i>-574.0</i>	<i>-538.9</i>	<i>-553.9</i>	<i>-584.0</i>	<i>-648.0</i>	<i>-654.8</i>	<i>-681.6</i>	<i>-707.9</i>
Current account as percent of GDP	-2.4	-2.6	-2.1	-2.6	-2.8	-2.7	-2.8	-2.8	-3.1	-3.0	-3.1	-3.2
<i>Previous Tealbook</i>	<i>-2.4</i>	<i>-2.6</i>	<i>-2.1</i>	<i>-2.6</i>	<i>-2.9</i>	<i>-2.7</i>	<i>-2.7</i>	<i>-2.8</i>	<i>-3.1</i>	<i>-3.1</i>	<i>-3.2</i>	<i>-3.3</i>
Net goods & services	-551.4	-565.8	-541.1	-615.5	-672.2	-661.8	-649.6	-640.8	-649.8	-629.1	-627.9	-636.6
Investment income, net	215.2	217.8	248.9	243.7	247.4	242.8	220.7	188.6	150.9	116.6	92.8	71.6
Direct, net	297.3	294.3	318.1	310.5	324.1	334.9	336.2	327.6	313.6	303.3	304.1	307.1
Portfolio, net	-82.1	-76.5	-69.2	-66.8	-76.7	-92.1	-115.5	-139.0	-162.7	-186.8	-211.3	-235.5
Other income and transfers, net	-115.3	-147.0	-113.8	-140.8	-140.3	-129.3	-135.4	-131.4	-140.3	-129.3	-135.4	-131.4

## Annual Data

	Projected-----									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	Billions of dollars									
<b>U.S. current account balance</b>	<b>-444.6</b>	<b>-426.2</b>	<b>-349.5</b>	<b>-373.0</b>	<b>-434.6</b>	<b>-451.7</b>	<b>-466.2</b>	<b>-565.4</b>	<b>-662.0</b>	<b>-787.6</b>
<i>Previous Tealbook</i>	<i>-444.6</i>	<i>-426.2</i>	<i>-349.5</i>	<i>-373.0</i>	<i>-434.6</i>	<i>-451.7</i>	<i>-466.1</i>	<i>-562.7</i>	<i>-673.1</i>	<i>-803.2</i>
Current account as percent of GDP	-2.9	-2.6	-2.1	-2.1	-2.4	-2.4	-2.4	-2.8	-3.1	-3.5
<i>Previous Tealbook</i>	<i>-2.9</i>	<i>-2.6</i>	<i>-2.1</i>	<i>-2.1</i>	<i>-2.4</i>	<i>-2.4</i>	<i>-2.4</i>	<i>-2.8</i>	<i>-3.2</i>	<i>-3.6</i>
Net goods & services	-548.6	-536.8	-461.9	-489.5	-500.4	-504.8	-568.4	-656.1	-635.8	-670.4
Investment income, net	219.2	216.1	215.4	221.3	192.7	186.8	231.4	224.9	108.0	16.9
Direct, net	288.7	285.5	283.3	276.7	266.5	258.8	305.1	330.7	307.0	309.9
Portfolio, net	-69.5	-69.4	-67.9	-55.4	-73.8	-72.0	-73.7	-105.8	-199.1	-293.0
Other income and transfers, net	-115.1	-105.5	-103.1	-104.8	-126.9	-133.7	-129.2	-134.1	-134.1	-134.1

## Abbreviations

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AFE	advanced foreign economy
BEA	Bureau of Economic Analysis
BEAT	base erosion anti-abuse tax
BGCR	Broad General Collateral Rate
BOE	Bank of England
BOJ	Bank of Japan
BOM	Bank of Mexico
CD	certificate of deposit
CDS	credit default swap
C&I	commercial and industrial
CMBS	commercial mortgage-backed securities
CP	commercial paper
CPH	compensation per hour
CPI	consumer price index
CRE	commercial real estate
DSGE	dynamic stochastic general equilibrium
ECB	European Central Bank
ECI	employment cost index
EDO model	Estimated Dynamic Optimization-based model (a medium-scale New Keynesian DSGE model of the U.S. economy)
EITC	earned income tax credit
ELB	effective lower bound
EME	emerging market economy
EU	European Union
FICC	Fixed Income Clearing Corporation
FOMC	Federal Open Market Committee; also, the Committee
FPLT	flexible price-level targeting
FRA	forward rate agreements
FRB/US model	A large-scale macroeconometric model of the U.S. economy

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GCF	General Collateral Finance
GDP	gross domestic product
ICR	interest coverage ratio
LFPR	labor force participation rate
LIBOR	London interbank offered rate
M&A	mergers and acquisitions
MBS	mortgage-backed securities
Michigan survey	University of Michigan Surveys of Consumers
NAFTA	North American Free Trade Agreement
NFC	nonfinancial corporate
NIT	nominal income targeting
OIS	overnight index swap
OMMF	offshore money market fund
ON RRP	overnight reverse repurchase agreement
PCE	personal consumption expenditures
PMI	purchasing managers index
PPI	producer price index
QS	quantitative surveillance
repo	repurchase agreement
RRE	residential real estate
SEP	Summary of Economic Projections
SIGMA	A calibrated multicountry DSGE model
SLOOS	Senior Loan Officer Opinion Survey on Bank Lending Practices
SOFR	Secured Overnight Financing Rate
SOMA	System Open Market Account
S&P	Standard & Poor's
SPF	Survey of Professional Forecasters
TGCR	Tri-Party General Collateral Rate
TIPS	Treasury Inflation-Protected Securities
VIX	one-month-ahead option-implied volatility on the S&P 500 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.

Class I FOMC – Restricted Controlled (FR)

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# Report to the FOMC on Economic Conditions and Monetary Policy



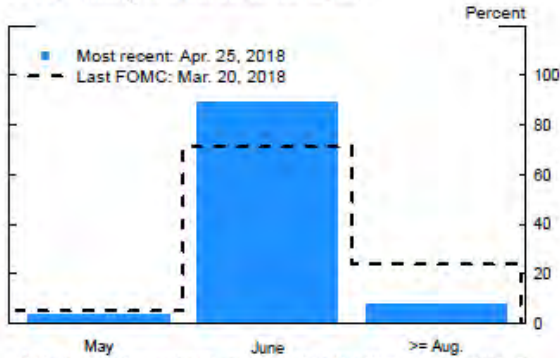
## Book B Monetary Policy Alternatives

April 26, 2018

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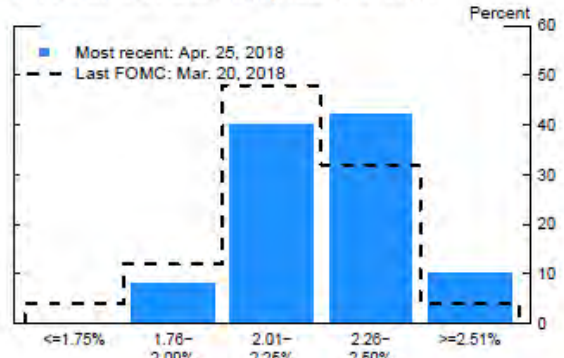
Prepared for the Federal Open Market Committee  
by the staff of the Board of Governors of the Federal Reserve System

Figure 1: Market-Implied Probability Distribution of the Timing of Next Rate Increase



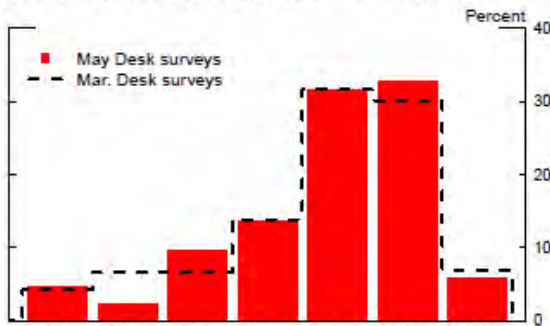
Note: Probabilities implied by a binomial tree fitted to settlement prices on federal funds futures contracts, assuming the next policy action is either no change or a 25 basis point increase in rates and no intermeeting moves. The effective federal funds rate until the next FOMC meeting is assumed to 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



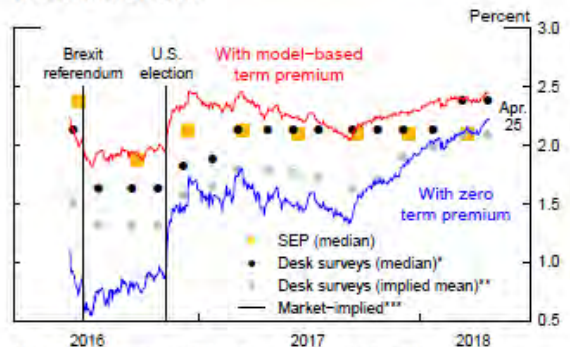
Note: Estimated from federal funds futures options for the average federal funds rate in January 2019 without adjusting for risk premiums.  
Source: CME Group; Federal Reserve Board staff estimates.

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



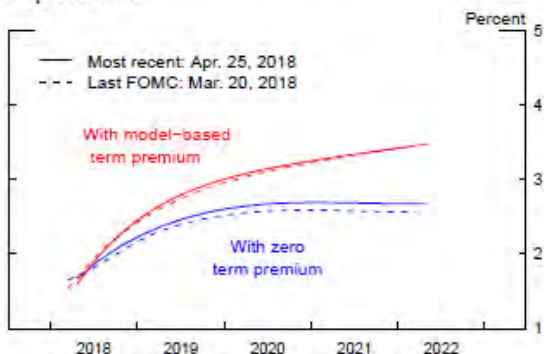
Note: Probabilities are averages of the probabilities assigned by respondents to different ranges of the federal funds rate at the end of 2018.  
Source: FRBNY.

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



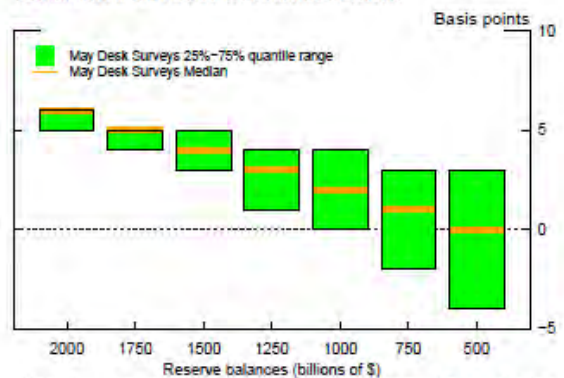
\* Median of the respondents' modal forecast for the federal funds rate.  
\*\* Estimated from respondents' year-end probability distributions.  
\*\*\* Zero term premium path is estimated using overnight index swap quotes with a spline approach and no term premium adjustment. Model-based term premium 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 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 premiums.  
Source: Bloomberg; Federal Reserve Board staff estimates.

Figure 6: Estimate of the IOER-EFFR Spread Conditional on Reserve Balance Levels



Note: Based on the combined responses from the Survey of Primary Dealers and Survey of Market Participants.  
Source: FRBNY.

## MBS Reinvestment Uncertainty

In the staff's baseline Tealbook projection, reinvestments of agency debt and agency MBS cease in August of this year as principal payments fall below the monthly redemption cap set by the FOMC. However, the actual path of prepayments is subject to considerable uncertainty, in part because the future paths of interest rates are highly uncertain. In this box, we illustrate how alternative interest rate paths affect our projections of MBS principal payments and thus the date at which the FOMC's cap on redemptions may cease to bind.<sup>1</sup>

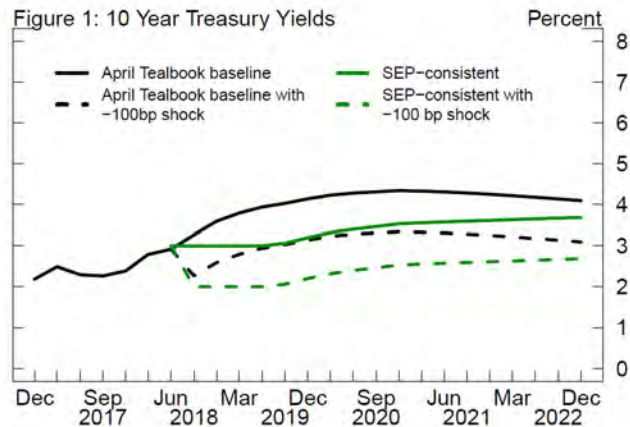


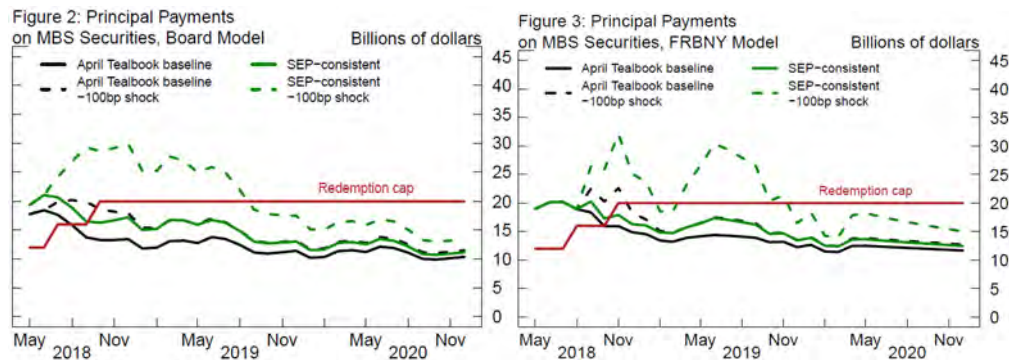
Figure 1 presents various projected paths for the 10-year Treasury yield, a key variable affecting mortgage rates and hence MBS prepayments. The April Tealbook baseline path and the March SEP-consistent path are represented by the solid black and green lines, respectively.<sup>2</sup> Relative to the Tealbook baseline, the SEP-consistent path is, on average, about 70 basis points lower through the end of 2022. The dashed black and green lines denote alternative paths for the 10-year Treasury yield that result from a permanent negative shock of 100 basis points, starting in 2018:Q3, applied to the interest rate paths in the original scenarios.<sup>3</sup> The corresponding paths for the primary

<sup>1</sup> Our projections abstract from prepayment model uncertainty—that is, the fact that models typically overestimate or underestimate realized prepayments even after conditioning on actual interest rate paths.

<sup>2</sup> We project SEP-consistent interest rate paths using the March 2018 Summary of Economic Projections and the staff's FRB/US model. To construct a baseline projection consistent with median SEP responses for the FRB/US model, the staff interpolated annual SEP information to a quarterly frequency subject to a restriction that values do not fall below their March 2018 levels. Beyond 2020 (the final year reported in the March 2018 SEP), the economy is assumed to transition to the longer-run values in a smooth and monotonic way. The 10-year Treasury yield is based on the SEP-consistent federal funds rate path using the expectations hypothesis. We also project an SEP-consistent path for nominal GDP as it is a necessary input for producing our model-based forecasts of prepayments.

<sup>3</sup> The set of interest rates to which the shock is applied includes the federal funds rate, the primary mortgage rate, and the 5-, 10-, and 30-year Treasury yields.

mortgage rate lie, on average, about 160 basis points above those for the 10- year Treasury yield.



Figures 2 and 3 illustrate the associated effects of the various interest rate paths on MBS principal payments using the Board and FRBNY prepayment models.<sup>4</sup> Both models show that lower interest rates induce higher principal payments from SOMA agency MBS holdings. This result reflects the fact that lower interest rates increase refinancing activity, triggering a faster pace of mortgage prepayments.

As shown by the solid black line in figure 2, using the Board model under the Tealbook baseline scenario, MBS principal payments are projected to fall below the redemption cap in August 2018. With interest rates 100 basis points lower than in the Tealbook baseline, principal payments are predicted to fall below the redemption cap two months later (the dashed black line). A similar response of prepayment activity is projected by the FRBNY's prepayment model under both the Tealbook baseline and shocked scenarios (the solid and dashed black lines in figure 3).

As the SEP-consistent interest rate path lies close to the shocked Tealbook path, MBS principal payments are similar in these two cases. In contrast, with the shocked SEP-consistent path, principal payments are notably higher and both the Board and FRBNY models predict that the redemption cap would bind for about one additional year. Under this scenario, the 10-year Treasury yield falls to 2 percent and then rises only gradually to 2½ percent over the projection period. Consequently, mortgage rates also fall appreciably below recent prevailing levels, thereby boosting refinancing activity.

All in all, the scenarios illustrate the considerable uncertainty around projections of MBS principal payments, which in turn reflects the inherent uncertainty in forecasts of longer-term interest rates.

<sup>4</sup> The Board prepayment model is a relatively simple framework using limited inputs. For a discussion of this model, see Brian Bonis, John Kandrak, and Luke Pardue, "Principal Payments on the Federal Reserve's Securities Holdings," FEDS Notes, June 16, 2017. Meanwhile, the FRBNY model includes additional drivers of prepayments but still results in prepayment forecast errors through time as a result of factors that are not considered by either model.

# Redemptions and Reinvestments of SOMA Principal Payments

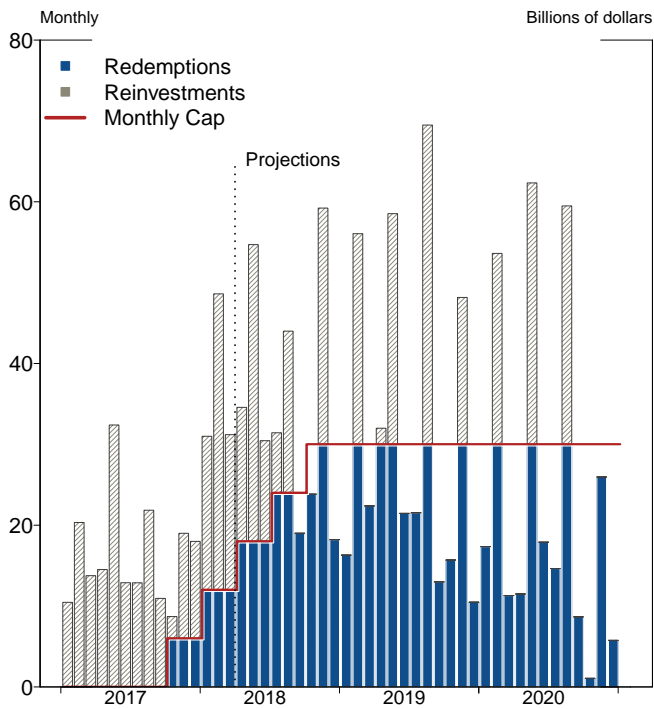
Projections for Treasury Securities  
(Billions of dollars)

	Redemptions		Reinvestments	
	Period	Since Oct. 2017	Period	Since Oct. 2017
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	195.7
2018: Q4	72.1	247.1	29.2	224.9
2018	229.1	247.1	197.2	224.9
2019	270.8	517.9	114.2	339.1
2020	204.1	722.0	85.4	424.6

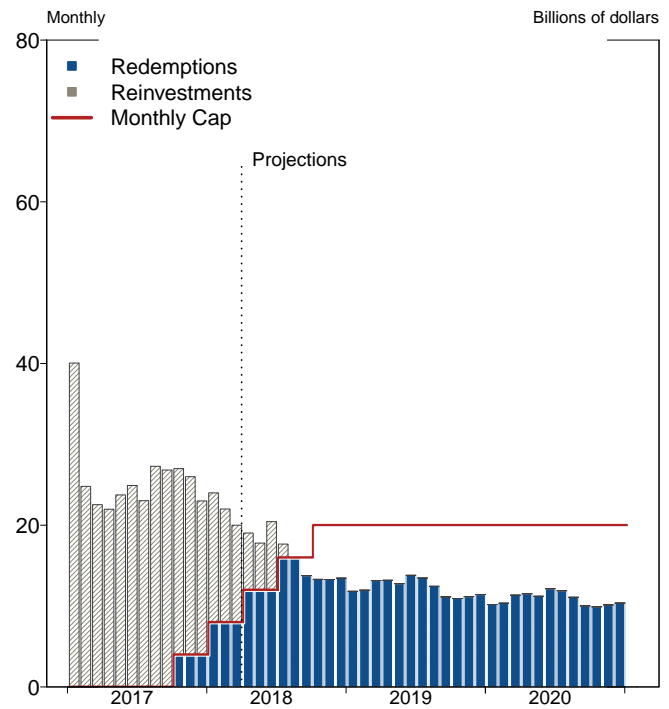
Projections for Agency Securities  
(Billions of dollars)

	Redemptions		Reinvestments	
	Period	Since Oct. 2017	Period	Since Oct. 2017
2018: Q1	24.0	36.0	40.7	101.8
2018: Q2	36.0	72.0	21.3	123.1
2018: Q3	45.6	117.6	1.7	124.8
2018: Q4	40.0	157.7	0.0	124.8
2018	145.7	157.7	63.7	124.8
2019	147.2	304.9	0.0	124.8
2020	130.2	435.1	0.0	124.8

**SOMA Treasury Securities  
Principal Payments**



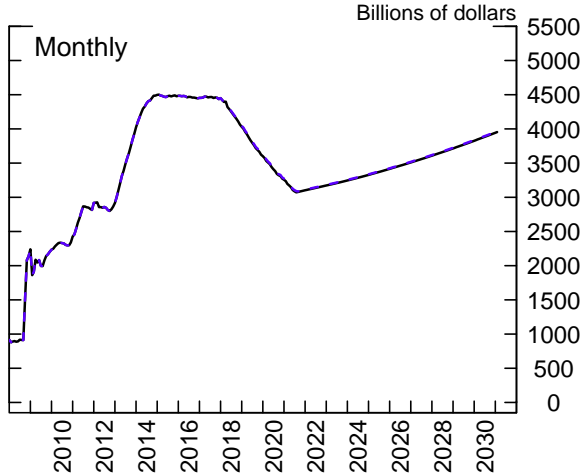
**SOMA Agency Debt and MBS  
Principal Payments**



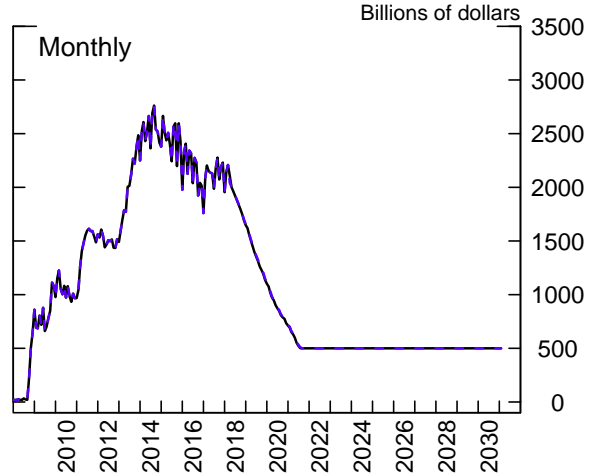
## Total Assets and Selected Balance Sheet Items

— April Tealbook baseline    - - - March Tealbook baseline

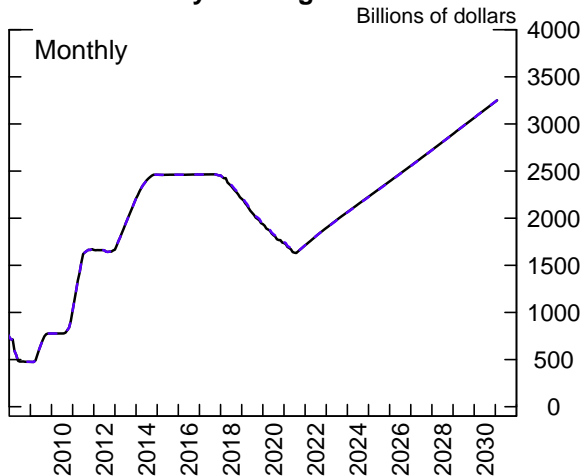
### Total Assets



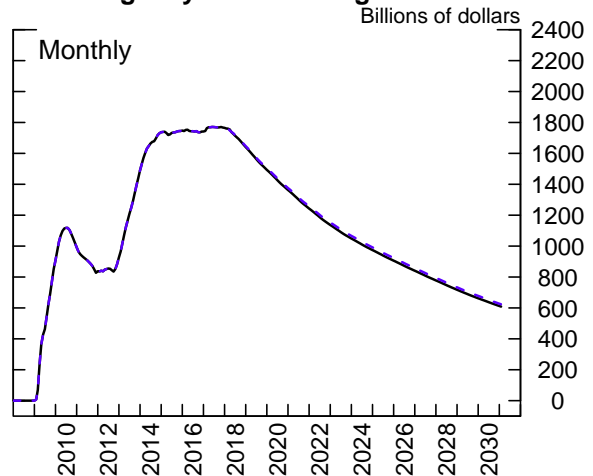
### Reserve Balances



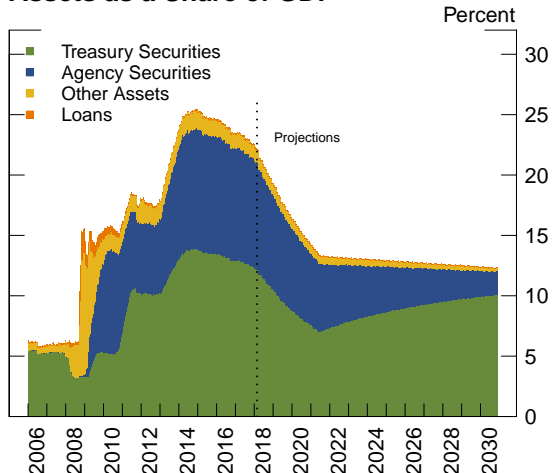
### SOMA Treasury Holdings



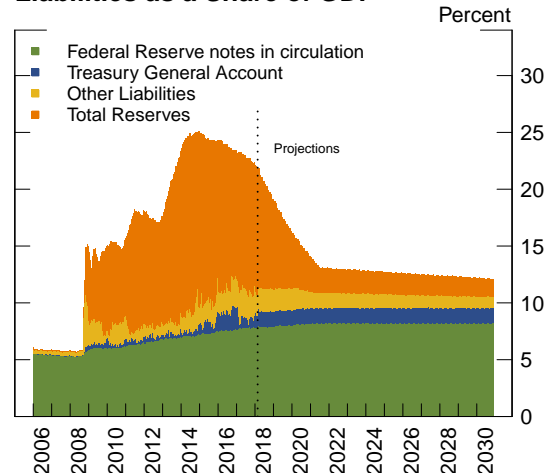
### SOMA Agency MBS Holdings



### Assets as a Share of GDP



### Liabilities as a Share of GDP



**Federal Reserve Balance Sheet**  
**End-of-Year Projections -- April Tealbook**  
 (Billions of dollars)

	Mar 31, 2018	2018	2020	2022	2024	2026	2030
Total assets	4,398	4,030	3,257	3,172	3,327	3,509	3,943
Selected assets							
Loans and other credit extensions*	7	0	0	0	0	0	0
Securities held outright	4,184	3,848	3,102	3,035	3,204	3,399	3,851
U.S. Treasury securities	2,425	2,205	1,736	1,896	2,228	2,556	3,236
Agency debt securities	4	2	2	2	2	2	2
Agency mortgage-backed securities	1,754	1,640	1,363	1,137	974	841	612
Unamortized premiums	154	141	111	91	76	63	43
Unamortized discounts	-14	-13	-10	-8	-7	-6	-4
Total other assets	67	54	54	54	54	54	54
Total liabilities	4,359	3,992	3,217	3,129	3,279	3,457	3,880
Selected liabilities							
Federal Reserve notes in circulation	1,589	1,654	1,864	1,992	2,122	2,275	2,639
Reverse repurchase agreements	261	330	255	230	230	230	230
Deposits with Federal Reserve Banks	2,490	2,003	1,093	902	923	948	1,007
Reserve balances held by depository institutions	2,107	1,647	712	500	500	500	500
U.S. Treasury, General Account	290	276	301	322	343	368	426
Other deposits	93	80	80	80	80	80	80
Earnings remittances due to the U.S. Treasury	2	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.

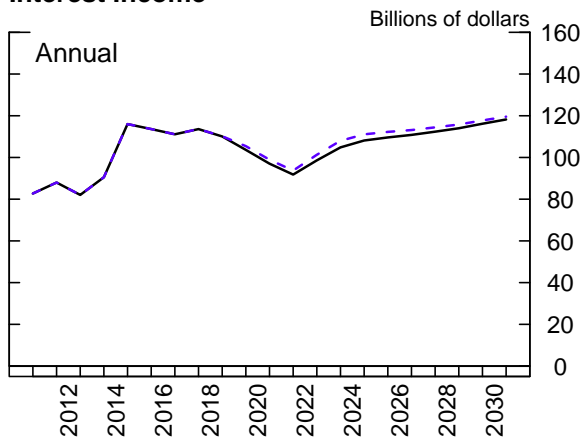
\*Loans and other credit extensions includes primary, secondary, and seasonal credit; central bank liquidity swaps; and net portfolio holdings of Maiden Lane LLC.

\*\*Total capital includes capital paid-in and capital surplus accounts.

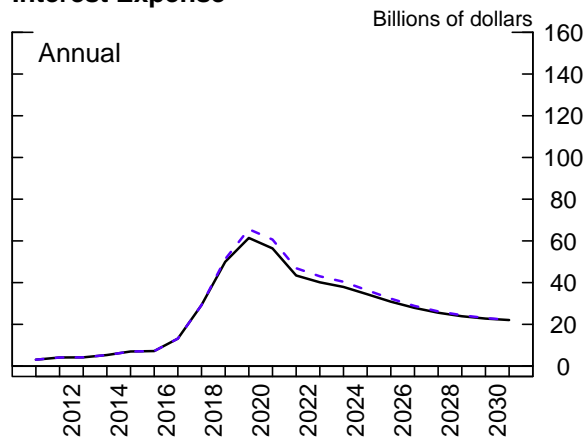
# Income Projections

— April Tealbook baseline    - - - March Tealbook baseline

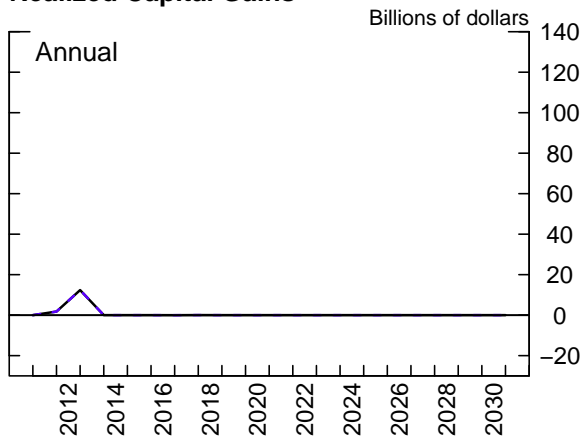
## Interest Income



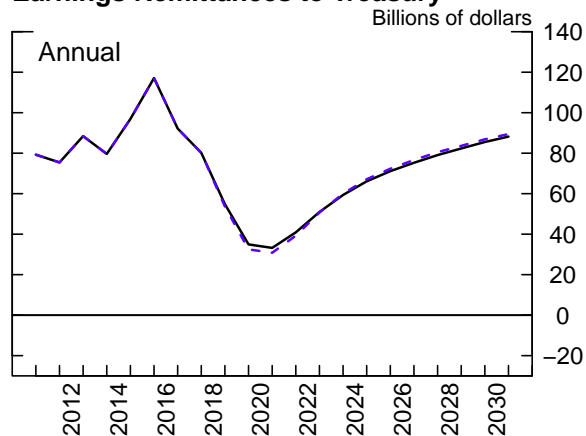
## Interest Expense



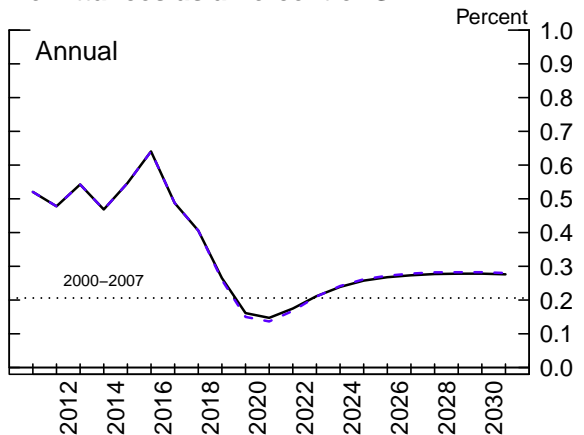
## Realized Capital Gains



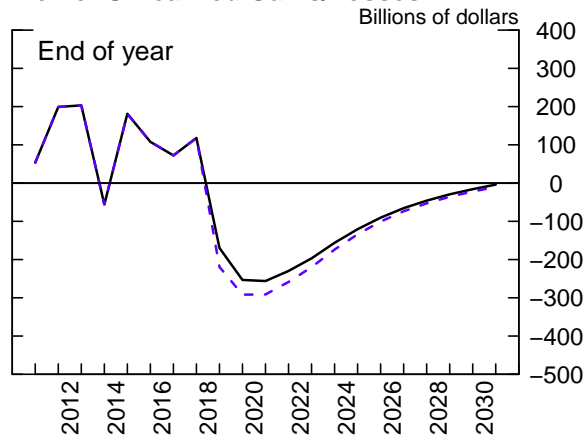
## Earnings Remittances to Treasury



## Remittances as a Percent of GDP



## Memo: Unrealized Gains/Losses



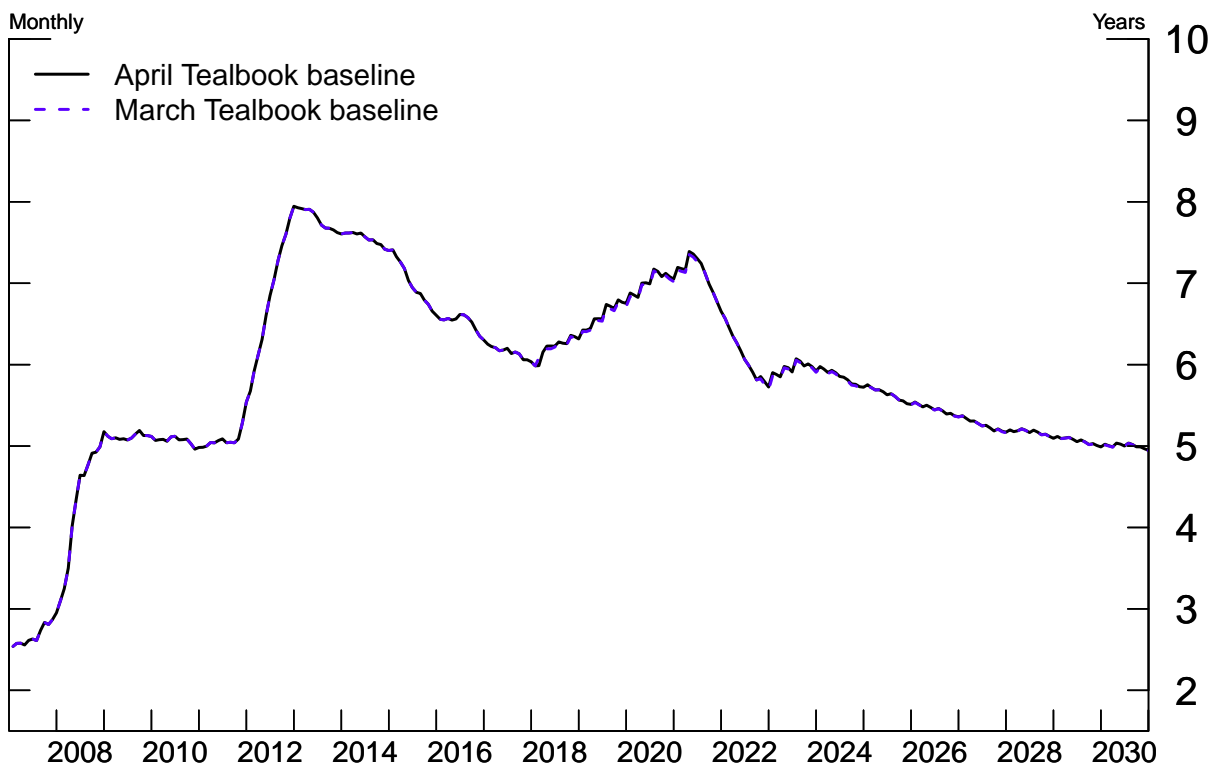
**Projections for the 10-Year Treasury Term Premium Effect \***  
(Basis Points)

Date	April Tealbook	March Tealbook
Quarterly Averages		
2018:Q2	-82	-83
Q3	-79	-80
Q4	-76	-77
2019:Q4	-66	-66
2020:Q4	-58	-58
2021:Q4	-52	-53
2022:Q4	-49	-49
2023:Q4	-46	-46
2024:Q4	-42	-43
2025:Q4	-39	-40
2026:Q4	-37	-37
2027:Q4	-35	-35
2028:Q4	-33	-33
2029:Q4	-31	-31
2030:Q4	-29	-29

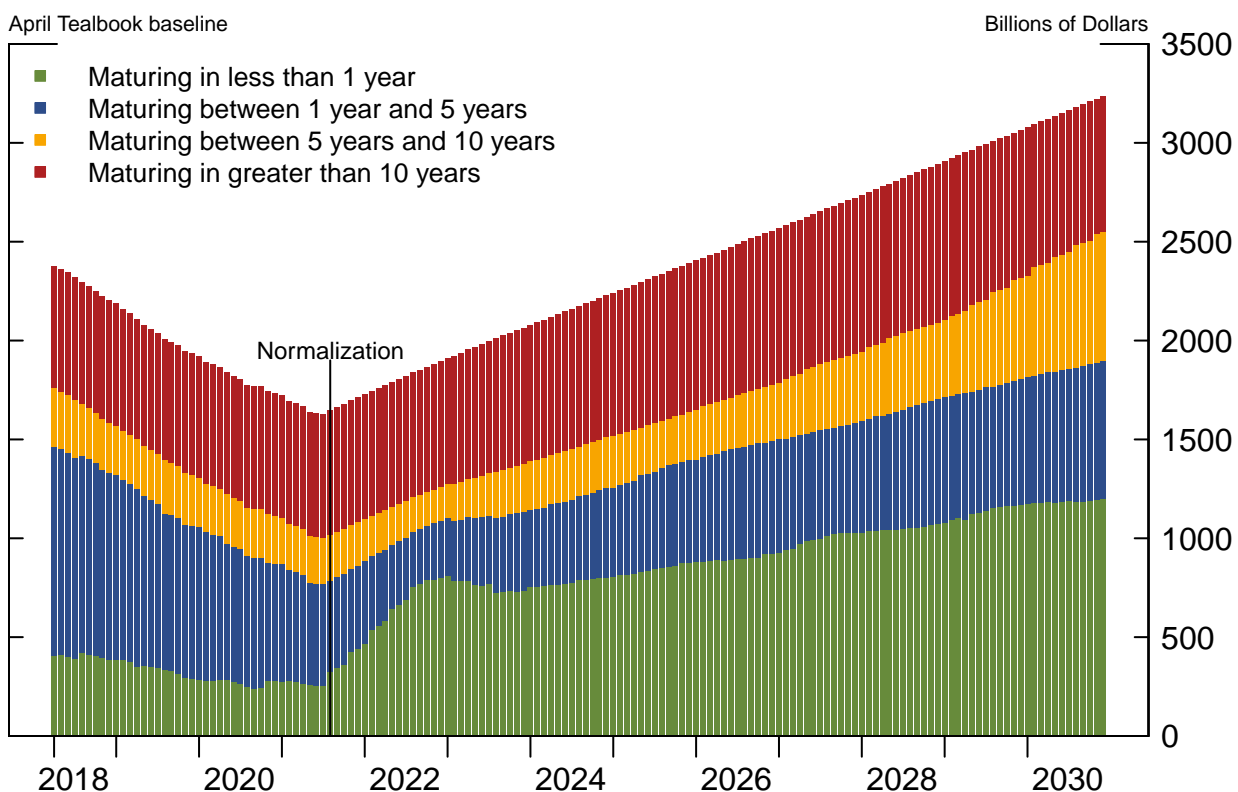
\* The figures show the estimated effects on the 10-year Treasury term premium resulting from the Federal Reserve's large-scale asset purchases.

# Projections for the Characteristics of SOMA Treasury Securities Holdings

## SOMA Weighted-Average Treasury Duration



## Maturity Composition of SOMA Treasury Portfolio



## Abbreviations

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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