

Prefatory Note

The attached document represents the most complete and accurate version available based on original files from the FOMC Secretariat at the Board of Governors of the Federal Reserve System.

Please note that some material may have been redacted from this document if that material was received on a confidential basis. Redacted material is indicated by occasional gaps in the text or by gray boxes around non-text content. All redacted passages are exempt from disclosure under applicable provisions of the Freedom of Information Act.

Class II FOMC – Restricted (FR)

Report to the FOMC on Economic Conditions and Monetary Policy



Book A

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

September 14, 2018

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

Authorized for Public Release

(This page is intentionally blank.)

Domestic Economic Developments and Outlook

The economy has continued to expand at a brisk pace. Real GDP is estimated to have increased 3½ percent at an annual rate in the first half of the year and is expected to rise at a 2¾ percent rate in the second half. GDP grows at a modestly faster pace in 2018 than we had written down in the July Tealbook, with slightly higher contributions from PCE and business investment. Labor market conditions have continued to strengthen: Payroll employment has continued to increase substantially, and the unemployment rate was 3.9 percent in July and August, unchanged from the second quarter and nearly ¾ percentage point below our estimate of its natural rate. With above-trend output growth, the unemployment rate is expected to move down to 3.7 percent by year-end.

Real GDP growth is projected to slow steadily from 3 percent this year to 1½ percent in 2021. A gradual tightening in monetary policy explains the bulk of the slowdown in GDP growth, but the emergence of some modest supply constraints and a reduction in fiscal impetus in 2021 also contribute. We now estimate the output gap to have been 1¾ percent in the second quarter of this year; with output expected to outpace its potential through mid-2020, the output gap increases steadily and reaches 3¼ percent in mid-2020 before edging down to 2¾ percent by the end of 2021, the same as in the July Tealbook. We project that the unemployment rate will fall to 3¼ percent in 2020 and then edge up to nearly 3½ percent by the end of the medium term. The unemployment rate at the end of 2021 is ¼ percentage point lower than we forecast in July, partly because we nudged down our estimate of the natural rate of unemployment by 0.1 percentage point, to 4.6 percent.

The 12-month change in core PCE prices is estimated to have been 1.9 percent in August, and it is expected to remain near that level through the end of this year. Core PCE price inflation is forecast to edge up to 2.1 percent by 2020—as labor and product markets tighten further—and then remain there in 2021. Total PCE price inflation is projected to run a little above core inflation through the end of this year and then to run a touch below it thereafter, reflecting the declining path for consumer energy prices in the medium term. As before, these projections incorporate our assumption that modest supply constraints will result in slightly higher inflation than would otherwise be the case. The forecast for the path of consumer prices is little different than in the July Tealbook.

Comparing the Staff Projection with Other Forecasts

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

Comparison of Tealbook and Outside Forecasts

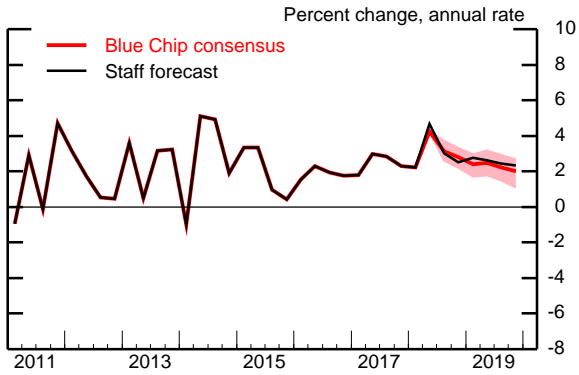
	2018	2019
GDP (Q4/Q4 percent change)		
September Tealbook	3.1	2.5
Blue Chip (09/10/18)	3.1	2.3
SPF median (08/10/18)	3.0	2.6
Unemployment rate (Q4 level)		
September Tealbook	3.7	3.3
Blue Chip (09/10/18)	3.7	3.5
SPF median (08/10/18)	3.7	n.a.
CPI inflation (Q4/Q4 percent change)		
September Tealbook	2.5	2.2
Blue Chip (09/10/18)	2.4	2.2
SPF median (08/10/18)	2.4	2.3
PCE price inflation (Q4/Q4 percent change)		
September Tealbook	2.0	1.9
SPF median (08/10/18)	2.1	2.1
Core PCE price inflation (Q4/Q4 percent change)		
September Tealbook	1.9	2.0
SPF median (08/10/18)	2.0	2.1

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

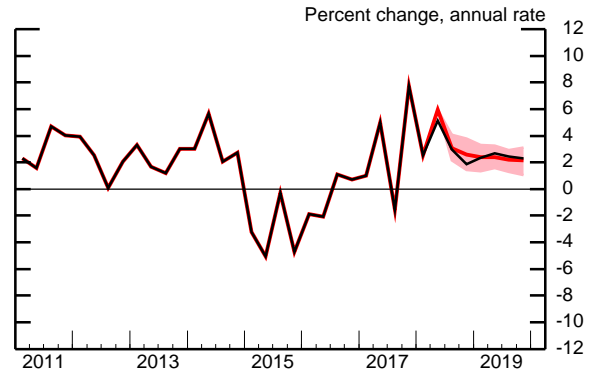
Source: Blue Chip Economic Indicators; Federal Reserve Bank of Philadelphia.

Tealbook Forecast Compared with Blue Chip

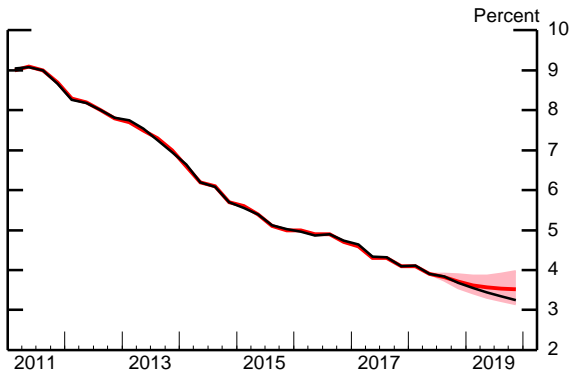
Real GDP



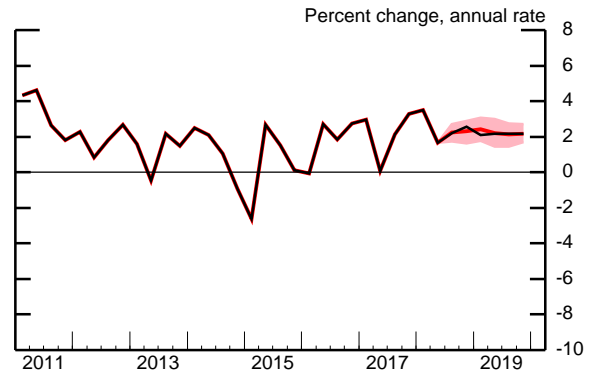
Industrial Production



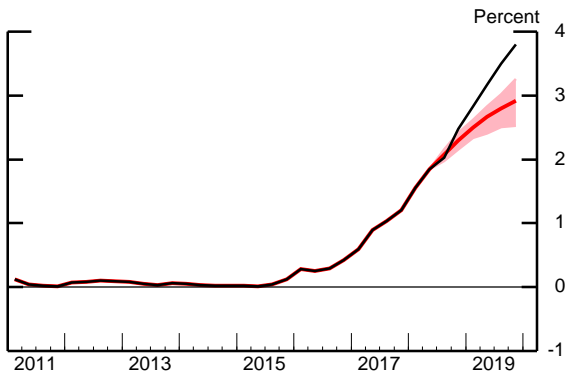
Unemployment Rate



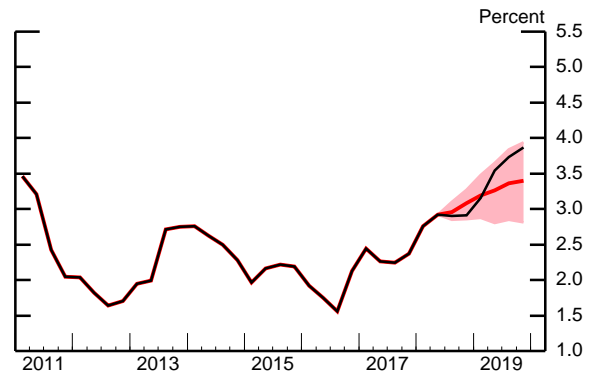
Consumer Price Index



Treasury Bill Rate



10-Year Treasury Yield



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

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

Revisions to the Staff Projection since the Previous SEP

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

Incoming data for real GDP growth have been a bit stronger than we expected in the June Tealbook, although the unemployment rate has come in a touch higher. Our projection for real GDP over the medium term has been revised up slightly, reflecting somewhat more favorable trajectories for both overall financial conditions (primarily, higher equity prices) and personal income. The medium-term forecast for the unemployment rate is revised down a little, partly reflecting our updated assumption that the natural rate of unemployment is 4.6 percent—0.1 percentage point lower than in the June forecast. All told, resource utilization, as measured by the output gap or the unemployment rate gap, is slightly tighter in our medium-term projection than in the June Tealbook.

Our forecasts for both total and core inflation in 2018 and over the medium term are little changed relative to the June Tealbook. We continue to expect core inflation to be close to 2 percent over the next several years; total inflation is forecast to run a bit below core inflation after this year, reflecting a small projected decline in energy prices.

The path for the federal funds rate derived from the inertial version of the Taylor (1999) rule used in our baseline forecast is quite similar to its trajectory in June, although it is a bit steeper in the medium term with the slightly tighter resource utilization in the current projection.

Staff Economic Projections Compared with the June Tealbook

Variable	2018		2018	2019	2020	2021	Longer run
	H1	H2					
Real GDP ¹	3.4	2.8	3.1	2.5	1.9	1.5	1.7
June Tealbook	2.8	2.7	2.8	2.4	1.8	1.5	1.7
Unemployment rate ²	3.9	3.7	3.7	3.3	3.2	3.4	4.6
June Tealbook	3.8	3.6	3.6	3.4	3.4	3.6	4.7
PCE inflation ¹	2.2	1.8	2.0	1.9	2.0	2.0	2.0
June Tealbook	2.3	1.8	2.1	1.9	2.0	2.0	2.0
Core PCE inflation ¹	2.1	1.6	1.9	2.0	2.1	2.1	n.a.
June Tealbook	2.1	1.7	1.9	2.0	2.1	2.1	n.a.
Federal funds rate ²	1.74	2.35	2.35	3.71	4.63	5.00	2.50
June Tealbook	1.74	2.52	2.52	3.78	4.54	4.79	2.50
Memo:							
Federal funds rate, end of period	1.88	2.38	2.38	3.73	4.64	5.00	2.50
June Tealbook	1.77	2.54	2.54	3.80	4.55	4.79	2.50
Output gap ^{2,3}	1.8	2.4	2.4	3.2	3.2	2.7	n.a.
June Tealbook	1.9	2.5	2.5	3.0	2.9	2.5	n.a.

1. Percent change from final quarter of preceding period to final quarter of period indicated.

2. Percent, final quarter of period indicated.

3. Percent difference between actual and potential. A negative number indicates that the economy is operating below potential.

n.a. Not available.

Finally, we estimate that the tariffs on steel, aluminum, and certain imports from China that were implemented this year, along with our trading partners' responses to those tariffs, will have only very small effects on net exports, overall spending, and aggregate consumer prices. Other tariff changes reportedly under review remain uncertain and are not included in our projection, but we estimate their effects would be more material. The possible effects of a broad-based increase in trade barriers are more consequential still and are discussed in the Risks and Uncertainty section.

KEY BACKGROUND FACTORS

Monetary Policy

- The inertial version of the Taylor (1999) rule that we use in our projection calls for the federal funds rate to increase $\frac{1}{2}$ percentage point over the remainder of this year, to increase $1\frac{1}{4}$ percentage points next year, and to rise, on average, $\frac{1}{2}$ percentage point per year in the remainder of the medium term, reaching 5 percent in the fourth quarter of 2021. This trajectory is very similar to the one in the July Tealbook.
- The size of the SOMA portfolio continues a gradual and predictable decline in a manner consistent with the Committee's public declarations.

Other Interest Rates

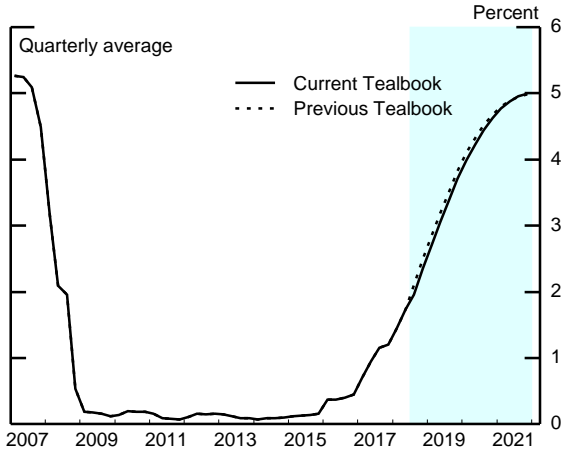
- The 10-year Treasury yield is projected to rise from an average of about 3 percent in the current quarter to $4\frac{1}{4}$ percent by the end of 2021, a path that is similar to the one in the July Tealbook.
 - The funds rate is anticipated to rise above the 10-year rate in mid-2020, the same as in the July Tealbook.
- The 30-year fixed mortgage rate and the triple-B corporate bond yield have risen about as expected and are projected to rise significantly further over the medium term, in line with the trajectory of the 10-year Treasury yield.

Equity Prices and Home Prices

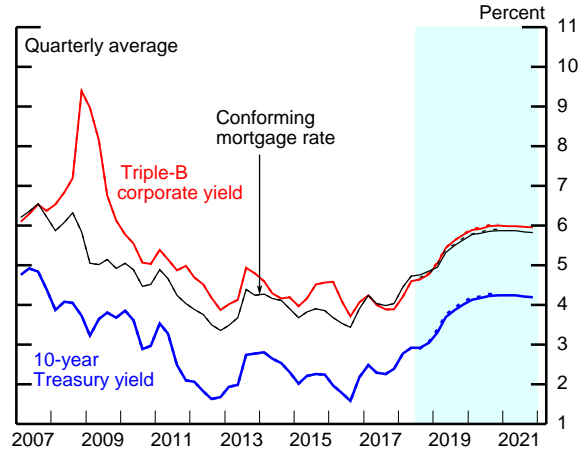
- Equity prices are projected to end the current quarter about $2\frac{1}{2}$ percent above the July Tealbook forecast, reflecting recent increases in broad equity price indexes. Beyond the current quarter, we forecast stock prices to rise at an

Key Background Factors underlying the Baseline Staff Projection

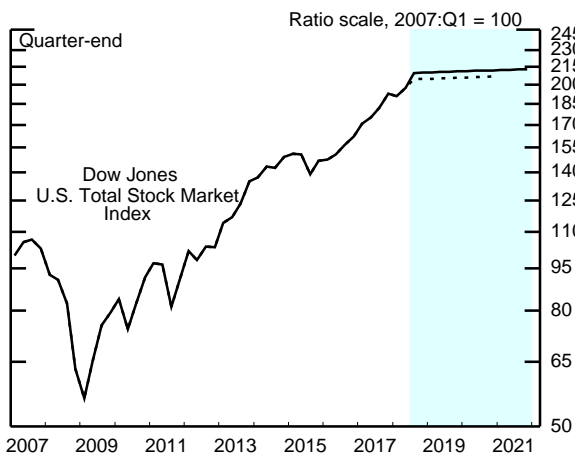
Federal Funds Rate



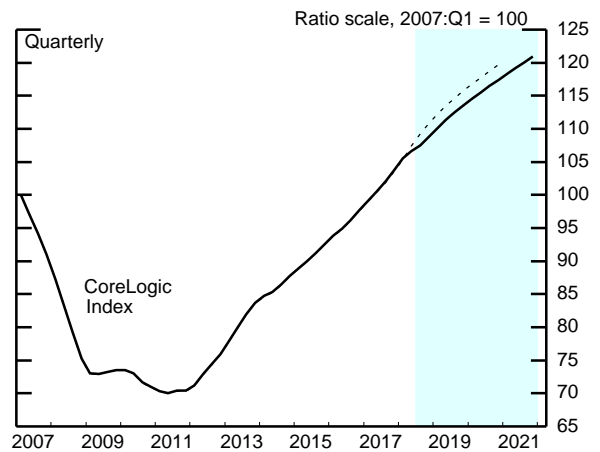
Long-Term Interest Rates



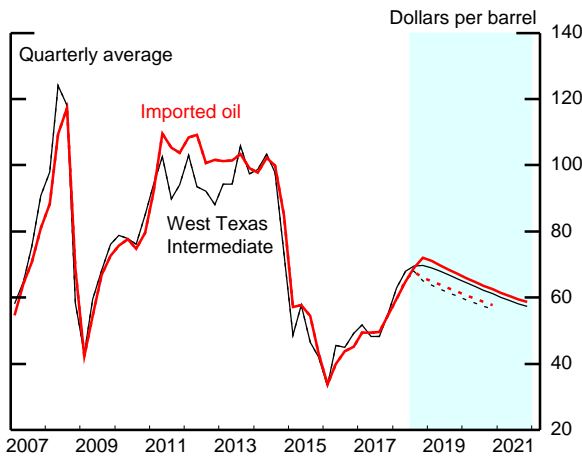
Equity Prices



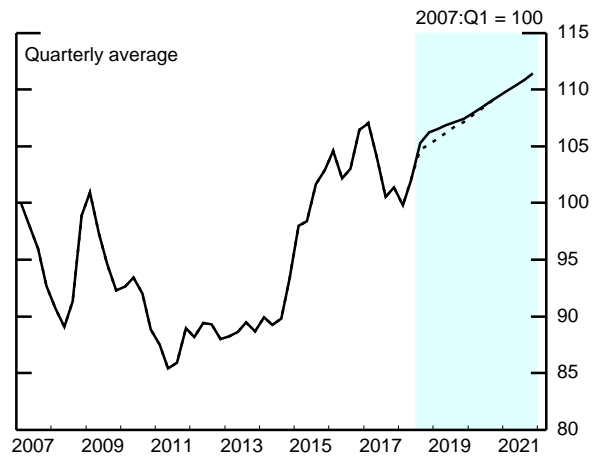
House Prices



Crude Oil Prices



Broad Real Dollar



average annual rate of around ½ percent, similar to our previous projection. Projected future appreciation is held down by the fact that equity valuations are already moderately stretched.

- We expect house price growth to slow from 6 percent in 2017 to 5 percent this year. Weaker-than-expected house price data for June and July caused us to mark down the increase we project this year. We continue to expect house price increases to moderate to an average pace of 3½ percent over the next three years, reflecting both the continuing rise in mortgage rates and our assessment that house prices are elevated relative to rents.

Fiscal Policy

- We assume that the expansionary fiscal policies enacted over the past year will continue through the medium term.¹ Taking these assumptions on board, we estimate that discretionary fiscal policy actions across all levels of government will contribute ½ percentage point to the rate of growth in aggregate demand in each year through 2020 (exclusive of any multiplier effects and financial offsets); this contribution eases to ¼ percentage point in 2021.
- We expect the federal budget deficit to widen from 3½ percent of GDP in fiscal year 2017 to 5½ percent in fiscal 2021 as a result of expansionary fiscal policy and the effects of higher interest rates on debt service costs.
 - We continue to assume that, in the longer run, policymakers gradually reduce deficits by an amount sufficient to stabilize the debt-to-GDP ratio.
 - We expect the debt-to-GDP ratio to stabilize at a level 20 percentage points higher than would have occurred absent recent and projected policy actions. We anticipate that the higher debt-to-GDP ratio will push up the longer-run term premium on 10-year Treasury securities by 50 basis points.

¹ Our forecast assumes that the current level of discretionary spending will be maintained in real terms in fiscal years 2020 and 2021; realization of that forecast will require lifting the discretionary spending caps for those years.

- Appropriations for fiscal 2019 have not yet been enacted, although there are reports of progress on a compromise agreement. The baseline projection continues to assume that there will be no meaningful disruption of government operations due to a shutdown.²

Foreign Economic Activity and the Dollar

- Real GDP growth in the foreign economies stepped down in the second quarter to an annual rate of 2 percent, as a broad-based slowing in the emerging market economies (EMEs) was only partly offset by a rebound in growth in some advanced foreign economies (AFEs). This estimate is noticeably lower than in the previous Tealbook. We foresee GDP growth abroad rising in the second half of this year to a little below its potential pace of around 2¾ percent and remaining there over the forecast period. The projection for the second half is somewhat weaker than in the previous Tealbook, reflecting softer data as well as increased financial stresses abroad (especially for some EMEs). Heightened financial pressures and recent trade policy developments have increased downside risks to our foreign outlook.
- Since the July Tealbook, the broad nominal dollar has appreciated 1¾ percent.³ We expect the broad real dollar to appreciate at an annual rate of 1¾ percent through the forecast period as market expectations for the federal funds rate move up toward the staff forecast. Because this rate of appreciation is slightly less than in the July Tealbook, our projection for the real dollar at the end of the forecast horizon is little changed.

Oil Prices

- The spot price of Brent crude oil has risen about \$7 per barrel, on net, since the July Tealbook, closing most recently around \$80 per barrel. The increase in prices is due partly to signals of greater foreign compliance with U.S.

² A lapse in appropriations that resulted in a short-term shutdown of the federal government would have only minor implications for the outlook. We estimate that each week of a government shutdown would directly reduce GDP growth in the current quarter by 0.1 percentage point (annual rate). Assuming government appropriations return to baseline levels in the next quarter, GDP growth would increase by the same magnitude.

³ Excluding the 96 percent devaluation of the bolivar announced last month by the Venezuelan government, the broad nominal dollar has appreciated only 1¾ percent.

sanctions on Iranian oil, set to come into effect in early November. In addition, oil prices moved higher in response to surprisingly large declines in U.S. oil inventories and a downward revision to the U.S. Department of Energy's forecast for U.S. oil production. Farther-dated futures prices are up about \$5 per barrel, with the futures price for delivery in December 2021 at \$69 per barrel.

THE OUTLOOK FOR REAL GDP AND AGGREGATE SUPPLY

Real GDP is now estimated to have increased at an annual rate of $4\frac{3}{4}$ percent in the second quarter. The strong showing reflected a rebound in consumer spending from an inexplicably weak first quarter as well as a temporary jump in agricultural exports and government expenditures. Smoothing through these movements, GDP growth rose at a brisk $3\frac{1}{2}$ percent pace in the first half. The incoming spending data have continued to be strong, on net, so far this quarter, and we project that real GDP in the second half will rise at a $2\frac{3}{4}$ percent pace, a little above our July Tealbook projection.⁴

- PCE rose at a $2\frac{1}{4}$ percent pace in the first half of the year, and we expect growth to step up in the second half. Combining the strong recent gains in retail sales and lackluster purchases of new vehicles, we see PCE goods spending rising at a solid pace in the third quarter. The latest data on household spending on services have also been quite strong. Although rising interest rates may have started to curb durables spending, the combination of the recent spending data and the solid fundamentals—rising income boosted by tax changes, wealth gains from rising equity prices and home values, and favorable sentiment—point to PCE growth of about $2\frac{3}{4}$ percent in the second half of this year.
- Business fixed investment rose at a 10 percent pace in the first half of 2018, which was in part due to an unusually swift pace of intangibles investment and a spike in drilling investment spurred by rising oil prices. We expect that growth in intangibles investment will moderate and that drilling investment will flatten out in the second half of this year, but that business fixed

⁴ The numerical forecast that accompanies this document was closed before the August retail sales report was available; that report was noticeably stronger than we had factored in and would boost our third-quarter GDP growth estimate by a little less than $\frac{1}{2}$ percentage point. Our forecast update next Friday will incorporate these data as well as our preliminary assessment of the economic effects of Hurricane Florence.

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

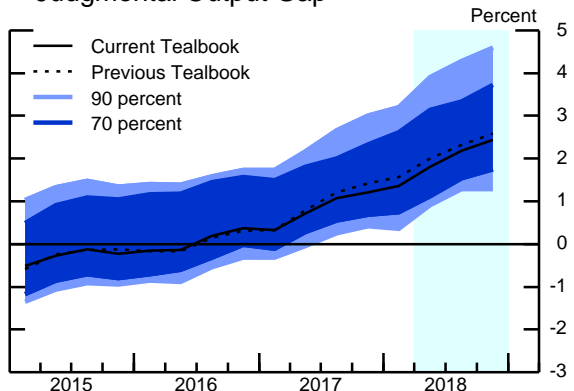
(Percent change at annual rate from final quarter of preceding period except as noted)

Measure	2016	2017	2018	2018 Q2	2018 Q3	2018 Q4
Output gap¹	.4	1.2	2.4	1.8	2.2	2.4
Previous Tealbook	.3	1.4	2.6	2.0	2.3	2.6
Real GDP	1.9	2.5	3.1	4.7	3.0	2.5
Previous Tealbook	1.8	2.6	2.9	4.8	2.5	2.5
Measurement error in GDP	-.3	.0	.2	1.2	-.2	-.2
Previous Tealbook	-.2	-.1	.1	1.4	-.5	-.3
Potential output	1.6	1.6	1.7	1.7	1.7	1.7
Previous Tealbook	1.6	1.5	1.7	1.7	1.7	1.7

Note: The output gap is the percent difference between actual and potential output; a negative number indicates that the economy is operating below potential. The change in the output gap is equal to real GDP growth less the contribution of measurement error less the growth rate of potential output. For quarterly figures, the growth rates are at an annual rate, and this calculation needs to be multiplied by 1/4 to obtain the quarterly change in the output gap.

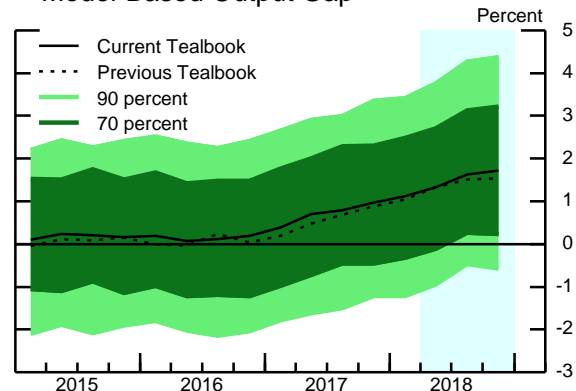
1. Percent, average for the final quarter in the period.

Judgmental Output Gap



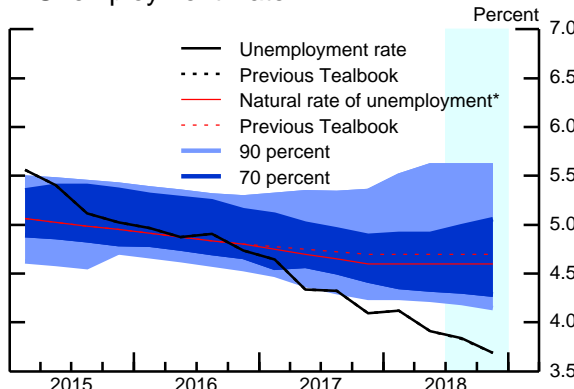
Note: Shaded regions show the distribution of historical revisions to the staff's estimates of the output gap.
Source: Various macroeconomic data; staff assumptions.

Model-Based Output Gap



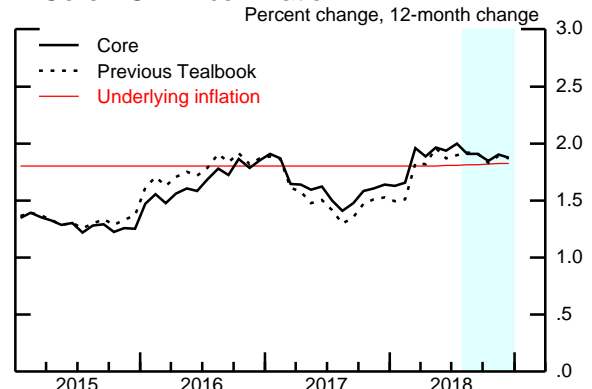
Note: Shaded regions denote model-computed uncertainty bands.
Source: Various macroeconomic data; staff assumptions.

Unemployment Rate



Note: Shaded regions show the distribution of historical revisions to the staff's estimates of the natural rate.
*Staff estimate including the effect of EEB.
Source: U.S. Department of Labor, Bureau of Labor Statistics; staff assumptions.

Core PCE Price Inflation



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

investment will rise at a still-solid pace of $5\frac{3}{4}$ percent. More broadly, business investment is being supported by solid business output growth, ample access to financing, continued upbeat readings on business sentiment, buoyant profit expectations, and the effects of the Tax Cuts and Jobs Act.

- Residential investment declined at an annual rate of $2\frac{1}{2}$ percent in the first half of this year, reflecting the drag from rising mortgage rates and supply constraints in the construction sector. Forward-looking indicators—including construction permits for single-family homes, pending home sales, and the Michigan survey index of homebuying conditions—have generally softened in recent months, on net, and we expect investment to continue to decline through the remainder of 2018.
- After making a sizable positive contribution to real GDP growth in the second quarter, net exports are expected to subtract about $\frac{1}{2}$ percentage point from growth in the second half of this year. The net export contribution in the second half is $\frac{1}{4}$ percentage point more negative relative to the July Tealbook, reflecting stronger-than-expected third-quarter imports, which do not appear to be in anticipation of prospective tariffs. Our projection for foreign trade in coming quarters includes the effects of the already implemented trade policy actions, including the aluminum and steel tariffs, tariffs on \$50 billion worth of imports from China, and reciprocal actions by our trading partners. Because the negative effects on export and import growth are offsetting, the trade policy measures are projected to have little effect on the overall contribution of net exports to real GDP growth.
- Manufacturing production picked up in July and August to a 3 percent annual rate after rising $2\frac{1}{4}$ percent at an annual rate in the first half of the year. Readings on new orders from manufacturing surveys remain upbeat. Although we estimate that light vehicle assemblies moved up, on net, in July and August, automakers' production schedules suggest production in the second half of the year will move sideways from the first half of the year at 10.8 million units. All told, manufacturing production is expected to pick up to a $2\frac{3}{4}$ percent pace in the second half.

For the medium term, we project that real GDP growth will slow roughly $\frac{1}{2}$ percentage point per year, from about 3 percent this year to $1\frac{1}{2}$ percent in 2021. The

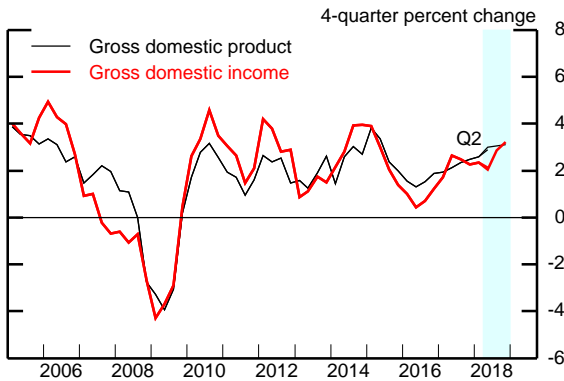
Summary of the Near-Term Outlook for GDP
(Percent change at annual rate except as noted)

Measure	2018:Q2		2018:Q3		2018:H2	
	Previous Tealbook	Current Tealbook	Previous Tealbook	Current Tealbook	Previous Tealbook	Current Tealbook
Real GDP	4.8	4.7	2.5	3.0	2.5	2.8
Private domestic final purchases	3.5	4.6	3.1	2.8	3.0	3.1
Personal consumption expenditures	3.4	4.2	2.7	2.9	2.7	2.8
Residential investment	-1.4	-1.8	-2.1	-2.1	-1.3	-1.2
Nonres. private fixed investment	6.0	8.9	7.3	3.7	6.3	5.8
Government purchases	3.2	2.4	.1	1.1	.9	1.4
<i>Contributions to change in real GDP</i>						
Inventory investment ¹	.0	-.9	.2	1.2	.1	.4
Net exports ¹	1.2	1.2	-.5	-.8	-.4	-.5

1. Percentage points.

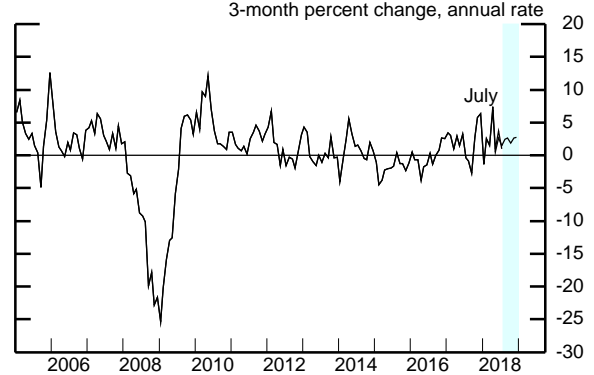
Recent Nonfinancial Developments (1)

Real GDP and GDI



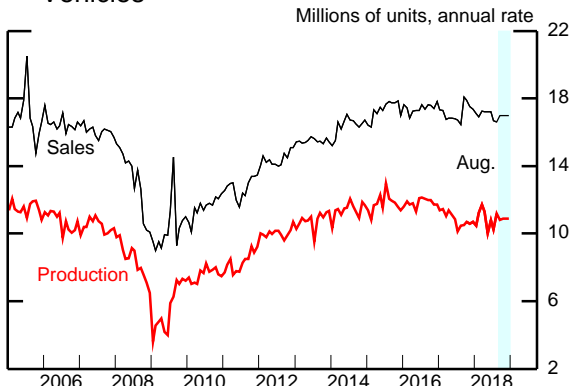
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

Manufacturing IP ex. Motor Vehicles and Parts



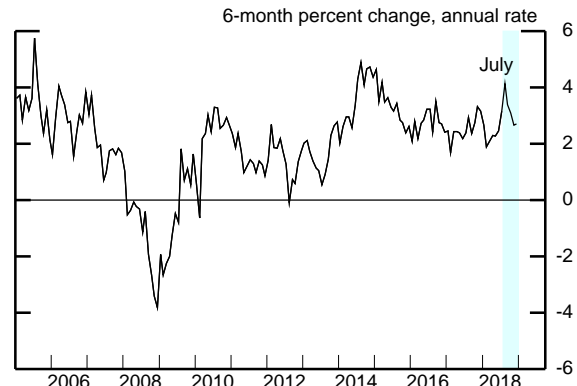
Source: Federal Reserve Board, G.17 Statistical Release, "Industrial Production and Capacity Utilization."

Sales and Production of Light Motor Vehicles



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

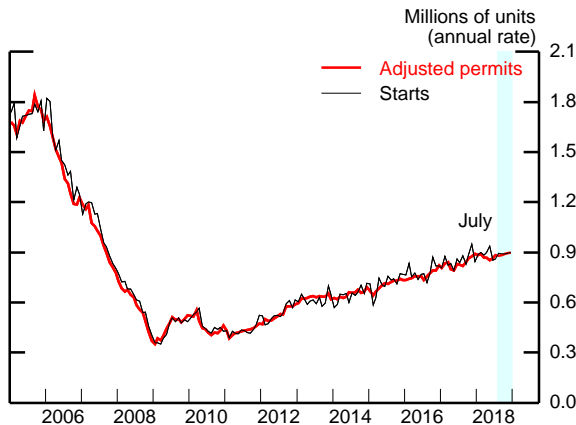
Real PCE Growth



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

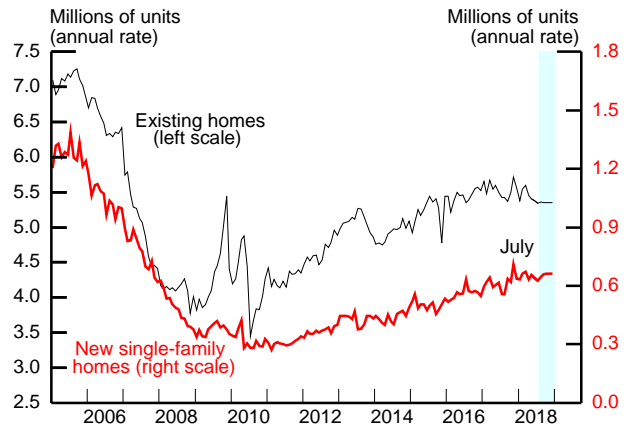
Recent Nonfinancial Developments (2)

Single-Family Housing Starts and Permits



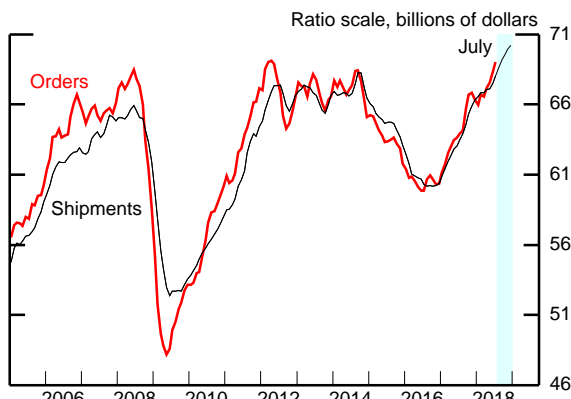
Note: Adjusted permits equal permit issuance plus starts outside of permit-issuing areas.
Source: U.S. Census Bureau.

Home Sales



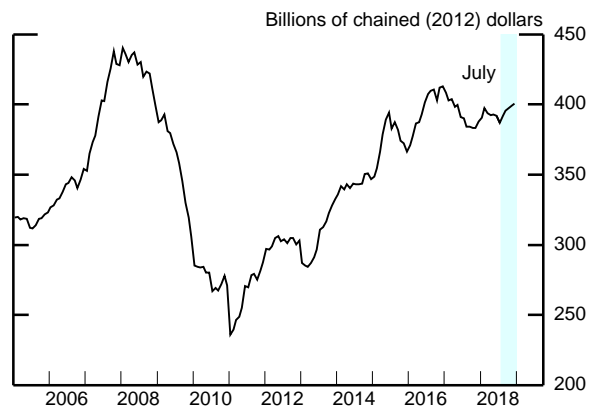
Source: For existing, National Association of Realtors; for new, U.S. Census Bureau.

Nondefense Capital Goods ex. Aircraft



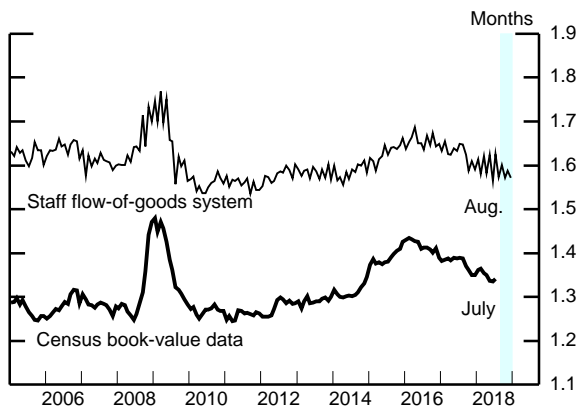
Note: Data are 3-month moving averages.
Source: U.S. Census Bureau.

Nonresidential Construction Put in Place



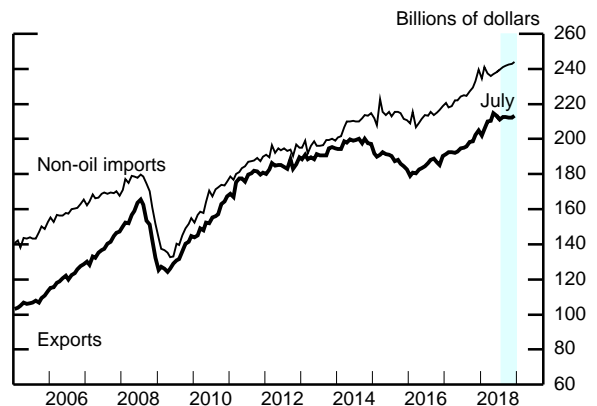
Note: Nominal CPIP deflated by BEA prices through 2018:Q1 and by the staff's estimated deflator thereafter.
Source: U.S. Census Bureau.

Inventory Ratios



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

Exports and Non-oil Imports



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

Federal Reserve System Nowcasts of 2018:Q3 Real GDP Growth
(Percent change at annual rate from previous quarter)

Federal Reserve Entity	Type of model	Nowcast as of Sept. 12, 2018
Federal Reserve Bank		
Boston	<ul style="list-style-type: none"> Mixed-frequency BVAR 	3.1
New York	<ul style="list-style-type: none"> Factor-augmented autoregressive model combination Factor-augmented autoregressive model combination, financial factors only Dynamic factor model 	3.4 1.9 2.2
Cleveland	<ul style="list-style-type: none"> Bayesian regressions with stochastic volatility Tracking model 	2.6 3.1
Atlanta	<ul style="list-style-type: none"> Tracking model combined with Bayesian vector autoregressions (VARs), dynamic factor models, and factor-augmented autoregressions (known as GDPNow) 	3.8
Chicago	<ul style="list-style-type: none"> Dynamic factor models Bayesian VARs 	3.2 2.9
St. Louis	<ul style="list-style-type: none"> Dynamic factor models News index model Let-the-data-decide regressions 	2.7 4.4 2.7
Kansas City	<ul style="list-style-type: none"> Accounting-based tracking estimate 	3.5
Board of Governors	<ul style="list-style-type: none"> Board staff's forecast (judgmental tracking model) Monthly dynamic factor models (DFM-45) Mixed-frequency dynamic factor model (DFM-BM) 	3.0 3.6 2.6
Memo: Median of Federal Reserve System nowcasts		3.1

gradual deceleration reflects the ongoing tightening of monetary policy, the emergence of some modest supply constraints, and waning fiscal impetus.

- Our forecast for real GDP is a little stronger than in the July Tealbook, primarily reflecting the effects of incoming data on business investment and a higher path for household income. Meanwhile, changes in financial market conditions and oil prices had little effect on the projection.
- In the comprehensive revision to the national accounts, the BEA revised up the level of disposable personal income substantially over history, with particularly large revisions in 2016 and 2017. We took some signal from the recent income revisions and nudged up our PCE forecast. Nevertheless, the revisions to income result in a markedly higher level of the saving rate over history that carries into the projection period.
- In the wake of the BEA’s comprehensive update to the national income and product accounts (NIPA), we re-evaluated our aggregate supply assumptions. Specifically, we lowered our natural rate estimate one-tenth to 4.6 percent, and we raised our estimate of the trend labor force participation rate by a little over 0.1 percentage point. Combined with some other housekeeping changes, these adjustments resulted in an output gap that was still sizable but $\frac{1}{4}$ percentage point smaller at midyear than we had previously shown.
 - Near the most recent two business cycle peaks, we had become too optimistic about our supply-side assumptions and later reversed some of that optimism. To take out some insurance against a repetition of that mistake, we have moved cautiously in this cycle in adjusting downward our assumption for the natural rate despite the low-inflation, low-unemployment environment. However, with the benefit of the comprehensive revision, we assessed that a small further adjustment was warranted.
 - At the same time, the participation rate has surprised us persistently on the upside over the past year, and the adjustment to the LFPR trend is an attempt to address this regularity.

- With the federal government expected to run historically large and rising deficits over the medium term, national saving is projected to trend downward as a share of GDP. Nevertheless, private investment trends upward as a share of the economy, with the widening gap between domestic investment and national saving financed by increased inflows of foreign capital.

THE OUTLOOK FOR THE LABOR MARKET

The July and August employment reports indicated that labor market conditions have continued to strengthen about as we had expected. The unemployment rate was 3.9 percent in both July and August, down 0.2 percentage point from the end of 2017, while the labor force participation rate (LFPR) averaged 62.8 percent during the past two months and has been little changed, on balance, over the past four years.

- According to the BLS, private nonfarm payrolls increased 204,000 in August and about 180,000 per month over the most recent three months—a slightly smaller three-month change than we had expected, owing to downward revisions to earlier months. In response, we nudged down our near-term projection for private nonfarm payroll gains 10,000 per month to an average of 180,000, still well above the pace we estimate to be required to maintain unchanged resource utilization.
- Data that we analyze from the payroll processing firm ADP (see the figure “Labor Market Developments and Outlook”) point to an average increase in private payrolls over the three months ending in August of about 260,000. A model-based estimate that combines the information from the BLS and ADP data currently shows the number of private jobs as having increased 220,000 per month over the past three months.
- We continue to project that the unemployment rate will move down further to 3.7 percent by the end of this year, a little less than 1 percentage point below our estimate of its natural rate.
- The LFPR fell to 62.7 percent in August, 0.1 percentage point below our previous forecast. Because the dip was concentrated in 16-to-24-year-olds’ LFPRs (which are especially volatile near the start of the school year), we are inclined to discount the August reading. Thus, we project the aggregate LFPR

will edge back up to 62.8 percent in September and remain at that level through the end of the year, unchanged from the July Tealbook. The LFPR is now $\frac{1}{4}$ percentage point above the trend estimated by the staff. The employment-to-population ratio averaged 60.4 percent over the past two months, in line with our July Tealbook forecast, and is $\frac{3}{4}$ percentage point above our estimate of its trend.

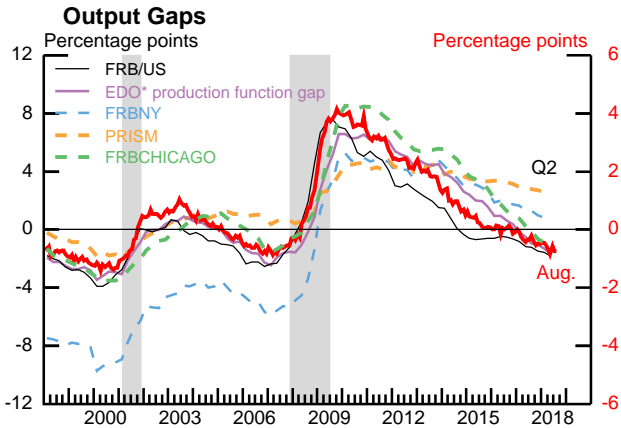
- The BLS Job Openings and Labor Turnover Survey for July also points to an extremely tight labor market—for example, the job openings rate for private-sector employment was reported to be 4.7 percent, a 0.3 percentage point increase from a year earlier and the highest rate recorded in the 18-year history of the series.

We continue to expect the labor market to tighten further over the medium term, consistent with above-trend GDP growth. We also continue to assume that, in an extremely tight labor market, a larger-than-usual amount of the tightening in resource utilization will manifest in a higher LFPR and a smaller-than-usual amount in a lower unemployment rate.

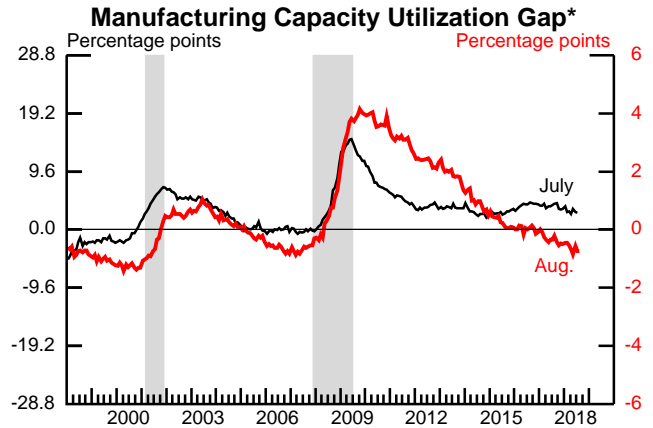
- Average monthly total payroll gains slow gradually in the projection, from about 180,000 in the second half of this year to about 90,000 in 2021. The box “Sources of Strong Employment Growth in the Staff Forecast” considers how the staff’s payroll forecast can be achieved given the current very tight labor market.
- The unemployment rate is projected to move down to 3.3 percent by the middle of next year and slip a touch further to 3.2 percent in 2020. We anticipate some softening in the labor market in 2021 and expect the unemployment rate to edge up to 3.4 percent by the end of that year—still $1\frac{1}{4}$ percentage points below its natural rate.
- The LFPR is expected to increase to 62.9 percent in 2019 and then decline gradually in 2020 and 2021. With the trend participation rate expected to continue to decline, we project that the LFPR gap will widen from 0.3 percentage point at the end of 2018 to 0.6 percentage point at the end of 2020 before narrowing to 0.5 percentage point by the end of 2021.

Alternative Measures of Slack

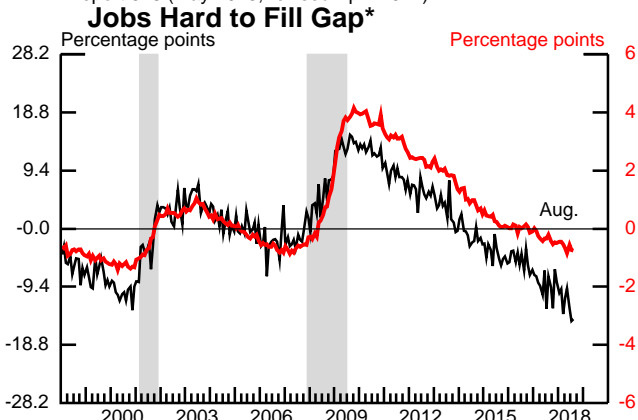
The red line in each panel is the staff's measure of the unemployment rate gap (right axis).



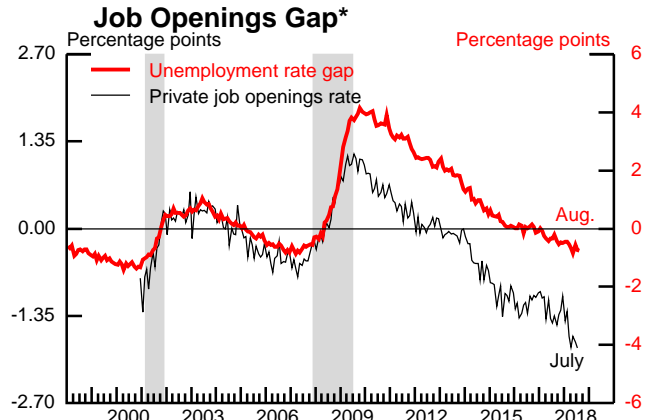
* EDO is Estimated, Dynamic, Optimization-based model.
 Source: Federal Reserve Board; PRISM: Federal Reserve Board Bank of Chicago; Federal Reserve Board Bank of Philadelphia, PRISM Model Documentation (June 2011); FRBNY: Federal Reserve Bank of New York Staff Report 618 (May 2013, revised April 2014).



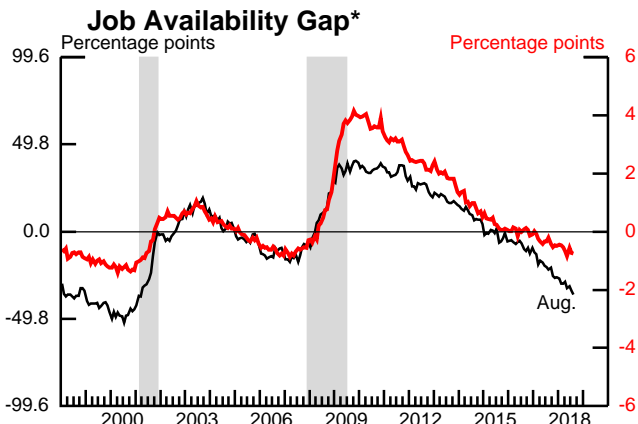
Source: Federal Reserve Board.



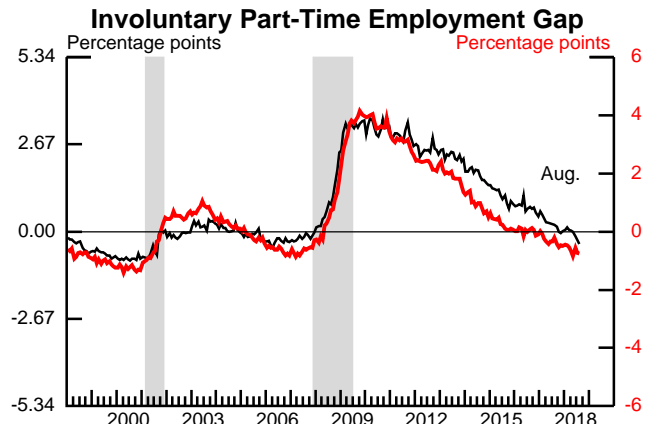
Note: Percent of small businesses surveyed with at least one "hard to fill" job opening. Seasonally adjusted by Federal Reserve Board Staff.
 Source: National Federation of Independent Business, Small Business Economic Trends Survey.



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



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



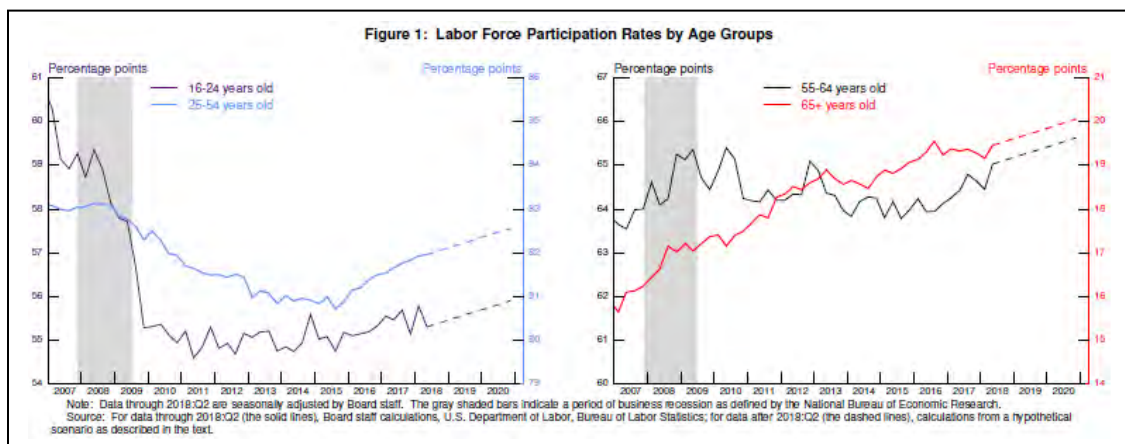
Note: Percent of employment.
 Source: U.S. Department of Labor, Bureau of Labor Statistics, Current Population Survey.

* Plots the negative of the gap to have the same sign as the unemployment rate gap.
 Note: The shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research. Output gaps are multiplied by negative 0.52 to facilitate comparison with the unemployment rate gap. Manufacturing capacity utilization gap is constructed by subtracting its average rate from 1972 to 2013. Other gaps were constructed by subtracting each series' average in 2004:Q4 and 2005:Q1.

Sources of Strong Employment Growth in the Staff Forecast

The staff projects that the labor market will tighten further through the end of 2020, with payroll employment rising by nearly 5 million from 2018:Q2 to 2020:Q4—about 2 million more than our estimate of its neutral pace (the pace of job gains needed to maintain labor utilization at its current level).¹ With the labor market already quite tight, how might the strong job growth in the staff forecast be achieved?

The staff expects that about half of these job gains will come from further increases in the labor force. In particular, the labor force participation rate (LFPR) is projected to be about flat, on net, through the end of 2020 even as the staff’s estimate of its trend declines almost 0.2 percentage point per year. The remainder of the above-trend job growth is manifest in a further 0.6 percentage point decline in the unemployment rate, to 3.2 percent by 2020:Q4. The important role played by the LFPR relative to the unemployment rate in the staff forecast contrasts with the typical pattern in which a greater portion of job gains are met by reductions in the unemployment rate and reflects the staff’s judgment that unusually abundant job openings and rising wages will draw new workers into the labor force and discourage others from leaving.



¹ The staff estimates that the neutral pace of payroll job gains through the medium term is roughly 95,000 per month. This estimate assumes that the unemployment rate remains at its 2018:Q2 value of 3.9 percent, that the LFPR declines in parallel with its trend (about 0.2 percentage point per year), and that the gains in employment as measured in the establishment survey exceed the gains in employment as measured in the household survey by about 15,000 per month (similar to the differential of the past few years and in the staff forecast through 2020).

How might these further increases in the labor force occur? Over the projection period, the staff estimates that population aging will continue to exert downward pressure on the LFPR. For the LFPR to remain about flat despite a larger share of the population moving into age groups with lower LFPRs, there must be offsetting increases in the LFPRs for some age groups. The staff does not explicitly forecast demographic-specific LFPRs, but it is useful to consider whether there is a reasonable combination of improvements in age-specific LFPRs that is consistent with the staff's projection for the aggregate LFPR. The dashed lines in figure 1 show one possible such combination of assumptions for the 16–24, 25–54, 55–64, and 65+ age groups, with the LFPR for each group increasing a little more than $\frac{1}{2}$ percentage point from 2018:Q2 to 2020:Q4—roughly a continuation of their increases since 2014.

Is this scenario reasonable? It leaves the LFPRs for the 16-to-24-year-old group and the 25-to-54-year-old group below pre-recession levels and the LFPRs for older individuals above pre-recession levels; for all of these groups, these outcomes are broadly consistent with multidecade trends before the recession. The secular decline in the LFPR for 16-to-24-year-olds before the recession reflected primarily a rise in school enrollment and a decline in labor force participation among students, while the decline for 25-to-54-year-olds partly reflected reduced demand for lower-skilled workers (due to, for example, globalization and automation) and rising disability rates.² A return to pre-recession levels for these groups seems unlikely because many of these factors have continued to exert some downward influence over the past decade and probably will continue to do so even in a tight labor market.³ Meanwhile, rising longevity and better health outcomes in the older age groups have helped push up their LFPRs for many decades before the recession, and some continuation of this trend seems likely.

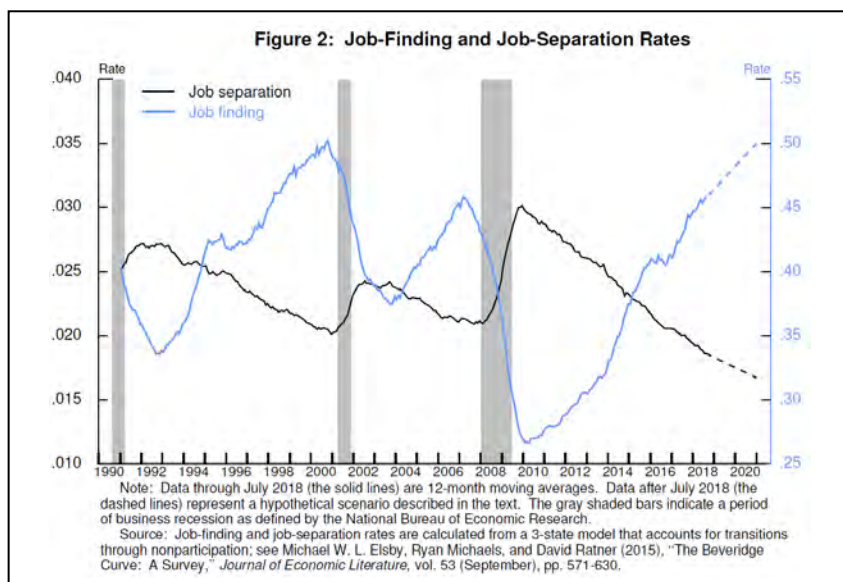
As for the unemployment rate, how might the labor market achieve an additional 0.6 percentage point decline, as in the staff forecast? The dashed lines in figure 2 show one possible combination of improvements to the job-finding rate out of unemployment and the job-separation rate into unemployment (modified to take into account flows into and out of the labor force; see the note in figure 2) that

² For the decline in labor force participation among 16-to-24-year-olds, see Teresa L. Morisi (2017), “Teen Labor Force Participation in the Great Recession and Beyond,” *Monthly Labor Review*, February, <https://doi.org/10.21916/mlr.2017.5>; for the decline among 25-to-54-year-olds, see Katharine G. Abraham and Melissa S. Kearney (2018), “Explaining the Decline in the U.S. Employment-to-Population Ratio: A Review of the Evidence,” NBER Working Paper Series 24333 (Cambridge, Mass.: National Bureau of Economic Research, February), <http://www.nber.org/papers/w24333>.

³ If, instead, all of the improvement in the aggregate LFPR were to come from an increase in the LFPR for the 25-to-54-year-old group, then the LFPR for this age group would have to rise another $\frac{1}{2}$ percentage point, putting it close to its pre-recession level.

together lead to a 3.2 percent unemployment rate in 2020:Q4. In this scenario, we assume that the recent pace of improvement in the job-finding and job-separation rates roughly continues through 2020.

Are these improvements in the job-finding and job-separation rates plausible? Because the job-finding rate is currently below the level seen during the late 1990s, it seems likely that at least some of the adjustment will come from the job-finding margin, as firms attempt to fill vacancies by relaxing job requirements and hiring standards, or offering training opportunities to less-qualified hires. Although the job-separation rate is already at a historical low, this low level may reflect structural as well cyclical factors.⁴ Moreover, in previous tight labor markets such as the late 1990s, falling separation rates contributed importantly to declines in unemployment. We conclude that these improvements in job-finding and job-separation rates are indeed plausible.



⁴ The declining labor force share of 16-to-24-year-olds (who have a higher-than-average job-separation rate) and the rising labor force share of college-educated workers (who have a lower-than-average job-separation rate) have exerted downward pressure on separation rates over the past few decades and will likely continue doing so.

- We project that labor productivity will increase a little more than 1 percent per year, on average, over the forecast period, a touch below our estimate of its structural pace. One possible constraint on productivity growth is the slow pace of business formation discussed in the box “Aggregate Implications of the Decline in Business Formation.”

THE OUTLOOK FOR INFLATION

With the CPI and PPI for August now in hand, we estimate that core PCE prices increased 1.9 percent over the 12 months ending in August, in line with our July Tealbook forecast and up substantially from 1.4 percent one year ago. We expect core inflation will remain around 1.9 percent through the end of the year. Total PCE prices are estimated to have increased 2.2 percent over the 12 months ending in August, boosted by increases in consumer energy prices in August and earlier in the year. We expect the 12-month change in total PCE prices to move down to 2.0 percent in September and to remain there through the end of the year.

- Our near-term projection for core price inflation is little revised. The PCE price data for July were a little higher than expected, but the CPI data for August were lower. However, we made some small upward adjustments in response to tariff policy developments and the latest annual announcement of Medicare payment rates for hospitals.⁵
- Core import prices increased at an average annual rate of 1½ percent in the first half of the year but are expected to reverse that increase over the second half as recent dollar appreciation and lower commodity prices reduce import prices.⁶ Thereafter, import price inflation is expected to turn positive again, averaging ¾ percent from 2019 to 2021, consistent with moderate foreign inflation and an only gradually appreciating dollar.

⁵ The Centers for Medicare and Medicaid Services have proposed a large increase in Medicare inpatient hospital payments for the fiscal year beginning in October that would result in a one-time increase in the level of prices and hence no lasting effect on the rate of inflation. With regard to import prices, U.S. tariffs have been implemented this year on a set of goods accounting for approximately \$100 billion in imports in 2017. Additional tariff increases are currently under consideration.

⁶ Although the effective prices paid by purchasers of imported goods will include the effects of tariffs, import price indexes are measured excluding tariffs. The contribution of the tariffs implemented so far this year to the rate of change in these effective prices over 2018:H2 is estimated to be at most 1 percentage point at an annual rate.

- Crude oil and retail gasoline prices have moved up somewhat faster than we projected in the July Tealbook, and we raised our PCE energy price forecast in the second half of the year in response. We anticipate consumer energy prices will rise 6.5 percent this year and then decline modestly over the next three years. With regard to food prices, the incoming data have been a bit weaker than expected. We partially offset the downward misses in light of announcements of selected packaged food and beverage price increases in response to increased tariffs on steel and aluminum; overall, these effects are modest, and our food price inflation forecast is little revised in the medium term.⁷
- Readings on longer-term inflation expectations have changed little since the July Tealbook and, on balance, suggest that expectations remain well anchored. In the preliminary September report from the University of Michigan Surveys of Consumers, the median of inflation expectations over the next 5 to 10 years was 2.4 percent, within the narrow range occupied in recent years.

We still project that core inflation will move up gradually to 2.1 percent in 2020 and 2021, reflecting the upward pressure on prices from elevated rates of resource utilization and an upward drift in trend inflation. Total PCE price inflation is projected to run slightly below core inflation after this year, reflecting the declining path for consumer energy prices in the medium term. As before, these projections are predicated on our assumption that modest supply constraints will give a slight boost to inflation over the next few years. Our medium-term outlook for total and core PCE price inflation is unchanged relative to the July Tealbook.

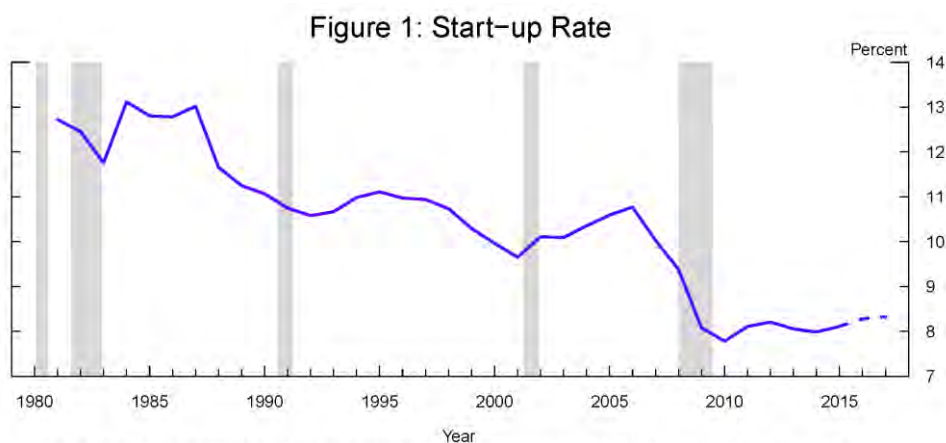
We continue to forecast that strong labor market conditions will bring about a further step-up in the growth of hourly compensation.

- Average hourly earnings of all employees increased 2.9 percent over the 12 months ending in August, above our July Tealbook expectations, and the highest 12-month increase since 2009.

⁷ Soda and beer producers, in particular, have announced price increases in response to the rising cost of aluminum cans attributed to higher tariffs on aluminum imports.

Aggregate Implications of the Decline in Business Formation

The start-up rate of new businesses (the share of firms less than one year old) fell from about 13 percent in the early 1980s to about 8 percent in 2015, according to the Business Dynamics Statistics (BDS) data shown in figure 1. In part, the decline appears to reflect a longer-run downward trend in business formations that can be partially attributed to demographic change.¹ Moreover, there was also a steep decline in start-ups during the financial crisis that has yet to be reversed: The start-up rate declined more than 25 percent from 2006 to 2010, resulting in a “missing generation” of firms.²



Note: Age zero firms as a share of all firms. Gray shaded bars indicate recession periods as defined by the National Bureau of Economic Research.
Source: Census Bureau Business Dynamics Statistics (1981–2015). Author's estimates for 2016 and 2017 are based on Bureau of Labor Statistics Business Employment Dynamics.

While start-ups in any given year account for only about 3 percent of aggregate employment, research suggests that changes in new business formation have had important consequences for employment, real GDP, and productivity growth over time.³ For example, state-level data from 1980 to 2013 indicate that a 1 percent increase in the start-up rate is associated with a contemporaneous increase in real GDP per capita of about 0.1 percent that persists over time. A 25 percent decline in start-ups would thus lead to a 2.5 percent decline in real GDP per capita.⁴ Similarly, metropolitan areas with larger declines in business formation during the recession had more gradual recoveries in employment, output, and wages from 2010 to 2014 (figure 2).⁵

¹ See Fatih Karahan, Benjamin Pugsley, and Aysegul Sahin (2018), “Demographic Origins of the Startup Deficit,” working paper, May.

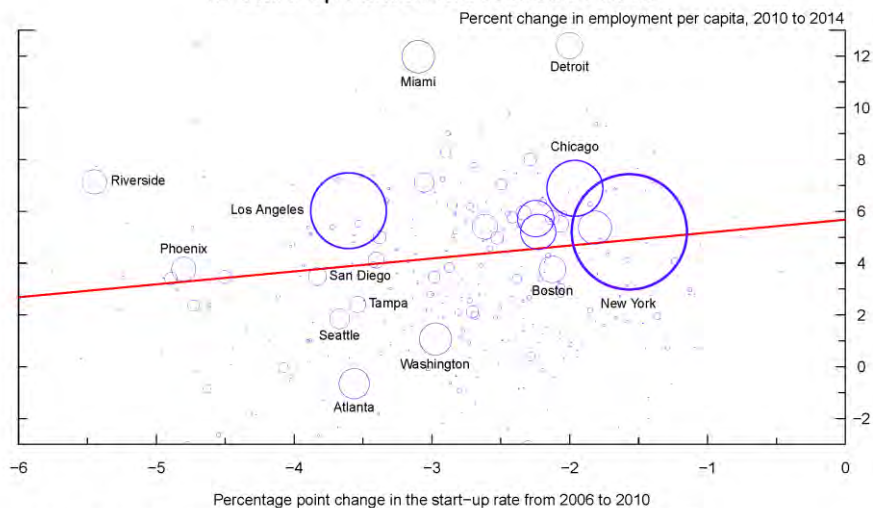
² Start-ups, as well as young and small firms, were adversely affected by both the decline in aggregate demand and by a steep reduction in the supply of credit during the financial crisis. See, for example, Michael Siemer (forthcoming), “Employment Effects of Financial Constraints during the Great Recession,” *Review of Economics and Statistics*.

³ See, for example, Titan Alon, David Berger, Robert Dent, and Benjamin Pugsley (2018), “Older and Slower: The Startup Deficit’s Lasting Effects on Aggregate Productivity Growth,” *Journal of Monetary Economics*, vol. 93 (September), pp. 68–85.

⁴ See François Gourio, Todd Messer, and Michael Siemer (2016), “Firm Entry and Macroeconomic Dynamics: A State-Level Analysis,” *American Economic Review*, vol. 106 (May), pp. 214–18.

⁵ The decline in business formation during the financial crisis predicts local employment per capita growth after the financial crisis even after controlling for a large number of other potential explanatory factors, such as the depth of the recession, the declines in house prices and small business lending during the recession, the

Figure 2: Employment Recovery and Change in Start-up Rates Across Metro Areas



Note: The markers for each metropolitan area indicate their relative size as measured by their population in 2007.
Source: Author's calculations based on Business Dynamics Statistics data.

With respect to the aggregate implications of the decline in business formation, a preliminary estimate suggests that if business formation had remained at its 2007 level, then more than 2 million additional jobs may have been created from 2010 to 2014.⁶ The intuition behind this finding is that start-ups tend to grow faster than older firms and thus contribute significantly to both gross and net job creation.⁷ Therefore, a “missing generation” of start-ups can have a persistent negative effect on the economy. Moreover, a new data set associated with recent research linking applications for employer identification numbers to future business formations suggests that business formation remained low through mid-2018.⁸

Economic research regarding the importance of business formation for economic growth is relatively new and rapidly evolving. Moreover, the above findings suggest that the lack of a substantial recovery in business formation may restrain future economic and productivity growth. What are the implications of the decline in business dynamism for monetary policymakers? The trend decline in business formation may point to ongoing slow growth in potential output that, in turn, will be associated with a low longer-run equilibrium level of the federal funds rate. Whether business formation indeed remains low is therefore one key point of uncertainty regarding the future performance of the economy.

growth of the gig economy, and the size of new start-ups. Data on business formation at the metropolitan area level from the BDS are only available until 2014.

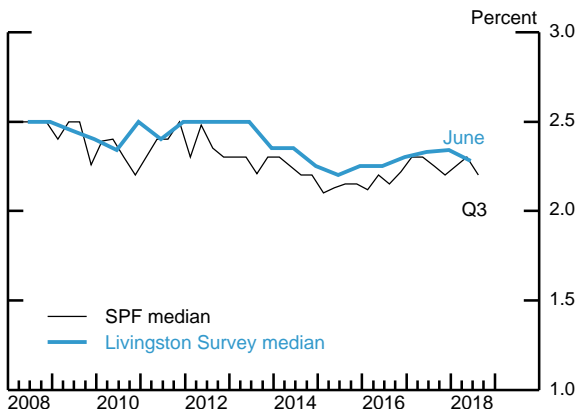
⁶ This partial-equilibrium estimate takes into account that other aforementioned factors may have affected the economic recovery. The estimate does not take into account that, in the absence of the decline in business formation, other factors, such as wages and prices, would likely have adjusted.

⁷ See John Haltiwanger, Ron S. Jarmin, and Javier Miranda (2013), “Who Creates Jobs? Small versus Large versus Young,” *Review of Economics and Statistics*, vol. 95 (May), pp. 347–61.

⁸ See Kimberly Bayard, Emin Dinlersoz, Timothy Dunne, John Haltiwanger, Javier Miranda, and John Stevens (2018), “Early-Stage Business Formation: An Analysis of Applications for Employer Identification Numbers,” NBER Working Paper Series 24364 (Cambridge, Mass.: National Bureau of Economic Research, March), www.nber.org/papers/w24364; subsequent data updates available at <https://www.census.gov/programs-surveys/bfs.html>.

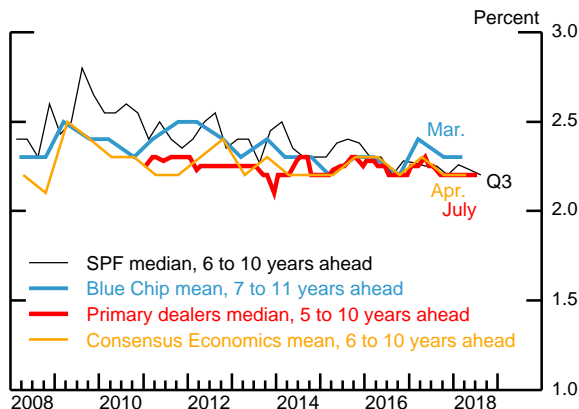
Survey Measures of Longer-Term Inflation Expectations

CPI Next 10 Years



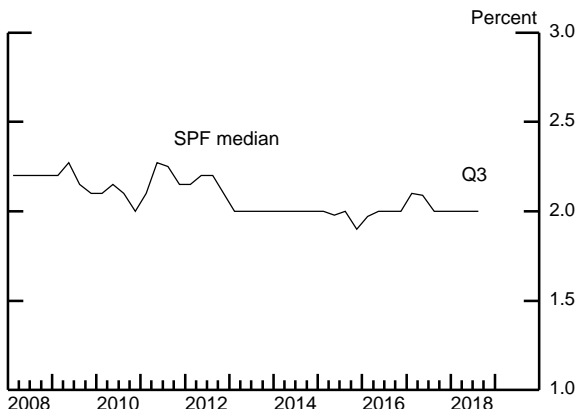
Note: SPF is Survey of Professional Forecasters.
Source: Federal Reserve Bank of Philadelphia.

CPI Forward Expectations



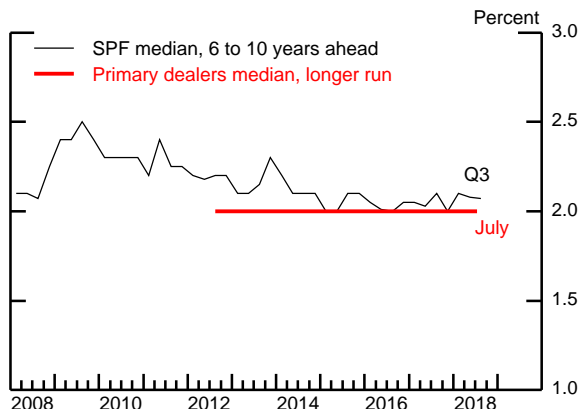
Source: Federal Reserve Bank of Philadelphia; Blue Chip Economic Indicators; Federal Reserve Bank of New York; Consensus Economics.

PCE Next 10 Years



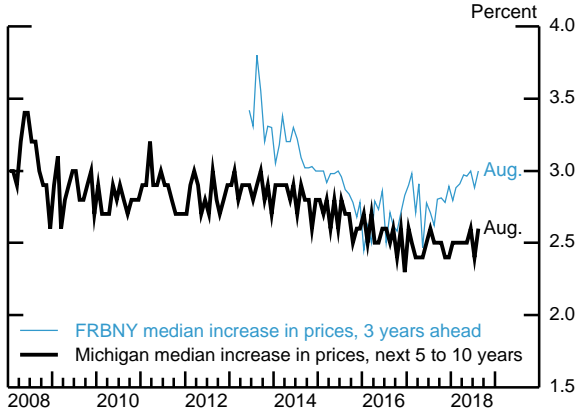
Source: Federal Reserve Bank of Philadelphia.

PCE Forward Expectations



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

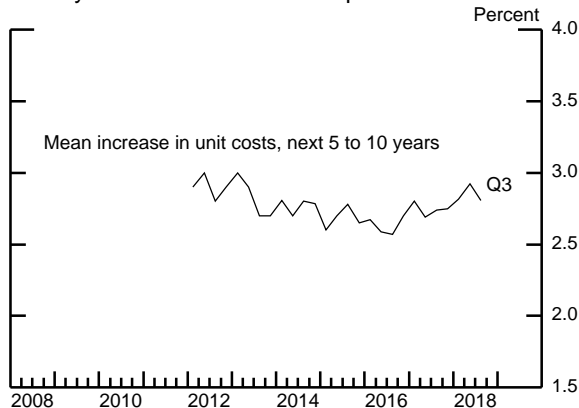
Surveys of Consumers



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

Source: University of Michigan Surveys of Consumers; Federal Reserve Bank of New York Survey of Consumer Expectations.

Survey of Business Inflation Expectations



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

- Compensation per hour (CPH) in the business sector increased 3.3 percent over the year ending in the second quarter, about three-tenths higher than we expected in the July Tealbook. We project that CPH will accelerate to a roughly 4 percent pace for 2019 through 2021. (CPH was revised appreciably higher from 2016 forward, reflecting the BEA’s comprehensive revision in July.)
- Over the four quarters ending in June, the ECI for private-sector workers increased 2.9 percent. Given its relatively muted cyclical sensitivity, the ECI is projected to accelerate less than the compensation per hour measure and to reach only 3.0 percent in the medium term.
- The July reading from the Federal Reserve Bank of Atlanta’s Wage Growth Tracker was 3.3 percent, within the range seen in the past year.

THE LONG-TERM OUTLOOK

- We have revised down our assumption about the natural rate of unemployment in the longer run to 4.6 percent, in line with the revision to the natural rate in the medium term. We continue to assume that potential output growth will be 1.7 percent per year in the longer run.
- We have maintained our assumption that the real equilibrium federal funds rate that will prevail in the longer run will be ½ percent. The nominal yield on 10-year Treasury securities is assumed to be 3.4 percent in the longer run. The term premium gradually rises toward 90 basis points in the longer run, lifted in part by the elevated level of federal debt.
- We expect that the Federal Reserve’s holdings of securities will continue to put downward pressure on longer-term interest rates, though to a diminishing extent over time. The SOMA portfolio is expected to be at a normal size and composition by mid-2021.
- With these assumptions, real GDP growth slows to slightly above 1 percent from 2022 to 2024, as the federal funds rate is above its neutral level and the boost to growth from fiscal policy fades. The unemployment rate moves up gradually from 3½ percent at the end of 2021 toward its assumed natural rate

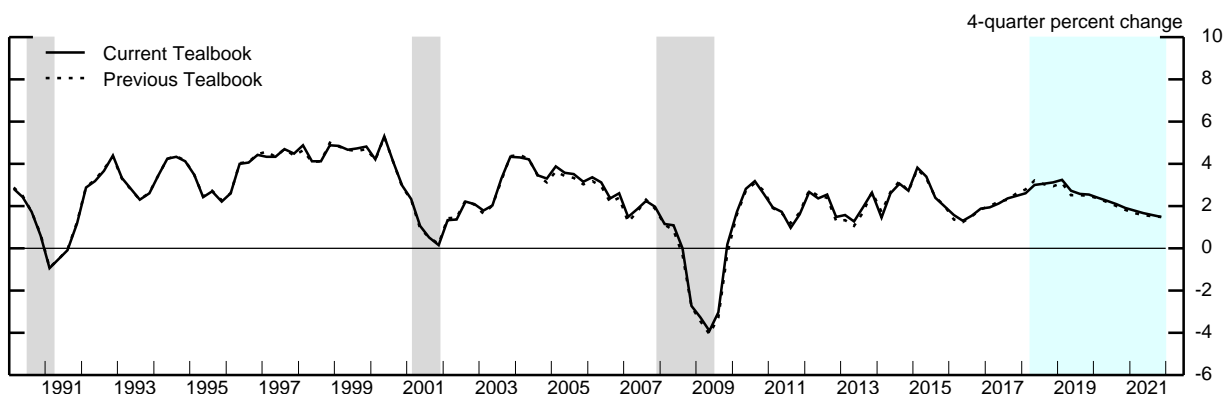
in subsequent years. PCE price inflation remains close to 2.0 percent throughout.

- With resource utilization cooling only slowly and inflation remaining close to the Committee's 2 percent objective, the nominal federal funds rate moves down only gradually from the elevated level of 5 percent at the end of the medium term toward its long-run value of 2½ percent.

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

Measure	2017	2018		2018	2019	2020	2021
		H1	H2				
Real GDP	2.5	3.4	2.8	3.1	2.5	1.9	1.5
Previous Tealbook	2.6	3.4	2.5	2.9	2.5	1.8	1.5
Final sales	2.6	3.8	2.3	3.0	2.5	1.9	1.6
Previous Tealbook	2.9	3.4	2.4	2.9	2.5	1.8	1.6
Personal consumption expenditures	2.7	2.3	2.8	2.6	2.8	2.5	2.1
Previous Tealbook	2.8	2.1	2.7	2.4	2.6	2.3	2.0
Residential investment	3.8	-2.6	-1.2	-1.9	3.4	.4	1.3
Previous Tealbook	2.6	-1.2	-1.3	-1.2	2.3	.9	2.0
Nonresidential structures	2.9	14.1	3.9	8.9	2.5	.0	-1.8
Previous Tealbook	5.0	13.5	6.6	10.0	2.4	.4	-1.6
Equipment and intangibles	7.3	9.1	6.4	7.7	4.2	2.2	1.7
Previous Tealbook	6.7	6.6	6.2	6.4	4.2	2.0	2.3
Federal purchases	1.3	3.2	2.5	2.8	3.1	2.8	1.3
Previous Tealbook	1.0	3.6	1.1	2.4	4.0	3.0	1.6
State and local purchases	-.5	1.3	.7	1.0	1.0	1.0	1.0
Previous Tealbook	.5	1.4	.8	1.1	1.0	1.0	1.0
Exports	4.7	6.2	1.3	3.7	2.9	2.8	2.7
Previous Tealbook	5.0	7.4	2.0	4.7	3.6	2.6	2.6
Imports	5.4	1.2	4.7	3.0	4.8	4.2	3.5
Previous Tealbook	4.7	2.2	4.1	3.2	4.9	4.3	3.6
Contributions to change in real GDP (percentage points)							
Inventory change	-.1	-.3	.4	.1	.0	.0	-.1
Previous Tealbook	-.3	.0	.1	.1	.0	.0	-.1
Net exports	-.2	.6	-.5	.0	-.4	-.3	-.2
Previous Tealbook	-.1	.6	-.4	.1	-.3	-.3	-.2

Real GDP

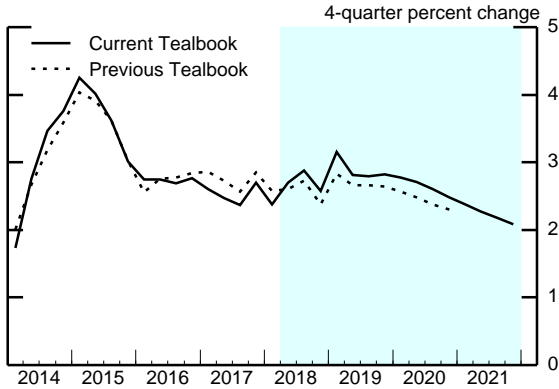


Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

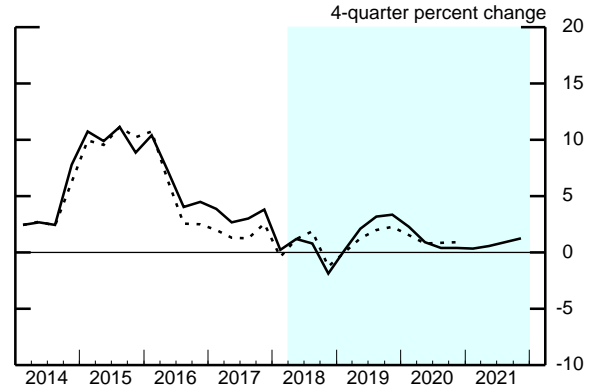
Domestic Econ Devel & Outlook

Components of Final Demand

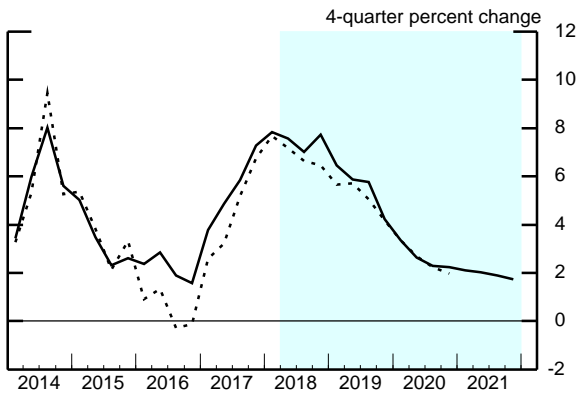
Personal Consumption Expenditures



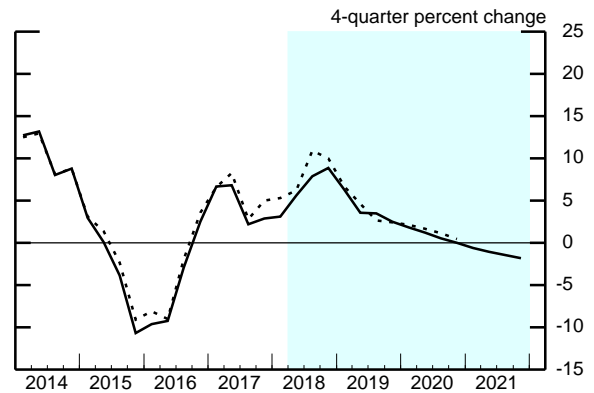
Residential Investment



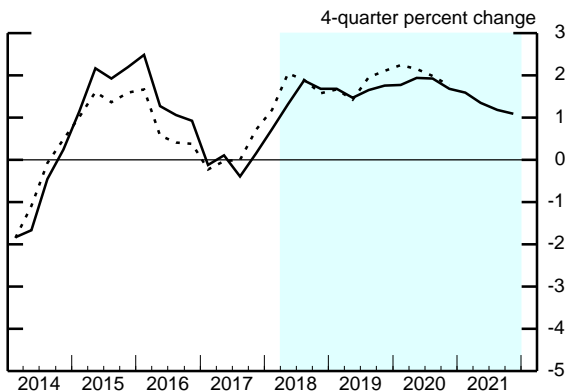
Equipment and Intangibles



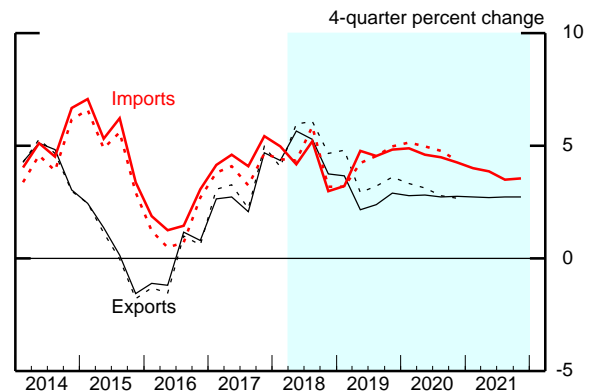
Nonresidential Structures



Government Consumption and Investment



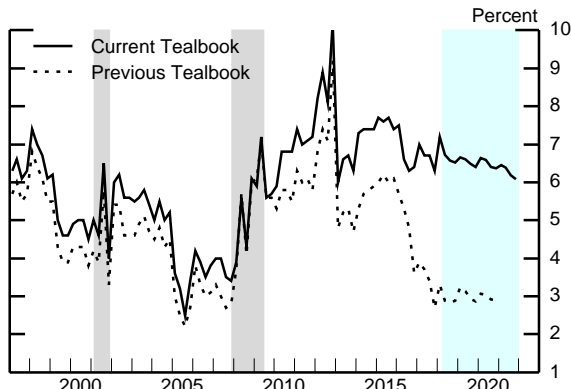
Exports and Imports



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

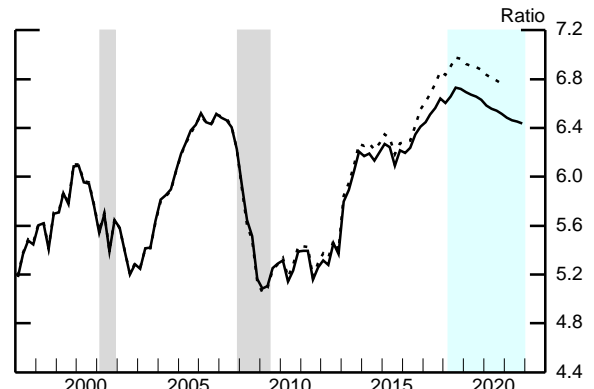
Aspects of the Medium-Term Projection

Personal Saving Rate



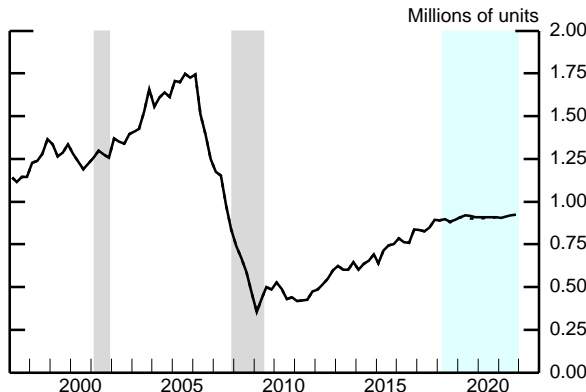
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

Wealth-to-Income Ratio



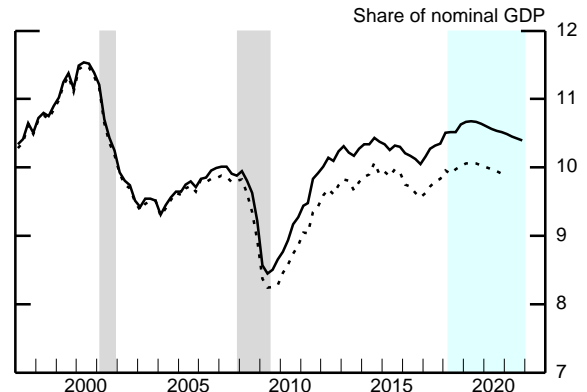
Note: Ratio of household net worth to disposable personal income.
Source: For net worth, Federal Reserve Board, Financial Accounts of the United States; for income, U.S. Dept. of Commerce, Bureau of Economic Analysis.

Single-Family Housing Starts



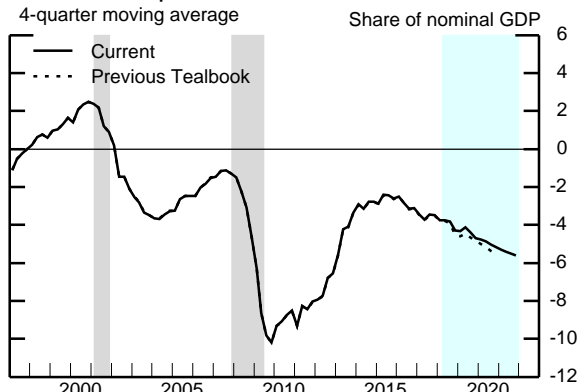
Source: U.S. Census Bureau.

Equipment and Intangibles Spending



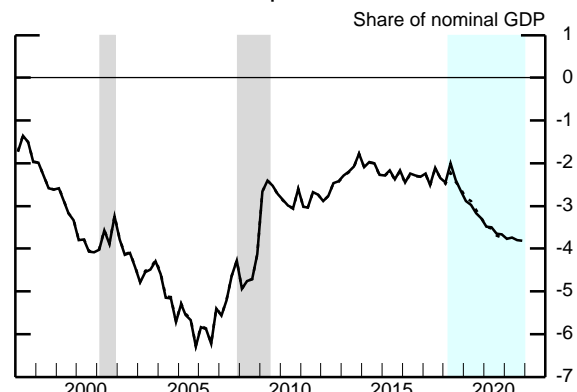
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

Federal Surplus/Deficit



Source: Monthly Treasury Statement.

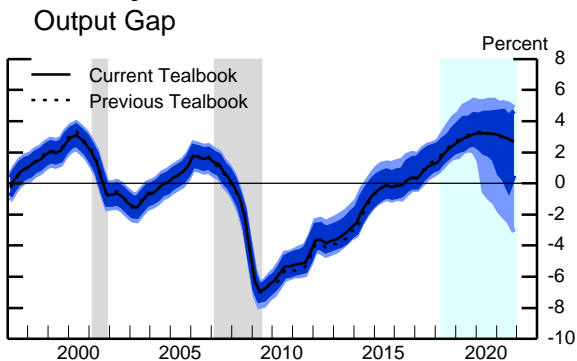
Current Account Surplus/Deficit



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

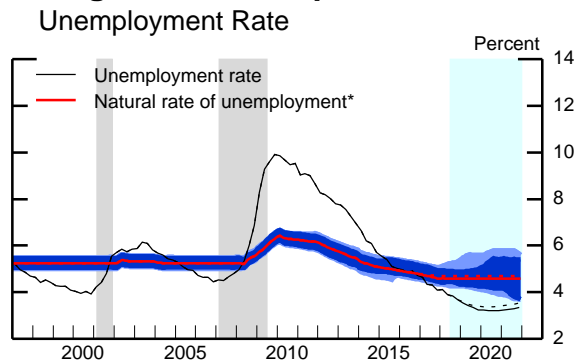
Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.

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



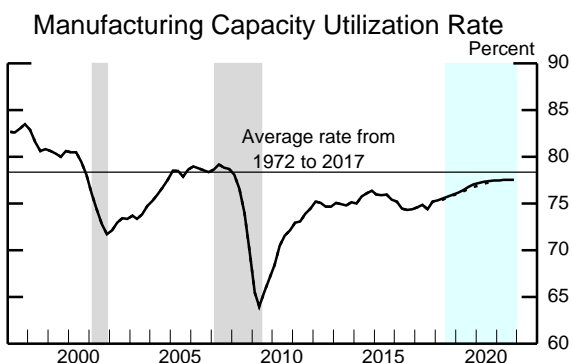
Note: Shaded regions show the 70 percent and 90 percent confidence intervals of the distribution of historical revisions to the staff's estimates of the output gap.

Source: Various macroeconomic data; staff assumptions.

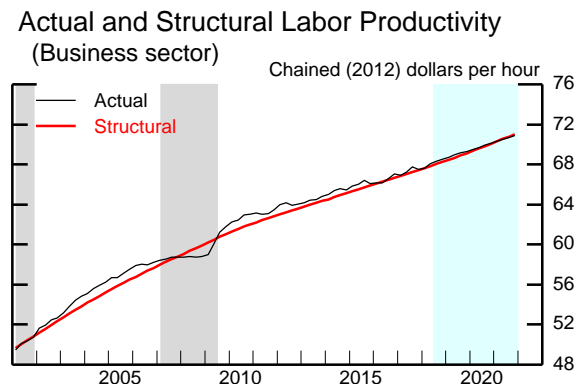


Note: Shaded regions show the 70 percent and 90 percent confidence intervals of the distribution of historical revisions to the staff's estimates of the natural rate.

*Staff estimate including the effect of EEB.
Source: Various macroeconomic data; staff assumptions.



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



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

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

Decomposition of Potential Output (Percent change, Q4 to Q4, except as noted)

Measure	1974-95	1996-2000	2001-07	2008-10	2011-16	2017	2018	2019	2020	2021
Potential output	3.1	3.6	2.7	1.9	1.4	1.6	1.7	1.8	1.9	1.9
Previous Tealbook	3.1	3.5	2.7	1.8	1.4	1.5	1.7	1.8	1.9	1.9
<i>Selected contributions¹</i>										
Structural labor productivity ²	1.7	2.9	2.7	1.8	1.2	1.2	1.2	1.3	1.4	1.4
Previous Tealbook	1.7	3.0	2.7	1.7	1.0	1.1	1.2	1.3	1.4	...
Capital deepening	.7	1.4	1.0	.5	.8	.7	.7	.8	.7	.6
Multifactor productivity	.8	1.1	1.4	1.1	.2	.3	.3	.3	.5	.6
Structural hours	1.5	1.3	.8	.4	.4	.3	.7	.6	.6	.5
Previous Tealbook	1.6	1.0	.8	.4	.5	.2	.7	.6	.6	...
Labor force participation	.4	-.1	-.2	-.5	-.5	-.3	-.3	-.2	-.2	-.2
Previous Tealbook	.4	-.1	-.2	-.5	-.5	-.3	-.3	-.2	-.2	...
Memo:										
Output gap ³	-1.2	2.5	.3	-5.3	.4	1.2	2.4	3.2	3.2	2.7
Previous Tealbook	-1.5	2.5	.2	-5.5	.3	1.4	2.6	3.3	3.1	2.7

... Not applicable.

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

1. Percentage points.

2. Total business sector.

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

The Outlook for the Labor Market

Measure	2017	2018		2018	2019	2020	2021
		H1	H2				
Nonfarm payroll employment ¹	183	218	183	200	177	129	85
Previous Tealbook	183	215	200	207	171	133	...
Private employment ¹	180	215	179	197	166	119	75
Previous Tealbook	180	213	193	203	160	123	...
Labor force participation rate ²	62.7	62.8	62.8	62.8	62.9	62.8	62.6
Previous Tealbook	62.7	62.8	62.8	62.8	62.8	62.8	...
Civilian unemployment rate ²	4.1	3.9	3.7	3.7	3.3	3.2	3.4
Previous Tealbook	4.1	3.9	3.7	3.7	3.4	3.4	3.6
Employment to population ratio ²	60.1	60.4	60.5	60.5	60.8	60.8	60.5
Previous Tealbook	60.1	60.4	60.5	60.5	60.6	60.6	...

... Not applicable.

1. Thousands, average monthly changes.

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

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

Inflation Projections

Measure	2017	2018		2018	2019	2020	2021
		H1	H2				
<i>Percent change at annual rate from final quarter of preceding period</i>							
PCE chain-weighted price index	1.8	2.2	1.8	2.0	1.9	2.0	2.0
Previous Tealbook	1.7	2.2	1.6	1.9	1.9	2.0	2.0
Food and beverages	.7	.7	1.3	1.0	2.4	2.6	2.3
Previous Tealbook	.7	.7	1.7	1.2	2.4	2.6	...
Energy	8.1	6.5	6.4	6.5	-.5	-1.2	-.8
Previous Tealbook	7.6	6.5	.9	3.7	-.4	-1.0	...
Excluding food and energy	1.6	2.1	1.6	1.9	2.0	2.1	2.1
Previous Tealbook	1.5	2.1	1.6	1.9	2.0	2.1	2.1
Prices of core goods imports ¹	1.1	1.6	-1.5	.0	.6	.8	.7
Previous Tealbook	1.3	2.1	-1.3	.4	.5	.7	...
	June 2018	July 2018	Aug. 2018 ²	Sept. 2018 ²	Oct. 2018 ²	Nov. 2018 ²	Dec. 2018 ²
<i>12-month percent change</i>							
PCE chain-weighted price index	2.3	2.3	2.2	2.0	2.0	2.0	2.0
Previous Tealbook	2.3	2.3	2.2	1.9	1.9	1.9	1.9
Excluding food and energy	1.9	2.0	1.9	1.9	1.8	1.9	1.9
Previous Tealbook	1.9	1.9	1.9	1.9	1.8	1.9	1.9

... Not applicable.

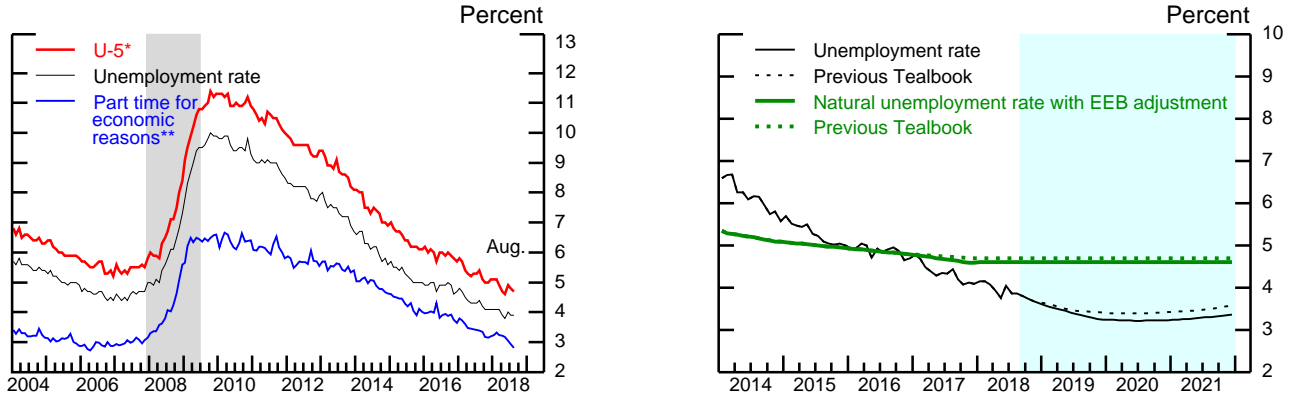
1. Core goods imports exclude computers, semiconductors, oil, and natural gas.

2. Staff forecast.

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

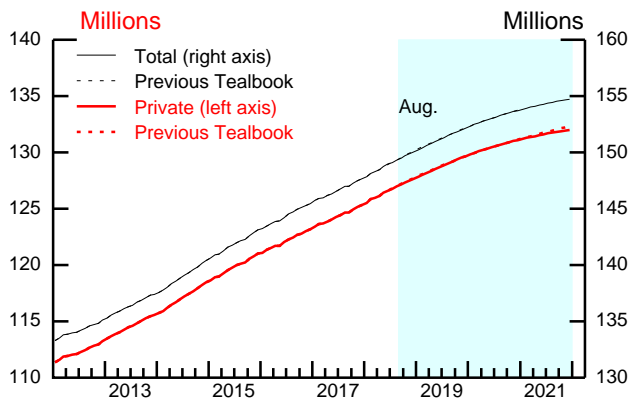
Labor Market Developments and Outlook (1)

Measures of Labor Underutilization



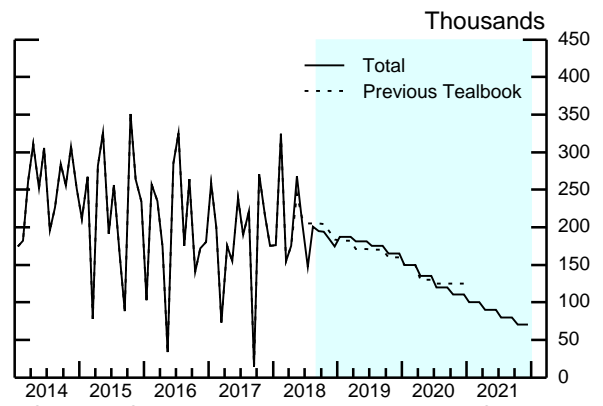
* U-5 measures total unemployed persons plus all marginally attached to the labor force as a percent of the labor force plus persons marginally attached to the labor force.
 ** Percent of Current Population Survey employment.
 EEB Extended and emergency unemployment benefits.
 Source: U.S. Department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

Level of Payroll Employment



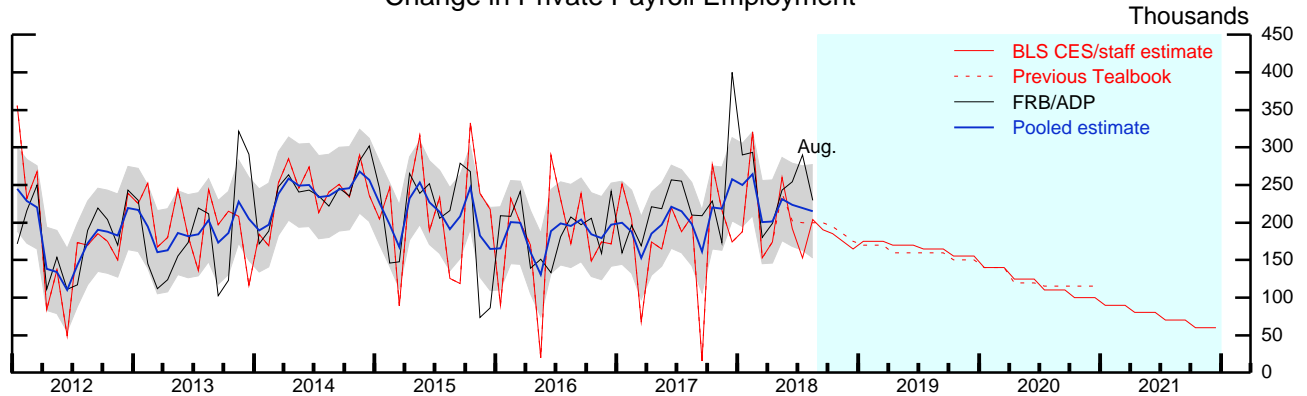
Source: U.S. Department of Labor, Bureau of Labor Statistics.

Change in Total Payroll Employment



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

Change in Private Payroll Employment

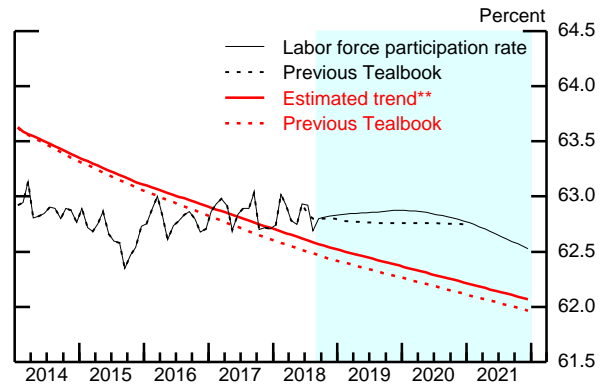
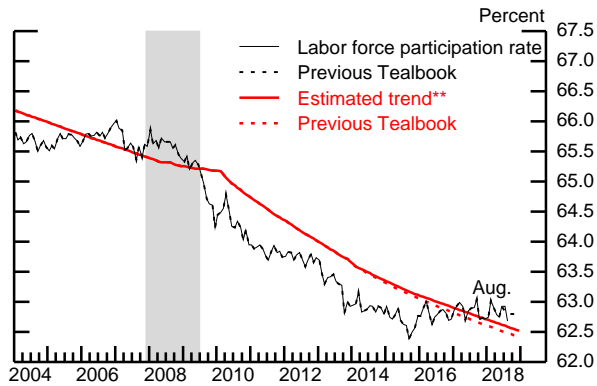


Source: U.S. Department of Labor, Bureau of Labor Statistics; staff calculations using microdata from ADP.
 Note: Gray shaded area around blue line is 90 percent confidence interval around pooled estimate.

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*

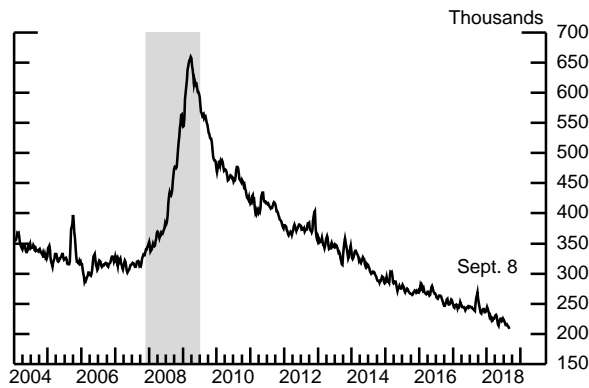


* Published data adjusted by staff to account for changes in population weights.

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

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

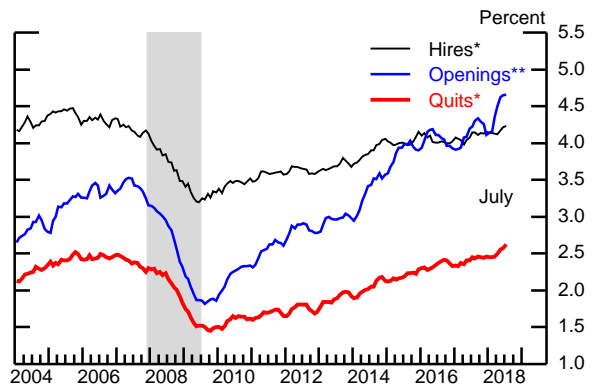
Initial Unemployment Insurance Claims*



* 4-week moving average.

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

Hires, Quits, and Job Openings

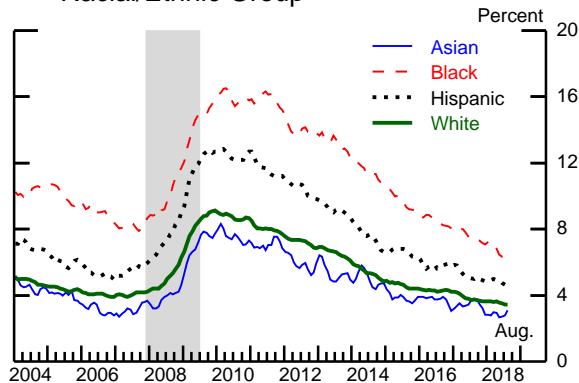


* Percent of private nonfarm payroll employment, 3-month moving average.

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

Source: Job Openings and Labor Turnover Survey.

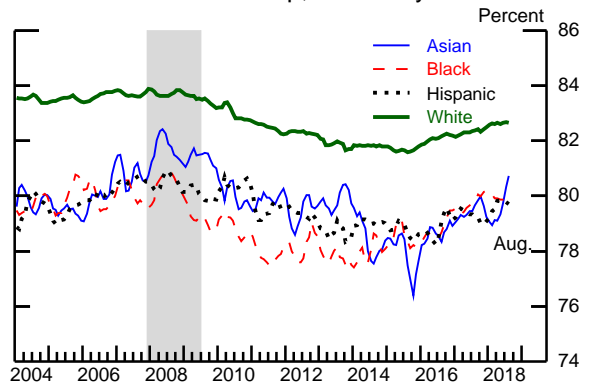
Unemployment Rate by Racial/Ethnic Group



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



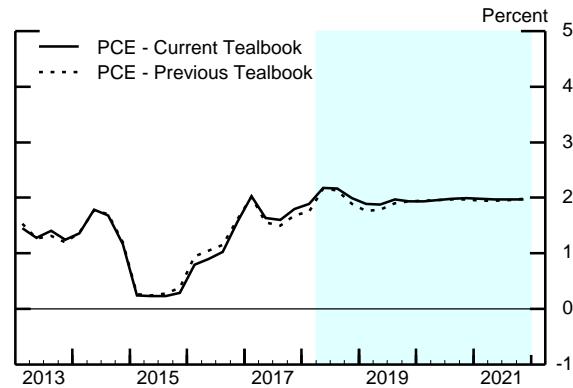
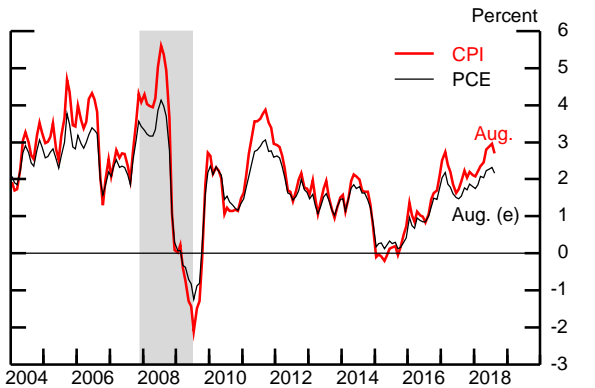
Note: These categories are not mutually exclusive, as the ethnicity Hispanic may include people of any race. The Current Population Survey defines Hispanic ethnicity as those who report their origin is Mexican, Puerto Rican, Cuban, Central American, or South American (and some others). 3-month moving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

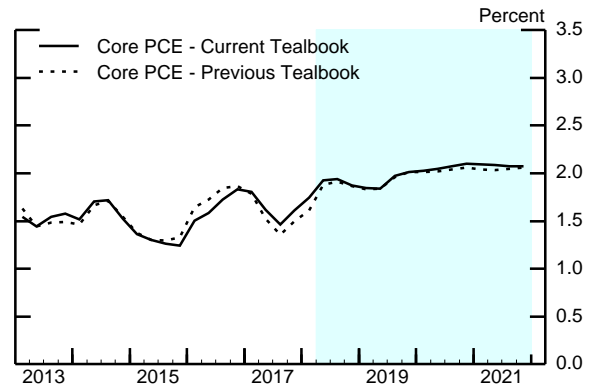
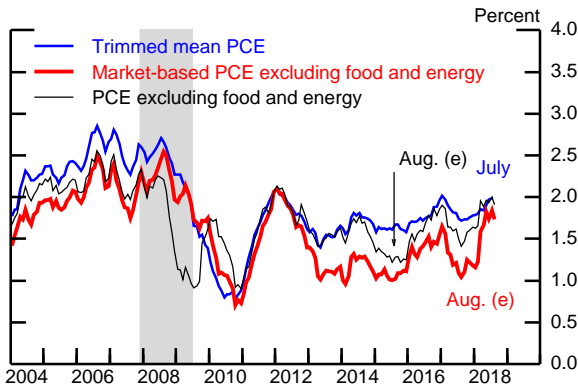
Headline Consumer Price Inflation



Note: PCE prices from April to August 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.

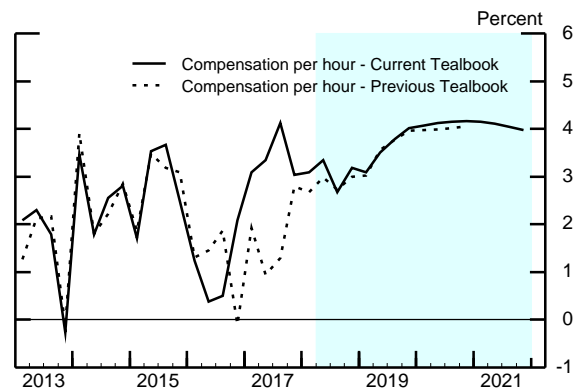
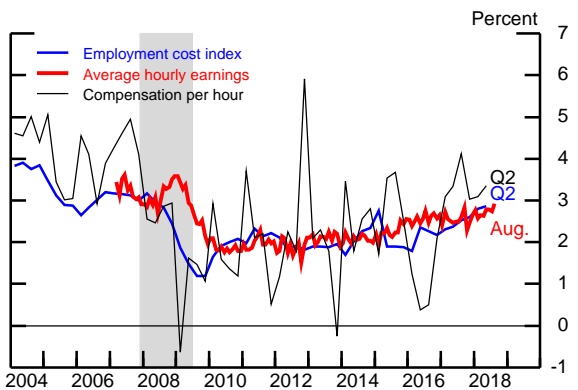
Measures of Underlying PCE Price Inflation



Note: Core PCE prices from April to August 2018 are staff estimates (e).

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

Labor Cost Growth



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

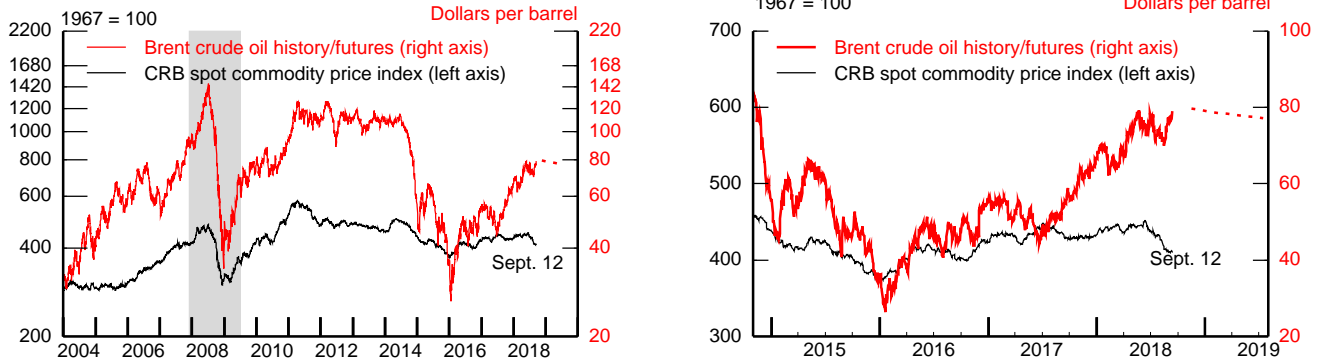
Source: U.S. Department of Labor, Bureau of Labor Statistics.

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

Inflation Developments and Outlook (2)

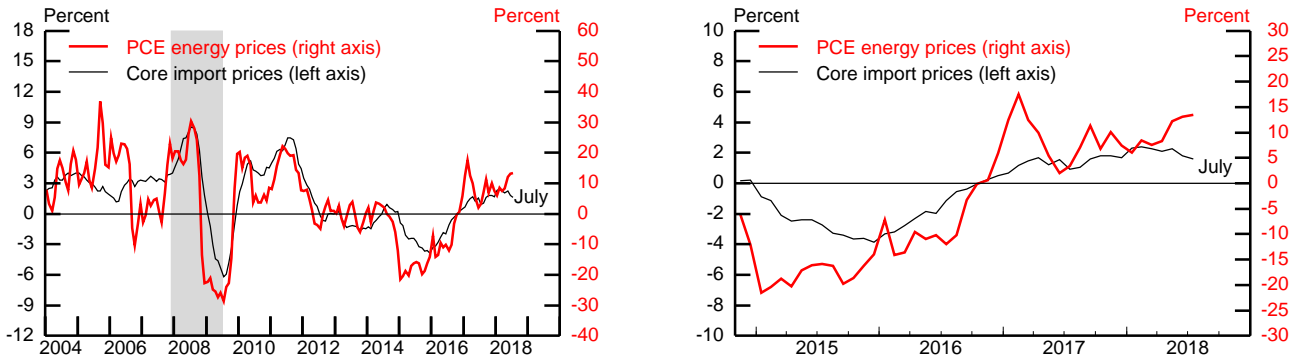
(Percent change from year-earlier period, except as noted)

Commodity and Oil Price Levels



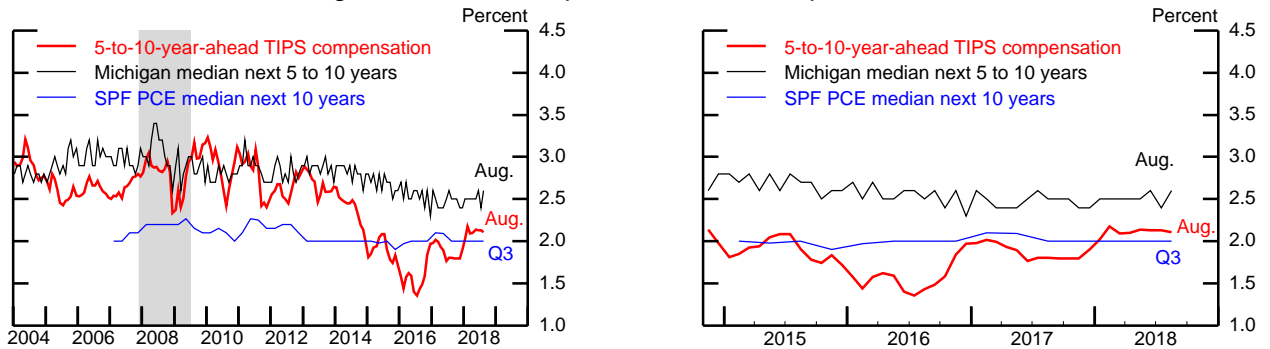
Note: Futures prices (dotted lines) are the latest observations on monthly futures contracts.
 Source: For oil prices, U.S. Department of Energy, Energy Information Agency; for commodity prices, Commodity Research Bureau (CRB).

Energy and Import Price Inflation



Source: For core import prices, U.S. Dept. of Labor, Bureau of Labor Statistics; for PCE, U.S. Dept. of Commerce, Bureau of Economic Analysis.

Long-Term Inflation Expectations and Compensation



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

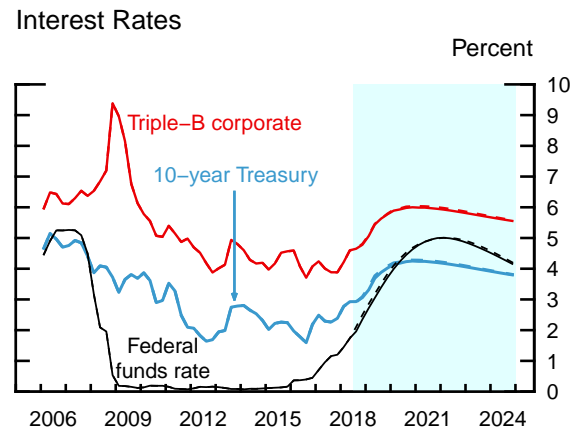
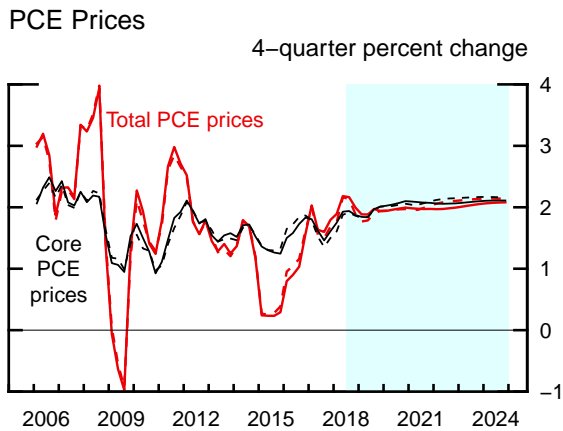
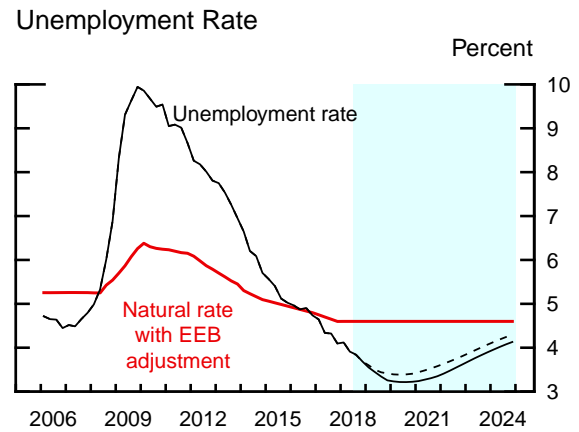
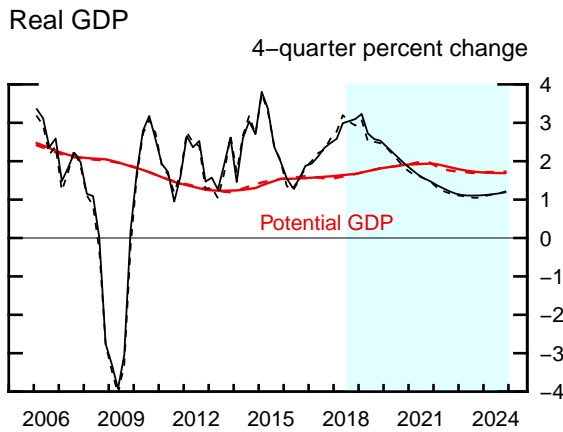
Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.

The Long-Term Outlook

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

Measure	2018	2019	2020	2021	2022	2023	2024	Longer run
Real GDP	3.1	2.5	1.9	1.5	1.2	1.1	1.2	1.7
Previous Tealbook	2.9	2.5	1.8	1.5	1.1	1.1	1.2	1.7
Civilian unemployment rate ¹	3.7	3.3	3.2	3.3	3.6	3.9	4.1	4.6
Previous Tealbook	3.7	3.4	3.4	3.6	3.8	4.1	4.3	4.7
PCE prices, total	2.0	1.9	2.0	2.0	2.0	2.1	2.1	2.0
Previous Tealbook	1.9	1.9	2.0	2.0	2.1	2.1	2.1	2.0
Core PCE prices	1.9	2.0	2.1	2.1	2.1	2.1	2.1	2.0
Previous Tealbook	1.9	2.0	2.1	2.1	2.1	2.2	2.2	2.0
Federal funds rate ¹	2.35	3.71	4.63	5.00	4.90	4.57	4.16	2.50
Previous Tealbook	2.50	3.83	4.68	4.99	4.94	4.63	4.21	2.50
10-year Treasury yield ¹	3.1	4.0	4.3	4.2	4.1	3.9	3.8	3.4
Previous Tealbook	3.1	4.1	4.3	4.2	4.1	4.0	3.8	3.4

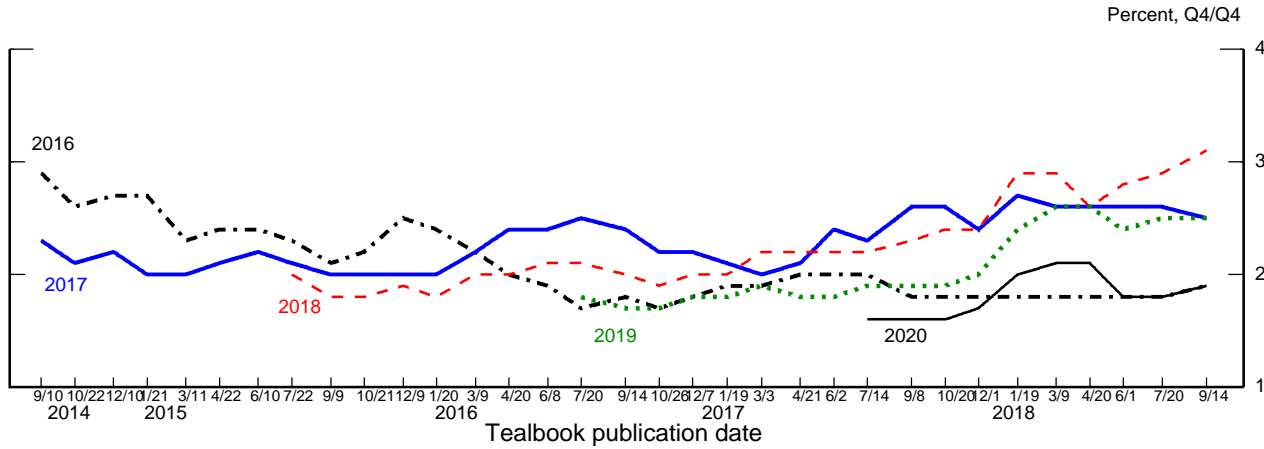
1. Percent, average for the final quarter of the period.



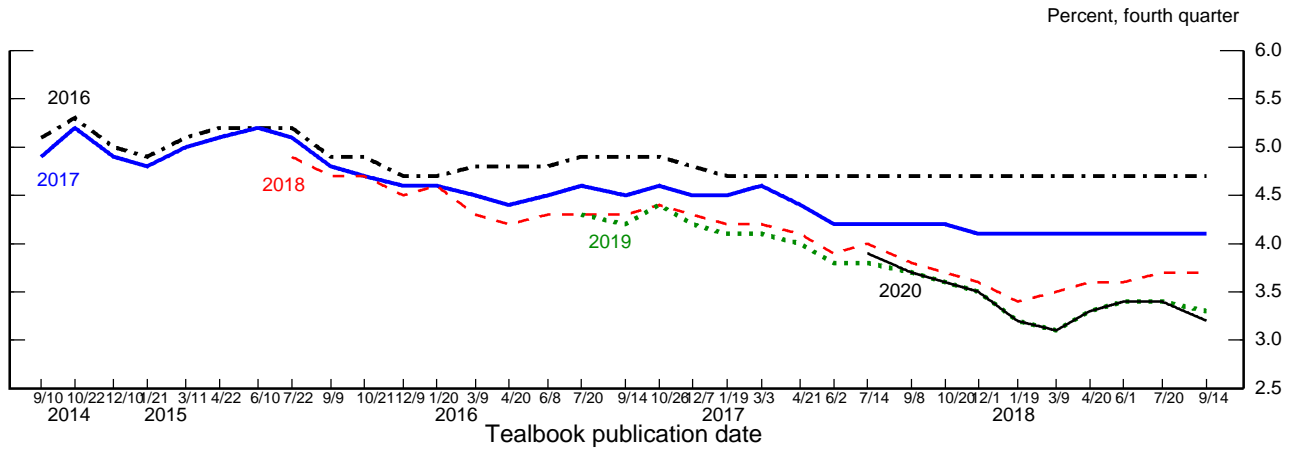
Note: In each panel, shading represents the projection period, and dashed lines are the previous Tealbook.

Evolution of the Staff Forecast

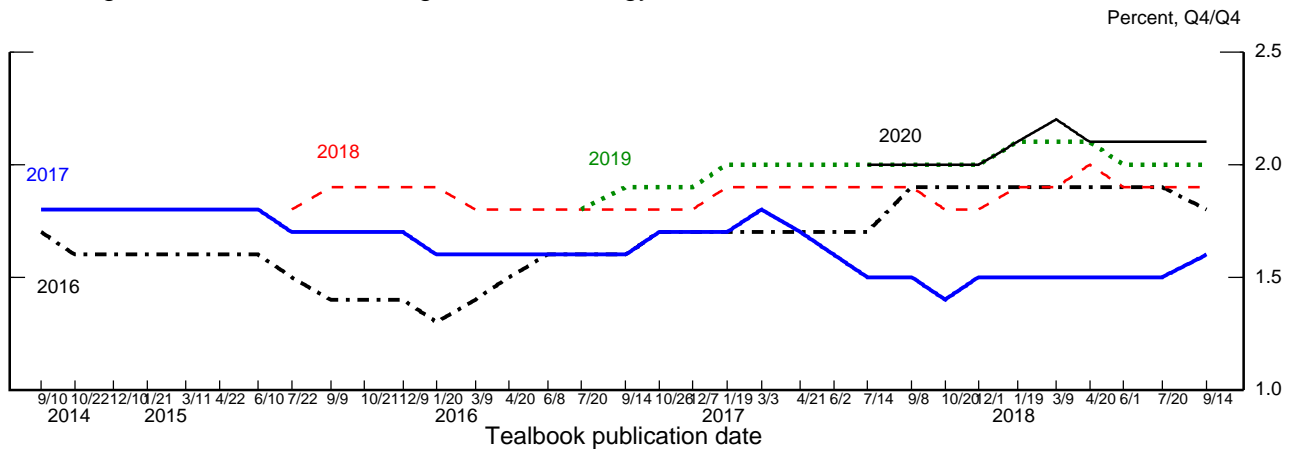
Change in Real GDP



Unemployment Rate



Change in PCE Prices excluding Food and Energy



(This page is intentionally blank.)

International Economic Developments and Outlook

The outlook for the U.S. and foreign economies appears to be diverging following the more buoyant, synchronized global expansion that characterized the turn of the year. In the United States, a sizable and growing positive output gap is projected for most of the forecast period. In contrast, the foreign output gap is projected to remain near zero over the forecast period, as foreign economic growth is projected to remain solid but only a bit above potential. Moreover, since the start of this year, we have been revising down our outlook for growth abroad even as the U.S. outlook has strengthened. Finally, in the face of a ratcheting up of financial stresses in emerging market economies (EMEs) and political uncertainties in Europe, downside risks to the foreign outlook have increased.

We estimate that real GDP growth in the EMEs will step up from a downwardly revised 1.6 percent in the second quarter to 3¼ percent in the third as export growth across the EMEs recovers from a temporary dip and as other temporary headwinds (including a nationwide truckers' strike in Brazil) dissipate. In the advanced foreign economies (AFEs), we estimate that growth will slow from 2.4 percent to 1¾ percent as Canadian and Japanese growth moderate from an unusually rapid pace. All told, foreign GDP growth is projected to step up from 2.0 percent in the second quarter to 2½ percent in the third quarter, close to its potential rate.

Continuing the trend of downward revisions to our foreign outlook, recent indicators suggest that the third-quarter pickup will be somewhat weaker than anticipated in the July Tealbook, and we also marked down somewhat the foreign growth outlook over the next few quarters. The revision reflects weaker-than-expected data in the EMEs as well as our view that heightened financial stresses will weigh on EME growth, especially in the more vulnerable economies where central banks are tightening monetary policy in response to capital flight or inflationary pressures. The recent weakening of EME currencies has bolstered AFE currencies on a trade-weighted basis, which led us to revise down AFE growth a touch in the near term.

As discussed in the box “Financial Stresses in Turkey and Argentina,” financial stresses have so far been concentrated in a few highly vulnerable EMEs; spillovers to less vulnerable EMEs have been relatively modest. Accordingly, the effect of these stresses on our baseline projection of overall foreign growth has been small. However, the recent

Financial Stresses in Turkey and Argentina

In an environment of rising U.S. interest rates, a strengthening dollar, and more risky, less buoyant conditions in Europe, prospects for EMEs are coming under increasing investor scrutiny. In particular, given already high domestic vulnerabilities, Turkey and Argentina experienced intense financial pressure over the intermeeting period. In Turkey, credit spreads widened sharply, and the Turkish lira depreciated 19 percent against the dollar from the time of the July FOMC meeting (panel 1 of the figure). In Argentina, despite an IMF program initiated in June, the Argentine peso fell 31 percent against the dollar, and sovereign spreads widened (panel 2). Though developments in these countries were accompanied by some deterioration of financial conditions in other EMEs, they have been driven largely by homegrown problems, and our baseline view is that spillovers to other markets and to the U.S. economy will likely be limited. That said, downside risks of more widespread problems in the EMEs have decidedly increased.

In Turkey, although the proximate trigger was escalating tensions with the United States over Turkish prosecution of a U.S. pastor, recent market pressures reflect pronounced macroeconomic vulnerabilities. Overly stimulative monetary and lending policies have led to a credit-fueled overheating of the economy and have pushed up inflation to 18 percent, well above the central bank's 5 percent target. As of 2017, the current account deficit had widened to about 6 percent of GDP, and short-term external debt had surpassed 20 percent of GDP. Much of this external debt is owed by Turkish banks, which have relied on wholesale foreign-currency funding from abroad. Despite having off-balance-sheet currency hedges, banks are nonetheless exposed to default risk on foreign-currency loans they extended to Turkish corporates.¹ These loans, together with debt issued in international markets, have swollen foreign-currency-denominated liabilities of Turkish nonfinancial corporations to nearly 40 percent of GDP. Against the background of President Erdoğan's stated preference for keeping interest rates low, the central bank's failure until very recently to tighten monetary policy appreciably in the face of rising inflation and financial turmoil intensified concerns about the economy.

On September 13, 2018, the Turkish central bank acted more forcefully, raising its benchmark policy rate 650 basis points, and the Turkish lira appreciated significantly following this move. These developments could presage a more persistent improvement in investor sentiment. However, Turkey's problems run deep, and President Erdoğan adamantly opposes seeking IMF support. As such, we see protracted financial stresses and recession in Turkey as likely.

Argentina's economy has also faltered, as a severe drought has exacerbated rising domestic macroeconomic imbalances. Despite the installment of President Macri's market-friendly government in 2015, a high fiscal deficit partly monetized by the central bank, growing public external debt, a large current account deficit, and only gradual fiscal tightening in the face of very high inflation have led to a loss of investor confidence and capital outflows. Unlike Turkish authorities, the Argentine government sought support from the IMF and is attempting to implement orthodox policies under the program (including fiscal tightening). Moreover, in light of the further slide in financial conditions since the program was agreed to, the Macri government has further tightened its fiscal target for the primary deficit to zero next year, and the central bank has sharply raised the policy rate. Nevertheless, the pressure on Argentine assets has abated only a little, given high sovereign indebtedness and Argentina's

¹Default risk of domestic-currency loans, which are funded via swaps of external funds, pressures banks' balance sheets. Rollover risk of short-term foreign-currency hedges adds to pressures on banks.

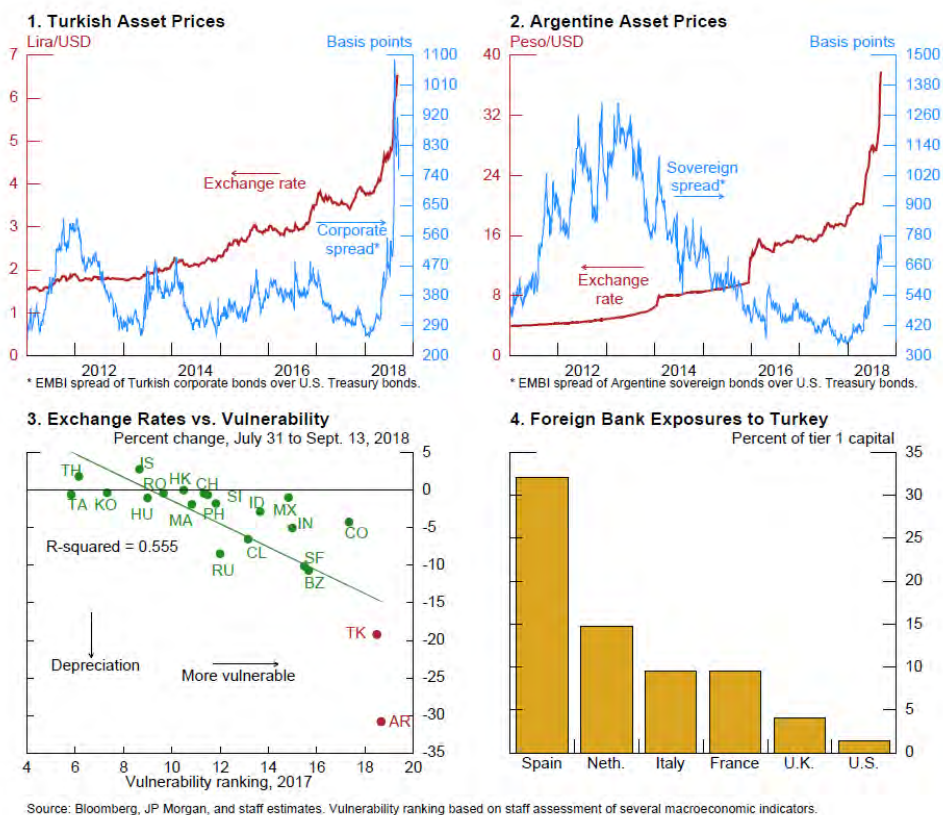
bitter history with global financial markets. As with Turkey, we see Argentina continuing to struggle, its situation complicated by the prospect of popular opposition to austerity ahead of next year’s elections.

Financial conditions in other vulnerable economies have also come under pressure. For example, the currencies of Brazil, India, and South Africa have depreciated significantly in recent weeks. However, investors still appear to be differentiating across EMEs in line with their relative macroeconomic vulnerabilities (panel 3).

Despite the grave outlook for Turkey and Argentina, we see limited spillovers to the United States. Direct exposures of U.S. financial institutions to these countries are small, and the real-economy links are limited. Combined, Turkey and Argentina account for about 1 percent of U.S. total exports; U.S. banks’ exposures to Turkey represent only 1½ percent of tier 1 capital, and their exposure to Argentina is negligible. Some European banks have larger credit exposures to Turkey (panel 4), and European bank stocks have suffered as a consequence, but these exposures appear to be manageable.

That said, there is some risk that in the context of global policy normalization, further deterioration in these two economies or elsewhere could cause more widespread stress in EMEs. Were these developments to transpire, there could be significant adverse repercussions for the U.S. economy, as discussed in the “EME Turbulence and Stronger Dollar” alternative scenario. Moreover, the instability in Turkey poses geopolitical risks. A further worsening in its relations with the West could damage the cooperation between the European Union and Turkey on the more than 3 million Syrian refugees Turkey has been hosting. A potential flow of refugees to Europe could, in turn, intensify political divisions there.

Int'l Econ Devel & Outlook



financial market volatility could presage more dire outcomes, and downside risks have become more prominent. First, rising global interest rates and heightened market focus on vulnerabilities in some EMEs (including sizable corporate debt burdens) could trigger a sharper and more widespread deterioration of financial conditions. This possibility is explored in our “EME Turbulence and Stronger Dollar” alternative scenario in the Risks and Uncertainty section. Second, populist fiscal policies in Italy could further intensify concerns about Italian public debt sustainability, exerting greater drag on euro-area growth than anticipated in our baseline. Third, with Brexit scheduled to occur in March 2019, if British and European Union (EU) authorities fail to reach a deal, significant disruptions of European economic and financial market activity could result. Finally, ongoing trade tensions could lead to much more widespread and sustained increases in trade barriers than in our baseline, which incorporates only the relatively modest measures already implemented. This possibility is discussed in the “Higher Trade Barriers” alternative scenarios.

Although headline inflation is estimated to have risen in the third quarter across all major AFEs because of higher energy prices, underlying inflation remains quite subdued in the euro area and Japan. With inflation expected to be noticeably below target over the next few years, the European Central Bank (ECB) and the Bank of Japan (BOJ) are assumed to wait until late 2019 and late 2020, respectively, to begin raising policy rates. Even with core inflation projected to run slightly above 2 percent in their economies for some time, the Bank of England (BOE) and the Bank of Canada (BOC) are expected to normalize policy only slowly.

In the EMEs, headline inflation is estimated to have stepped up to 4½ percent in the third quarter, reflecting higher energy prices in several countries and higher food prices in China and Mexico. In response to rising inflationary pressures, capital outflows, and currency depreciation, central banks in some vulnerable EMEs—including India, Indonesia, and the Philippines—tightened monetary policy, with central banks in crisis-ravaged Argentina and Turkey raising their policy rates more sharply. In contrast, in more resilient EMEs such as South Korea and Taiwan, central banks have maintained highly accommodative policies, and we see them normalizing policy gradually.

ADVANCED FOREIGN ECONOMIES

- ***Euro area.*** Real GDP growth edged down from 1.6 percent in the first quarter to 1.5 percent in the second. Recent indicators, such as PMIs through August, suggest

that growth should remain around this pace in the third quarter. We also see growth continuing through 2021 at around 1½ percent, a touch faster than potential, as monetary policy remains highly accommodative. This projection is slightly weaker than in the July Tealbook, largely reflecting the recent appreciation of the euro (on a trade-weighted basis) and higher oil prices. We assume that periodic bouts of financial stress in Italy will continue to weigh on activity in that country and, to a lesser extent, other euro-area countries. In August, inconsistent statements by senior Italian officials intensified concerns that the government will flout EU rules calling for fiscal consolidation. In response, Italian government bond yields rose sharply, prompting senior Italian officials to pledge to contain fiscal deficits. The situation remains unsettled.

We estimate that a surge in retail energy prices will boost headline inflation to 2½ percent in the third quarter, while core inflation remains around 1¼ percent. Headline inflation should fall below 1½ percent next year, as energy prices stabilize, and then slowly edge up as resource slack is gradually eliminated. We continue to assume that the ECB will cease net asset purchases by year-end, wait until late 2019 to begin raising its deposit rate, and then increase it to ¼ percent by late 2021.

- **United Kingdom.** Real GDP growth picked up to 1.5 percent in the second quarter from 0.9 percent in the first, driven by stronger domestic demand. Incoming data—such as July industrial output—suggest that growth should edge up to 1¾ percent in the third quarter. Brexit negotiations have yet to resolve several critical issues, intensifying fears that the United Kingdom will exit the EU in March 2019 with no deal in place. Even so, we continue to assume that the United Kingdom and the EU will eventually reach an agreement that will avoid major economic and financial disruptions. With interest rates remaining low, U.K. growth should stay slightly above its potential rate of 1½ percent over the forecast period.

We project inflation to rise from 1.9 percent in the second quarter to 2½ percent in the third, reflecting higher oil prices, and then to gradually edge down to 2 percent. With the unemployment rate down to a 43-year low, the BOE raised its policy rate ¼ percentage point to ¾ percent in August. We anticipate that the BOE will gradually raise its Bank Rate to 1¾ percent by the end of 2021, ¼ percentage point lower than assumed in July, owing to greater Brexit-related uncertainty.

- **Canada.** Supported by private consumption and especially exports, real GDP growth rebounded from 1.4 percent in the first quarter to 2.9 percent in the second. That said, data through July indicate that exports have slowed even more sharply than expected, suggesting that economic growth will moderate to 1¾ percent in the third quarter, ½ percentage point lower than estimated in the July Tealbook. Nevertheless, underlying growth momentum remains solid. We see growth picking up to 2¼ percent in 2019 before declining to 1¾ percent (our estimate of potential growth) in 2020 and 2021. Of course, ongoing negotiations over NAFTA pose some uncertainty to this outlook.

Inflation should pick up to 3 percent this quarter from 1.1 percent in the second, reflecting idiosyncratic increases in some core prices as well as elevated retail energy inflation. With oil prices projected to decline, inflation should moderate to the BOC's target of 2 percent by late 2020. Against this background, the BOC is expected to raise its policy rate from 1½ percent to 1¾ percent in the fourth quarter, gradually increase it to 3 percent by mid-2020, and keep it there through 2021.

- **Japan.** Following a weather-related contraction at the start of the year, real GDP rebounded 3 percent in the second quarter, 1½ percentage points higher than estimated in the July Tealbook, reflecting surprisingly strong private domestic demand. However, more-recent data have been somewhat weak; for example, industrial production declined in July. Accordingly, we see growth moderating to a range of ½ to 1 percent over the remainder of the forecast period, abstracting from substantial fluctuations in the second half of 2019 due to the consumption tax hike planned for October 2019.

Inflation is expected to swing from negative 2.3 percent in the second quarter to positive 1¼ percent in the third, partly reflecting fluctuations in food prices. Core inflation is also projected to rise, but only to ¼ percent. Going forward, we see headline inflation remaining near 1 percent through 2021, as higher oil prices provide some boost in the near term and a tight economy slowly pushes up core inflation. With inflation well below target, we expect the BOJ to maintain a highly accommodative stance. Although the BOJ signaled that it would allow the 10-year Japanese government bond yield to fluctuate a bit more around zero, we expect it to wait until the end of 2020 to lift that target range.

EMERGING MARKET ECONOMIES

- **China.** We estimate that growth slowed from 6½ percent in the second quarter to about 6 percent in the third, as tighter credit conditions weighed on domestic demand. Recent data suggest that both retail sales and investment growth have slowed notably, with the latter reflecting a sharp deceleration of infrastructure investment amid increased scrutiny of off-balance-sheet local government spending. In contrast, exports have so far remained relatively strong despite rising trade tensions with the United States. Going forward, we expect weakening external demand to be offset by more accommodative monetary and fiscal policies, with real GDP growth remaining around 6 percent in 2019 and 2020. With tariffs looming on a further \$200 billion (and perhaps even more) of U.S. imports from China, and with China poised to retaliate with tariffs on \$60 billion of imports from the United States, the threat of an escalation of trade hostilities remains a downside risk to our forecast.

Inflation has been subdued, partly because of past declines in food prices. With food prices rebounding and higher oil prices passing through to gasoline prices, inflation should rise to 3¾ percent in the third quarter and then settle at 2½ percent by the end of the year.

- **Other Emerging Asia.** Growth slowed to a mere 2½ percent in the second quarter, primarily because of payback from an unusually strong pace of 5½ percent in the first quarter. The second-quarter outcome was well below our July Tealbook estimate, in part reflecting weak exports. This weakness, along with a smaller-than-anticipated pickup in the tech sector, suggests that third-quarter growth will recover a little less than we expected, to 3½ percent. We expect growth to edge up to 3¾ percent in 2019 and 2020. This projection is down slightly due to somewhat tighter financial conditions—more so in India and Indonesia, where persistent current account deficits and other vulnerabilities have led to significant currency depreciation. Although U.S.–China trade barriers implemented to date should have a negligible effect on growth in other emerging Asian economies, an escalation of trade tensions is a clear downside risk.
- **Mexico.** Mexican real GDP contracted 0.6 percent at an annual rate in the second quarter after growing at a 4 percent pace in the first quarter. Monthly indicators suggest that investment (especially residential investment) was particularly weak, and manufacturing exports were surprisingly flat despite strong U.S. demand. However,

more-recent data, including resilient manufacturing PMIs and surging consumer confidence, have been more upbeat. Accordingly, we see growth moving up to nearly 3 percent by mid-2019, supported by robust U.S. demand. That said, because of the weak second-quarter data and the recent tightening in financial conditions, we have marked down growth about $\frac{1}{2}$ percentage point in the current quarter and by a touch over the medium term.

Headline inflation moved up to nearly 5 percent on a 12-month basis in August, boosted by rising food and energy prices. Concerned that inflation has been persistently well above the 3 percent target, the Bank of Mexico (BOM) decided in August to maintain its policy rate at $7\frac{3}{4}$ percent, notwithstanding the weak second quarter. As inflation returns to its target and concerns about capital flight moderate, the BOM is projected to begin easing monetary policy in mid-2019.

- **Brazil.** Partly because of the disruptions from the nationwide truckers' strike in May, the Brazilian economy grew at a tepid $\frac{3}{4}$ percent pace in the second quarter. Household demand was weak, investment dropped, and exports plummeted. Recent data on industrial production and exports suggest that activity has since recovered from the strike. Accordingly, we see growth rebounding in the third quarter and averaging nearly $2\frac{3}{4}$ percent in 2019. Relative to the July Tealbook, we marked down growth over the next year in response to tighter financial conditions and greater political uncertainty related to the October presidential election. Uncertainty about prospects for Brazil is unusually high due to the pressing need for pension reform and grave doubts about the ability of any of the leading presidential candidates to achieve it.

We estimate that headline inflation jumped from 4.3 percent in the second quarter to $6\frac{1}{4}$ percent in the third, reflecting currency depreciation and the lagged effects of disruptions from the truckers' strike. As the transitory effects of the strike dissipate, we expect inflation to fall in the fourth quarter before settling at $4\frac{1}{4}$ percent, the government's inflation target, by early next year. Despite elevated inflation, the central bank kept rates unchanged at $6\frac{1}{2}$ percent at its August meeting, citing the weak economy and anchored inflation expectations.

(This page is intentionally blank.)

The Foreign GDP Outlook

Real GDP*

Percent change, annual rate

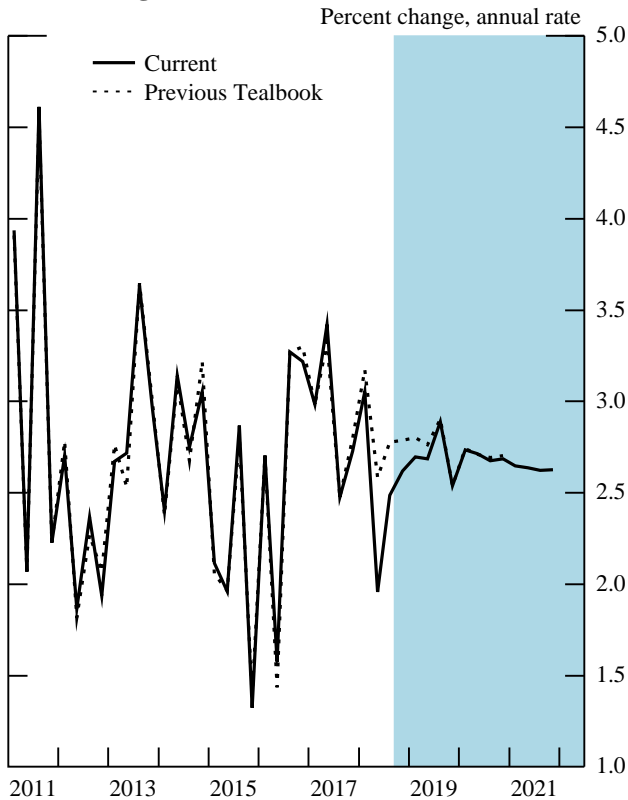
	2017	2018				2019	2020	2021
		Q1	Q2	Q3	Q4			
1. Total Foreign	2.9	3.1	2.0	2.5	2.6	2.7	2.7	2.6
Previous Tealbook	2.9	3.2	2.6	2.8	2.8	2.8	2.7	...
2. Advanced Foreign Economies	2.6	1.4	2.4	1.7	1.7	1.7	1.7	1.7
Previous Tealbook	2.6	1.3	2.0	1.9	1.9	1.7	1.7	...
3. Canada	3.0	1.4	2.9	1.8	2.1	2.2	1.8	1.8
4. Euro Area	2.7	1.6	1.5	1.6	1.5	1.5	1.6	1.6
5. Japan	2.0	-.9	3.0	.9	.7	.1	.8	.8
6. United Kingdom	1.3	.9	1.5	1.7	1.7	1.7	1.7	1.6
7. Emerging Market Economies	3.2	4.7	1.6	3.3	3.5	3.7	3.7	3.6
Previous Tealbook	3.2	5.1	3.2	3.6	3.7	3.7	3.7	...
8. China	6.8	7.2	6.5	6.1	6.3	6.2	5.9	5.7
9. Emerging Asia ex. China	4.1	5.5	2.5	3.6	3.8	3.7	3.7	3.5
10. Mexico	1.6	4.0	-.6	2.3	2.6	2.8	2.9	2.9
11. Brazil	2.1	.6	.7	3.5	2.3	2.6	2.8	2.8

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

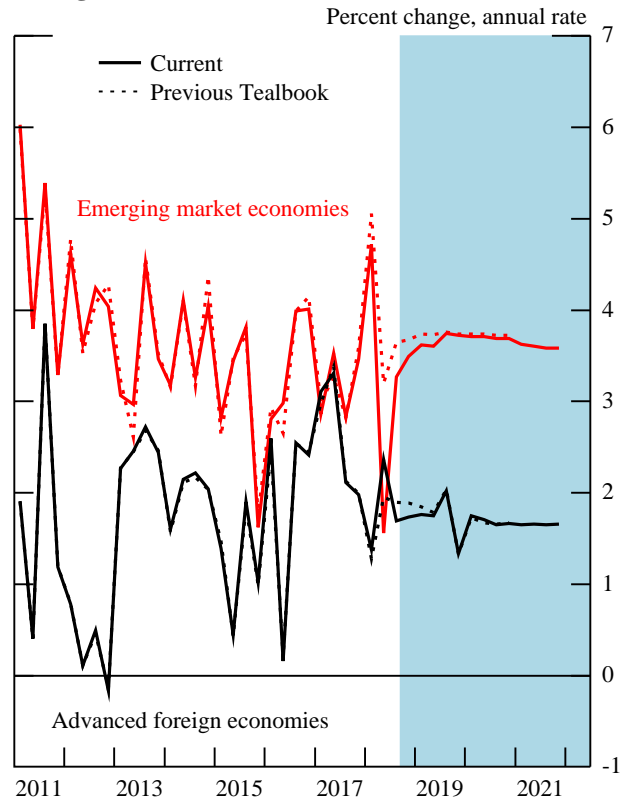
... indicates not applicable. This is the first time we have included a Tealbook forecast for 2021.

Int'l Econ Devel & Outlook

Total Foreign GDP



Foreign GDP



The Foreign Inflation Outlook

Consumer Prices*	Percent change, annual rate									
	2017	2018				2019	2020	2021		
		Q1	Q2	Q3	Q4					
1. Total Foreign	2.6	2.7	1.7	3.5	2.7	2.7	2.4	2.4		
Previous Tealbook	2.6	2.6	1.6	2.7	2.5	2.5	2.4	...		
2. Advanced Foreign Economies	1.5	2.6	1.0	2.3	1.8	1.9	1.7	1.7		
Previous Tealbook	1.5	2.6	1.0	1.8	1.6	1.8	1.7	...		
3. Canada	1.8	3.6	1.1	2.9	2.4	2.3	2.1	2.0		
4. Euro Area	1.4	2.1	2.1	2.5	1.7	1.4	1.5	1.7		
5. Japan	.6	2.5	-2.3	1.3	1.0	2.3	1.0	1.1		
6. United Kingdom	3.0	2.4	1.9	2.5	2.5	2.4	2.2	2.1		
7. Emerging Market Economies	3.4	2.7	2.2	4.4	3.3	3.2	3.0	2.9		
Previous Tealbook	3.4	2.6	2.1	3.4	3.1	3.0	3.0	...		
8. China	1.8	1.5	.7	3.8	2.5	2.5	2.5	2.5		
9. Emerging Asia ex. China	2.3	2.2	1.4	1.6	2.8	3.1	3.0	3.0		
10. Mexico	6.6	4.1	3.8	6.6	3.6	3.4	3.2	3.2		
11. Brazil	2.8	3.1	4.3	6.3	3.4	4.3	4.3	4.3		

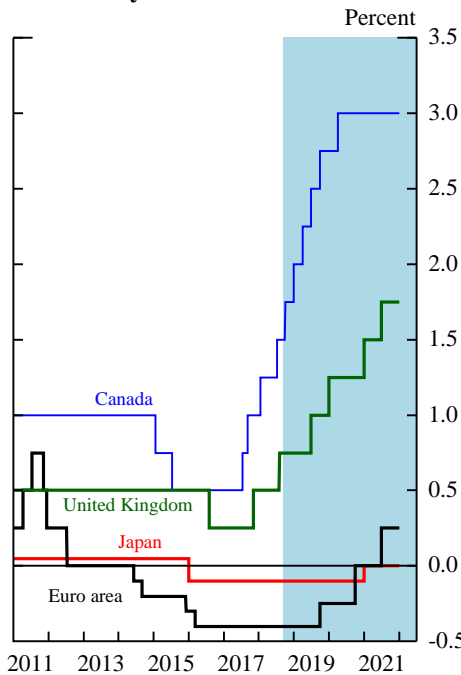
* CPI aggregates weighted by shares of U.S. non-oil imports.

... indicates not applicable. This is the first time we have included a Tealbook forecast for 2021.

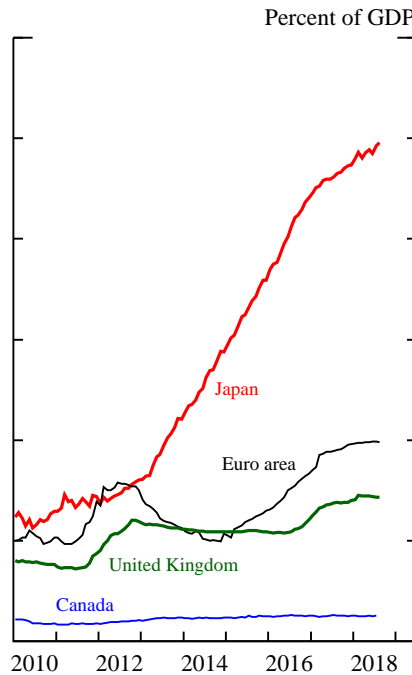
Int'l Econ Devel & Outlook

Foreign Monetary Policy

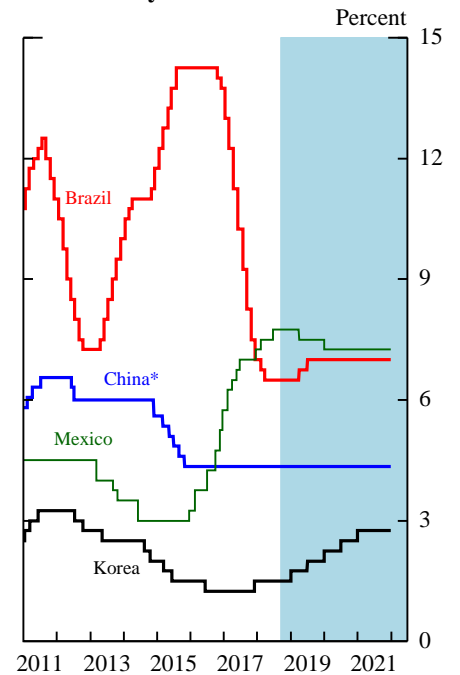
AFE Policy Rates



AFE Central Bank Balance Sheets

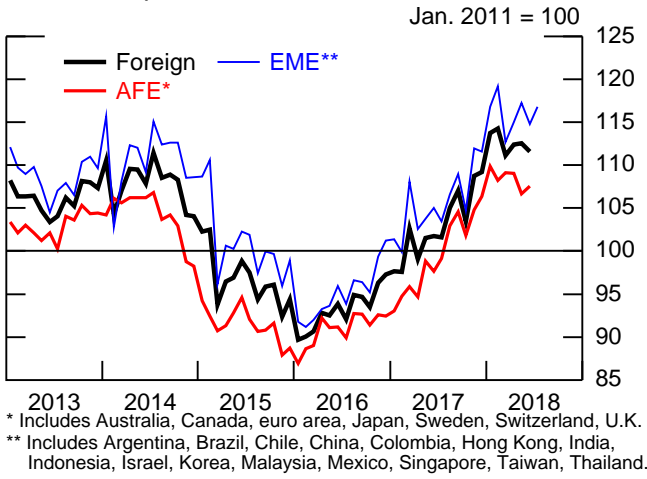


EME Policy Rates

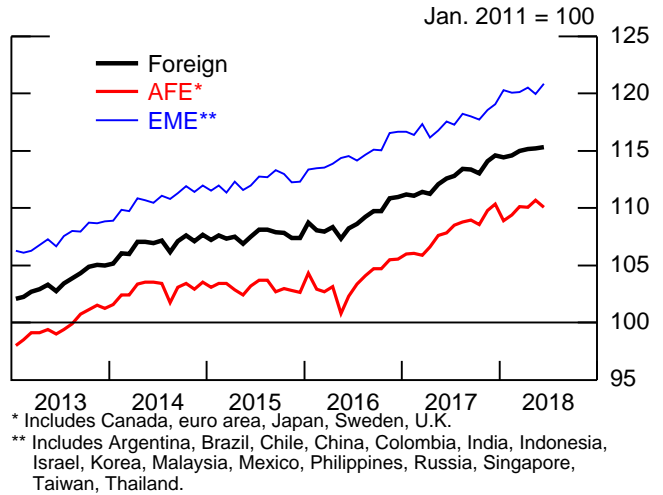


Recent Foreign Indicators

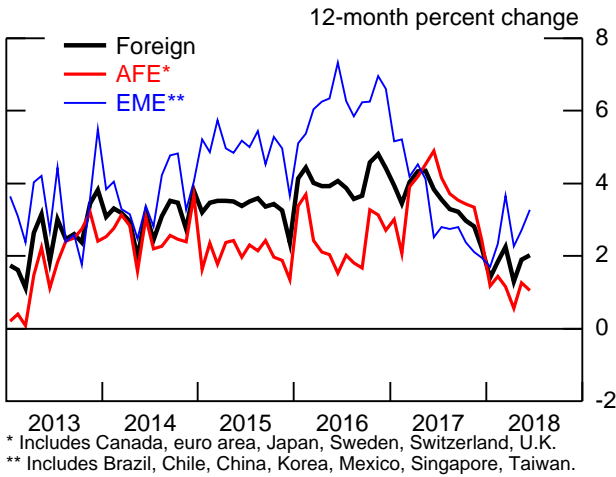
Nominal Exports



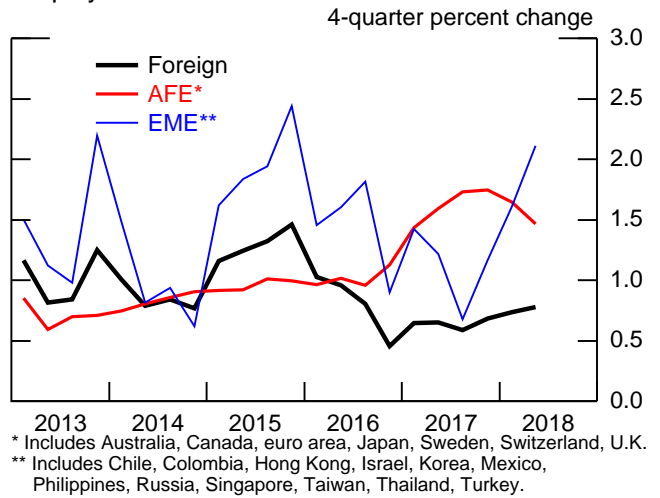
Industrial Production



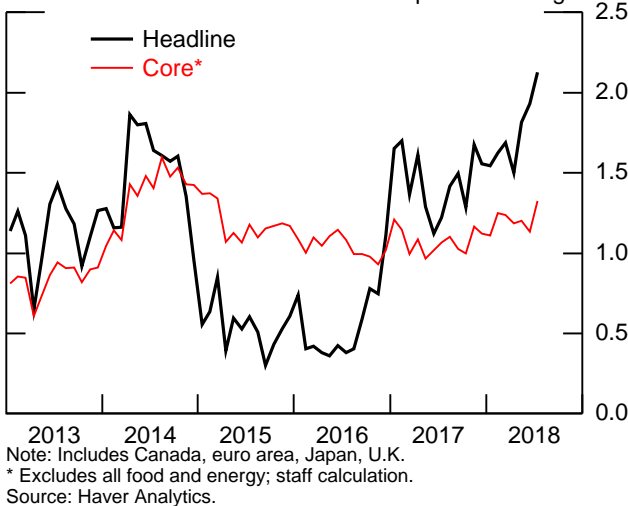
Retail Sales



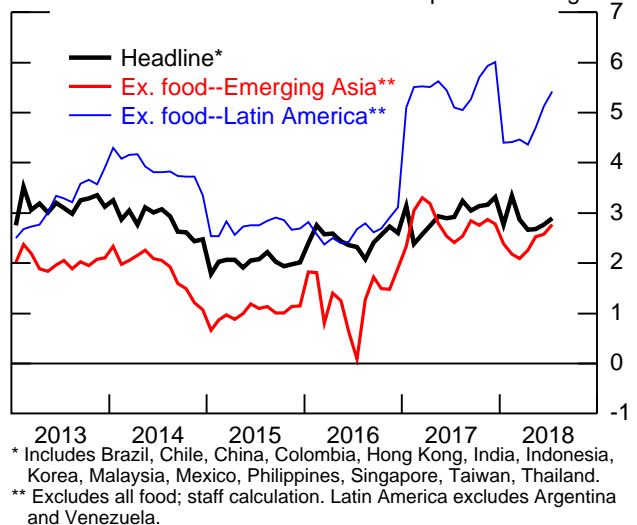
Employment



Consumer Prices: Advanced Foreign Economies
12-month percent change

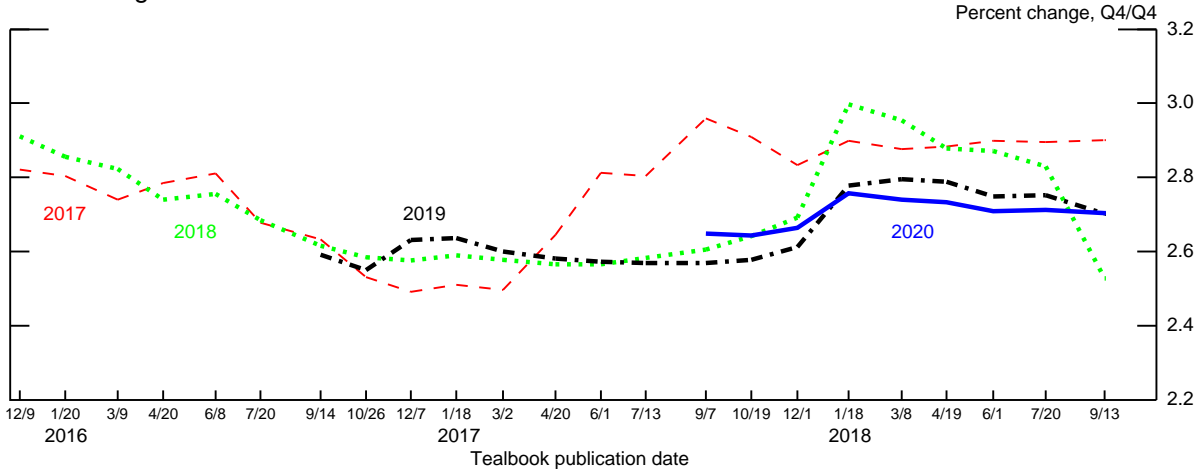


Consumer Prices: Emerging Market Economies
12-month percent change

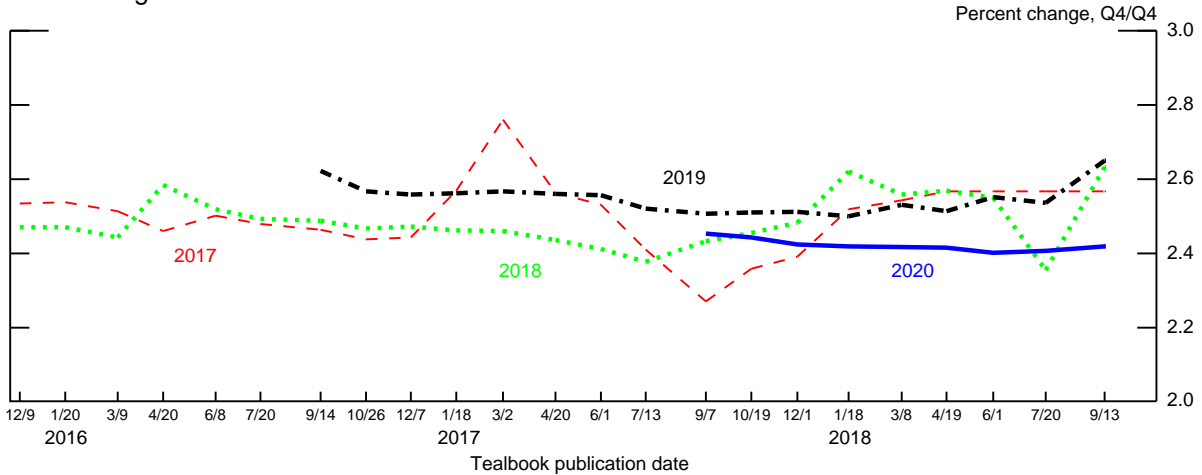


Evolution of Staff's International Forecast

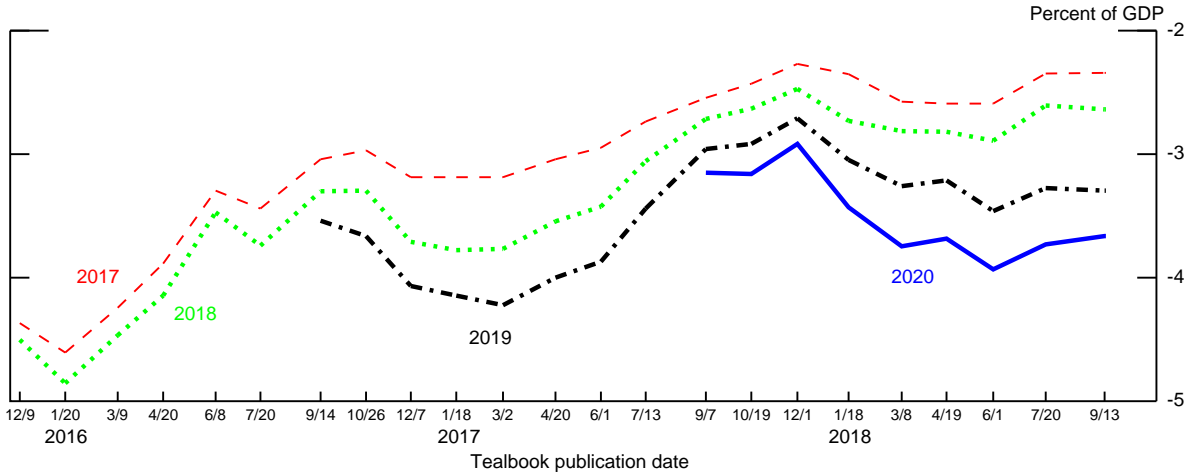
Total Foreign GDP



Total Foreign CPI



U.S. Current Account Balance



Int'l Econ Devel & Outlook

(This page is intentionally blank.)

Financial Market Developments

Nominal Treasury yields were little changed, on net, over the intermeeting period, amid ongoing concerns about trade policy, negative developments in some emerging market economies (EMEs), and domestic economic data releases that were, on balance, slightly stronger than expected. FOMC communications over the period were largely in line with expectations and appear to have had little effect on asset prices. U.S. stock prices rose, buoyed in part by positive news about corporate earnings, while global equity indexes declined and the broad dollar index moved up.

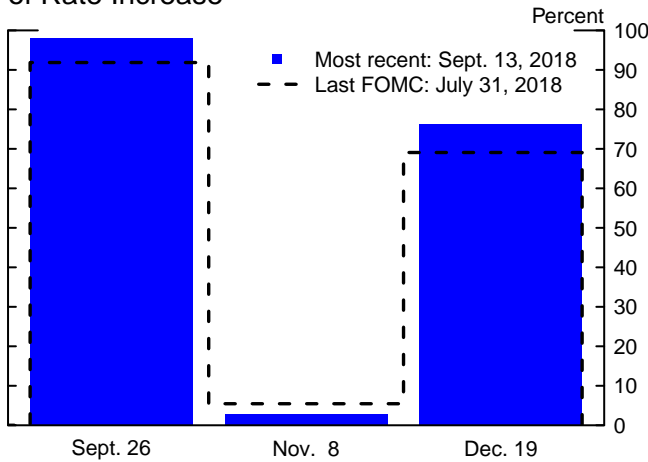
- A straight read of market quotes implies that the probability of a 25 basis point rate hike at the September FOMC meeting inched up further to near certainty, and the likelihood of an additional hike at the December meeting rose to about 75 percent.
- Nominal Treasury yields were little changed on net. Changes in inflation compensation were modest and mixed, with carry-adjusted TIPS-implied inflation compensation over the next 5 years ticking up and 5-to-10-year inflation compensation inching down.
- Broad U.S. equity price indexes increased about 3 percent, while the VIX moved down a bit. Credit spreads on both investment- and speculative-grade corporate bonds were little changed, on net, and remained low.
- The broad dollar index increased 1.5 percent, driven by appreciation against EME currencies. Broad measures of EME equity prices declined about 6 percent, led by significant stress in some countries and continued uncertainty about trade policy. Concerns about Italy and Brexit also weighed on major advanced foreign economy (AFE) equity price indexes, which declined 2 to 6 percent.

DOMESTIC DEVELOPMENTS

FOMC communications elicited limited price reaction in financial markets over the intermeeting period, and market-implied measures of monetary policy expectations were little changed. Based on a straight read of quotes on federal funds futures contracts,

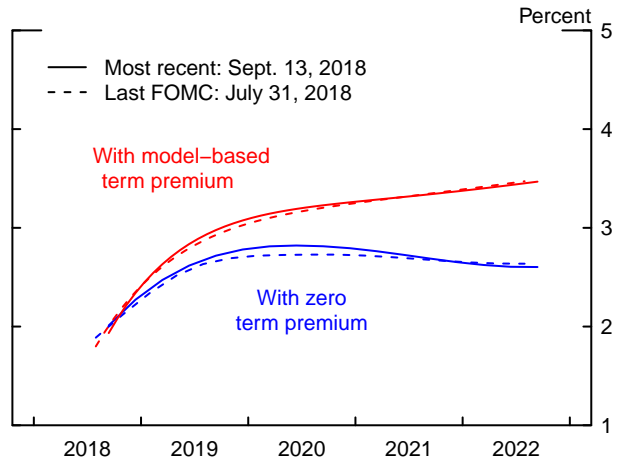
Policy Expectations and Treasury Yields

Market-Implied Probability of Rate Increase



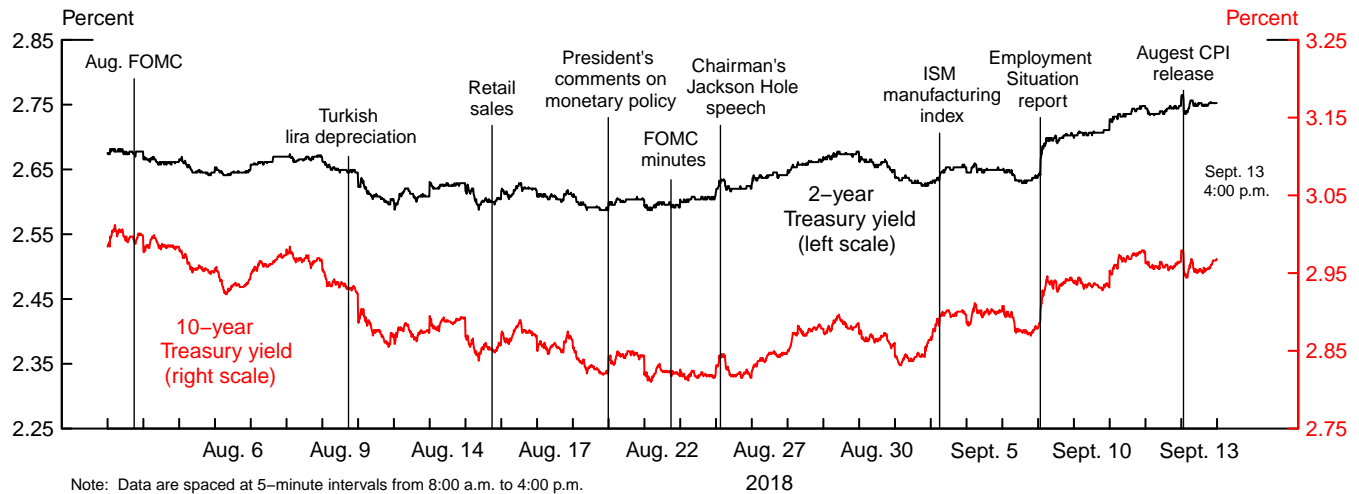
Note: Probabilities implied by a binomial tree fitted to settlement prices on federal funds futures contracts, assuming the policy action at each meeting is either no change or a 25 basis point increase in rates and no intermeeting moves. The effective federal funds rate until the next FOMC meeting is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

Implied Federal Funds Rate



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

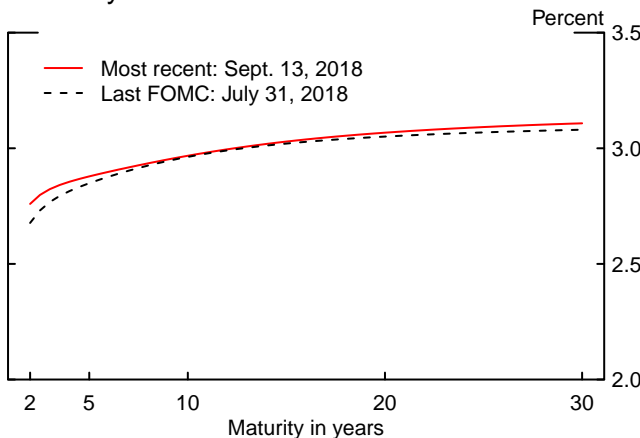
Selected Interest Rates



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

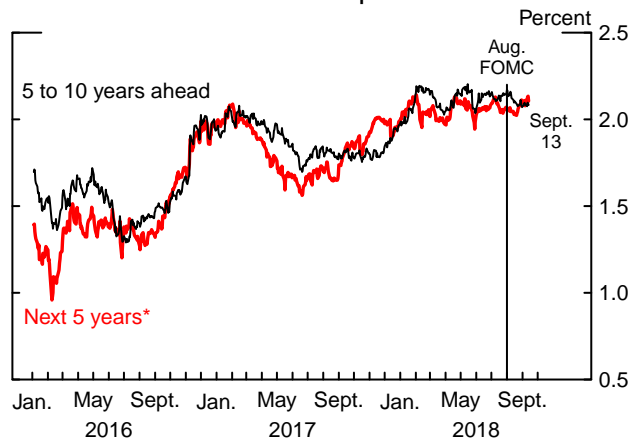
Financial Markets

Treasury Yield Curve



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

TIPS-Based Inflation Compensation



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

investors are currently pricing in a 98 percent probability that the FOMC will raise the target range for the federal funds rate 25 basis points at its September meeting and about a 75 percent probability of an additional hike at the December meeting. The OIS-implied path of the federal funds rate, adjusted for term premiums using a staff model, continues to imply that an increase totaling roughly 50 basis points is expected between now and the end of the year.

Evolving trade-related risks and other international developments reportedly weighed somewhat on market sentiment, especially in the early part of the intermeeting period. However, domestic economic data releases came in a bit above market expectations, on net, with the stronger-than-expected average hourly earnings in the August employment report notably boosting nominal Treasury yields. On balance, the nominal Treasury yield curve was little changed, with 2- and 10-year yields increasing 8 basis points and 1 basis point, respectively (see also the related box “Will Pension Fund Demand for Long-Dated U.S. Treasury Securities Shift in Mid-September?”). The spread between 10- and 2-year Treasury yields, a popular leading indicator of recessions, now stands a bit above the 20th percentile of its distribution since 1971, while the near-term forward spread—an arguably more precise gauge of the intermediate-term outlook—stands near its 50th percentile.¹ Uncertainty about short- and long-term interest rates implied by interest rate derivatives remained close to the lower end of its range over recent years.

Changes in inflation compensation over the intermeeting period were modest. TIPS-implied inflation compensation over the next 5 years ticked up, while 5-to-10-year inflation compensation fell a little on net.

Broad U.S. equity price indexes have risen about 3 percent, on net, since the August FOMC meeting, as positive news about corporate earnings and the domestic

¹ The near-term forward spread in this context is defined as the difference between the current implied forward rate on three-month Treasury bills six quarters from now and the current yield on a three-month Treasury bill. For analysis of the information content of these spreads, see Eric Engstrom and Steven Sharpe (2018), “(Don’t Fear) The Yield Curve,” FEDS Notes (Washington: Board of Governors of the Federal Reserve System, June 28), www.federalreserve.gov/econres/notes/feds-notes/dont-fear-the-yield-curve-20180628.htm.

In a special question in the September Blue Chip Economic Indicators survey, respondents were asked to assess whether they envision the yield curve inverting, defined as the spread between 10- and 2-year Treasury yields falling below zero. Only 4 percent of respondents reported that they expect an inversion during the remainder of this year, while 33 percent reported expecting such an outcome in 2019.

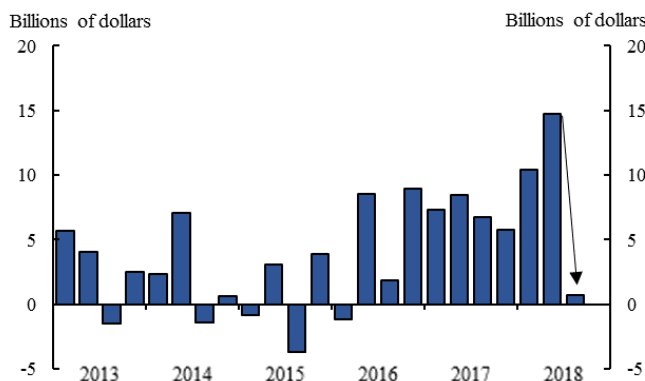
Will Pension Fund Demand for Long-Dated U.S. Treasury Securities Shift in Mid-September?

Some recent financial market commentaries have suggested that, since the beginning of this year, domestic pension funds have increased their holdings of long-dated Treasury securities, putting downward pressure on long-dated yields. Commentaries have highlighted, in particular, U.S. corporations’ incentive to increase contributions to their pension plans to take advantage of deductions based on last year’s 35 percent corporate tax rate instead of the 21 percent rate for 2018 under the new tax legislation. Private pension funds can take advantage of this deduction until 8½ months after the end of their pension plan’s fiscal year, which will be mid-September for firms that follow a calendar-year plan. Some commentaries have further speculated that when the mid-September deadline passes, the flow effect from the increased demand for Treasury securities may dissipate, putting upward pressure on long-dated yields. The discussion below argues that a material shift in pension fund demand for longer-dated Treasury securities after mid-September seems unlikely to occur.

First, available indicators do not suggest that demand for U.S. Treasury securities by pension funds is presently elevated. Given a lack of comprehensive and timely data on pension fund activity, financial market commentaries frequently use STRIPS (Separate Trading of Registered Interest and Principal of Securities) activity as a proxy to gauge pension fund demand for U.S. Treasury securities.¹ The figure shows that STRIPS activity did rise in the first half of the year, with the total amount of STRIPS outstanding increasing in the first and second quarters. However, the figure

Financial Markets

Change in Total STRIPS Outstanding



Note: Data for 2018:Q3 are through August 2018.
Source: Bloomberg.

¹ STRIPS are Treasury securities where the coupon and principal payments have been separated. Pension funds typically prefer principal STRIPS because they have no coupon payments and so are longer-duration securities, allowing pension funds to better match their long-duration liabilities. STRIPS data are typically used when looking at pension fund dynamics given the longer time lag for other available data on pension funds.

also shows that this activity has already decelerated in the third quarter, with monthly data (not shown) indicating a steady decline in activity since June. Consequently, this pattern does not suggest a current run-up in pension fund demand for Treasury securities in the months leading up to the mid-September deadline.

Second, survey-based estimates of pension fund contributions also indicate that corporate contributions thus far have not increased significantly in 2018, with some estimating that total contributions will be smaller than in 2017.² Other long-dated fixed-income markets where pension funds are active have also not shown signs of increased demand. For example, while the Treasury yield curve has flattened, the curve for investment-grade credit spreads has actually steepened this year.

Even if the change in tax policy lowers demand for Treasury securities by pension funds after mid-September, other important factors driving pension fund demand are likely to persist beyond mid-September. First, outperformance of equities relative to fixed income typically leads pension funds to de-risk and increasingly rebalance their portfolios into fixed income. This factor behind pension fund demand for Treasury securities is unlikely to change after September. Second, the variable premium that pension funds pay based on their level of underfunding has been increasing and is expected to increase further in the coming year.³ This factor is expected to continue to drive pension funds' need to improve their funded status and demand high-quality fixed-income securities such as Treasury securities.

In sum, it seems unlikely that any material shift in pension fund demand for Treasury securities will occur in mid-September. Market pricing currently also does not show evidence of concerns of a potential increase in interest rate volatility in mid-September. More broadly, the factors highlighted in previous staff work as driving long-dated yields—including changes in the estimated longer-run neutral rate and the effect of central bank balance sheets on term premiums—are expected to persist.⁴ Nonetheless, the staff will continue to monitor pension fund demand and the potential effect on the Treasury yield curve.

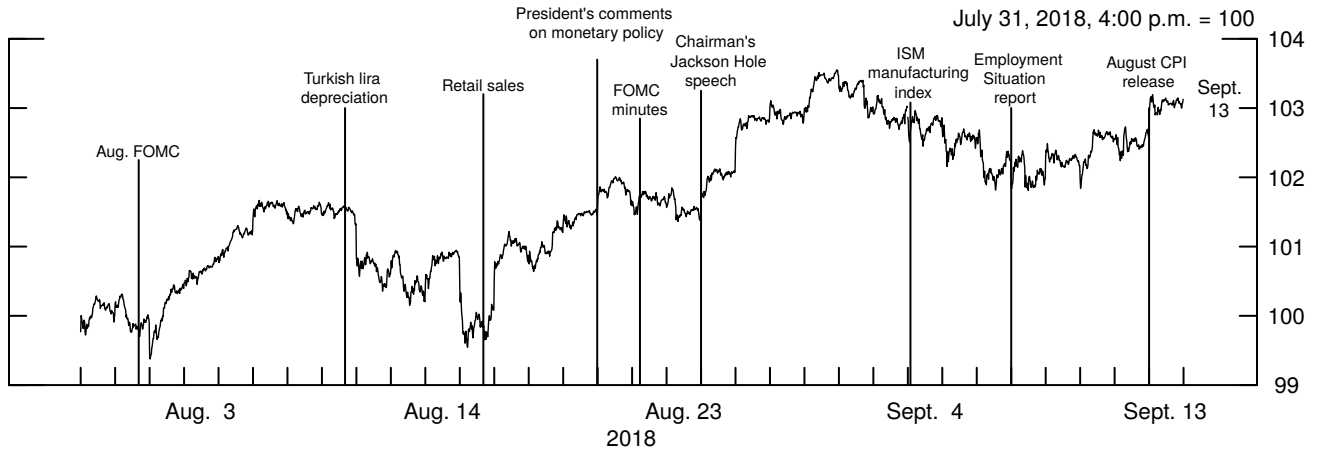
² Estimates from a *Pensions & Investments* survey indicated total contributions for 2018 will be around \$30 billion. Assuming effects similar to previous staff studies, demand for Treasury securities of this magnitude would imply a decline in term premiums of just a few basis points.

³ Corporate pension funds are required to pay premiums to the Pension Benefit Guaranty Corporation (PBGC). The variable component of the premium is determined as a given percentage of a pension's unfunded liabilities. This rate has increased from 1.5 percent to 3.5 percent since 2015 and is expected to increase further to 4.0 percent in 2019. For additional information on these factors, see Pooja Gupta, Monica Scheid, and Jason Warner (2018), "Pension Fund Demand for Fixed Income Products," MarketSource (New York: Federal Reserve Bank of New York, May 8).

⁴ See the memo to the FOMC titled "Recent Movements in Longer-Term Treasury Yields: Causes and Potential Policy Implications," by the staff at the Board and the Federal Reserve Bank of New York, dated July 14, 2017.

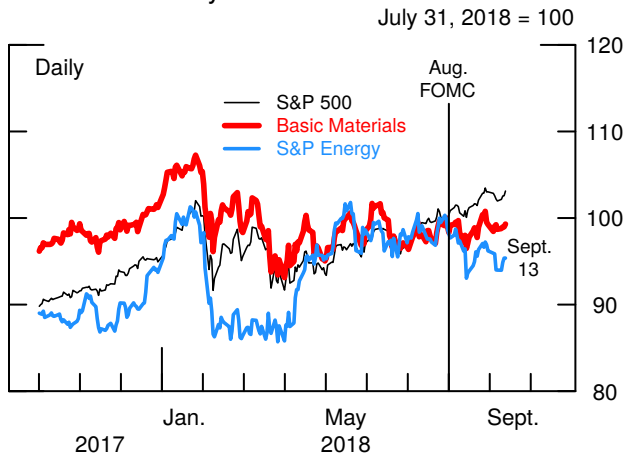
Corporate Asset Market Developments

Intraday S&P 500 Index



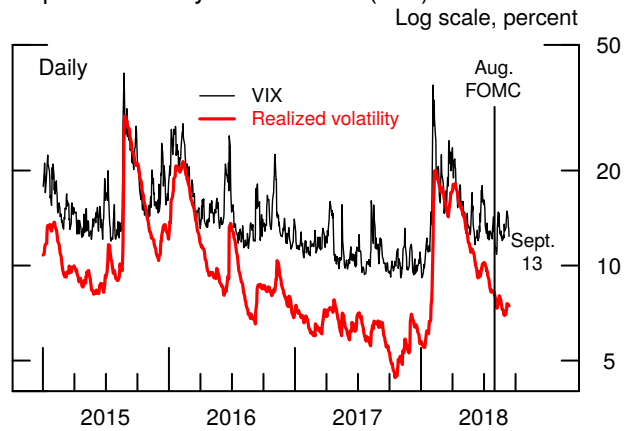
Note: Data are spaced at 5-minute intervals from 9:30 a.m. to 4:00 p.m.
Source: Bloomberg.

S&P 500 Industry Indexes



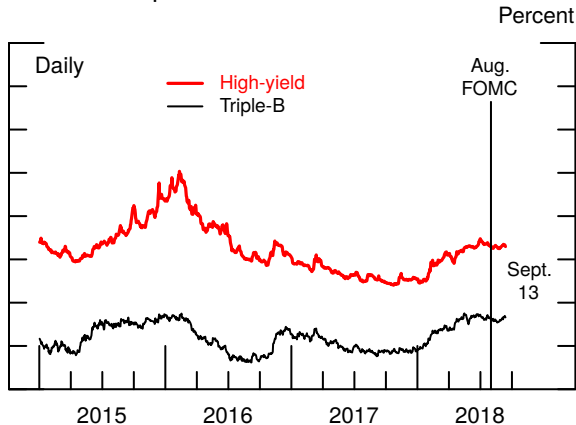
Source: Bloomberg.

Implied Volatility on S&P 500 (VIX)



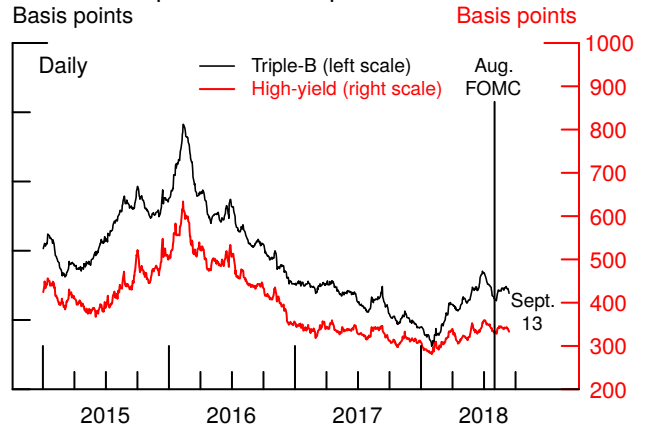
Source: Chicago Board Options Exchange; Bloomberg.

10-Year Corporate Bond Yields



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

10-Year Corporate Bond Spreads



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

Financial Markets

economy outweighed negative international developments. Stock prices increased for most sectors in the S&P 500 index, as the final group of second-quarter earnings reports came in strong and analysts' earnings expectations for the rest of the year, which typically weaken after a reporting season, stayed firm. However, concerns about prospects in EMEs—particularly with respect to trade policy and China—appeared to weigh on stocks in the energy sector, which fell notably, and those in the basic materials sector, which also declined. The VIX moved down a bit, on net, and remains somewhat above the extremely low levels seen in late 2017.

Over the intermeeting period, yields on investment- and speculative-grade corporate bonds were little changed on net. As a result, spreads of corporate bond yields over comparable-maturity Treasury yields also were about unchanged. Overall, yields and spreads on corporate bonds remained at the low ends of their respective historical distributions.

FOREIGN DEVELOPMENTS

Since the August FOMC meeting, risk sentiment in global financial markets deteriorated amid significant stress in some EMEs, increased focus on the course of fiscal policy in Italy, and continued trade tensions. Foreign economic data releases were generally in line with market expectations and did not materially move foreign asset prices.

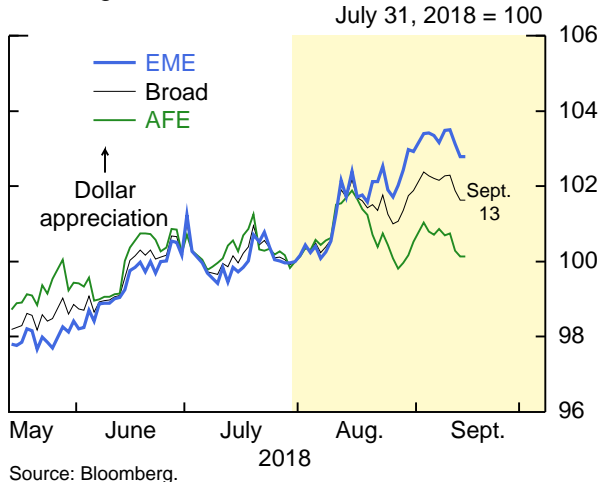
The U.S. dollar appreciated 2.6 percent against EME currencies and was flat against AFE currencies, as trade tensions and severe financial pressures on several EMEs weighed on broader risk sentiment. Some of the largest contributors to the strengthening of the dollar were Latin American currencies.² The Mexican peso depreciated 1 percent against the dollar despite a preliminary trade agreement between the United States and Mexico. Political developments ahead of the Brazilian presidential election this fall weighed on Brazilian assets, and the *real* depreciated 12 percent against the dollar. The Chinese RMB was little changed as the authorities took measures to contain depreciation.

Turkey and Argentina experienced significant market pressure over the intermeeting period (see the box “Financial Stresses in Turkey and Argentina” in the International Economic Developments and Outlook section). Other EMEs with

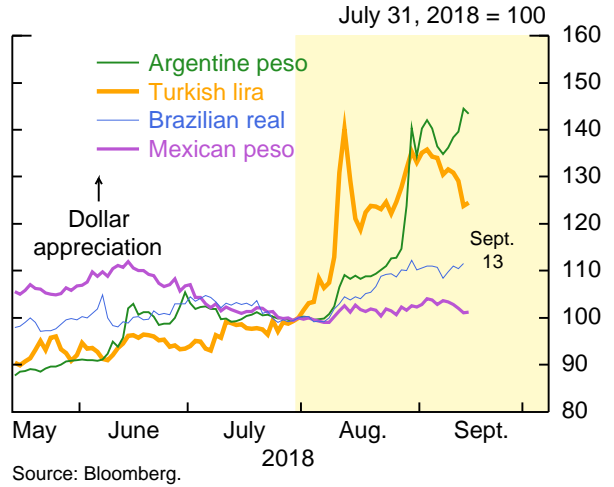
² The 97 percent devaluation of the Venezuelan bolivar against the dollar accounted for nearly 1 percentage point of the 2.6 percent appreciation of the dollar against EME currencies.

Foreign Developments

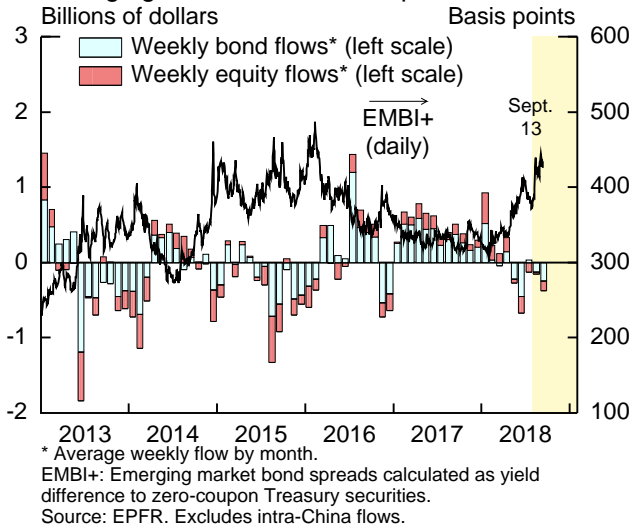
Exchange Rates



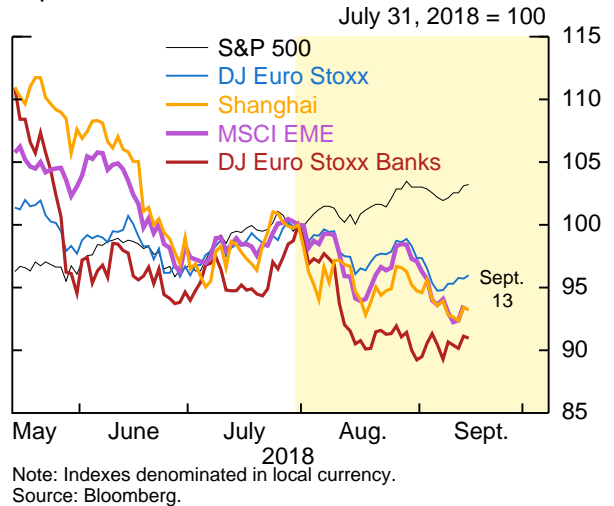
EME Currencies



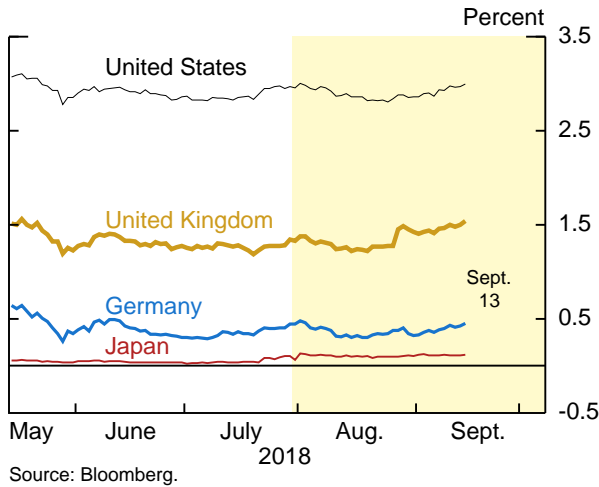
Emerging Market Flows and Spreads



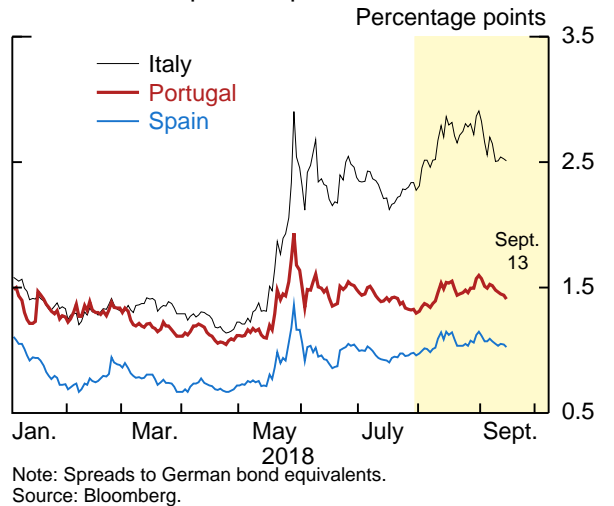
Equities



10-Year Nominal Yields



Euro-Area Peripheral Spreads



Financial Markets

macroeconomic vulnerabilities and reliance on external financing, such as South Africa, Brazil, and Russia, also came under considerable pressure. Stronger EMEs such as South Korea and Thailand held up better. Overall, broad measures of EME equity prices declined about 6 percent, with the Shanghai Composite declining 7 percent on continuing trade tensions. Outflows over the intermeeting period from mutual funds that invest in emerging market bonds and equities have been small.

In the AFEs, major equity price indexes fell 2 to 6 percent. European bank stocks moved down 9 percent on concerns about Brexit, fiscal policy in Italy, and potential exposures to Turkey and other EMEs. Movements in AFE sovereign yields were mixed, with slight declines in German bund yields and modest increases in Japanese sovereign yields. Euro-area peripheral spreads to German equivalents widened, led by a 25 basis point increase in Italian spreads.

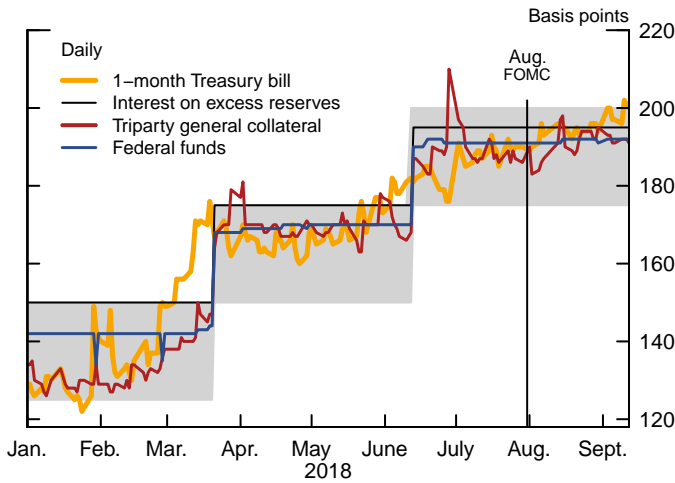
SHORT-TERM FUNDING MARKETS AND FEDERAL RESERVE OPERATIONS

Short-term funding markets functioned smoothly over the intermeeting period. The effective federal funds rate (EFFR) ticked up from 1.91 percent to 1.92 percent, narrowing its spread relative to IOER to 3 basis points. In the triparty Treasury repo market, rates averaged 1.91 percent, 16 basis points above the ON RRP rate and about unchanged from the previous intermeeting period. An elevated level of Treasury bills outstanding, following heavy issuance this summer, reportedly has continued to put upward pressure on money market rates and reduced the attractiveness of the Federal Reserve's ON RRP facility. Take-up at the facility averaged only \$1.4 billion per day over the intermeeting period.

Funding spreads in markets for unsecured short-term instruments continued to retrace from their elevated levels seen earlier this year. The spread of overnight nonfinancial A2/P2 commercial paper (CP) to the EFFR, as well as spreads of one-month nonfinancial A2/P2 CP and three- and six-month negotiable certificates of deposit to OIS, edged down over the intermeeting period. Assets under management at prime money market funds (MMFs) continued to move up but remained well below the levels that prevailed prior to the implementation of MMF reforms in 2016.

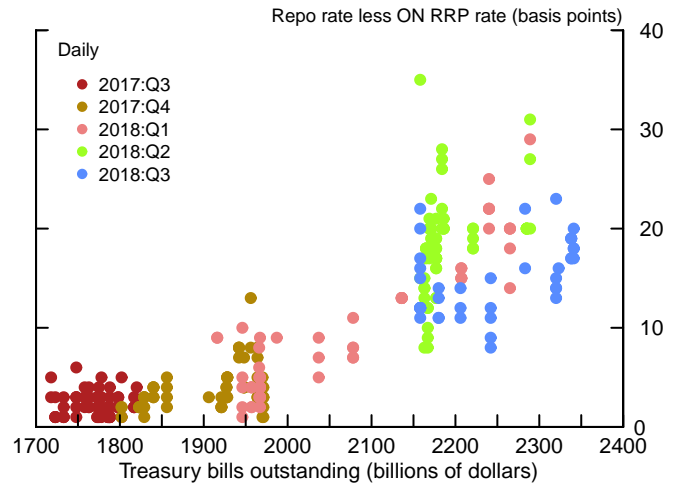
Short-Term Funding Markets

Selected Money Market Rates



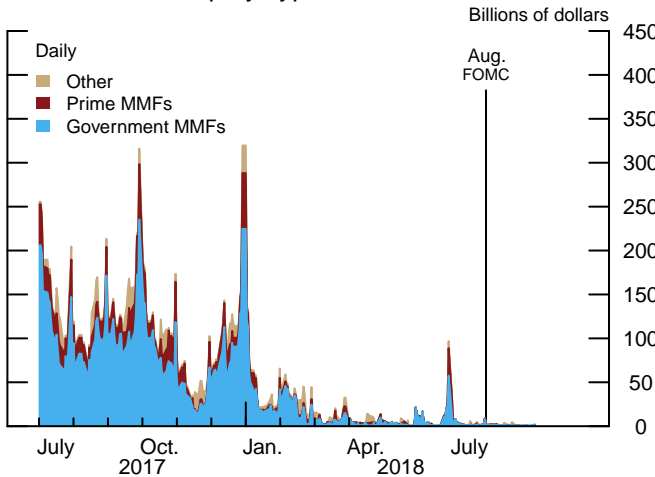
Note: Federal funds rate is a weighted median. Shaded area is the target range for the federal funds rate.
Source: Federal Reserve Board, Form FR 2420, Report of Selected Money Market Rates.

Repo Rate and Treasury Bills Outstanding



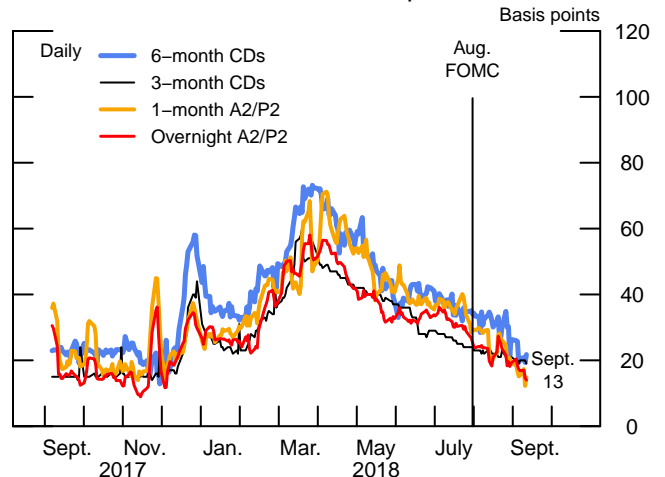
Note: Repo rate is the triparty general collateral rate (TGCR). ON RRP is the overnight reverse repurchase rate.
Source: Federal Reserve Bank of New York; Department of the Treasury.

ON RRP Take-Up by Type



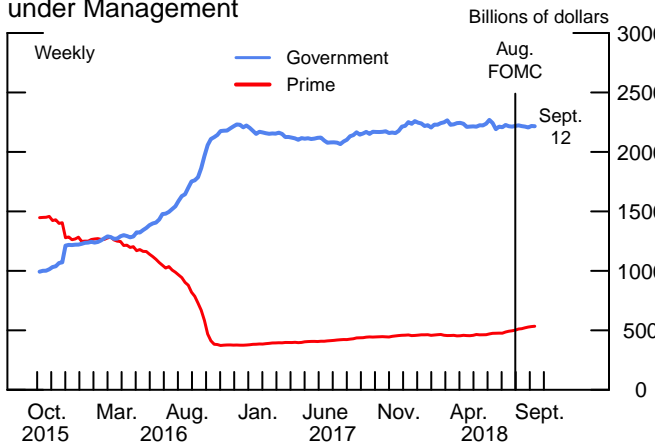
Note: ON RRP is overnight reverse repurchase agreement; MMF is money market fund.
Source: Federal Reserve Bank of New York.

CD and A2/P2 Nonfinancial CP Spreads



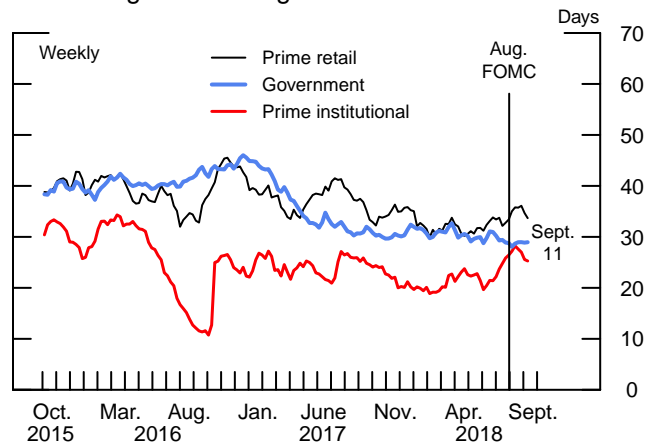
Note: Overnight CP spreads are to federal funds rate. All other spreads are to OIS. CD spreads are a 5-day moving average.
Source: Depository Trust & Clearing Corporation.

Prime and Government MMF Assets under Management



Source: Investment Company Institute.

MMF Weighted-Average Maturities



Note: All statistics are computed on an asset-weighted basis.
Source: iMoneyNet.

Financial Markets

Financing Conditions for Businesses and Households

Data received over the intermeeting period indicate that financing conditions for businesses and households remained supportive of economic activity. Financing flows to business and households have been solid but moderated a bit in recent months. Credit quality remained strong, on balance, although some signs of deterioration emerged.

- Gross issuance of corporate bonds and banks’ extensions of C&I loans moderated in July and August. In contrast, new-money leveraged loan issuance was robust.
- Financing conditions for small businesses remained favorable, and credit demand among small business owners showed signs of strengthening, albeit from a low base.
- Mortgage credit remained widely available to most borrowers in recent months. For borrowers with low credit scores, lending conditions continued to ease but remain somewhat tight. Growth of home-purchase mortgages slowed, likely reflecting the run-up in mortgage rates earlier this year.
- Consumer credit continued to expand at a solid pace in recent months even as interest rates for credit cards and auto loans have continued to rise.
- In this Tealbook, we also provide the staff’s assessment of changes in financing conditions over the past year (see the box “How Have Business and Household Borrowing Conditions Changed over the Past Year?”).¹ In sum, nonprice terms and standards appear to have eased over the past year, at least partially offsetting the rise in interest rates during that time.

¹ Moreover, the box “Financial Conditions Indexes” discusses several publicly available financial conditions indexes, plus a new staff index that focuses specifically on nonfinancial firms, that all point toward an overall easing of financial conditions over the past two years.

How Have Business and Household Borrowing Conditions Changed over the Past Year?

Since September 2017, key interest rates for business and household borrowers have continued to increase, broadly in line with increases in the federal funds rate (table 1). Borrowing conditions overall, however, have not tightened as much as these increases might suggest, in part because nonprice credit terms and standards across several categories of credit have eased.

In the business sector, investor appetite for corporate debt has been supported by lower corporate tax rates and strong corporate earnings over the past year as well as generally strong corporate credit quality. In addition, a rising short-term interest rate environment has particularly increased investor demand for floating-rate corporate debt. This dynamic has contributed to an easing of corporate loan standards and terms, especially in the leveraged loan market, where “covenant lite” loans are common and other terms have continued to ease (figure 1). Partly in response to the increased competition from capital markets and other lenders, banks have eased terms and standards on C&I loans (figure 2).

Indications of credit conditions easing over the past year are also apparent for small businesses. The share of small business owners reporting that it is “easy” or “somewhat easy” to obtain credit over the past 12 months has been steadily trending upward (figure 3).

Nonprice terms and standards in commercial real estate (CRE) markets have also eased a bit. A moderate net share of banks reported in the SLOOS that they have eased standards and terms on nonfarm nonresidential and multifamily CRE loans over the past year. Banks cited increased competition from bank and nonbank lenders and an improved outlook for the sector as reasons for the easing. In the

Table 1. Change in Key Borrowing Rates for Businesses and Households

Interest Rate or Yield	Change since Sept. 19, 2017 (bps)
Federal funds target range	75
5-year Treasury	103
10-year Treasury	72
10-year triple-B bond	88
10-year high-yield bond	109
30-year fixed-rate mortgage	88
Auto loan	91

Note: Changes calculated from Sept. 19, 2017, through Sept. 11, 2018, except for auto loans, which are calculated through Sept. 2, 2018. Recent data on credit card and commercial mortgage rates not available.

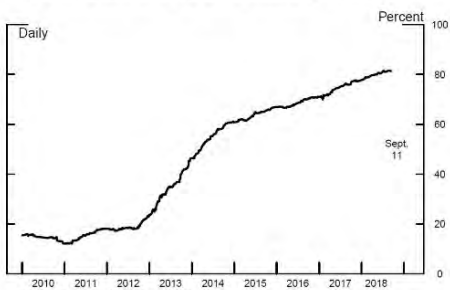
Source: Federal Reserve Bank of New York; Federal Reserve Board staff estimates (Treasury yields); staff estimates of yield curves based on Merrill Lynch bond data (triple-B and high-yield rates), LoanSifter (mortgage rate), and J.D. Power (auto loan rates).

CMBS market, the share of interest-only loans has increased (figure 4), although underwriting on other dimensions has remained stable.

Terms and standards have also eased in residential mortgage lending. The maximum debt-service-to-income ratio available on mortgage loans for subprime borrowers, for example, has been easing steadily for the past several years (figure 5). One factor contributing to the easing is that mortgage lenders face strong incentives to keep up the volume of originations in order to cover their high fixed costs. The rise in interest rates has depressed mortgage refinancing originations, so lenders have an incentive to ease terms so that more borrowers qualify. Meanwhile, extremely low delinquency rates on mortgage loans may have also contributed to lender willingness to ease mortgage standards and terms.

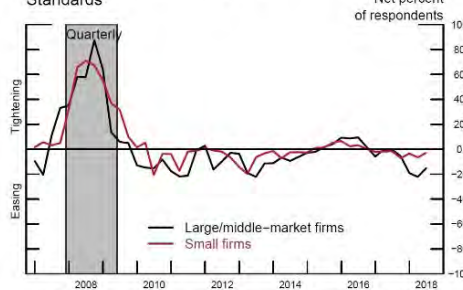
In contrast, in credit card and auto lending markets, lender risk appetite for extending credit to subprime consumers appears to have diminished a bit, perhaps because of rising (though still low) delinquency rates among these consumers. A significant net share of banks reported in July 2018 that their standards on both subprime credit cards (figure 6) and subprime auto loans were at the tighter end of the range of standards on such loans since 2005. However, standards for prime borrowers in both markets appear broadly unchanged over the past year.

Figure 1. Percent of Covenant Lite Leveraged Loans



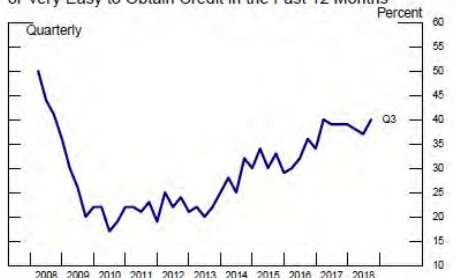
Note: Reported by Market Weight.
Source: J.P. Morgan Markets; JPM Leveraged Loan Index.

Figure 2. C&I Loans: Changes in Standards



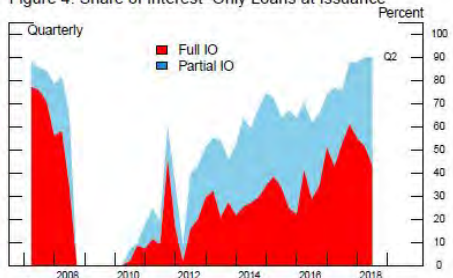
Note: Responses are weighted by respondents' holdings of C&I loans. The shaded region represents the 2008-09 recession.
Source: Federal Reserve Board, Senior Loan Officer Opinion Survey on Bank Lending Practices.

Figure 3. Small Businesses Reporting It was Somewhat or Very Easy to Obtain Credit in the Past 12 Months



Note: Not seasonally adjusted.
Source: Wells Fargo Small Business Survey, <https://wellsfargobusinessinsights.com/research/small-business-index>.

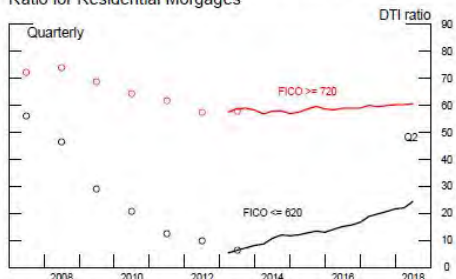
Figure 4. Share of Interest-Only Loans at Issuance



Source: MorningStar.

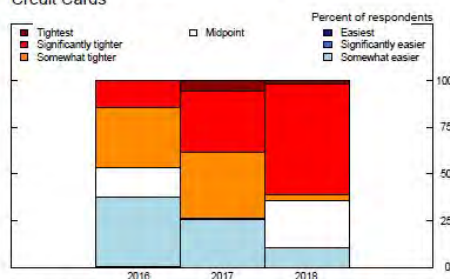
Taken together, these indicators suggest that the effects of the rise in interest rates on broad financing conditions have been offset to some degree by an easing of terms and standards in many markets.¹ While there is no definitive summary statistic to characterize the aggregate net effect of rising rates and easing availability, the net effect of these developments on a given borrower may depend on that borrower’s characteristics. A stylized fact in the academic literature is that the borrowing decisions of those with easy access to credit are primarily governed by interest rates, whereas terms and standards have a larger effect on credit-constrained borrowers. If so, given that interest rates are still low by historical standards, the increasing availability of credit in several markets may imply that credit conditions have eased, on net, for many credit-constrained borrowers.

Figure 5. Maximum Allowed Debt–Service–to–Income Ratio for Residential Mortgages



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

Figure 6. Level of Standards on Subprime Credit Cards



Note: Responses are weighted by survey respondents’ holdings of relevant loan types, as reported on the Q1 Call Reports from 2016 to 2018 where relevant.

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

¹ This discussion assumes that an increase in interest rates represents a tightening of financing conditions. To the extent that interest rates have risen because firms’ expected returns on investment have increased, financing conditions are not necessarily tighter relative to productive opportunities.

BUSINESS FINANCING CONDITIONS

Nonfinancial Corporations

On balance, financing conditions for large nonfinancial firms remained accommodative in recent months. Demand for corporate borrowing appears to have declined, in part due to strong earnings, rising rates, and seasonal factors. In July and August, gross issuance of corporate bonds was relatively weak, while C&I loan growth moderated. An abundance of M&A activity drove new-money leveraged loan issuance higher, while the run-up in spreads earlier this year reportedly led to significantly weaker refinancing issuance.

Meanwhile, the pace of equity issuance through both initial and seasoned offerings was solid in July but fell, due to seasonal factors, in August. The volumes of announced and completed M&A deals in recent months continued their upward trend since the beginning of the year, with the value of completed deals reaching its highest level in three years. Volumes of announced and completed share repurchases stayed near their respective all-time highs.

On balance, the credit quality of nonfinancial corporations remained strong over the intermeeting period, though some signs of deterioration emerged. The aggregate KMV expected year-ahead default rate for nonfinancial firms rose in September because of an increase in firm liabilities and now stands near its historical median. Despite dipping slightly in August, the six-month trailing bond default rate remained near its highest level in two years and stayed above the median of its historical distribution.

The reporting season for second-quarter corporate earnings drew to a close during the intermeeting period, with earnings per share for nearly all sectors of the S&P 500 showing strong gains. Wall Street analysts project robust growth in earnings for S&P 500 companies over the next year.

Small Businesses

Financing conditions for small businesses remained favorable. The supply of credit showed signs of continued easing, as the share of respondents to the Wells Fargo Small Business Index reporting that it was “easy” or “somewhat easy” to obtain credit in the previous 12 months increased again in the latest data, although it remained below pre-crisis levels. Loan originations, as measured by the three-month moving average of the Thomson Reuters/PayNet Small Business Lending Index, were flat in July and remained

Financial Conditions Indexes

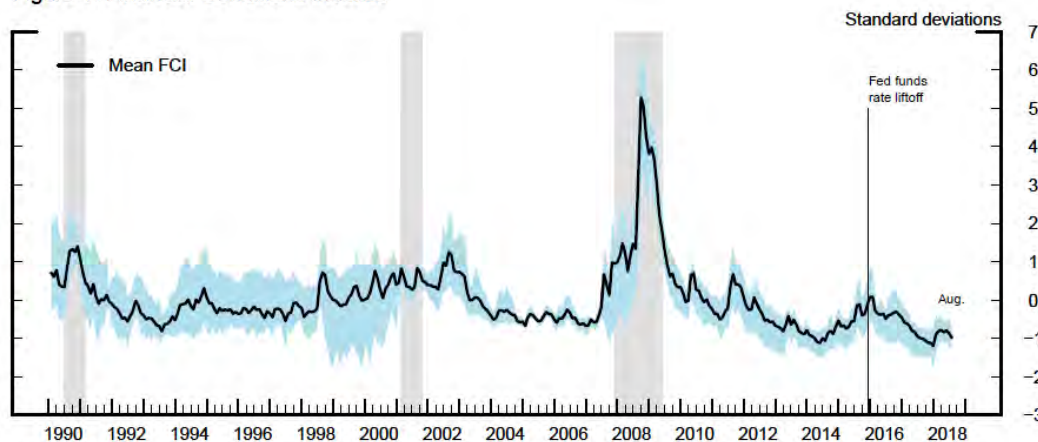
Over the past decade, market participants, academics, and policy institutions have created an increasing number of financial conditions indexes (FCIs).¹ These indexes were developed for three main purposes: to summarize overall financial market developments, to assess how monetary policy is transmitted to financial conditions, and to gauge what financial conditions presage for future economic activity.

The blue shaded region in figure 1 displays the range of values over time across five publicly available FCIs, developed by Goldman Sachs; Bloomberg; and the Federal Reserve Banks of Chicago, Kansas City, and St. Louis. The mean of these indexes is plotted as the black line.²

Although they are based on different numbers and types of financial variables, these indexes share broadly similar variations, especially during periods of widespread financial market stress such as the financial crisis of 2007–09.³ They all point to a broad easing of financial conditions since December 2015, even as the FOMC has gradually raised the federal funds rate from its lower bound.

The existing FCIs are typically constructed by aggregating financial variables into one summary series using methods such as principal component analysis, weighted averages, and dynamic factor models.⁴ While these composite indexes provide a useful summary of broad financial market movements, they share two main drawbacks when used to assess the link between financial

Figure 1: Financial Conditions Indexes



Note: Mean FCI represents the mean of the standardized FCIs developed by Goldman Sachs, Bloomberg, the Chicago Fed, the St. Louis Fed, and the Kansas City Fed. The indexes are shown in standard deviation units from their respective means. The blue shaded region represents the range of these five standardized FCIs. The gray shaded regions represent NBER-dated recessions.
Source: FRED, Bloomberg.

¹ A partial list of widely used FCIs includes those developed by Goldman Sachs; Deutsche Bank; Citi; Bloomberg; IMF; OECD; and the Federal Reserve Banks of Chicago, Kansas City, and St. Louis.

² To facilitate the comparison, each index is normalized by subtracting its mean and then dividing by its standard deviation. Values of the indexes above (below) zero indicate tighter (looser) financial conditions than on average. An index value of 1.0 denotes financial conditions that are tighter than average by one standard deviation.

³ The number of variables included in the FCIs ranges from 5 in the Goldman Sachs index to more than 100 in the Chicago Fed index.

⁴ For example, the highly watched GS-FCI is a weighted average of five financial variables (the federal funds rate, the 10-year Treasury yield, the corporate BBB–Treasury yields spread, the S&P price-to-earnings ratio, and the broad value of the U.S. dollar), with weights chosen based on the effects of these variables on real GDP growth using a VAR model.

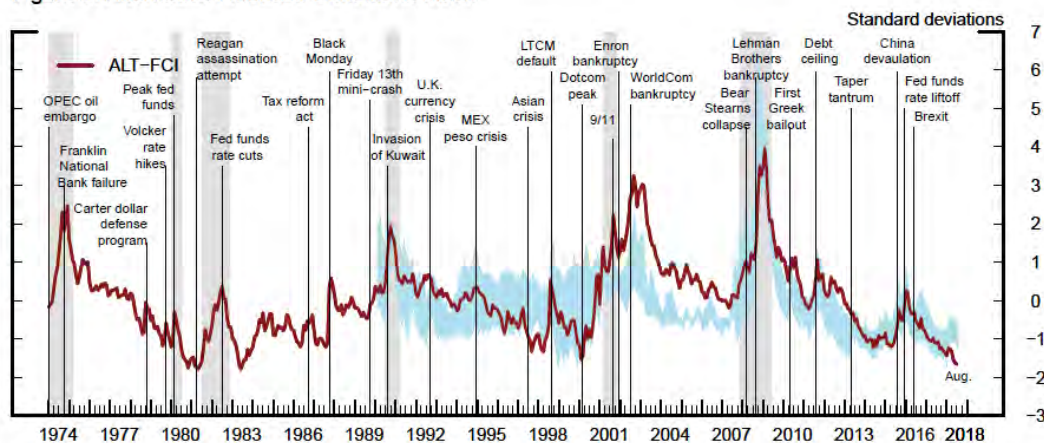
markets, the real economy, and monetary policy. First, the weights used to aggregate financial variables are typically determined by statistical methods rather than justified by how these variables affect economic activity. Second, these indexes do not differentiate between the various channels—such as the wealth channel, the credit condition channel, and the terms-of-trade channel—through which financial variables affect the real economy.

In an attempt to overcome these shortcomings, the staff recently developed an alternative index that is designed to measure financing conditions for nonfinancial corporations. This index uses only information from firms' stock returns and credit ratings. Roughly speaking, it is constructed as the difference in equity returns between two portfolios of firms with credit ratings above and just below investment grade.⁵ Due to credit market imperfections, speculative-grade firms are more sensitive to changes in overall financing conditions than comparable investment-grade firms. To the extent that financing condition risks are priced in the equity market, investment-grade firms can be expected to outperform speculative-grade firms when financing conditions tighten, leading to a wider returns differential.

This alternative staff index has three main properties. First, by focusing on the cost and availability of funding to nonfinancial corporations, this index captures a well-defined channel through which financial conditions affect the economy. Second, it provides a clean measure of changes in financing conditions by comparing two groups of firms that mainly differ in their access to capital markets. Third, it has better in-sample forecasting power for economic activity than other available financial conditions indexes (not shown).⁶

As shown by the red line in figure 2, the staff's index exhibits countercyclical variations and effectively captures several episodes of stress in the U.S. financial system. It co-moves with the range of other FCIs, and, like the other FCIs, indicates that financing conditions have eased since liftoff.

Figure 2: Alternative Financial Conditions Index



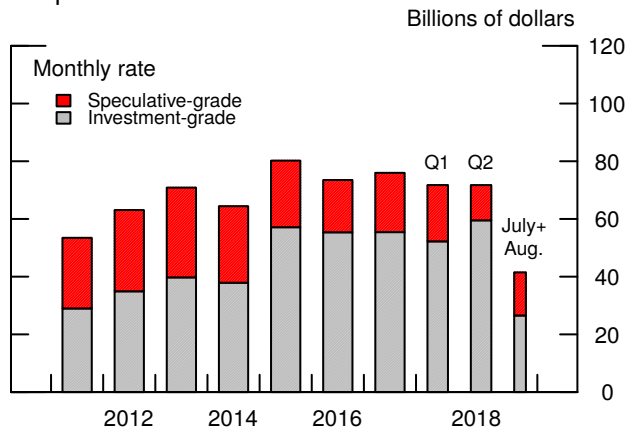
Note: The alternative FCI is standardized; values above (below) zero represent tighter (easier) than average financial conditions. The blue shaded region represents the range of five standardized FCIs: Goldman Sachs, Bloomberg, the Chicago Fed, the St. Louis Fed, and the Kansas City Fed. The indexes are shown in standard deviation units from their respective means. The gray shaded regions represent NBER-dated recessions.
Source: Staff calculations, CRSP, Moody's.

⁵ Technically, this index is calculated as the deviation from the long-run relation between the systematic components of the cumulative log returns of the two portfolios. The systematic components are derived from the Fama-French five-factor asset pricing model, augmented with the momentum and quality/junk factors.

⁶ One important limitation of this index is that it does not capture changes in financing conditions for private nonfinancial firms, financial institutions, or households. Another limitation of this index is that firms in both groups are assumed to have similar exposure to nonfinancing conditions shocks.

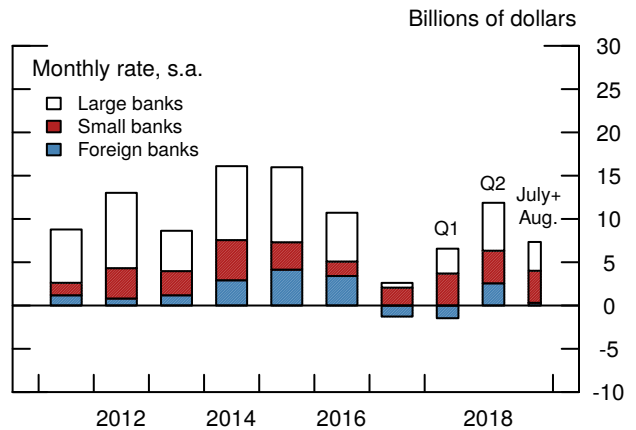
Business Finance

Gross Issuance of Nonfinancial Corporate Bonds



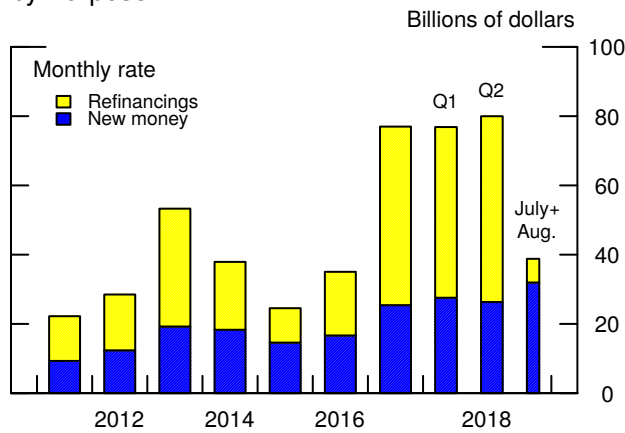
Note: Bonds are categorized by Moody's, Standard & Poor's, and Fitch. Source: Mergent Fixed Income Securities Database.

Commercial and Industrial Loans



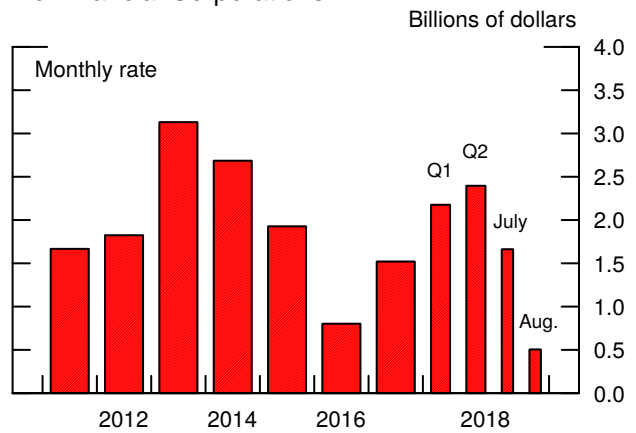
Source: Staff calculations, Federal Reserve Board, Form FR 2644, Weekly Report of Selected Assets and Liabilities of Domestically Chartered Commercial Banks and U.S. Branches and Agencies of Foreign Banks.

Institutional Leveraged Loan Issuance, by Purpose



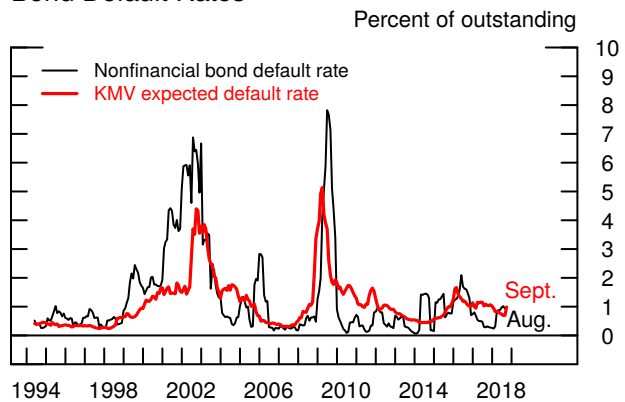
Source: Thomson Reuters LPC LoanConnector.

IPO Issuance by Domestic Nonfinancial Corporations



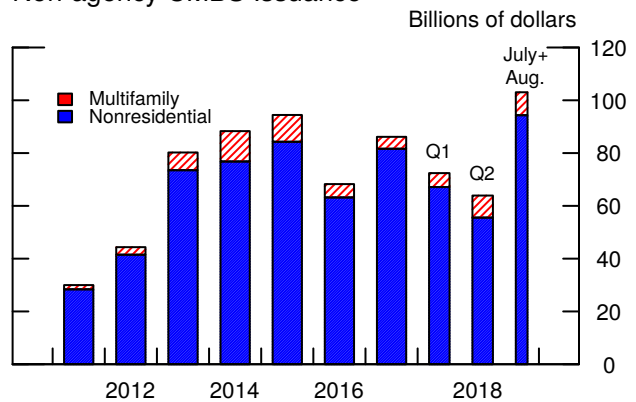
Source: Securities Data Company.

Realized and Expected Nonfinancial Bond Default Rates



Note: For realized nonfinancial bond default rate, 6-month trailing defaults divided by beginning-of-period outstanding, at an annual rate. Source: For realized default rate, Moody's Investors Service. Expected default rate is calculated using firm-level data from Moody's KMV.

Non-agency CMBS Issuance



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

well above year-earlier levels. Although the demand for credit by small businesses still appears weak relative to pre-crisis levels, the National Federation of Independent Business optimism index has moved higher in recent months, suggesting a further strengthening of small business credit demand in coming months. While indicators of recent small business loan performance remained strong, delinquency rates on such loans have been rising slowly over the past several months.

Commercial Real Estate

Financing conditions for commercial real estate also remained accommodative. Although CRE loan growth at banks moderated in July and August, issuance of CMBS was robust. Market participants expect CMBS issuance to slow in the near term because of declines in both the volume of maturing pre-crisis-era loans that need to be refinanced and the volume of property acquisitions that require purchase loans. CMBS spreads were little changed and remained near their post-crisis lows.

MUNICIPAL GOVERNMENT FINANCING CONDITIONS

Over the intermeeting period, financing continued to be readily available to municipalities. Yields on 20-year municipal bonds increased slightly over the intermeeting period, as did their ratios over comparable-maturity Treasury yields. Gross issuance of municipal bonds remained solid. The credit quality of state and local governments improved in recent months, as the number of credit rating upgrades outpaced the number of downgrades. The recent agreement between Puerto Rico GO and COFINA bondholders over the division of future sales tax revenues resulted in a marked increase in the price of Puerto Rico's benchmark GO bonds.

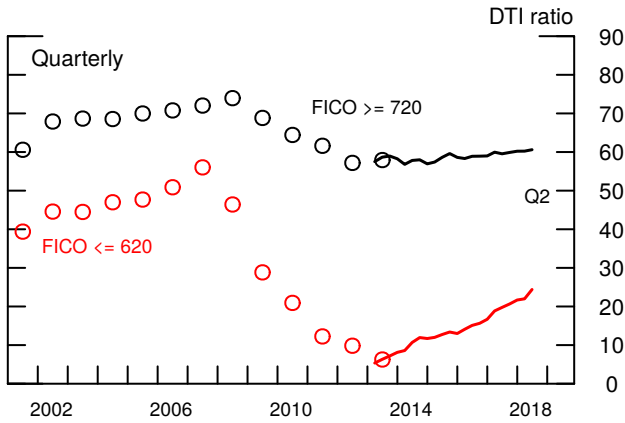
HOUSEHOLD FINANCING CONDITIONS

Residential Real Estate

Financing conditions in the residential mortgage market remained accommodative on balance. For borrowers with low credit scores, however, conditions remained somewhat tight despite continued easing, as the maximum debt-service-to-income ratio for residential mortgages for these borrowers continued to climb but remained well below pre-crisis levels. Rates on 30-year fixed-rate conforming mortgages rose a bit, on net, roughly in line with movements in yields on agency MBS. Refinancing activity continued to be muted in recent months, and the growth in purchase mortgage

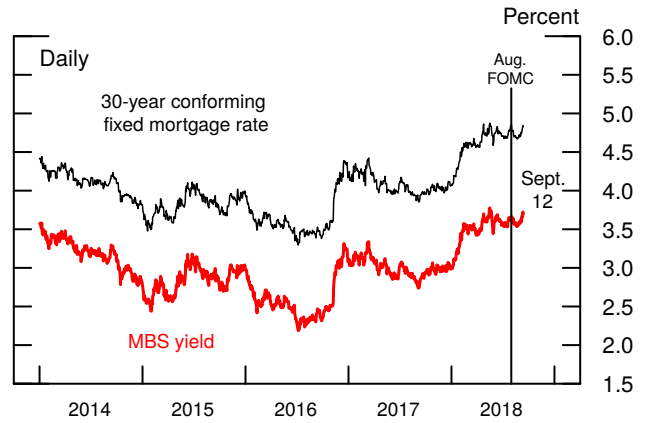
Household Finance

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



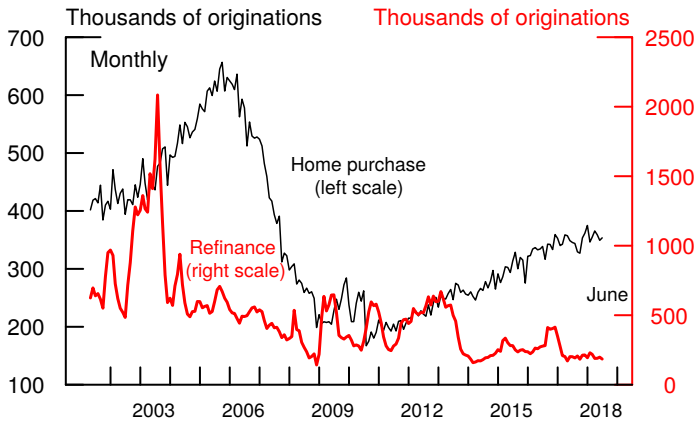
Note: DTI is debt service to income.
Source: For frontiers shown with circles, McDash and CoreLogic; for frontiers shown with solid lines, Optimal Blue.

Mortgage Rate and MBS Yield



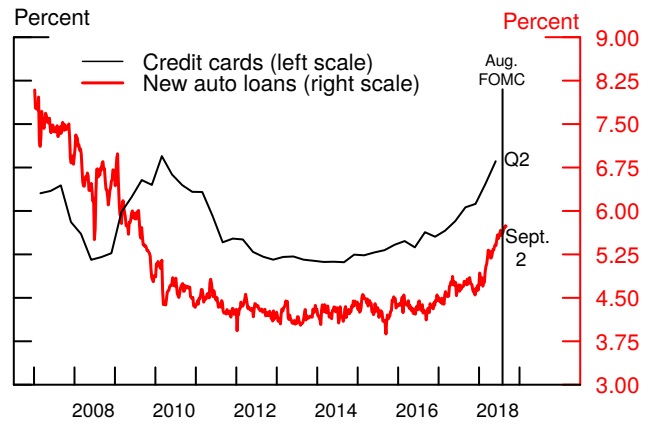
Note: The mortgage-backed securities (MBS) yield is the Fannie Mae 30-year current-coupon rate.
Source: For MBS yield, Barclays; for mortgage rate, Optimal Blue.

Purchase and Refinance Activity



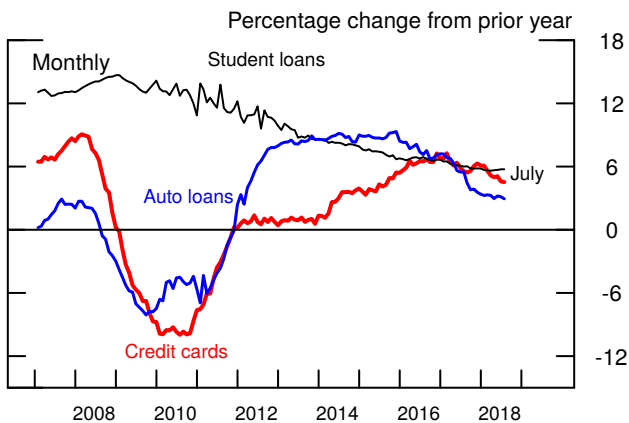
Note: The data are seasonally adjusted by Federal Reserve Board staff.
Source: For values prior to 2017, data reported under the Home Mortgage Disclosure Act of 1975; for values in and after 2017, staff estimates.

Consumer Interest Rates



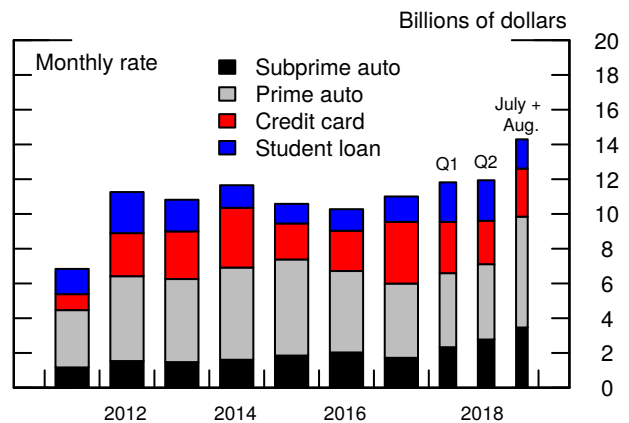
Note: Credit card data reflect rates at commercial banks on all credit card plans; data are reported quarterly and not seasonally adjusted. Auto loans data are reported weekly and seasonally adjusted.
Source: For credit cards, Federal Reserve Board; for auto loans, J.D. Power.

Consumer Credit



Source: Federal Reserve Board.

Gross Consumer ABS Issuance



Source: Bloomberg.

originations slowed a bit relative to year-earlier levels, in part reflecting the notable increase in mortgage rates earlier this year.

Consumer Credit

On balance, financing conditions were little changed in recent months and remained largely supportive of growth in household spending. However, the supply of credit to consumers with subprime credit scores remained tight. More broadly, although interest rates for credit cards and auto loans continued to rise, consumer credit expanded at a solid pace.² Conditions in the consumer ABS market remained favorable, with issuance remaining robust and spreads holding at very low levels.

² The box “Recent Auto Loan Growth at U.S. Credit Unions” discusses how auto lending at credit unions has remained strong despite the moderation in auto lending at finance companies and banks.

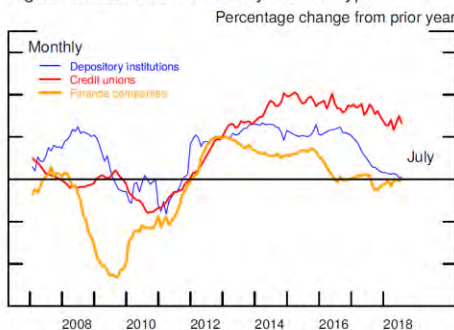
Recent Auto Loan Growth at U.S. Credit Unions

Auto lending has recovered strongly, on balance, since 2012. Nominal outstanding loan balances rebounded from their post-crisis nadir of \$700 billion to over \$1.1 trillion in 2018:Q2. This discussion highlights that auto loan growth at credit unions was particularly strong and persistent over this period, resulting in a notable expansion in credit unions’ share of the U.S. auto loan market. The expansion of credit unions’ auto lending appears to be concentrated among borrowers with better credit scores and so does not appear to represent a loosening of lending standards.

Over the past five years, the average annual growth of auto loans from credit unions was about 13 percent, more than that from depository institutions (about 7 percent) and finance companies (about 3 percent).¹ Moreover, although auto lending at banks and finance companies has moderated over the past two years as interest rates gradually rose, growth at credit unions has remained strong (figure 1). Indeed, had auto lending growth at credit unions been the same as that for other types of lenders, total auto loans outstanding would currently be 10 percent (about \$120 billion) lower.

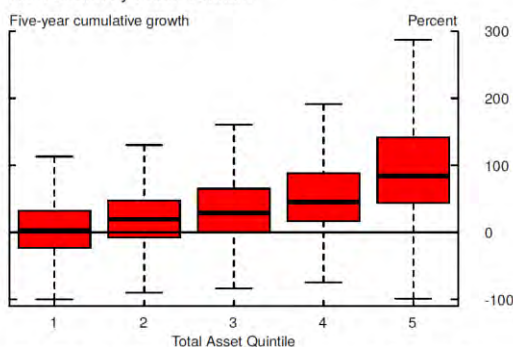
Growth in auto lending within the credit union sector has been highly concentrated among the largest credit unions. As shown in figure 2, median five-year cumulative auto loan growth was merely 3 percent for credit unions in the bottom size quintile of the total assets distribution but was 80 percent for credit unions in the top size quintile.

Figure 1: Auto Loan Growth by Lender Type



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

Figure 2: 2013:Q1 to 2018:Q1 Growth of Credit Union Auto Loans by Asset Quintile



Note: Black lines indicate median five-year cumulative growth. Boxes indicate interquartiles of the cumulative growth. Whiskers indicate 1.5 times interquartile range.
Source: National Credit Union Administration, Call Report.

¹ As of July 2018, auto loan balances at depository institutions, credit unions, and finance companies were about \$450 billion, \$370 billion, and \$300 billion, respectively.

The number of auto loans originated by credit unions grew much faster than that of other types of lenders. Loans originated to finance new car purchases rose 80 percent over the past five years at credit unions but stayed about flat, on net, at banks and finance companies (figure 3).² Over the same period, the average size of credit union auto loans rose 17 percent, about in line with other lenders.³

As shown in figure 4, the average credit score of new originations from credit unions increased appreciably while staying roughly flat at other lenders.⁴ Partly due to the higher average credit quality of their borrowers, credit union loans, on average, have lower interest rates than those from banks and finance companies. Moreover, even with borrower credit scores held constant, loans extended by credit unions tend to have a lower average interest rate (figure 5), potentially due, in part, to credit unions’ stable deposit bases and their nonprofit status. As a result, despite the larger amounts financed, the monthly payments of credit union auto loans are about the same as those of other lenders.⁵ Finally, despite the rapid expansion, delinquency rates on credit union auto loans have remained low and stable in recent years (figure 6).

Figure 3: Number of New-Car Loans Originated

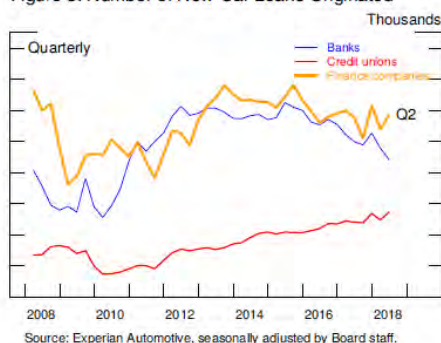


Figure 4: Credit Score at Origination of New-Car Loans

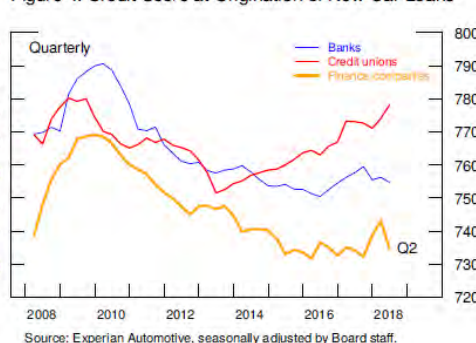


Figure 5: Average Rate for New-Car Loans by VantageScore as of 2018:Q2

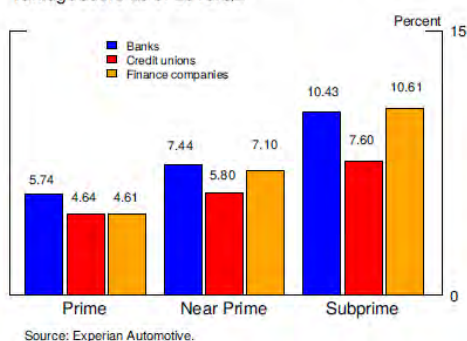
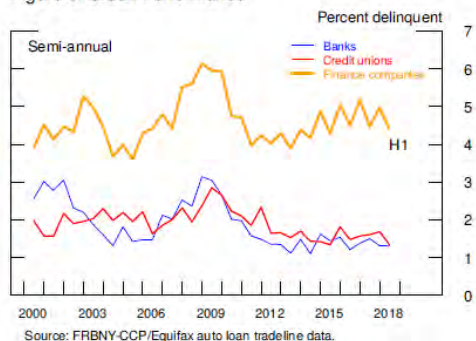


Figure 6: Credit Performance



² The analysis presented focuses on new-car loans, but the pattern is qualitatively similar for used car loans.

³ As of 2018:Q2, the average size of credit union new-car loans was \$33,000, higher than \$31,000 for banks and \$30,000 for finance companies.

⁴ The lower percentiles of the distribution of credit scores of auto loans originated by credit unions also trended up, and the share of subprime loans at credit unions remained low.

⁵ Credit union loans have longer average maturities, further lowering monthly payments.

(This page is intentionally blank.)

Risks and Uncertainty

ASSESSMENT OF RISKS

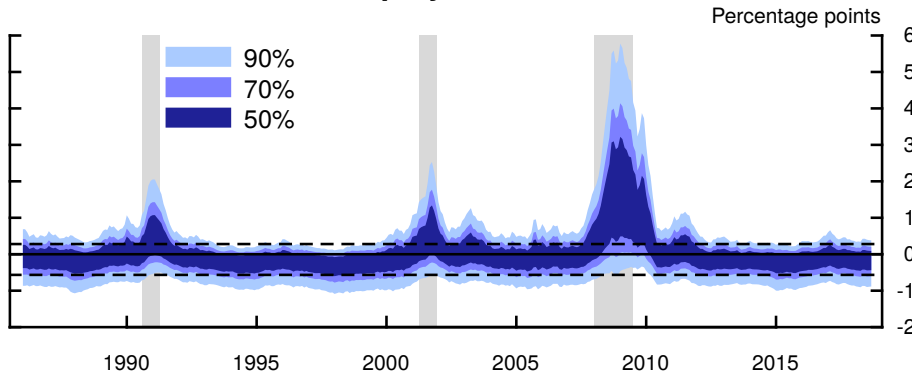
We view the uncertainty around the staff forecast of economic activity over the next year or so as being in line with the average over the past 20 years, the benchmark used by the FOMC. In addition, we see the upside and downside risks around the projections for real GDP growth and the unemployment rate over that period as being balanced. On the upside, the underlying fundamentals for household spending and business investment remain strong—bolstered in part by the tax cuts enacted last year—and readings on household and business sentiment generally continue to be upbeat. Against this economic backdrop, spending and investment could expand faster than in the staff projection. On the downside, foreign economic developments and trade policies could move in directions that have significant negative effects on U.S. economic growth. Those overall assessments are consistent with the four-quarter-ahead estimates for GDP growth and the unemployment rate presented in the exhibit “Time-Varying Macroeconomic Risk.”

We are more concerned about recession risks during the period beyond the next year or so. In our baseline outlook, the economy is currently operating above potential and is projected to move further beyond its potential over the next two years. If this assessment is correct, then we anticipate that a significant slowing in the pace of economic activity, along with a gradual increase in the unemployment rate, will be required in order to return the economy to a sustainable position in the longer run. During the period of subpar growth, the economy will be more susceptible to negative shocks that could push it into recession. Neither we nor anyone else will have clear insight as to the precise timing of when a recession will occur, but the period of adjustment back to sustainability will be a time of heightened risk.

With regard to inflation, the staff still sees average uncertainty and balanced risks around the projection over the next year or so. To the downside, longer-run inflation expectations relevant for wage and price setting could currently be lower than assumed in the baseline or may not edge up in the coming years. Also, the exchange value of the dollar could appreciate more than expected and put downward pressure on inflation. To the upside, with economic activity projected to move further above its potential, inflation could increase more than in the staff forecast, consistent with the predictions of models that emphasize nonlinear effects of resource utilization on inflation. In addition, an unexpectedly widespread and sustained increase in trade barriers could lead to higher inflation. These assessments are consistent with the statistical

Time-Varying Macroeconomic Risk

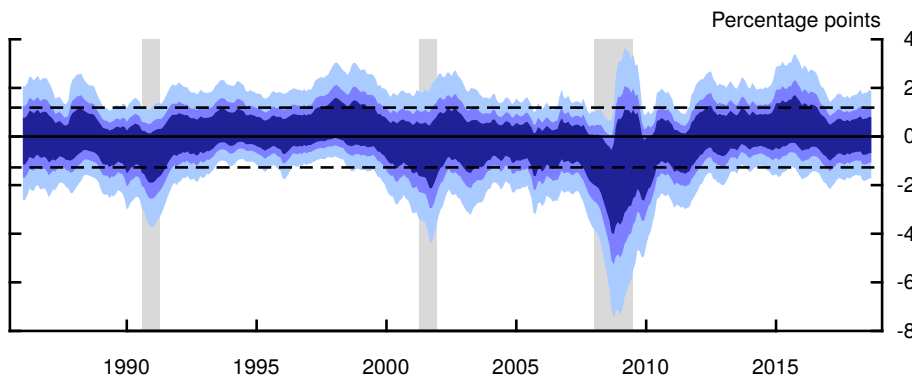
Unemployment Rate



September 2018

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

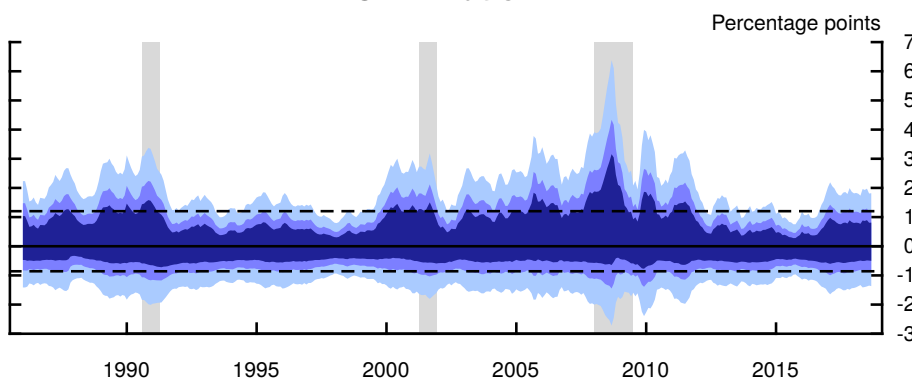
GDP Growth



September 2018

95th	1.9
85th	1.2
50th	0.0
15th	-1.1
5th	-1.7

CPI Inflation

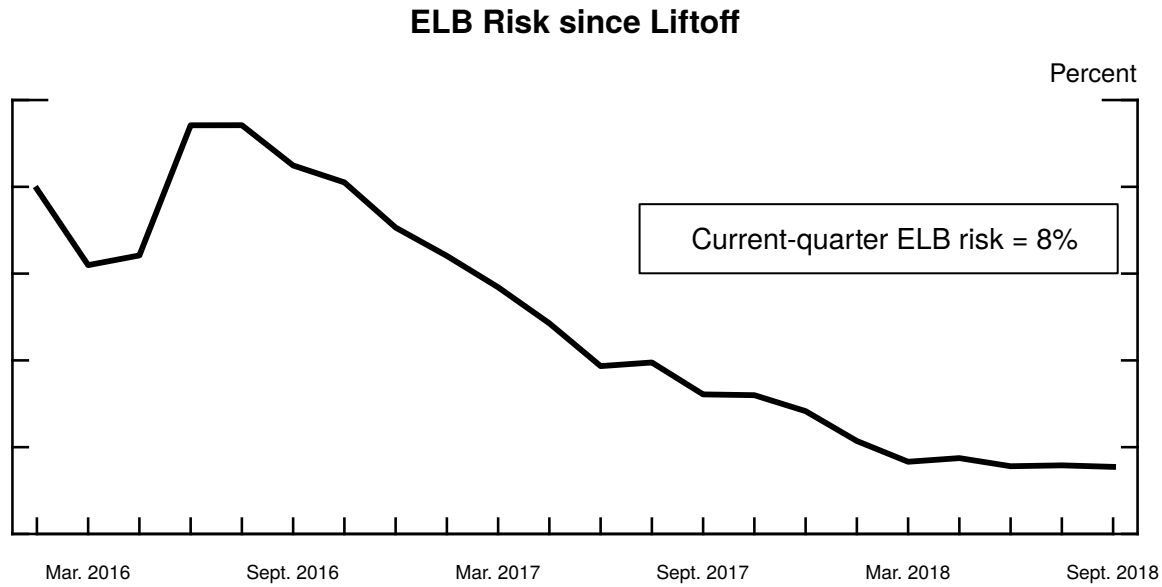


September 2018

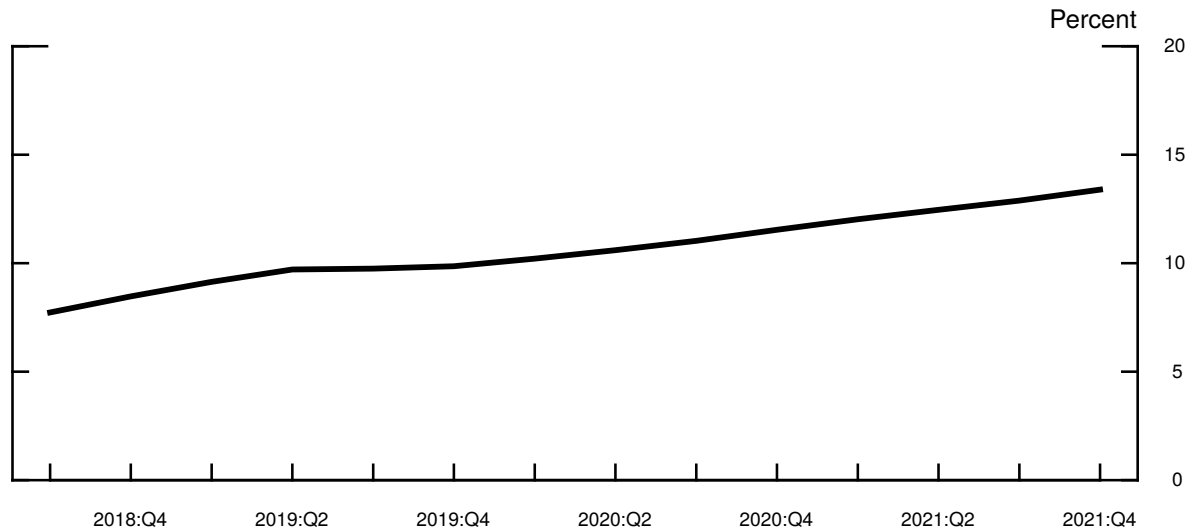
95th	1.8
85th	1.2
50th	0.1
15th	-0.8
5th	-1.4

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

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

ALTERNATIVE SCENARIOS

To illustrate some of the risks to the outlook, we construct alternatives to the baseline projection using simulations of staff models. The first scenario describes the macroeconomic consequences of an average recession assumed to start in 2021. In the second scenario, higher realized inflation destabilizes inflation expectations, which leads to persistently higher inflation and also slower output growth. The third and fourth scenarios provide a comparison of two different possible causes for faster wage growth: labor supply constraints or faster productivity growth. In the fifth scenario, we consider the possibility that financial turbulence in emerging market economies (EMEs) leads to sizable capital outflows and a stronger appreciation of the dollar. Finally, the last two scenarios illustrate the effects of a widespread increase in trade barriers. In the sixth scenario, the central bank reacts to total inflation inclusive of the direct effect of the tariffs on import prices. In the seventh scenario, the central bank “sees through” the temporary effect of the tariffs on inflation.

We simulate each of these scenarios using one of four staff models that embed different macroeconomic structures and dynamics. The first two scenarios are simulated with the FRB/US model; the third and fourth scenarios use a DSGE model developed by Gertler, Sala, and Trigari; the fifth scenario uses the SIGMA model; and the last two scenarios use the GEMUS model.¹ In all of the scenarios except the first one, the federal funds rate is governed by the same policy rule as in the baseline. (The first scenario, which features a recession, allows for a more aggressive monetary policy response than would be prescribed by the baseline inertial Taylor rule.) In addition, the size and composition of the SOMA portfolio are assumed to follow the baseline paths in all of the scenarios.

¹ The four models used are (1) FRB/US, which is a large-scale macroeconometric model of the U.S. economy; (2) a calibrated New Keynesian DSGE model with search and matching frictions in the labor market similar to that described in Mark L. Gertler, Luca Sala, and Antonella Trigari (2008), “An Estimated Monetary DSGE Model with Unemployment and Staggered Nominal Wage Bargaining,” *Journal of Money, Credit and Banking*, vol. 40 (8), pp. 1713–64; (3) SIGMA, which is a calibrated multicountry DSGE model; and (4) GEMUS, which is a simplified version of SIGMA that is better suited to analyze trade policy issues.

Recession [FRB/US]

While the probability of a recession in the near future is small, the odds increase further out in the medium-term forecast, as the projected pace of economic activity moderates and the distribution of outcomes around the baseline becomes more dispersed. As reported in the box “Alternative View: A Strong but Precarious Expansion” from the June 2018 Tealbook, one empirical framework consulted by the staff suggests that the probability of a recession in the medium term is greater than 75 percent by the end of 2020.² This scenario assumes that adverse shocks to financial market spreads and household and business confidence materialize starting in mid-2021 and that these shocks are sufficient to generate a downturn similar in magnitude to the median recession over the past 50 years. We also assume that monetary policymakers respond to sustained increases in the unemployment rate more aggressively than prescribed by the baseline rule, in line with the FOMC’s typical reaction in previous recessions.

In this scenario, real GDP declines at the end of 2021 and begins to recover at the start of 2023. The unemployment rate peaks at 6 percent by the beginning of 2023, an increase of 2½ percentage points from the start of the recession, similar to the median increase in the unemployment rate in recessions over the past five decades. With the lower level of resource utilization, inflation runs about ¼ percentage point below baseline, on average, between 2022 and 2024. Despite the sharp deterioration in economic conditions, the federal funds rate is sufficiently elevated at the onset of the recession that it does not quite reach its effective lower bound, although it does fall as low as ½ percent in mid-2023. A similar deterioration in economic activity and inflation occurring two years earlier would result in the federal funds rate briefly reaching its effective lower bound.

Inflation Fears [FRB/US]

In recent years, private-sector expectations of future inflation have been formed in an environment mainly characterized by low and stable inflation, generally at or below the Committee’s 2 percent objective. Considerable uncertainty surrounds how these expectations might revise if inflation were to run persistently and significantly above that objective. In particular, an extended period of high inflation may cause longer-run inflation expectations to

² The model is a logistic regression estimating the probability of being in a recession, as defined by the NBER, at any time over the next four quarters. The explanatory variables in the regression include the term spread between the 10-year Treasury yield and the federal funds rate, the term premium on 10-year Treasury yields, the spread of triple-B-rated bonds over Treasury yields, and the staff’s judgmental output gap.

Alternative Scenarios

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

Measure and scenario	2018	2019	2020	2021	2022	2023- 24
	H2					
<i>Real GDP</i>						
Tealbook baseline and extension	2.8	2.5	1.9	1.5	1.2	1.1
Recession	2.8	2.5	1.9	.1	-.8	2.0
Inflation fears	2.8	1.5	1.3	1.2	1.1	1.1
Faster wage growth, supply constraints	2.9	2.5	1.7	1.3	1.1	1.1
Faster wage growth, higher productivity	3.5	4.0	1.8	.8	.5	.9
EME turbulence and stronger dollar	2.8	2.0	1.4	1.4	1.3	1.3
Higher trade barriers	1.8	-.3	1.1	1.3	1.1	1.0
Higher trade barriers--see through	2.2	.4	.9	1.0	.8	.9
<i>Unemployment rate¹</i>						
Tealbook baseline and extension	3.7	3.3	3.2	3.3	3.6	4.1
Recession	3.7	3.3	3.2	3.7	5.4	5.0
Inflation fears	3.7	3.7	3.9	4.1	4.4	5.0
Faster wage growth, supply constraints	3.7	3.5	3.5	3.7	3.9	4.3
Faster wage growth, higher productivity	3.8	2.9	2.7	3.1	3.6	4.3
EME turbulence and stronger dollar	3.7	3.4	3.6	3.8	4.1	4.5
Higher trade barriers	3.7	4.0	4.1	4.0	4.0	4.3
Higher trade barriers--see through	3.7	3.6	3.7	3.8	4.0	4.3
<i>Total PCE prices</i>						
Tealbook baseline and extension	1.8	1.9	2.0	2.0	2.0	2.1
Recession	1.8	1.9	2.0	1.9	1.8	1.9
Inflation fears	1.9	2.3	2.8	3.2	3.5	3.5
Faster wage growth, supply constraints	2.1	2.8	2.9	2.6	2.4	2.2
Faster wage growth, higher productivity	1.6	1.4	1.7	1.9	2.1	2.3
EME turbulence and stronger dollar	1.8	1.3	1.9	2.1	2.2	2.2
Higher trade barriers	2.9	2.5	1.8	2.0	2.2	2.4
Higher trade barriers--see through	2.9	2.6	1.7	1.9	2.0	2.2
<i>Core PCE prices</i>						
Tealbook baseline and extension	1.6	2.0	2.1	2.1	2.1	2.1
Recession	1.6	2.0	2.1	2.0	1.8	1.9
Inflation fears	1.7	2.4	2.9	3.3	3.5	3.6
Faster wage growth, supply constraints	2.0	2.8	3.0	2.7	2.4	2.3
Faster wage growth, higher productivity	1.5	1.5	1.8	2.0	2.2	2.3
EME turbulence and stronger dollar	1.6	1.6	2.0	2.2	2.2	2.3
Higher trade barriers	2.7	2.6	1.9	2.1	2.3	2.4
Higher trade barriers--see through	2.7	2.7	1.8	2.0	2.1	2.2
<i>Federal funds rate¹</i>						
Tealbook baseline and extension	2.4	3.7	4.6	5.0	4.9	4.2
Recession	2.4	3.7	4.6	4.2	1.3	3.1
Inflation fears	2.4	3.6	4.4	4.8	5.0	4.5
Faster wage growth, supply constraints	2.3	3.8	5.0	5.4	5.2	4.3
Faster wage growth, higher productivity	2.3	3.6	4.8	5.3	5.2	4.2
EME turbulence and stronger dollar	2.4	3.4	4.3	4.7	4.7	4.0
Higher trade barriers	2.8	3.7	3.9	4.3	4.5	4.2
Higher trade barriers--see through	2.3	3.1	3.8	4.3	4.4	4.0

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

drift upward and also raise the perceived riskiness of nominal assets, thus increasing term premiums.

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

All told, inflation runs substantially above the Tealbook forecast for several years. Yields on Treasury securities and corporate bonds rise in response to the assumed increase in inflation risk premiums, causing GDP growth to be 1 percentage point slower than in the baseline by the end of 2019. The unemployment rate increases slowly but steadily throughout the simulation, ending almost 1 percentage point above the baseline (though still only a little above its assumed sustainable level by the end of the simulation period). Because the baseline policy rule depends on the lagging four-quarter change in inflation, the monetary policy response to the shocks in this scenario is initially dominated by the lower level of economic activity rather than by the higher path of inflation so that the federal funds rate is slightly below baseline until mid-2022. Beginning at the end of 2022, however, the higher inflation rate dominates, and the federal funds rate stays persistently 25 basis points above the baseline for the remainder of the simulation period as inflation is slowly brought back to the Committee's objective.

Faster Wage Growth, Supply Constraints [Gertler, Sala, and Trigari Model]

Recent data suggest that wages have been rising moderately. While the pace of wage growth steps up in the medium-term forecast, wages could possibly accelerate more rapidly than we anticipate. In this scenario and the following one, we analyze two scenarios that feature significantly faster wage growth than in the baseline. The path for wages in both scenarios is the same, but, because the underlying sources of the faster wage growth differ, economic outcomes and the monetary policy response also differ.³ In this scenario, the acceleration in wages is caused by tighter supply constraints in the labor market, while, in the next scenario, the

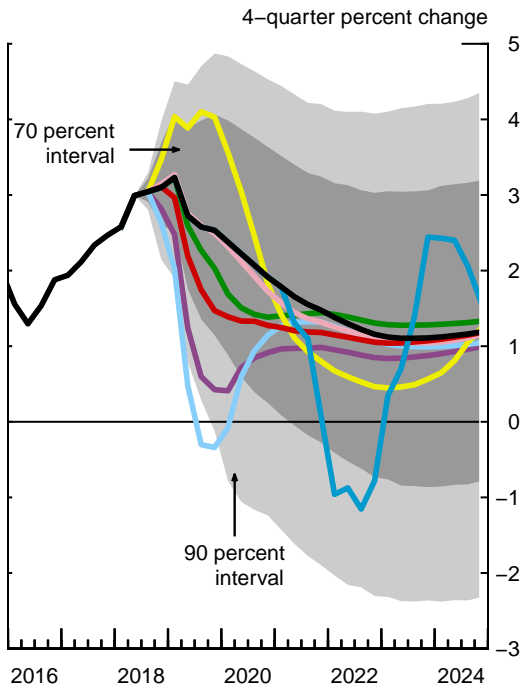
³ Both scenarios use the Gertler, Sala, and Trigari model. However, “Faster Wage Growth, Supply Constraints” uses a nonlinear version of the model in order to emphasize the nonlinear supply constraint, while the scenario “Faster Wage Growth, Higher Productivity” uses a linear version of the model.

Forecast Confidence Intervals and Alternative Scenarios

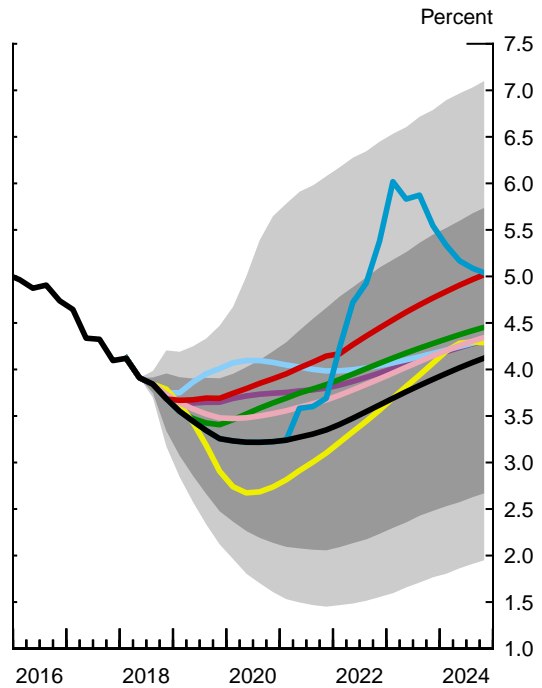
Confidence Intervals Based on FRB/US Stochastic Simulations

- Tealbook baseline and extension
- Faster wage growth, supply constraints
- Higher trade barriers
- Recession
- Faster wage growth, higher productivity
- Higher trade barriers—see through
- Inflation fears
- EME turbulence and stronger dollar

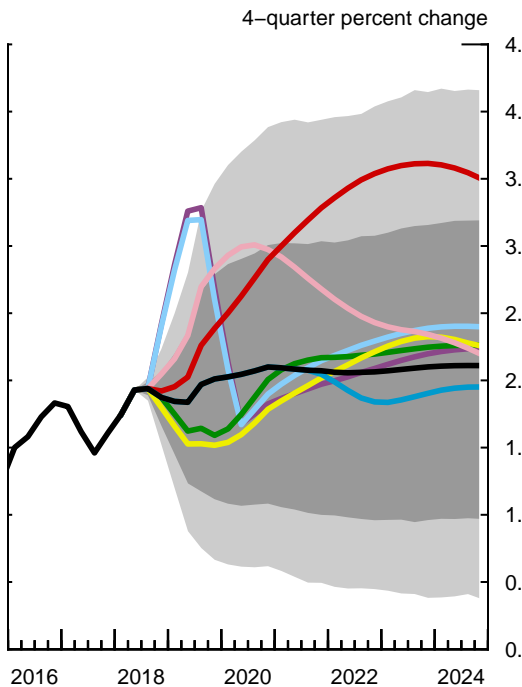
Real GDP



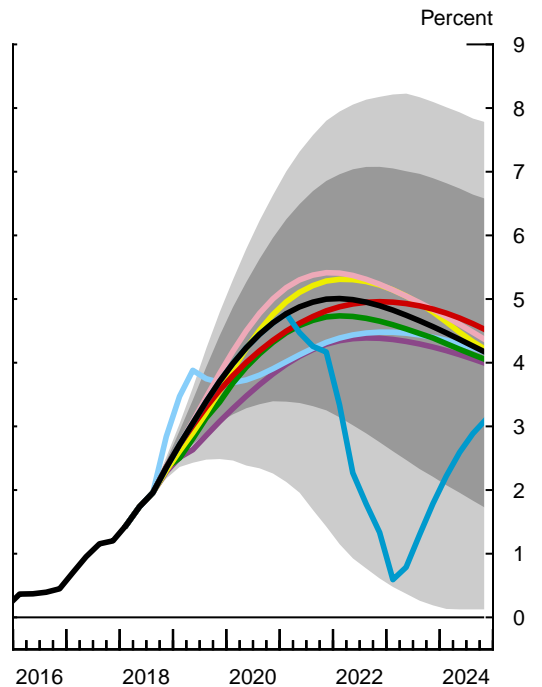
Unemployment Rate



PCE Prices excluding Food and Energy



Federal Funds Rate



acceleration in wages is caused by faster productivity growth and somewhat stronger aggregate demand.

In the baseline, although the unemployment rate is persistently below the natural rate of unemployment, inflation remains subdued, consistent with the modest response of prices to economic activity seen in recent years. However, the effects of supply constraints may not have been fully captured in the baseline projection. In particular, when the unemployment rate is unusually low, filling a vacancy becomes increasingly difficult, which could imply a reduced pace of hiring and a substantially steeper rise in wages as the value to firms of a filled vacancy increases. In this scenario, we illustrate these risks using simulations from a nonlinear New Keynesian model with costly search and matching frictions in the labor market.⁴

With greater supply constraints, the unemployment rate continues to decline until the beginning of 2020 but by $\frac{1}{4}$ percentage point less than in the baseline projection, and this gap persists over the forecast horizon. Wage growth is nearly 1 percentage point higher than in the baseline for the next two years before slowing such that the level of wages converges to the baseline by the end of the projection period. However, GDP growth is close to the baseline throughout the projection as, in this model, more intense utilization of capital partially compensates for the reduction in labor input. Because of higher recruiting costs and real wage growth well in excess of productivity growth, inflation is significantly higher and peaks at 3 percent at the end of 2019. Monetary policymakers are assumed to infer resource slack from the unemployment rate. Nonetheless, the federal funds rate is slightly above the baseline, as the effect of higher inflation dominates the effect of the smaller unemployment rate gap.

Faster Wage Growth, Higher Productivity [Gertler, Sala, and Trigari Model]

In contrast to the previous scenario, in this scenario, we generate the same faster wage growth through sizable increases in multifactor productivity along with somewhat greater aggregate demand; as a result, the level of labor productivity is, on average, 1 percentage point higher than baseline for four years before returning slowly to the baseline.

The boom in productivity growth unleashes a surge in economic activity. Real GDP growth rises sharply, cresting above 4 percent at the start of 2019, and the unemployment rate falls well below the baseline. Because labor productivity growth exceeds real wage growth,

⁴ For a more detailed description of the model, see the box “Alternative View: Supply Constraints Will Prevent the Unemployment Rate from Falling Much Further” in the July 2018 Tealbook.

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

Risks & Uncertainty

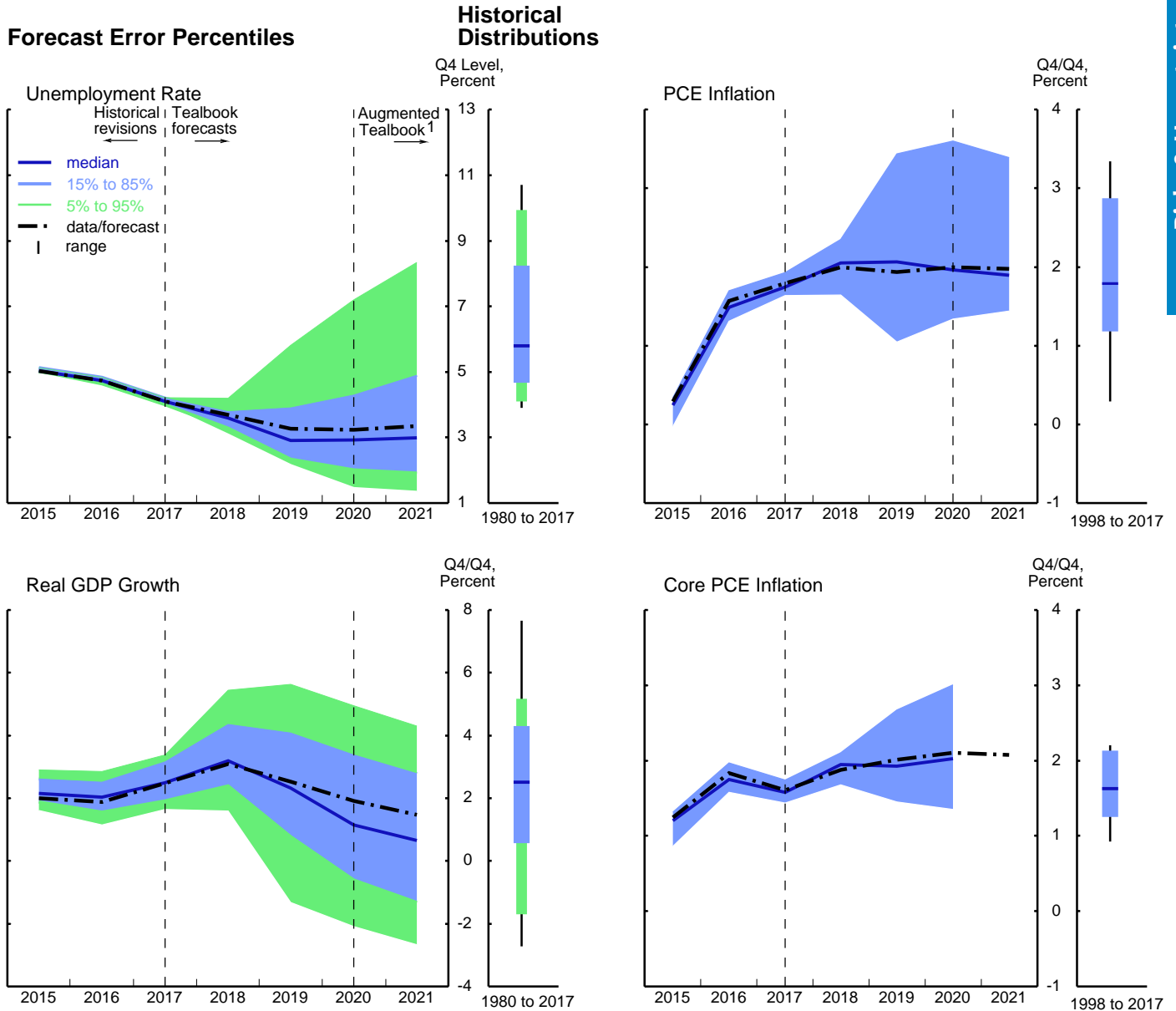
Measure	2018	2019	2020	2021	2022	2023	2024
<i>Real GDP</i>							
<i>(percent change, Q4 to Q4)</i>							
Projection	3.1	2.5	1.9	1.5	1.2	1.1	1.2
Confidence interval							
Tealbook forecast errors	2.4–4.4	.8–4.1	-.6–3.4	-1.3–2.8	...	...	...
FRB/US stochastic simulations	2.6–3.7	1.1–4.1	.2–3.6	-.3–3.2	-.7–3.0	-.9–3.1	-.8–3.2
<i>Civilian unemployment rate</i>							
<i>(percent, Q4)</i>							
Projection	3.7	3.3	3.2	3.3	3.6	3.9	4.1
Confidence interval							
Tealbook forecast errors	3.3–3.8	2.3–3.9	2.0–4.3	1.9–4.9	...	...	...
FRB/US stochastic simulations	3.3–4.0	2.5–3.9	2.1–4.2	2.1–4.7	2.2–5.1	2.5–5.4	2.7–5.7
<i>PCE prices, total</i>							
<i>(percent change, Q4 to Q4)</i>							
Projection	2.0	1.9	2.0	2.0	2.0	2.1	2.1
Confidence interval							
Tealbook forecast errors	1.6–2.4	1.0–3.4	1.3–3.6	1.4–3.4	...	...	...
FRB/US stochastic simulations	1.7–2.3	.9–2.8	.9–3.0	.8–3.0	.8–3.1	.8–3.2	.9–3.2
<i>PCE prices excluding food and energy</i>							
<i>(percent change, Q4 to Q4)</i>							
Projection	1.9	2.0	2.1	2.1	2.1	2.1	2.1
Confidence interval							
Tealbook forecast errors	1.7–2.1	1.4–2.7	1.4–3.0	...	...	...	...
FRB/US stochastic simulations	1.7–2.1	1.1–2.8	1.1–3.0	1.0–3.0	1.0–3.1	1.0–3.2	1.0–3.2
<i>Federal funds rate</i>							
<i>(percent, Q4)</i>							
Projection	2.4	3.7	4.6	5.0	4.9	4.6	4.2
Confidence interval							
FRB/US stochastic simulations	2.3–2.5	3.1–4.4	3.4–6.0	3.3–6.9	2.8–7.1	2.2–6.9	1.7–6.6

Note: Shocks underlying FRB/US stochastic simulations are randomly drawn from the 1969–2017 set of model equation residuals. Intervals derived from Tealbook forecast errors are based on projections made from 1980 to 2017 for real GDP and unemployment and from 1998 to 2017 for PCE prices. The intervals for real GDP, unemployment, and total PCE prices are extended into 2021 using information from the Blue Chip survey and forecasts from the CBO and CEA.

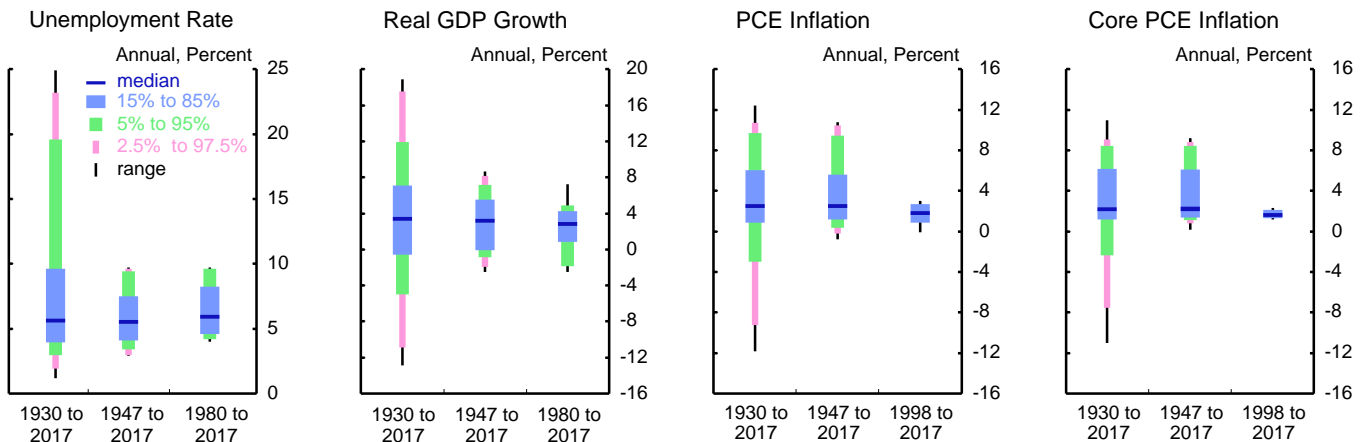
... Not applicable.

Prediction Intervals Derived from Historical Tealbook Forecast Errors

Risks & Uncertainty



Historical Distributions



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

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

inflation is subdued, falling to 1½ percent by mid-2019. With the decline in the unemployment rate, the federal funds rate exceeds the baseline for some time but converges back to the baseline by the end of the simulation period.

EME Turbulence and Stronger Dollar [SIGMA]

In our baseline, we continue to expect solid growth in most EMEs despite some recent increases in financial stresses. Although Argentina and Turkey are in crisis, their weight in global finance and trade is very small; we do not expect their problems to affect the U.S. economy directly, and they are not likely to spill over materially to other EMEs. Even so, other EMEs also harbor vulnerabilities, including high sovereign and private debt, which may be exacerbated by ongoing U.S. monetary policy normalization, especially if investor confidence is weakened by heightening geopolitical risks, rising trade tensions, or political uncertainties. In this scenario, we assume that EMEs experience a broad-based deterioration of financial conditions that is accompanied by substantial capital outflows and currency depreciation, generating sizable adverse spillovers to the United States and advanced foreign economies.

Specifically, this scenario assumes that declining confidence fuels an ongoing flight from EME assets, causing credit spreads to widen 125 basis points and EME currencies to depreciate sharply. Flight-to-safety flows into dollar-denominated assets reduce the term premiums on U.S. Treasury securities 30 basis points and cause corporate bond spreads to rise 50 basis points both in the United States and in the advanced foreign economies, while the broad real dollar appreciates 10 percent.

Weaker foreign activity, the appreciation of the dollar, and tighter financial conditions restrain the pace of economic expansion in the United States. U.S. GDP growth moderates to 2 percent in 2019, about ½ percentage point less than in the baseline, and core PCE inflation runs only a little above 1½ percent. The federal funds rate follows a shallower path than in the baseline.

Higher Trade Barriers [GEMUS]

The current process of widespread trade negotiations is unprecedented in the post–World War II period, and it is difficult to predict the outcome. Accordingly, beyond the measures already implemented, which should have a relatively limited effect on aggregate economic activity, we have not built any additional trade policy actions into our baseline outlook. If the

process ultimately leads to lower trade barriers around the world, there could be significant positive effects on the United States and foreign economies. Conversely, an outcome of widespread and sustained increases in trade barriers would likely entail sizable adverse effects.

This scenario considers the latter possibility. In particular, we assume that the United States increases tariffs on all non-oil imported goods 15 percentage points and that foreign economies impose a similar-sized increase in tariffs on U.S. exports. Because higher U.S. tariffs reduce imports while higher foreign tariffs reduce U.S. exports, these policies have little effect on the trade balance. However, the higher cost of imported consumption goods depresses household spending while business spending declines, both as a result of the higher cost of imported capital goods and as lower expected profits cause corporate borrowing spreads to rise. In addition, we assume that productivity growth slows as a result of a shift in production to less efficient domestic firms and industries as well as a reduction in international competition that diminishes incentives to innovate.

The tariff-driven rise in import prices causes core PCE inflation to surge temporarily to 3¼ percent in the first half of 2019. Monetary policy initially reacts to the temporary run-up in inflation by tightening faster than in the baseline, with the federal funds rate rising to almost 4 percent in early 2019. All told, these developments push the U.S. economy into a mild recession lasting until the end of 2019, and the unemployment rate rises to 4¼ percent. The federal funds rate moves below the baseline starting in 2020, as inflation returns close to baseline and the unemployment rate remains well above the baseline.

We have limited experience with the large and broad-based increases in trade barriers contemplated in this scenario, and, accordingly, there is unusually large uncertainty around our estimates. The declines in productivity associated with higher trade barriers could show through to aggregate output either more slowly or more rapidly than indicated in the simulation. It is also possible that a prolonged period of trade tensions causes declines in consumer and business confidence as well as further deterioration in financial market conditions. And, notably, the simulation does not take into account hard-to-model features—including disruptions to global supply chains or the effects of policy uncertainty on business investment—which might have an especially large effect on economic activity here and abroad.

Higher Trade Barriers with See-Through Monetary Policy [GEMUS]

In the previous scenario, we assumed that monetary policy responds to the temporary surge in inflation caused by the higher tariffs by raising the federal funds rate. This scenario considers the same hikes in U.S. and foreign tariffs as in the previous scenario but assumes instead that monetary policy “sees through” this short-lived rise in inflation and lowers the policy rate. Specifically, we assume here that the policy rule responds to a different measure of inflation that nets out the direct effects of tariffs.

In this case, the federal funds rate runs persistently below baseline in response to weaker economic activity and remains below 4 percent at the end of 2020. The more accommodative monetary policy response cushions the output decline enough to avoid a recession, with output growth bottoming out at about $\frac{1}{2}$ percent in mid-2019, about $\frac{3}{4}$ percentage point above the previous scenario in which policy does not see through the spike in inflation. Inflation jumps above $3\frac{1}{4}$ percent in mid-2019, just a little higher than in the previous scenario, and then falls just as sharply.

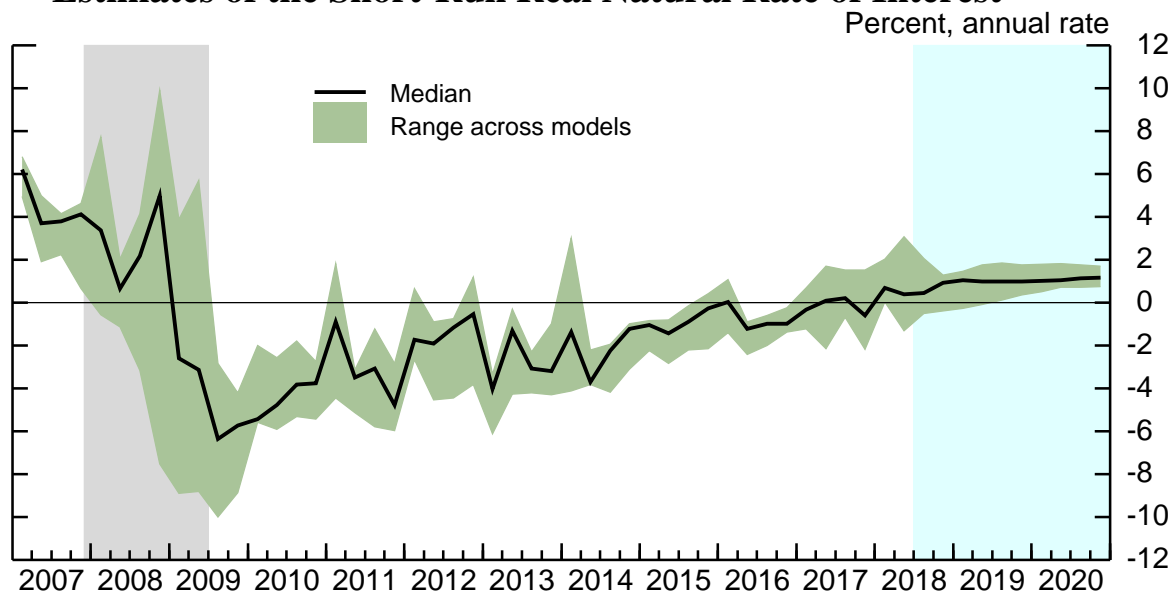
The more accommodative policy response considered here attenuates the output decline considerably—relative to the previous scenario—without much effect on inflation. Accordingly, the see-through policy would seem an appropriate response to a tariff hike. However, the desirability of this strategy depends on firmly anchored inflation expectations and the pass-through of cost shocks into inflation being relatively short lived. If those conditions do not hold, then the alternative approach assumed in the previous scenario could be more attractive. In particular, inflation and inflation expectations might run persistently higher if the tariff hike leads workers to raise their wage demands or firms to raise their markups. These effects might be intensified in a very tight labor market.

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

Measure and projection	2018		2019		2020	
	June Tealbook	Current Tealbook	June Tealbook	Current Tealbook	June Tealbook	Current Tealbook
<i>Real GDP</i>						
Staff	2.8	3.1	2.4	2.5	1.8	1.9
FRB/US	2.5	3.2	1.7	1.3	1.3	1.1
EDO	2.8	3.2	2.3	2.2	2.3	2.1
<i>Unemployment rate¹</i>						
Staff	3.6	3.7	3.4	3.3	3.4	3.2
FRB/US	3.8	3.8	3.8	4.3	4.0	4.7
EDO	4.0	4.0	4.2	4.2	4.5	4.6
<i>Total PCE prices</i>						
Staff	2.1	2.0	1.9	1.9	2.0	2.0
FRB/US	2.2	1.9	1.8	1.8	1.8	1.9
EDO	2.0	1.9	1.8	1.8	1.9	2.1
<i>Core PCE prices</i>						
Staff	1.9	1.9	2.0	2.0	2.1	2.1
FRB/US	2.0	1.8	1.9	1.9	1.9	2.1
EDO	1.9	1.8	1.8	1.8	1.9	2.1
<i>Federal funds rate¹</i>						
Staff	2.5	2.4	3.8	3.7	4.5	4.6
FRB/US	2.4	2.3	3.1	3.1	3.4	3.3
EDO	2.4	2.2	3.1	3.0	3.5	3.5

1. Percent, average for Q4.

Estimates of the Short-Run Real Natural Rate of Interest



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

Risks & Uncertainty

Assessment of Key Macroeconomic Risks**Probability of Inflation Events**

(4 quarters ahead)

Probability that the 4-quarter change in total PCE prices will be . . .	Staff	FRB/US	EDO	BVAR
<i>Greater than 3 percent</i>				
Current Tealbook	.10	.07	.02	.03
Previous Tealbook	.06	.08	.02	.09
<i>Less than 1 percent</i>				
Current Tealbook	.12	.18	.12	.26
Previous Tealbook	.16	.11	.12	.12

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	.11	.18	.03
Previous Tealbook	.01	.08	.15	.03
<i>Decrease by 1 percentage point</i>				
Current Tealbook	.26	.01	.03	.08
Previous Tealbook	.18	.01	.04	.10

Probability of Near-Term Recession

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

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

Appendix

Technical Note on “Prediction Intervals Derived from Historical Tealbook Forecast Errors”

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

The historical distributions of the corresponding series (with the adjustments described above) are plotted immediately to the right of each of the fan charts. The thin black lines show the highest and lowest values of the series during the indicated time period. At the bottom of the page, the distributions over three different time periods are plotted for each series. To enable the use of data for years prior to 1947, we report annual-average data in this section. The annual data going back to 1930 for GDP growth, PCE inflation, and core PCE inflation are available in the conventional national accounts; we used estimates from Lebergott (1957) for the unemployment rate from 1930 to 1946.¹

The prediction intervals around the current and one-year-ahead forecasts are derived from historical staff forecast errors, comparing staff forecasts with the latest published data. For the unemployment rate and real GDP growth, errors were calculated for a sample starting in 1980, yielding percentiles of the sizes of the forecast errors. For PCE and core PCE inflation, errors based on a sample beginning in 1998 were used. This shorter range reflects both more limited data on staff forecasts of PCE inflation and the staff judgment that the distribution of inflation since the mid-1990s is more appropriate for the projection period than distributions of inflation reaching further back. In all cases, the prediction intervals are computed by adding the percentile bands of the errors onto the forecast. The blue bands encompass 70 percent prediction-interval ranges; adding the green bands expands this range to 90 percent. The dark blue line plots the median of the prediction intervals. There is not enough historical forecast data to calculate meaningful 90 percent ranges for the two inflation series. A median line above the staff forecast means that forecast errors were positive more than half of the time.

¹ Stanley Lebergott (1957), “Annual Estimates of Unemployment in the United States, 1900–1954,” in National Bureau of Economic Research, *The Measurement and Behavior of Unemployment* (Princeton, N.J.: Princeton University Press), pp. 213–41.

Because the staff has produced two-year-ahead forecasts for only a few years, the intervals around the two-year-ahead forecasts are constructed by augmenting the staff projection errors with information from outside forecasters: the Blue Chip consensus, the Council of Economic Advisers, and the Congressional Budget Office. Specifically, we calculate prediction intervals for outside forecasts in the same manner as for the staff forecasts. We then calculate the change in the error bands from outside forecasts from one year ahead to two years ahead and apply the average change to the staff's one-year-ahead error bands. That is, we assume that any deterioration in the performance between the one- and two-year-ahead projections of the outside forecasters would also apply to the Tealbook projections. Limitations on the availability of data mean that a slightly shorter sample is used for GDP and unemployment, and the outside projections may only be for a similar series, such as total CPI instead of total PCE prices or annual growth rates of GDP instead of four-quarter changes. In particular, because data on forecasts for core inflation by these outside forecasters are much more limited, we did not extrapolate the staff's errors for core PCE inflation two years ahead.

The intervals around the historical data in the four fan charts are based on the history of data revisions for each series. The previous-year, two-year-back, and three-year-back values as of the current Tealbook forecast are subtracted from the corresponding currently published estimates (adjusted as described earlier) to produce revisions, which are then combined into distributions and revision intervals in the same way that the prediction intervals are created.

Monetary Policy Strategies

In this section, we discuss a range of strategies for setting the federal funds rate and compare the associated interest rate paths and macroeconomic outcomes with those in the Tealbook baseline projection. Resource utilization is projected to be a bit less tight in the near term, and inflation is projected to be a touch higher. Overall, these revisions imply that the prescriptions arising from most of the strategies are little changed from those in the previous Tealbook. A special exhibit illustrates how policy prescriptions and macroeconomic outcomes under flexible price-level targeting (FPLT) depend on the reference date for the target path for the price level. A second special exhibit provides updated estimates of the equilibrium real federal funds rate in the longer run. The revised historical NIPA data and data over the first half of the year imply small upward revisions for most estimates and somewhat larger ones in a couple of cases.

NEAR-TERM PRESCRIPTIONS OF SELECTED SIMPLE POLICY RULES

The top panel of the first exhibit shows near-term prescriptions for the federal funds rate from four simple policy rules: the Taylor (1999) rule (also known as the “balanced approach” rule), the Taylor (1993) rule, a first-difference rule, and an FPLT rule. These near-term prescriptions take as given the Tealbook baseline projections for the output gap and core inflation, shown in the middle panels.¹ The top and middle panels also provide the staff’s baseline path for the federal funds rate, which is constructed using an inertial version of the Taylor (1999) rule.²

Relative to the July Tealbook, the staff projects resource utilization to be a bit less tight over the next 18 months and inflation to be a touch higher. Because the effects of these changes to the forecast mostly offset each other, the prescriptions of all of the policy rules are little changed from the previous Tealbook.

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

¹ Because the FPLT rule responds to the gap between the unemployment rate and the natural rate of unemployment, this rule takes as given the Tealbook baseline projections for these variables instead of the output gap.

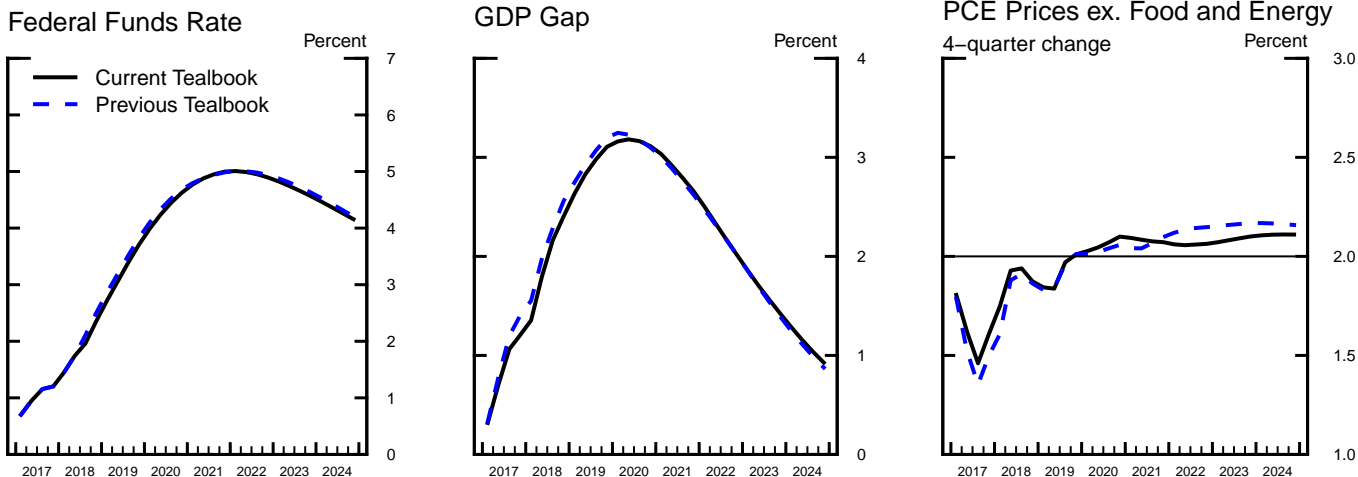
² Except for the first-difference rule, which has no intercept term, the simple rules examined here use intercept terms that are consistent with a real federal funds rate of 50 basis points in the longer run.

Policy Rules and the Staff Projection

Near-Term Prescriptions of Selected Simple Policy Rules¹

	(Percent)	
	2018:Q4	2019:Q1
Taylor (1999) rule	4.69	4.87
<i>Previous Tealbook</i>	4.83	4.97
Taylor (1993) rule	3.49	3.56
<i>Previous Tealbook</i>	3.55	3.59
First-difference rule	2.34	2.69
<i>Previous Tealbook projection</i>	2.32	2.64
Flexible price-level targeting rule	1.78	1.65
<i>Previous Tealbook projection</i>	1.78	1.64
<i>Addendum:</i>		
Tealbook baseline	2.35	2.71

Key Elements of the Staff Projection



A Medium-Term Notion of the Equilibrium Real Federal Funds Rate²

	(Percent)	
	Current Value	Previous Tealbook
Tealbook baseline		
FRB/US r^*	3.29	3.44
Average projected real federal funds rate	1.70	1.82
SEP-consistent baseline		
FRB/US r^*	1.80	
Average projected real federal funds rate	.88	

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 June 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^* .

policy rates in the Tealbook baseline. The near-term prescriptions of the first-difference rule, for which adjustments are gradual, essentially coincide with those of the Tealbook baseline.

- Unlike the other rules and the Tealbook baseline policy, which call for raising the federal funds rate in the near term, the FPLT rule, in an effort to eliminate the cumulative shortfall in the core PCE price index of about 2¼ percent since the end of 2011, prescribes setting the federal funds rate near the bottom of the current target range.

A MEDIUM-TERM NOTION OF THE EQUILIBRIUM REAL FEDERAL FUNDS RATE

The bottom panel of the first exhibit reports estimates of a medium-term concept of the equilibrium real federal funds rate generated under two baselines: the Tealbook baseline and a projection consistent with the medians in the June 2018 Summary of Economic Projections (SEP).³ In both cases, simulations of the FRB/US model are used to generate an estimate of r^* .⁴ This concept of r^* , labeled “FRB/US r^* ,” corresponds to the level of the real federal funds rate that, if maintained over a 12-quarter period starting in the current quarter, would bring the output gap to zero in the final quarter of that period. This concept of r^* is a summary of the projected underlying strength of the real economy and does not take into account considerations such as achieving the inflation objective or avoiding sharp changes in the federal funds rate.

- At 3.29 percent, the estimate of Tealbook-consistent FRB/US r^* in this quarter is 15 basis points below the corresponding value computed using the July Tealbook projection. The downward revision reflects the fact that the staff has revised downward its projection for the output gap at the end of the 12-quarter period.

³ To construct a baseline projection consistent with median SEP responses for the FRB/US model, the staff interpolated annual SEP information to a quarterly frequency and assumed that, beyond 2020 (the final year reported in the June 2018 SEP), the economy transitions to the longer-run values in a smooth and monotonic way. The staff also posited economic relationships to project variables not covered in the SEP. For example, the staff assumed an Okun’s law relationship to recover an output gap from the deviation of the median SEP unemployment rate from the median SEP estimate of its longer-run value.

⁴ The staff implemented a number of technical adjustments to the FRB/US model in preparing the July Tealbook. The SEP-consistent FRB/US r^* continues to use the previous version of the model because of data compatibility limitations.

- At 1.80 percent, the SEP-consistent FRB/US r^* is significantly lower than the Tealbook-consistent FRB/US r^* . The difference stems from the fact that the SEP-consistent projection has output exceeding potential by a considerably smaller amount over the medium term than does the current Tealbook forecast. This smaller anticipated output gap occurs despite the fact that the median path for the real federal funds rate implied by the SEP projections averages almost 1 percentage point less than the corresponding path in the Tealbook.

SIMPLE POLICY RULE SIMULATIONS

The second exhibit reports results from dynamic simulations of the FRB/US model under the Taylor (1999) rule, the Taylor (1993) rule, the first-difference rule, and the FPLT rule. These simulations reflect the endogenous responses of the output gap and inflation to the different federal funds rate paths implied by the policy rules.⁵ The simulations for each rule are carried out under the assumptions that policymakers commit to following that rule in the future and that financial market participants, price setters, and wage setters correctly anticipate that monetary policy will follow through on this commitment and are aware of the implications for interest rates and the economy.

- Under the Tealbook baseline, the federal funds rate increases $\frac{1}{2}$ percentage point over the remainder of this year and rises, on average, 1 percentage point per year for the following three years, reaching 5 percent in the fourth quarter of 2021.
- The Taylor (1999) rule calls for an immediate and substantial increase in the federal funds rate, and the prescribed values remain above the corresponding Tealbook baseline values through mid-2022. This higher path is associated with only a modestly higher trajectory for the real 10-year Treasury yield than in the baseline until 2020 and a slightly lower path thereafter, because the Taylor (1999) rule calls for somewhat lower values of the federal funds rate beyond the period shown. Because wage and price setting today is influenced by expected future outcomes in the FRB/US model, and because the Taylor (1999) rule calls for somewhat more accommodative policy later in the

⁵ Because of the endogenous responses of the output gap and inflation to the different federal funds rate paths, the near-term prescriptions from the dynamic simulations can differ from those shown in the top panel of the first exhibit.

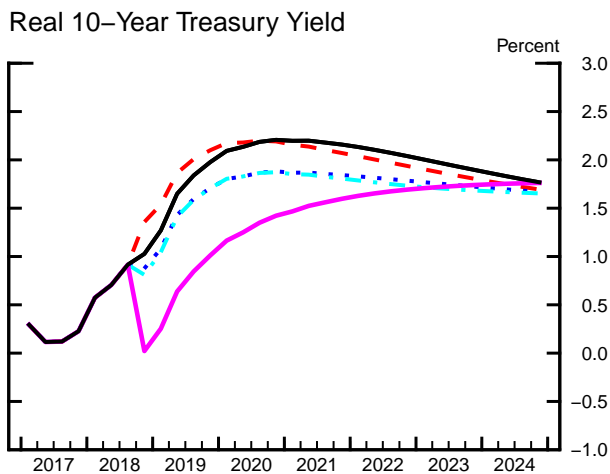
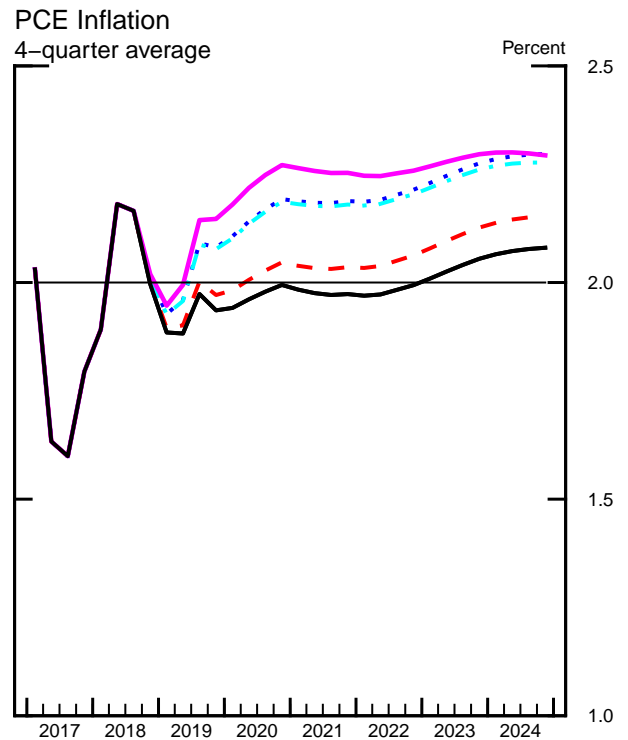
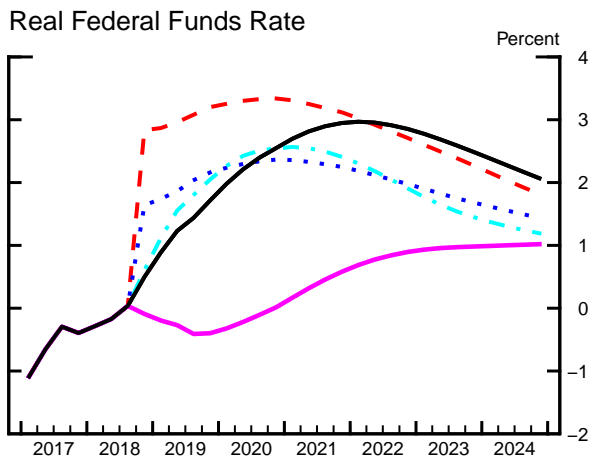
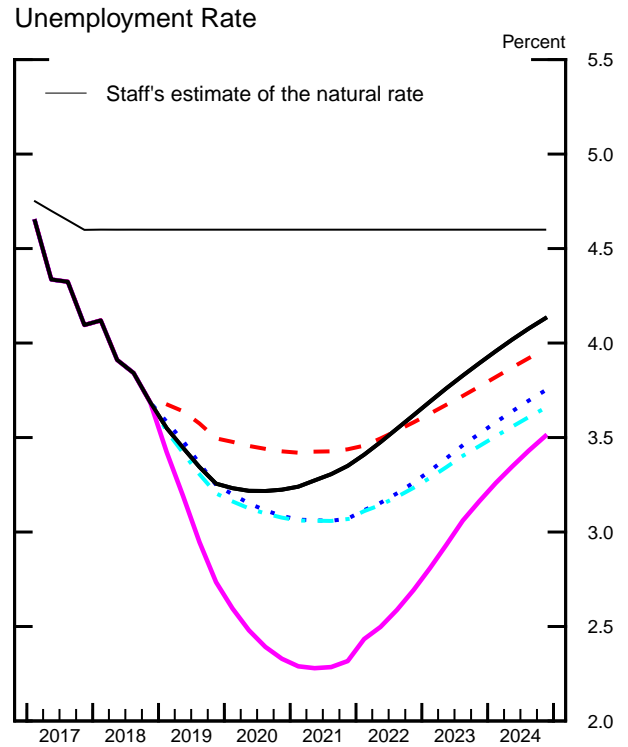
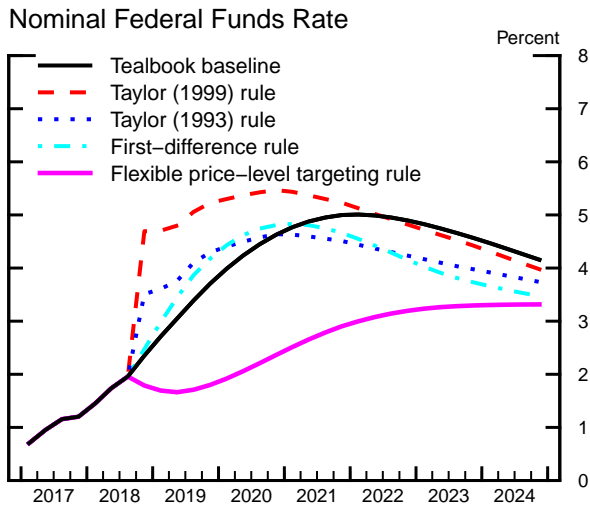
simulation, starting in the fourth quarter inflation is somewhat higher than in the baseline projection. The path for the unemployment rate lies above the Tealbook baseline path over the next few years, but it subsequently lies below and takes a bit longer to return to its natural rate.⁶

- The Taylor (1993) rule also calls for an immediate sharp increase in the federal funds rate. Because the Taylor (1993) rule responds less strongly to output exceeding its assumed potential level over the projection period, the prescriptions of this rule are lower than those of the Taylor (1999) rule over the period shown. The prescriptions from the Taylor (1993) rule are higher than the Tealbook baseline over the next two years, but, starting in 2021, the path for the federal funds rate falls below the baseline path for a sustained period. As a result, inflation is higher, and the real 10-year Treasury yield is lower, than their corresponding values in the Tealbook projection. The more accommodative conditions engender a more pronounced undershooting of the unemployment rate below its natural rate beyond the medium term.
- The path for the federal funds rate prescribed by the first-difference rule is somewhat above the path in the Tealbook baseline through 2020, but runs below the baseline path for some years thereafter. The latter divergence occurs because the first-difference rule, which responds to the expected change in the output gap rather than to its level, reacts to the decline in the output gap that is projected beyond 2020. The associated lower path of the federal funds rate and the expectation of higher inflation in the future imply lower longer-term real interest rates than in the Tealbook baseline. Thus, the first-difference rule generates outcomes for the unemployment rate that are lower, and outcomes for inflation that are higher, than the corresponding outcomes in the Tealbook baseline projection.

⁶ The result that inflation runs above the baseline projection in this and the Taylor (1993) rule simulations, despite higher levels of the federal funds rate in the near term, depends on the assumption that price and wage setters perfectly anticipate the more accommodative path of the federal funds rate beyond the next several years and factor these future monetary policy conditions into today's price and wage setting decisions. The box "Learning and Misperceptions of Policy Strategies" in the Monetary Policy Strategies section of the June 2018 Tealbook A presented results under a scenario in which price and wage setters lack such a perfect understanding. In that scenario, the switch from an inertial to a non-inertial policy rule led to a significant decline in inflation and a rise in the unemployment rate at the start of the simulation in response to an unexpected jump in the federal funds rate.

Simple Policy Rule Simulations

Monetary Policy Strategies



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.

- The FPLT rule seeks to compensate for the cumulative shortfall, since the end of 2011, of core PCE inflation from an annual rate of 2 percent. The FPLT rule calls for keeping the federal funds rate slightly below its third-quarter value in the Tealbook baseline projection until the first quarter of 2020 and maintaining a markedly slower pace of increases thereafter than in the Tealbook baseline. This prescription generates a higher rate of inflation in coming years that eventually undoes the 2¼ percentage point shortfall of the core PCE price index relative to a path that rises 2 percent per year since the end of 2011. Because the simulation embeds the assumptions that policymakers can credibly commit to closing this gap over time and that financial market participants, price setters, and wage setters correctly anticipate the ensuing long period of a low federal funds rate, the path of the real 10-year Treasury rate drops below the Tealbook baseline for the next six years. The unemployment rate is substantially lower than in the Tealbook baseline and all other simulations shown, dropping below 2½ percent in 2020.

OPTIMAL CONTROL SIMULATIONS UNDER COMMITMENT

The third exhibit displays optimal control simulations under various assumptions about policymakers' preferences, as captured by four specifications of the loss function.⁷ The concept of optimal control employed here corresponds to a commitment policy under which the plans that policymakers make today constrain future policy choices; such a constraint may improve economic outcomes.⁸

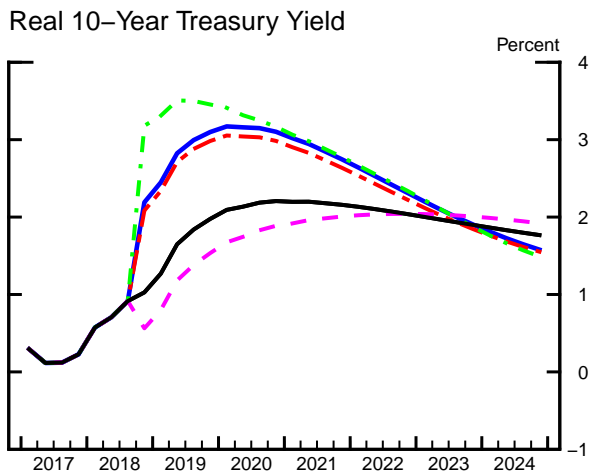
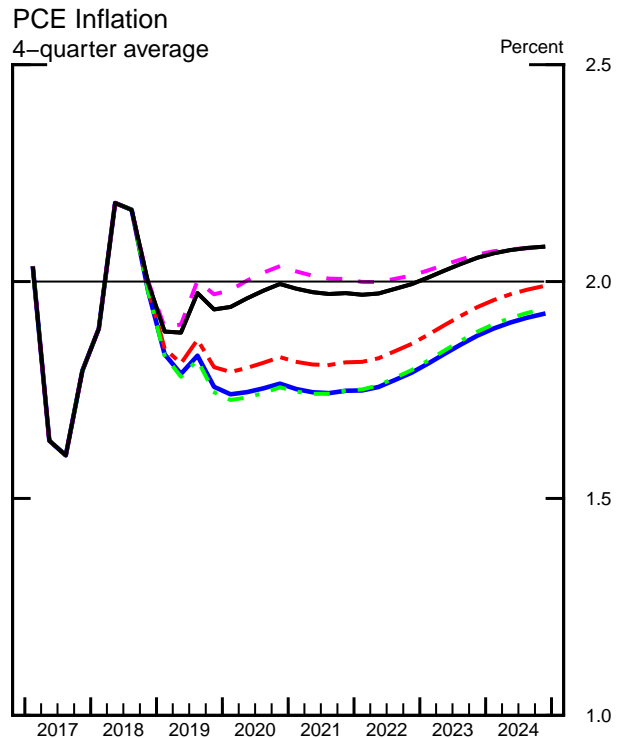
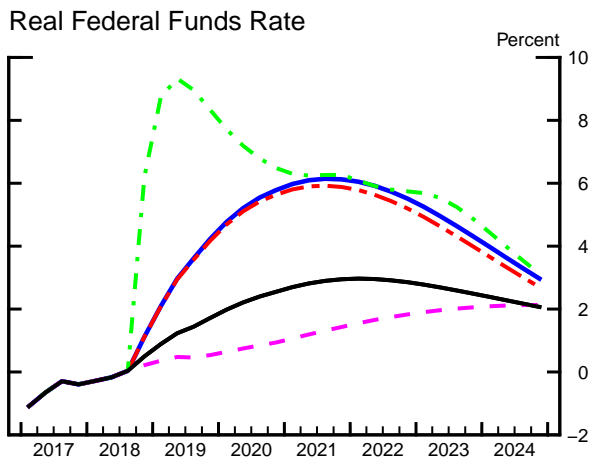
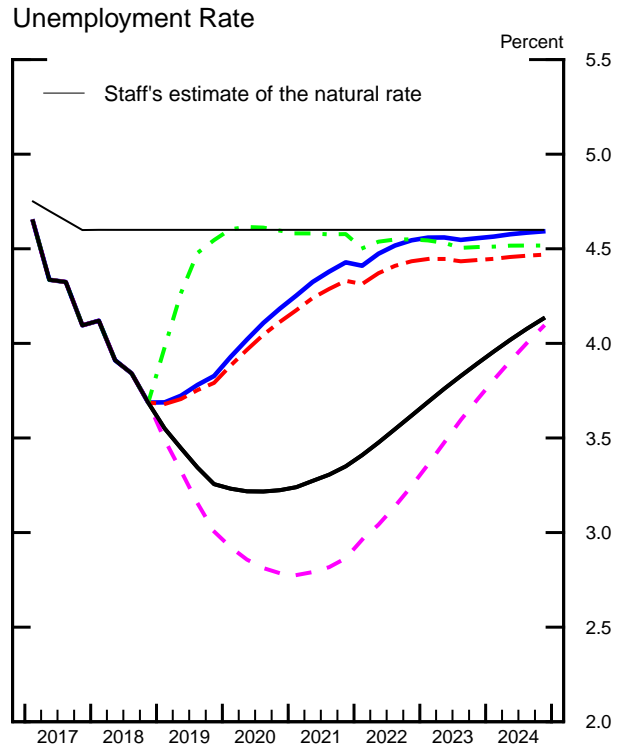
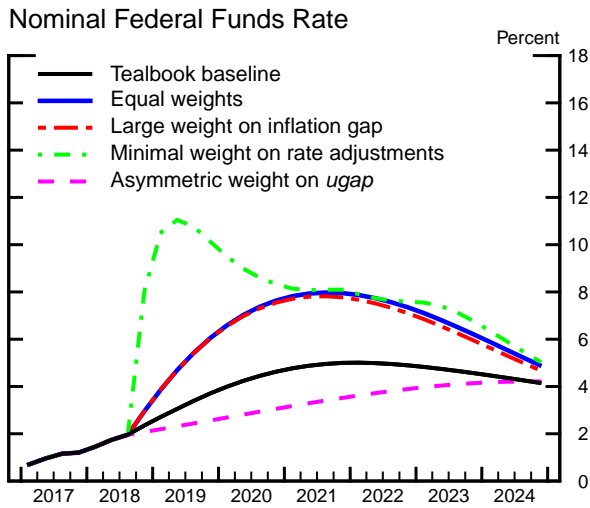
The first three of the four optimal control policies prescribe much higher paths for the federal funds rate than the path in the baseline projection, for two reasons. First, high levels of the real federal funds rate are necessary to push the unemployment rate up to its natural rate, because, consistent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

⁷ The box "Optimal Control and the Loss Function" in the Monetary Policy Strategies section of the June 2016 Tealbook B offers motivations for these specifications. The appendix in this Tealbook section provides technical details on the optimal control simulations.

⁸ Under the optimal control policies, policymakers achieve the displayed economic outcomes by making promises that bind future policymakers to take actions that will not be optimal from the perspective of those future policymakers (that is, the promises are time inconsistent). It is assumed that these promises are taken as credible by wage and price setters and by financial market participants.

Optimal Control Simulations under Commitment

Monetary Policy Strategies



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.

front-loading of policy tightening is not disruptive. In practice, however, if the FOMC were to raise the real federal funds rate abruptly, wage and price setters and financial market participants could misinterpret policymakers' intentions and may anticipate tighter monetary policy than policymakers envision, leading to less benign macroeconomic outcomes than shown here.⁹ By contrast, the fourth optimal control policy allows the unemployment rate to decline to levels not experienced since the 1950s. Such a development might likewise entail outcomes different from those predicted by the simulations.

- The first simulation, labeled “Equal weights,” presents the case in which policymakers are assumed to place equal weights on keeping headline PCE inflation close to the Committee’s 2 percent objective, on keeping the unemployment rate close to the staff’s estimate of the natural rate of unemployment, and on keeping the federal funds rate close to its previous value. Under this strategy, the path for the federal funds rate is significantly higher than the Tealbook baseline path in order to temper the projected sizable undershooting of the unemployment rate below its natural rate over the next several years in the Tealbook baseline—an outcome that policymakers with the equal-weights loss function judge to be costly.¹⁰ The small projected deviations of inflation from 2 percent in the Tealbook baseline entail relatively small losses and so have little influence on optimal policy. Moreover, a relatively rapid closing of the unemployment gap generates only slightly lower inflation because, in the FRB/US model, the response of inflation to the level of resource utilization is small.
- The second simulation, “Large weight on inflation gap,” is based on a loss function that assigns a cost to deviations of inflation from 2 percent that is five times larger than the specification with equal weights but is otherwise identical to that specification. Even though policymakers attach larger losses to deviations of inflation from 2 percent, they nonetheless choose a federal funds rate path that results in inflation undershooting the inflation objective by more than under the baseline policy over the period shown, for two reasons.

⁹ See note 6 for a related discussion in the case of simple policy rules.

¹⁰ When we use the June 2018 SEP-consistent baseline as the underlying projection, the federal funds rate under the optimal control simulation with equal weights peaks at around 5½ percent, compared with about 8 percent under the Tealbook baseline.

First, policymakers seek to undo the modest but persistent overshoot of the inflation objective over the next decade, which they see as costly. Second, policymakers continue to attach significant losses to the unemployment rate undershooting its natural rate. On net, the federal funds rate path is only modestly less restrictive than under the equal-weights specification.

- The third simulation, “Minimal weight on rate adjustments,” uses a loss function that assigns only a very small cost to changes in the federal funds rate but that is otherwise identical to the loss function with equal weights. This simulated policy seeks to return the unemployment rate to its natural rate even faster than under the equal-weights specification. The federal funds rate soars to 11 percent by mid-2019 and then averages around 7½ percent from 2020 through 2023.
- The fourth simulation, “Asymmetric weight on *ugap*,” uses a loss function that assigns no cost to deviations of the unemployment rate from the natural rate when the unemployment rate is below the natural rate, but the loss function is identical to the specification with equal weights when the unemployment rate is above the natural rate. Under this strategy, the path of the federal funds rate is considerably below the path in the optimal control simulation with equal weights and below the Tealbook baseline path in the medium term; later in the 2020s it exceeds the policy paths implied by all other optimal control strategies and the Tealbook baseline (not shown). With the asymmetric loss function, policymakers choose this more accommodative path for the policy rate because their desire to keep inflation close to 2 percent is not tempered by an aversion to undershooting the natural rate of unemployment. The tighter labor market keeps inflation closer to 2 percent than in the case of equal weights. Beyond the period shown, the unemployment rate runs a little above its natural rate for several years as policymakers act to contain the inflationary pressures stemming from the prolonged period of elevated resource utilization.

FLEXIBLE PRICE-LEVEL TARGETING WITH ALTERNATIVE PRICE-LEVEL GAPS

The exhibit “Flexible Price-Level Targeting with Alternative Price-Level Gaps” illustrates how the choice of a reference date for the core PCE price-level target path

influences the policy rates prescriptions of FPLT rules and their associated economic outcomes. We compare the results from simulations of two FPLT rules with those from an inertial version of the Taylor (1999) rule—the same rule used to construct the Tealbook baseline path for the federal funds rate—under both the Tealbook baseline projection and a demand-driven recession scenario. The first rule, “FPLT (2011:Q4),” sets the reference date for the target path for the price level to 2011:Q4, resulting in an initial price-level gap in 2018:Q4 of 2¼ percent. The second rule, “FPLT (2017:Q4),” sets the reference date to 2017:Q4, implying an initial price-level gap in 2018:Q4 of roughly zero. For both FPLT rules, the coefficient on the unemployment gap is chosen to deliver the same marginal response to resource utilization as the inertial Taylor (1999) rule and is almost double the size of the coefficient used in the “Flexible price-level targeting rule” shown in the exhibit “Simple Policy Rule Simulations.”

The simulations conditional on the Tealbook baseline projection are shown in the panels on the left.

- Given the large initial price-level gap, the “FPLT (2011:Q4)” rule prescribes a lower path of the federal funds rate than under the Tealbook baseline, leading to markedly lower unemployment and modestly higher inflation over the period shown. Consequently, the price-level gap closes gradually; at the end of 2024 the price level is still 1 percent below the target path.¹¹
- The “FPLT (2017:Q4)” rule leads to policy prescriptions and macroeconomic outcomes similar to those associated with the inertial Taylor (1999) rule.¹² In part, this result reflects the fact that this FPLT rule has the same marginal response to resource utilization as the inertial Taylor (1999) rule. Moreover, the price-level gaps in this FPLT rule and the deviations of inflation from 2 percent in the inertial Taylor (1999) rule are very small over the period

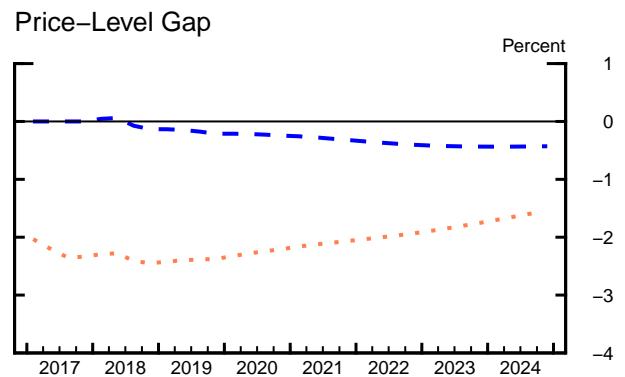
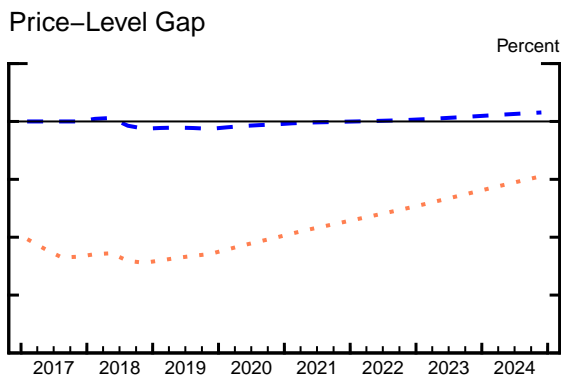
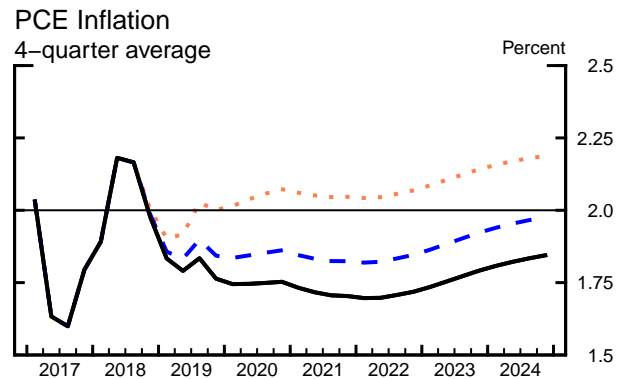
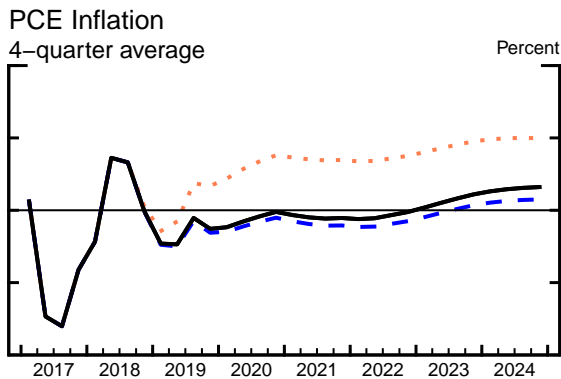
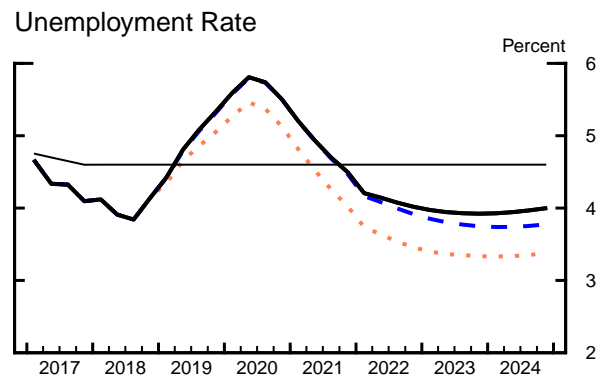
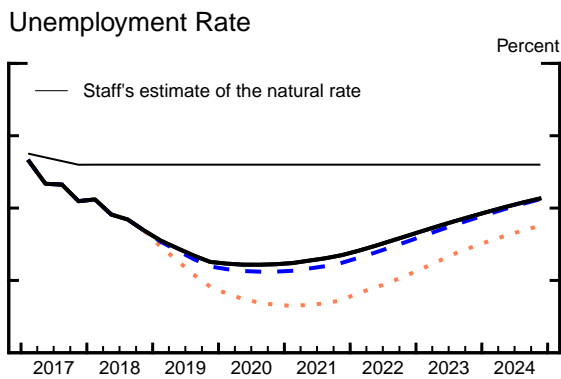
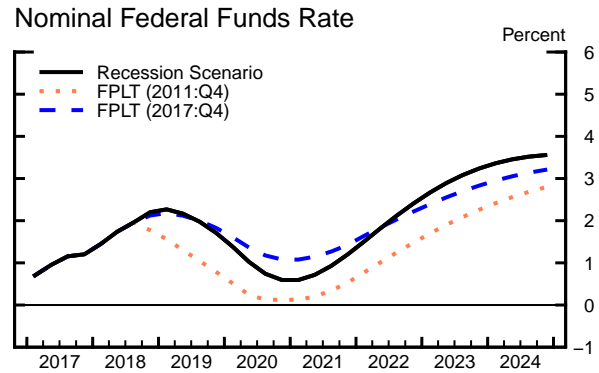
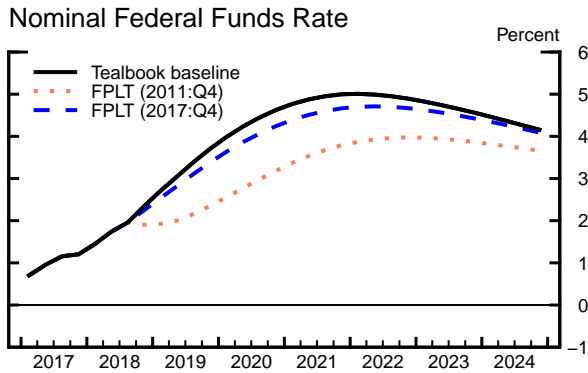
¹¹ The “FPLT (2011:Q4)” rule is less accommodative in these circumstances than the “Flexible price-level targeting rule” shown in the exhibit “Simple Policy Rule Simulations.” Both rules use the same reference date to define the price-level gap and have the same coefficient on that gap; however, under the “FPLT (2011:Q4)” rule, policymakers respond more strongly to an unemployment rate that is below the natural rate.

¹² The path of the federal funds rate under the “FPLT (2017:Q4)” rule is below the Tealbook baseline projections in the near term but is higher further in the future. The same is true for the real 10-year Treasury yield. Because inflation is forward looking in the FRB/US model, the inflation rate under the “FPLT (2017:Q4)” rule is lower than under the inertial Taylor (1999) rule.

Flexible Price–Level Targeting with Alternative Price–Level Gaps

Tealbook Baseline

Recession Scenario



Monetary Policy Strategies

Note: The FPLT rules used herein respond to the unemployment gap with a coefficient of -1.85 . We constructed the recession scenario in the FRB/US model by subjecting the Tealbook baseline to a sequence of negative spending shocks starting in the fourth quarter of 2018, the first quarter in the simulation. In constructing the recession scenario, we assumed that the federal funds rate is determined by the inertial Taylor (1999) rule.

shown. Accordingly, the different price objectives in the two rules do not result in materially different policy prescriptions.

The price-level gap inherited under the “FPLT (2011:Q4)” rule similarly affects the path of policy and macroeconomic outcomes under a moderate demand-driven recession scenario, as illustrated in the panels on the right.¹³

- Given the large inherited price-level gap, the “FPLT (2011:Q4)” rule prescribes a much lower path for the federal funds rate than the inertial Taylor (1999) rule in the recession scenario, as was the case in the previous scenario.¹⁴ The much lower path for the federal funds rate helps combat the recession by curbing the rise in the unemployment rate relative to the inertial Taylor (1999) rule. Inflation stays above 2 percent, causing the price-level gap to narrow, even during the recession.
- By comparison, policymakers provide only slightly more stimulus to the economy under the “FPLT (2017:Q4)” rule than under the inertial Taylor (1999) rule. The path of the federal funds rate is initially higher under this FPLT rule but falls below the path under the inertial Taylor (1999) rule in the medium term, reflecting policymakers’ promise to undo the shortfalls in inflation from 2 percent during the recession. Price and wage setters anticipate this relatively accommodative period, and, as a result, inflation stays closer to 2 percent under the “FPLT (2017:Q4)” rule than under the inertial Taylor (1999) rule and the path of the unemployment rate is slightly lower.
- As our simulations illustrate, whether FPLT rules provide substantially more accommodation in demand-driven recessions than rules such as the inertial Taylor (1999) rule in which deviations from the inflation objective are “bygones” hinges on the magnitude of the initial price-level gap.¹⁵ In

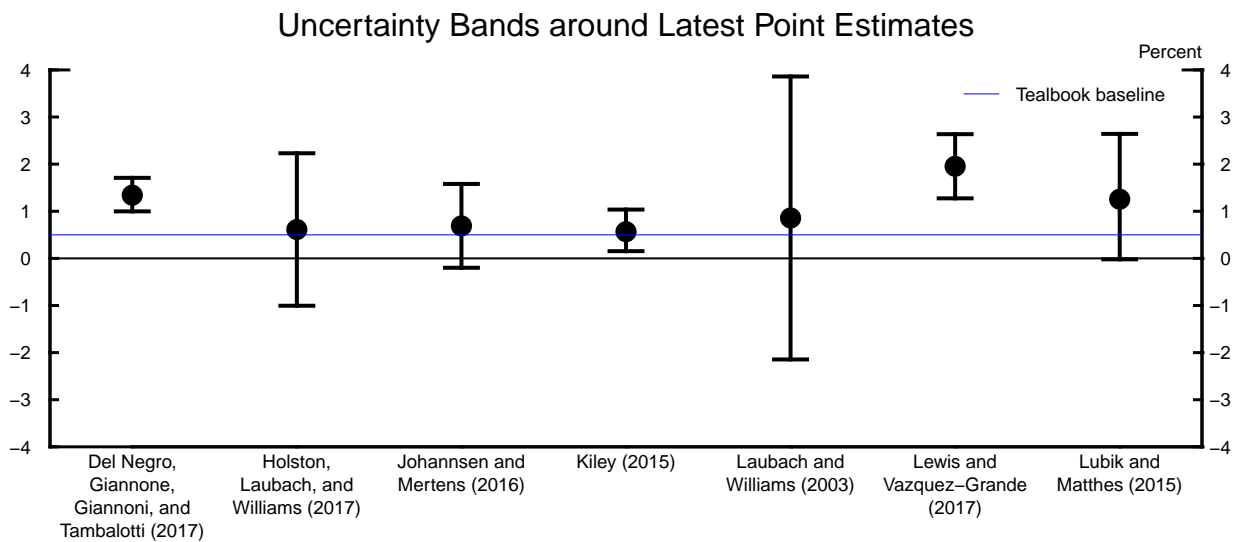
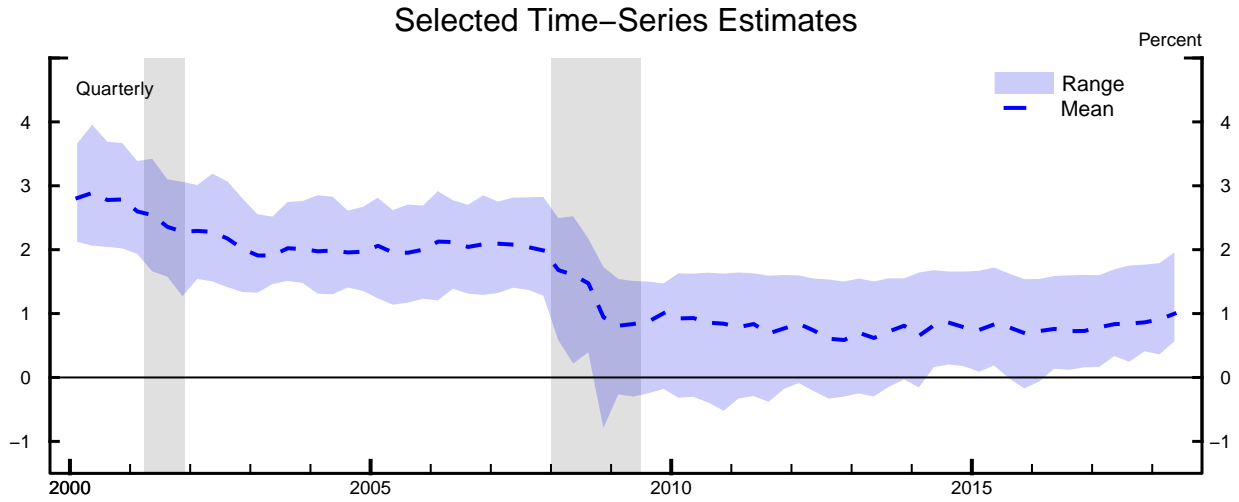
¹³ The demand-driven recession scenario in the FRB/US model is constructed by subjecting the Tealbook baseline to a sequence of negative spending shocks starting in 2018:Q4 that raise the unemployment rate by close to the median increase of past recessions. In constructing this scenario, we assume that the federal funds rate is determined by the inertial Taylor (1999) rule.

¹⁴ The federal funds rate remains positive under the “FPLT (2011:Q4)” rule throughout the simulation.

¹⁵ In a supply-driven recession, the price level would be higher than otherwise. Accordingly, the “FPLT (2017:Q4)” rule might prescribe tighter monetary policy than the inertial Taylor (1999) rule because the FPLT rule would promise to undo the positive price-level gap stemming from a period of above 2 percent inflation caused by the negative supply shocks.

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

Monetary Policy Strategies



Longer-Run Values from Selected Forecasters

	<u>Release Date</u>	<u>Percent</u>
Tealbook baseline	Sept. 2018	.50
Median SEP	June 2018	.88
Median Survey of Primary Dealers	Aug. 2018	.75
Median Blue Chip (6-to-10-year)	Mar. 2018	.84
Congressional Budget Office (10-year)	Aug. 2018	1.15

Note: All time-series estimates run through 2018:Q2. The shaded vertical areas in the top panel are NBER recessions. In addition to the studies listed in the middle panel, the computation of the mean and the range in the top panel includes estimates from Christensen and Rudebusch (2017). The middle panel reports, where available, 68 percent uncertainty bands around each point estimate for 2018:Q2. See the technical appendix for sources.

addition, the efficacy of an FPLT rule crucially depends on the public’s understanding of this policy and the public’s beliefs about policymakers’ commitment to this rule and, in particular, to the reference date. If the public does not expect policymakers to eliminate the price-level gap specified in the FPLT rule, the public will anticipate future policy to be tighter than otherwise. Consequently, long-term interest rates would be higher, inhibiting policymakers’ ability to stabilize the economy.

ESTIMATES OF THE EQUILIBRIUM REAL FEDERAL FUNDS RATE IN THE LONGER RUN

The next exhibit, “Estimates of the Equilibrium Real Federal Funds Rate in the Longer Run,” updates selected estimates of the equilibrium real federal funds rate in the longer run, denoted r^{LR} ; this concept is the rate consistent with the economy operating at its potential once the transitory effects of economic shocks have abated. The top panel of the exhibit shows the range of historical values through 2018:Q2 for several model-based time-series estimates of r^{LR} .¹⁶ The estimates for 2018:Q2 range from ½ to 1¾ percent. Relative to their respective 2017:Q4 values reported in the March Tealbook, five of the measures increased by less than 20 basis points from their 2017:Q4 levels. The estimates from Laubach and Williams (2003) and Lubik and Matthes (2015) have risen by more than 50 basis points. In the case of Laubach and Williams (2003), the increase is due to revisions in the historical NIPA data that have caused the current and past estimates of r^{LR} to be higher, primarily because trend growth in real GDP, one of the factors determining r^{LR} , is now estimated to be more variable. In the case of Lubik and Matthes (2015), the increase reflects the effect of including data through the first half of this year. The lower panel of the exhibit reports longer-term forecasts of the real federal funds rate from selected sources. The Tealbook baseline assumption, at ½ percent, is below the other measures, which range from 0.75 to 1.15 percent. That said, the Tealbook baseline assumption remains well within the uncertainty bands of most time-series estimates.

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

¹⁶ For a discussion of time-series estimates of r^{LR} over history, see the Monetary Policy Strategies section of the October 2017 Tealbook. See the appendix to this section for sources.

Outcomes of Simple Policy Rule Simulations
(Percent change, annual rate, from end of preceding period except as noted)

Outcome and strategy	2018	2019	2020	2021	2022	2023	2024
<i>Nominal federal funds rate¹</i>							
Taylor (1999)	4.7	5.2	5.5	5.2	4.8	4.4	4.0
Taylor (1993)	3.5	4.3	4.6	4.5	4.2	4.0	3.7
First-difference	2.5	4.2	4.8	4.7	4.2	3.7	3.5
Flexible price-level targeting	1.8	1.8	2.4	2.9	3.2	3.3	3.3
Extended Tealbook baseline	2.4	3.7	4.6	5.0	4.9	4.6	4.2
<i>Real GDP</i>							
Taylor (1999)	3.1	2.1	2.0	1.7	1.4	1.3	1.3
Taylor (1993)	3.1	2.6	2.2	1.8	1.3	1.1	1.2
First-difference	3.1	2.7	2.1	1.8	1.4	1.2	1.3
Flexible price-level targeting	3.1	3.7	2.7	1.7	1.0	.8	1.1
Extended Tealbook baseline	3.1	2.5	1.9	1.5	1.2	1.1	1.2
<i>Unemployment rate¹</i>							
Taylor (1999)	3.7	3.5	3.4	3.4	3.6	3.8	4.0
Taylor (1993)	3.7	3.3	3.1	3.1	3.3	3.5	3.7
First-difference	3.7	3.2	3.1	3.1	3.2	3.5	3.7
Flexible price-level targeting	3.7	2.7	2.3	2.3	2.7	3.2	3.5
Extended Tealbook baseline	3.7	3.3	3.2	3.3	3.6	3.9	4.1
<i>Total PCE prices</i>							
Taylor (1999)	2.0	2.0	2.0	2.0	2.1	2.1	2.2
Taylor (1993)	2.0	2.1	2.2	2.2	2.2	2.3	2.3
First-difference	2.0	2.1	2.2	2.2	2.2	2.3	2.3
Flexible price-level targeting	2.0	2.1	2.3	2.3	2.3	2.3	2.3
Extended Tealbook baseline	2.0	1.9	2.0	2.0	2.0	2.1	2.1
<i>Core PCE prices</i>							
Taylor (1999)	1.9	2.0	2.2	2.1	2.1	2.2	2.2
Taylor (1993)	1.9	2.2	2.3	2.3	2.3	2.3	2.3
First-difference	1.9	2.2	2.3	2.3	2.3	2.3	2.3
Flexible price-level targeting	1.9	2.2	2.4	2.4	2.3	2.3	2.3
Extended Tealbook baseline	1.9	2.0	2.1	2.1	2.1	2.1	2.1

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

Outcomes of Simple Policy Rule Simulations, Quarterly

(4-quarter percent change, except as noted)

Outcome and strategy	2018		2019				2020	
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
<i>Nominal federal funds rate¹</i>								
Taylor (1999)	2.0	4.7	4.7	4.8	5.1	5.2	5.3	5.4
Taylor (1993)	2.0	3.5	3.6	3.8	4.1	4.3	4.4	4.5
First-difference	2.0	2.5	3.0	3.4	3.9	4.2	4.4	4.6
Flexible price-level targeting	2.0	1.8	1.7	1.7	1.7	1.8	1.9	2.1
Extended Tealbook baseline	2.0	2.4	2.7	3.1	3.4	3.7	4.0	4.2
<i>Real GDP</i>								
Taylor (1999)	3.0	3.1	3.0	2.4	2.2	2.1	2.1	2.1
Taylor (1993)	3.0	3.1	3.2	2.7	2.6	2.6	2.6	2.4
First-difference	3.0	3.1	3.3	2.8	2.7	2.7	2.6	2.4
Flexible price-level targeting	3.0	3.1	3.5	3.3	3.5	3.7	3.5	3.3
Extended Tealbook baseline	3.0	3.1	3.2	2.7	2.6	2.5	2.4	2.2
<i>Unemployment rate¹</i>								
Taylor (1999)	3.8	3.7	3.7	3.6	3.6	3.5	3.5	3.5
Taylor (1993)	3.8	3.7	3.6	3.5	3.4	3.3	3.2	3.2
First-difference	3.8	3.7	3.5	3.4	3.3	3.2	3.2	3.1
Flexible price-level targeting	3.8	3.7	3.4	3.2	2.9	2.7	2.6	2.5
Extended Tealbook baseline	3.8	3.7	3.5	3.4	3.3	3.3	3.2	3.2
<i>Total PCE prices</i>								
Taylor (1999)	2.2	2.0	1.9	1.9	2.0	2.0	2.0	2.0
Taylor (1993)	2.2	2.0	1.9	2.0	2.1	2.1	2.1	2.1
First-difference	2.2	2.0	1.9	2.0	2.1	2.1	2.1	2.1
Flexible price-level targeting	2.2	2.0	1.9	2.0	2.1	2.1	2.2	2.2
Extended Tealbook baseline	2.2	2.0	1.9	1.9	2.0	1.9	1.9	2.0
<i>Core PCE prices</i>								
Taylor (1999)	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.1
Taylor (1993)	1.9	1.9	1.9	1.9	2.1	2.2	2.2	2.2
First-difference	1.9	1.9	1.9	1.9	2.1	2.2	2.2	2.2
Flexible price-level targeting	1.9	1.9	1.9	2.0	2.1	2.2	2.3	2.3
Extended Tealbook baseline	1.9	1.9	1.8	1.8	2.0	2.0	2.0	2.0

1. Percent, average for the quarter.

Outcomes of Optimal Control Simulations under Commitment

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

Outcome and strategy	2018	2019	2020	2021	2022	2023	2024
<i>Nominal federal funds rate¹</i>							
Equal weights	3.0	6.0	7.6	8.0	7.4	6.2	4.9
Large weight on inflation gap	3.0	6.0	7.5	7.8	7.1	6.0	4.7
Minimal weight on rate adjustments	8.0	10.1	8.3	8.1	7.6	6.8	5.1
Asymmetric weight on <i>ugap</i>	2.1	2.6	3.1	3.5	3.9	4.1	4.2
Extended Tealbook baseline	2.4	3.7	4.6	5.0	4.9	4.6	4.2
<i>Real GDP</i>							
Equal weights	3.1	1.2	1.0	1.2	1.4	1.7	1.5
Large weight on inflation gap	3.1	1.3	1.1	1.3	1.5	1.7	1.5
Minimal weight on rate adjustments	3.1	-1	1.4	1.8	1.8	1.8	1.5
Asymmetric weight on <i>ugap</i>	3.1	3.1	2.3	1.6	.9	.8	1.0
Extended Tealbook baseline	3.1	2.5	1.9	1.5	1.2	1.1	1.2
<i>Unemployment rate¹</i>							
Equal weights	3.7	3.8	4.2	4.4	4.5	4.6	4.6
Large weight on inflation gap	3.7	3.8	4.1	4.3	4.4	4.4	4.5
Minimal weight on rate adjustments	3.7	4.5	4.6	4.6	4.5	4.5	4.5
Asymmetric weight on <i>ugap</i>	3.7	3.0	2.8	2.9	3.2	3.7	4.1
Extended Tealbook baseline	3.7	3.3	3.2	3.3	3.6	3.9	4.1
<i>Total PCE prices</i>							
Equal weights	2.0	1.8	1.8	1.7	1.8	1.9	1.9
Large weight on inflation gap	2.0	1.8	1.8	1.8	1.9	1.9	2.0
Minimal weight on rate adjustments	2.0	1.7	1.8	1.7	1.8	1.9	1.9
Asymmetric weight on <i>ugap</i>	2.0	2.0	2.0	2.0	2.0	2.1	2.1
Extended Tealbook baseline	2.0	1.9	2.0	2.0	2.0	2.1	2.1
<i>Core PCE prices</i>							
Equal weights	1.9	1.8	1.9	1.8	1.9	1.9	2.0
Large weight on inflation gap	1.9	1.9	1.9	1.9	1.9	2.0	2.0
Minimal weight on rate adjustments	1.9	1.8	1.9	1.8	1.9	1.9	2.0
Asymmetric weight on <i>ugap</i>	1.9	2.0	2.1	2.1	2.1	2.1	2.1
Extended Tealbook baseline	1.9	2.0	2.1	2.1	2.1	2.1	2.1

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

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

Outcome and strategy	2018		2019				2020	
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
<i>Nominal federal funds rate¹</i>								
Equal weights	2.0	3.0	3.9	4.7	5.4	6.0	6.6	7.0
Large weight on inflation gap	2.0	3.0	3.9	4.7	5.4	6.0	6.6	7.0
Minimal weight on rate adjustments	2.0	8.0	10.5	11.0	10.8	10.1	9.5	9.0
Asymmetric weight on <i>ugap</i>	2.0	2.1	2.2	2.3	2.4	2.6	2.7	2.8
Extended Tealbook baseline	2.0	2.4	2.7	3.1	3.4	3.7	4.0	4.2
<i>Real GDP</i>								
Equal weights	3.0	3.1	2.9	2.1	1.6	1.2	1.1	1.0
Large weight on inflation gap	3.0	3.1	2.9	2.1	1.7	1.3	1.2	1.1
Minimal weight on rate adjustments	3.0	3.1	2.5	1.3	.4	-.1	.2	.6
Asymmetric weight on <i>ugap</i>	3.0	3.1	3.4	3.0	3.0	3.1	2.9	2.7
Extended Tealbook baseline	3.0	3.1	3.2	2.7	2.6	2.5	2.4	2.2
<i>Unemployment rate¹</i>								
Equal weights	3.8	3.7	3.7	3.7	3.8	3.8	3.9	4.0
Large weight on inflation gap	3.8	3.7	3.7	3.7	3.8	3.8	3.9	4.0
Minimal weight on rate adjustments	3.8	3.7	4.0	4.3	4.5	4.5	4.6	4.6
Asymmetric weight on <i>ugap</i>	3.8	3.7	3.5	3.3	3.2	3.0	2.9	2.9
Extended Tealbook baseline	3.8	3.7	3.5	3.4	3.3	3.3	3.2	3.2
<i>Total PCE prices</i>								
Equal weights	2.2	2.0	1.8	1.8	1.8	1.8	1.7	1.7
Large weight on inflation gap	2.2	2.0	1.8	1.8	1.9	1.8	1.8	1.8
Minimal weight on rate adjustments	2.2	2.0	1.8	1.8	1.8	1.7	1.7	1.7
Asymmetric weight on <i>ugap</i>	2.2	2.0	1.9	1.9	2.0	2.0	2.0	2.0
Extended Tealbook baseline	2.2	2.0	1.9	1.9	2.0	1.9	1.9	2.0
<i>Core PCE prices</i>								
Equal weights	1.9	1.9	1.8	1.7	1.8	1.8	1.8	1.8
Large weight on inflation gap	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9
Minimal weight on rate adjustments	1.9	1.9	1.8	1.7	1.8	1.8	1.8	1.8
Asymmetric weight on <i>ugap</i>	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.1
Extended Tealbook baseline	1.9	1.9	1.8	1.8	2.0	2.0	2.0	2.0

1. Percent, average for the quarter.

(This page is intentionally blank.)

Appendix

Implementation of the Simple Rules and Optimal Control Simulations

The monetary policy strategies considered in this section of Tealbook A typically fall into one of two categories. Under simple policy rules, policymakers set the federal funds rate according to a reaction function that includes a small number of macroeconomic factors. Under optimal control policies, policymakers compute a path for the federal funds rate that minimizes a loss function meant to capture policymakers' preferences over macroeconomic outcomes. Both approaches recognize the Federal Reserve's dual mandate. Unless otherwise noted, the simulations embed the assumption that policymakers will adhere to the policy strategy in the future and that financial market participants, price setters, and wage setters not only believe that policymakers will follow through with their strategy, but also fully understand the macroeconomic implications of policymakers doing so. Such policy strategies are described as commitment strategies.

The two approaches have different merits and limitations. The parsimony of simple rules makes them relatively easy to communicate to the public, and, because they respond only to variables that are central to a range of models, proponents argue that they may be more robust to uncertainty about the structure of the economy. However, simple rules omit, by construction, other potential influences on policy decisions; thus, strict adherence to such rules may, at times, lead to unsatisfactory outcomes. By comparison, optimal control policies respond to a broader set of economic factors; their prescriptions optimally balance various policy objectives. And, although this section focuses on policies under commitment, optimal control policies can more generally be derived under various assumptions about the degree to which policymakers can commit. That said, optimal control policies assume substantial knowledge on the part of policymakers and are sensitive to the assumed loss function and the specifics of the particular model.

Given the different strengths and weaknesses of the two approaches, they are probably best considered together as a means to assess the various tradeoffs policymakers may face when pursuing their mandated objectives.

POLICY RULES USED IN THE MONETARY POLICY STRATEGIES SECTION

The table "Simple Rules" that follows gives expressions for four simple policy rules reported in the Monetary Policy Strategies section. It also reports the expression for the inertial version of the Taylor (1999) rule; the staff uses that inertial version, augmented with a small temporary intercept adjustment, in the construction of the Tealbook baseline projection. R_t denotes the nominal federal funds rate prescribed by a strategy for quarter t ; for quarters prior to the projection period under consideration, R_t corresponds to the historical data in the economic projection. The right-hand-side variables of the first four rules include the staff's projection of trailing four-quarter core PCE price inflation for the current quarter and three quarters ahead (π_t and $\pi_{t+3|t}$), the output gap estimate for the current period ($ygap_t$), and the forecast of the three-

quarter-ahead annual change in the output gap ($ygap_{t+3|t} - ygap_{t-1}$). The value of policymakers' longer-run inflation objective, denoted π^{LR} , is 2 percent. In the case of the flexible price-level targeting rule, the right-hand-side variables include an unemployment rate gap and a price gap. The unemployment gap is defined as the difference between the unemployment rate, u_t , and the staff's estimate of its natural rate, u_t^* . The price gap is defined as 100 times the difference between the log of the core PCE price level, p_t , and the log of the target price-level path, p_t^* . The 2011:Q4 value of p_t^* is set to the 2011:Q4 value of the core PCE price index, and, subsequently, p_t^* is assumed to grow at a 2 percent annual rate.

Simple Rules

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

The first two rules in the table were studied by Taylor (1993, 1999), whereas the inertial version of the Taylor (1999) rule and rules that depend on a price gap like the flexible price-level targeting (FPLT) rule have been featured prominently in analysis by Board staff.¹ An FPLT rule similar to the one above is also analyzed by Chung and others (2014).

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

NEAR-TERM PRESCRIPTIONS OF SELECTED POLICY RULES

The “Near-Term Prescriptions of Selected Policy Rules” reported in the first exhibit are calculated taking as given the Tealbook projections for inflation and the output gap. When the Tealbook is published early in a quarter, the prescriptions are shown for the current and next quarters. When the Tealbook is published late in a quarter, the prescriptions are shown for the next two quarters. Rules that include a lagged policy rate as a right-hand-side variable are conditioned on the lagged federal funds rate in the Tealbook projection for the first quarter shown and then conditioned on their simulated lagged federal funds rate for the second quarter shown. To isolate the effects of changes in macroeconomic projections on the prescriptions of these inertial rules, the lines labeled “Previous Tealbook projection” report prescriptions that are

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

conditional on the previous Tealbook projections for inflation and the output gap but that use the value of the lagged federal funds rate in the current Tealbook for the first quarter shown.

A MEDIUM-TERM NOTION OF THE EQUILIBRIUM REAL FEDERAL FUNDS RATE

The bottom panel of the exhibit “Policy Rules and the Staff Projection” provides estimates of one notion of the equilibrium real federal funds rate that uses alternative baselines: the Tealbook baseline and another one consistent with median responses to the latest Summary of Economic Projections (SEP). The simulations are conducted using the FRB/US model, the staff’s large-scale econometric model of the U.S. economy. “FRB/US r^* ” is the real federal funds rate that, if maintained over a 12-quarter period (beginning in the current quarter), makes the output gap equal to zero in the final quarter of that period, given either the Tealbook or the SEP-consistent economic projection.² This measure depends on a broad array of economic factors, some of which take the form of projected values of the model’s exogenous variables.³ The measure is derived under the assumption that agents in the model form VAR-based expectations—that is, agents use small-scale statistical models so that their expectations of future variables are determined solely by historical relationships.

The “Average projected real federal funds rate” for the Tealbook baseline and the SEP-consistent baseline reported in the panel are the corresponding averages of the real federal funds rate under the Tealbook baseline projection and SEP-consistent projection, respectively, calculated over the same 12-quarter period as the Tealbook-consistent and SEP-consistent FRB/US r^* . For a given economic projection, the average projected real federal funds rates and the FRB/US r^* may be associated with somewhat different macroeconomic outcomes even when their values are identical. The reason is that, in the FRB/US r^* simulation, the real federal funds rate is held constant over the entire 12-quarter period, whereas, in the economic projection, the real federal funds rate can vary over time.

FRB/US MODEL SIMULATIONS

The results presented in the exhibits “Simple Policy Rule Simulations” and “Optimal Control Simulations under Commitment” are derived from dynamic simulations of the FRB/US model. Each simulated policy strategy is assumed to be in force over the whole period covered by the simulation; this period extends several decades beyond the time horizon shown in the exhibits. The simulations are conducted under the assumption that market participants as well as price and wage setters form model-consistent expectations and are predicated on the staff’s extended Tealbook projection, which includes the macroeconomic effects of the Committee’s large-scale asset purchase programs. When the Tealbook is published early in a quarter, all of the simulations begin in that quarter; when the Tealbook is published late in a quarter, all of the simulations begin in the subsequent quarter.

² The staff implemented a number of technical adjustments to the FRB/US model ahead of the July 2018 Tealbook. The SEP-consistent FRB/US r^* continues to use the previous version of the model because of data compatibility limitations.

³ For a discussion of the equilibrium real federal funds rates in the longer run and other concepts of equilibrium interest rates, see Gust and others (2016).

COMPUTATION OF OPTIMAL CONTROL POLICIES UNDER COMMITMENT

The optimal control simulations posit that policymakers minimize a discounted weighted sum of squared inflation gaps (measured as the difference between four-quarter headline PCE price inflation, π_t^{PCE} , and the Committee’s 2 percent objective), squared unemployment gaps ($ugap_t$, measured as the difference between the unemployment rate and the staff’s estimate of the natural rate), and squared changes in the federal funds rate. In the following equation, the resulting loss function embeds the assumption that policymakers discount the future using a quarterly discount factor, $\beta = 0.9963$:

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

The exhibit “Optimal Control Simulations under Commitment” considers four specifications of the weights on the inflation gap, the unemployment gap, and the rate change components of the loss function. The box “Optimal Control and the Loss Function” in the Monetary Policy Strategies section of the June 2016 Tealbook B provides motivations for the four specifications of the loss function. The table “Loss Functions” shows the weights used in the four specifications.

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

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

For each of these four specifications of the loss function, the optimal control policy is the path for the federal funds rate that minimizes the loss function in the FRB/US model, subject to

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

the effective lower bound constraint on nominal interest rates, under the assumption that market participants and wage and price setters employ model-consistent expectations and conditional on the staff's extended Tealbook projection. Policy tools other than the federal funds rate are taken as given and subsumed within the Tealbook baseline. The path chosen by policymakers today is assumed to be credible, meaning that the public sees this path as a binding commitment on policymakers' future decisions; the optimal control policy takes as given the initial lagged value of the federal funds rate but is otherwise unconstrained by policy decisions made prior to the simulation period. The discounted losses are calculated over a horizon that ends sufficiently far in the future so that extending the horizon further would not affect the policy prescriptions shown in the exhibits.

FLEXIBLE PRICE-LEVEL TARGETING WITH ALTERNATIVE PRICE-LEVEL GAPS

The FPLT rules underlying the simulations shown in the special exhibit “Flexible Price-Level Targeting with Alternative Price-Level Gaps” are of the form

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

Under the “FPLT (2011:Q4)” rule, the 2011:Q4 value of p_t^* is set to the 2011:Q4 value of the core PCE price index, and, subsequently, p_t^* is assumed to grow at a 2 percent annual rate. Under the “FPLT (2017:Q4)” rule, the 2017:Q4 value of p_t^* is set to the 2017:Q4 value of the core PCE price index, and, subsequently, p_t^* is assumed to grow at a 2 percent annual rate. We set the coefficient on the unemployment gap to -1.85, which would imply a coefficient of 1 on the output gap under the Okun's law relationship assumed by the staff in constructing the projection.

ESTIMATES OF THE EQUILIBRIUM REAL FEDERAL FUNDS RATE IN THE LONGER RUN

The top panel of the exhibit “Estimates of the Equilibrium Real Federal Funds Rate in the Longer Run” shows a range of estimates of r^{LR} from eight time-series models based on the following studies: Christensen and Rudebusch (2017); Del Negro, Giannone, Giannoni, and Tambalotti (2017); Holston, Laubach, and Williams (2017); Johannsen and Mertens (2016); Kiley (2015); Laubach and Williams (2003); Lewis and Vazquez-Grande (2017); and Lubik and Matthes (2015). For comparability, all computations use the latest vintage of historical data through 2018:Q2. Moreover, the estimates are “one sided” in the sense that, at each point, they make use of historical data only up to that point in time. As a result, their historical movements can differ from the “two sided” estimates reported in some of those studies.

Where possible, the middle panel reports 68 percent uncertainty bands around each model's point estimate for 2018:Q2. The computation and interpretation of these bands are specific to each study.

The bottom panel shows r^{LR} values from selected forecasters. These values were obtained as follows:

- “Tealbook baseline” is the staff’s assumption about the level of the equilibrium real federal funds rate in the longer run.
- “Median SEP” is the median of FOMC participants’ projections of the federal funds rate in the longer run minus the corresponding projection of PCE inflation as of the June 2018 SEP.
- “Median Survey of Primary Dealers” equals the long-run median dealer forecast for the target rate minus the longer-run median dealer forecast of PCE inflation as of the June 2018 survey.
- “Median Blue Chip (6-to-10-year)” equals the consensus five-year average (2025–29) forecast for the federal funds rate minus the consensus five-year average (2025–29) forecast for the annual change in the GDP chained price index as of the March 2018 Blue Chip Financial Forecasts survey.
- “Congressional Budget Office (10-year)” equals the federal funds rate in 2028 minus the annual change in the PCE index in 2028 as of August 2018.

REFERENCES

- Christensen, Jens H.E., and Glenn D. Rudebusch (2017). “A New Normal for Interest Rates? Evidence from Inflation-Indexed Debt,” FRBSF Working Paper 2017-07. San Francisco: Federal Reserve Bank of San Francisco, May, <https://www.frbsf.org/economic-research/publications/working-papers/wp2017-07.pdf>.
- Chung, Hess, Edward Herbst, and Michael T. Kiley (2014). “Effective Monetary Policy Strategies in New Keynesian Models: A Reexamination,” *NBER Macroeconomics Annual*, vol. 29 (1), pp. 289–344.
- Del Negro, Marco, Domenico Giannone, Marc P. Giannoni, and Andrea Tambalotti (2017). “Safety, Liquidity, and the Natural Rate of Interest,” *Brookings Papers on Economic Activity*, Spring, pp. 235–316, <https://www.brookings.edu/wp-content/uploads/2017/08/delnegrotextsp17bpea.pdf>.
- Erceg, Christopher, Jon Faust, Michael Kiley, Jean-Philippe Laforté, David López-Salido, Stephen Meyer, Edward Nelson, David Reifschneider, and Robert Tetlow (2012). “An Overview of Simple Policy Rules and Their Use in Policymaking in Normal Times and Under Current Conditions,” memorandum to the Federal Open Market Committee, Board of Governors of the Federal Reserve System, Divisions of International Finance, Monetary Affairs, and Research and Statistics, July 18.
- Gust, Christopher, Benjamin K. Johansson, David López-Salido, and Robert Tetlow (2016). “ r^* : Concepts, Measures, and Uses,” memorandum to the Federal Open Market Committee, Board of Governors of the Federal Reserve System, Division of Monetary Affairs, October 13.
- Holston, Kathryn, Thomas Laubach, and John C. Williams (2017). “Measuring the Natural Rate of Interest: International Trends and Determinants,” *Journal of International Economics*, vol. 108 (May), pp. S59–75.
- Johansson, Benjamin K., and Elmar Mertens (2016). “A Time Series Model of Interest Rates with the Effective Lower Bound,” Finance and Economics Discussion Series 2016-033. Washington: Board of Governors of the Federal Reserve System, April, <http://dx.doi.org/10.17016/FEDS.2016.033>.
- Kiley, Michael T. (2015). “What Can the Data Tell Us about the Equilibrium Real Interest Rate?” Finance and Economics Discussion Series 2015-077. Washington: Board of Governors of the Federal Reserve System, August, <http://dx.doi.org/10.17016/FEDS.2015.077>.
- Laubach, Thomas, and John C. Williams (2003). “Measuring the Natural Rate of Interest,” *Review of Economics and Statistics*, vol. 85 (November), pp. 1063–70.

Lewis, Kurt F., and Francisco Vazquez-Grande (2017). “Measuring the Natural Rate of Interest: Alternative Specifications,” Finance and Economics Discussion Series 2017-059. Washington: Board of Governors of the Federal Reserve System, June, <https://dx.doi.org/10.17016/FEDS.2017.059>.

Lubik, Thomas A., and Christian Matthes (2015). “Time-Varying Parameter Vector Autoregressions: Specification, Estimation, and an Application,” *Economic Quarterly*, vol. 101 (Fourth Quarter), pp. 323–52.

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

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

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

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

Interval	Nominal GDP		Real GDP		PCE price index		Core PCE price index		Unemployment rate ¹	
	07/20/18	09/13/18	07/20/18	09/13/18	07/20/18	09/13/18	07/20/18	09/13/18	07/20/18	09/13/18
<i>Quarterly</i>										
2018:Q1	4.2	4.3	2.0	2.2	2.5	2.5	2.3	2.2	4.1	4.1
Q2	7.4	8.1	4.8	4.7	1.9	1.9	2.0	2.1	3.9	3.9
Q3	4.2	4.7	2.5	3.0	1.4	1.5	1.5	1.5	3.8	3.8
Q4	4.5	4.4	2.5	2.5	1.7	2.1	1.7	1.8	3.7	3.7
2019:Q1	4.7	4.8	2.6	2.7	2.0	2.0	2.1	2.1	3.6	3.6
Q2	4.9	5.1	2.5	2.6	2.0	1.9	2.0	2.0	3.5	3.4
Q3	4.5	4.6	2.4	2.4	1.9	1.9	1.9	2.0	3.4	3.3
Q4	4.3	4.3	2.3	2.3	1.9	1.9	1.9	2.0	3.4	3.3
2020:Q1	4.2	4.2	2.1	2.1	2.0	2.0	2.1	2.1	3.4	3.2
Q2	4.2	4.4	1.8	2.0	2.0	2.0	2.1	2.1	3.4	3.2
Q3	3.8	4.0	1.7	1.8	1.9	2.0	2.0	2.1	3.4	3.2
Q4	3.6	3.8	1.6	1.7	1.9	2.0	2.0	2.1	3.4	3.2
<i>Two-quarter²</i>										
2018:Q2	5.8	6.2	3.4	3.4	2.2	2.2	2.1	2.1	-2	-2
Q4	4.3	4.5	2.5	2.8	1.6	1.8	1.6	1.6	-2	-2
2019:Q2	4.8	5.0	2.6	2.7	2.0	2.0	2.1	2.1	-2	-3
Q4	4.4	4.5	2.4	2.4	1.9	1.9	1.9	2.0	-1	-1
2020:Q2	4.2	4.3	2.0	2.1	2.0	2.0	2.1	2.1	.0	-1
Q4	3.7	3.9	1.6	1.8	1.9	2.0	2.0	2.1	.0	.0
<i>Four-quarter³</i>										
2017:Q4	4.5	4.5	2.6	2.5	1.7	1.8	1.5	1.6	-6	-6
2018:Q4	5.1	5.3	2.9	3.1	1.9	2.0	1.9	1.9	-4	-4
2019:Q4	4.6	4.7	2.5	2.5	1.9	1.9	2.0	2.0	-3	-4
2020:Q4	3.9	4.1	1.8	1.9	2.0	2.0	2.1	2.1	.0	-1
2021:Q4	...	3.6	1.5	1.5	2.0	2.0	2.1	2.1	.2	.2
<i>Annual</i>										
2017	4.1	4.2	2.3	2.2	1.7	1.8	1.5	1.6	4.4	4.4
2018	5.2	5.3	3.0	2.9	2.0	2.1	1.8	1.9	3.9	3.9
2019	4.7	4.9	2.6	2.8	1.8	1.9	1.9	1.9	3.5	3.4
2020	4.2	4.3	2.1	2.1	2.0	2.0	2.0	2.1	3.4	3.2
2021	...	3.7	1.6	1.6	2.0	2.0	2.0	2.1	3.5	3.3

... Not applicable.

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

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

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

Changes in Real Gross Domestic Product and Related Items

(Percent, annual rate except as noted)

Item	2018				2019				2020				2018 ¹	2019 ¹	2020 ¹	2021 ¹
	Q2	Q3	Q4		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
Real GDP	4.7	3.0	2.5		2.7	2.6	2.4	2.3	2.1	2.0	1.8	1.7	3.1	2.5	1.9	1.5
<i>Previous Tealbook</i>	4.8	2.5	2.5		2.6	2.5	2.4	2.3	2.1	1.8	1.7	1.6	2.9	2.5	1.8	1.5
Final sales	5.6	1.8	2.8		2.9	2.5	2.3	2.3	2.1	2.0	1.7	1.9	3.0	2.5	1.9	1.6
<i>Previous Tealbook</i>	4.8	2.2	2.5		2.9	2.5	2.2	2.2	2.1	1.8	1.5	1.8	2.9	2.5	1.8	...
Priv. dom. final purch.	4.6	2.8	3.4		3.3	3.2	2.9	2.6	2.4	2.3	2.2	2.1	3.2	3.0	2.3	1.9
<i>Previous Tealbook</i>	3.5	3.1	2.9		3.1	2.9	2.7	2.5	2.3	2.2	2.1	2.0	2.9	2.8	2.1	...
Personal cons. expend.	4.2	2.9	2.7		2.8	2.8	2.8	2.8	2.7	2.5	2.4	2.3	2.6	2.8	2.5	2.1
<i>Previous Tealbook</i>	3.4	2.7	2.6		2.7	2.7	2.7	2.6	2.4	2.3	2.3	2.3	2.4	2.6	2.3	...
Durables	8.6	1.7	4.6		2.3	2.3	2.3	2.3	2.1	2.0	1.8	1.7	3.1	2.3	1.9	1.5
Nondurables	3.7	4.0	3.0		2.9	2.9	2.9	2.9	2.7	2.6	2.5	2.4	2.7	2.9	2.6	2.2
Services	3.7	2.8	2.3		2.9	2.9	2.9	2.9	2.7	2.6	2.5	2.4	2.5	2.9	2.5	2.1
Residential investment	-1.8	-2.1	-2		5.1	5.8	2.2	4	.7	.4	.2	.3	-1.9	3.4	.4	1.3
<i>Previous Tealbook</i>	-1.4	-2.1	-4		3.9	3.7	.8	.8	1.1	.7	1.0	.9	-1.2	2.3	.9	...
Nonres. priv. fixed invest.	8.9	3.7	7.9		5.2	4.4	3.4	2.3	1.9	1.7	1.7	1.6	8.0	3.8	1.7	.9
<i>Previous Tealbook</i>	6.0	7.3	5.4		4.9	4.2	3.4	2.5	2.1	1.8	1.4	1.1	7.2	3.8	1.6	...
Equipment & intangibles	7.3	4.1	8.8		5.7	4.9	3.7	2.6	2.2	2.1	2.3	2.3	7.7	4.2	2.2	1.7
<i>Previous Tealbook</i>	4.6	6.4	6.1		5.6	4.7	3.7	2.6	2.3	2.1	1.9	1.6	6.4	4.2	2.0	...
Nonres. structures	14.4	2.5	5.2		3.5	2.8	2.2	1.4	.8	.2	-.4	-.7	8.9	2.5	.0	-1.8
<i>Previous Tealbook</i>	10.8	10.4	2.8		2.8	2.5	2.3	2.2	1.4	.7	.0	-.4	10.0	2.4	.4	...
Net exports ²	-844	-887	-907		-920	-952	-984	-1001	-1019	-1042	-1075	-1083	-885	-964	-1055	-1121
<i>Previous Tealbook</i> ²	-605	-627	-641		-641	-661	-687	-705	-717	-738	-767	-776	-633	-673	-750	...
Exports	9.0	2.1	.5		3.1	2.8	3.1	2.5	2.8	2.8	2.7	2.7	3.7	2.9	2.8	2.7
Imports	-.5	6.8	2.7		3.9	5.7	5.9	3.8	4.0	4.6	5.5	2.8	3.0	4.8	4.2	3.5
Gov't. cons. & invest.	2.4	1.1	1.6		1.5	1.6	1.8	2.0	1.6	2.3	1.8	1.1	1.7	1.8	1.7	1.1
<i>Previous Tealbook</i>	3.2	.1	1.7		1.6	2.3	2.2	2.4	2.1	1.9	1.5	1.5	1.6	2.1	1.8	...
Federal	3.7	1.9	3.0		2.5	2.7	3.3	3.8	2.5	4.5	3.1	1.2	2.8	3.1	2.8	1.3
Defense	6.0	2.3	4.1		2.7	3.0	3.8	4.3	2.9	5.2	2.7	1.0	3.8	3.5	3.0	1.0
Nondefense	.5	1.4	1.5		2.3	2.2	2.6	2.9	2.0	3.5	3.6	1.5	1.4	2.5	2.7	1.6
State & local	1.7	.7	.8		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Change in priv. inventories ²	-23	37	21		14	19	29	29	31	31	39	29	16	23	32	16
<i>Previous Tealbook</i> ²	13	24	24		8	9	20	27	29	31	41	30	19	16	33	...

... Not applicable.

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

2. Billions of chained (2012) dollars; annual values show annual averages.

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

Item	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Real GDP	1.5	2.6	2.7	2.0	1.9	2.5	3.1	2.5	1.9	1.5
<i>Previous Tealbook</i>	1.3	2.7	2.7	2.0	1.8	2.6	2.9	2.5	1.8	1.5
Final sales	1.9	2.0	3.0	1.9	2.1	2.6	3.0	2.5	1.9	1.6
<i>Previous Tealbook</i>	1.7	2.0	2.9	2.0	1.9	2.9	2.9	2.5	1.8	...
Priv. dom. final purch.	2.6	2.6	4.3	2.7	2.7	3.3	3.2	3.0	2.3	1.9
<i>Previous Tealbook</i>	2.3	2.6	4.1	2.9	2.5	3.3	2.9	2.8	2.1	...
Personal cons. expend.	1.6	1.9	3.8	3.0	2.8	2.7	2.6	2.8	2.5	2.1
<i>Previous Tealbook</i>	1.3	2.0	3.6	3.0	2.8	2.8	2.4	2.6	2.3	...
Durables	6.3	5.0	9.2	6.0	6.8	7.7	3.1	2.3	1.9	1.5
Nondurables	.7	2.8	3.0	3.0	2.0	3.0	2.7	2.9	2.6	2.2
Services	1.2	1.1	3.2	2.6	2.4	1.8	2.5	2.9	2.5	2.1
Residential investment	15.4	7.1	7.8	8.9	4.5	3.8	-1.9	3.4	.4	1.3
<i>Previous Tealbook</i>	15.7	6.8	6.3	10.3	2.5	2.6	-1.2	2.3	.9	...
Nonres. priv. fixed invest.	5.6	5.4	6.4	-.7	1.8	6.3	8.0	3.8	1.7	.9
<i>Previous Tealbook</i>	5.2	4.8	6.1	.3	.7	6.3	7.2	3.8	1.6	...
Equipment & intangibles	6.1	5.1	5.6	2.6	1.6	7.3	7.7	4.2	2.2	1.7
<i>Previous Tealbook</i>	5.5	4.5	5.3	3.3	-1	6.7	6.4	4.2	2.0	...
Nonres. structures	4.0	6.7	8.8	-10.7	2.5	2.9	8.9	2.5	.0	-1.8
<i>Previous Tealbook</i>	4.1	5.8	8.8	-9.1	3.5	5.0	10.0	2.4	.4	...
Net exports ¹	-569	-533	-578	-725	-786	-859	-885	-964	-1055	-1121
<i>Previous Tealbook</i> ¹	-447	-405	-428	-545	-586	-622	-633	-673	-750	...
Exports	2.1	6.0	3.0	-1.6	.8	4.7	3.7	2.9	2.8	2.7
Imports	.6	3.0	6.7	3.4	3.1	5.4	3.0	4.8	4.2	3.5
Gov't. cons. & invest.	-2.1	-2.4	.2	2.2	.9	.1	1.7	1.8	1.7	1.1
<i>Previous Tealbook</i>	-2.2	-2.8	.5	1.6	.4	.7	1.6	2.1	1.8	...
Federal	-2.6	-6.1	-1.2	1.2	.2	1.3	2.8	3.1	2.8	1.3
Defense	-4.7	-6.5	-3.6	-.2	-.7	1.3	3.8	3.5	3.0	1.0
Nondefense	1.2	-5.5	2.7	3.4	1.5	1.3	1.4	2.5	2.7	1.6
State & local	-1.7	.2	1.1	2.8	1.4	-.5	1.0	1.0	1.0	1.0
Change in priv. inventories ¹	71	109	87	129	23	23	16	23	32	16
<i>Previous Tealbook</i> ¹	55	79	68	101	33	15	19	16	33	...

... Not applicable.

1. Billions of chained (2012) dollars; annual values show annual averages.

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

Item	2018				2019				2020				2018 ¹	2019 ¹	2020 ¹	2021 ¹
	Q2	Q3	Q4		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
Real GDP <i>Previous Tealbook</i>	4.7	3.0	2.5		2.7	2.6	2.4	2.3	2.1	2.0	1.8	1.7	3.1	2.5	1.9	1.5
	4.8	2.5	2.5		2.6	2.5	2.4	2.3	2.1	1.8	1.7	1.6	2.9	2.5	1.8	1.5
Final sales <i>Previous Tealbook</i>	5.6	1.9	2.8		2.9	2.5	2.3	2.3	2.1	2.0	1.7	1.9	3.0	2.5	1.9	1.6
	4.8	2.2	2.5		2.9	2.5	2.2	2.2	2.1	1.8	1.5	1.8	2.9	2.5	1.8	...
Priv. dom. final purch. <i>Previous Tealbook</i>	4.0	2.4	2.9		2.8	2.7	2.5	2.2	2.1	2.0	1.9	1.8	2.7	2.6	1.9	1.6
	3.1	2.7	2.5		2.6	2.5	2.3	2.1	1.9	1.8	1.8	1.7	2.5	2.4	1.8	...
Personal cons. expend. <i>Previous Tealbook</i>	2.9	2.0	1.8		1.9	1.9	1.9	1.9	1.9	1.7	1.6	1.6	1.8	1.9	1.7	1.4
	2.4	1.8	1.8		1.8	1.8	1.8	1.8	1.8	1.6	1.5	1.5	1.6	1.8	1.6	...
Durables	.6	.1	.3		.2	.2	.2	.2	.2	.1	.1	.1	.2	.2	.1	.1
Nondurables	.5	.6	.4		.4	.4	.4	.4	.4	.4	.4	.3	.4	.4	.4	.3
Services	1.7	1.3	1.1		1.3	1.3	1.3	1.3	1.3	1.3	1.2	1.1	1.2	1.4	1.2	1.0
Residential investment <i>Previous Tealbook</i>	-1	-1	.0		.2	.2	.1	.0	.0	.0	.0	.0	-1	.1	.0	.0
	-1	-1	.0		.1	.1	.0	.0	.0	.0	.0	.0	.0	.1	.0	...
Nonres. priv. fixed invest. <i>Previous Tealbook</i>	1.2	.5	1.1		.7	.6	.5	.3	.3	.2	.2	.2	1.1	.5	.2	.1
	.8	.9	.7		.6	.5	.4	.3	.3	.2	.2	.1	.9	.5	.2	...
Equipment & intangibles <i>Previous Tealbook</i>	.8	.4	.9		.6	.5	.4	.3	.3	.2	.2	.2	.8	.4	.2	.2
	.5	.6	.6		.6	.5	.4	.3	.3	.2	.2	.2	.6	.4	.2	...
Nonres. structures <i>Previous Tealbook</i>	.4	.1	.2		.1	.1	.1	.0	.0	.0	.0	.0	.3	.1	.0	-1
	.3	.3	.1		.1	.1	.1	.1	.1	.0	.0	.0	.3	.1	.0	...
Net exports <i>Previous Tealbook</i>	1.2	-8	-3		-2	-5	-5	-3	-3	-4	-5	-1	.0	-4	-3	-2
	1.2	-5	-3		.0	-4	-5	-3	-3	-4	-5	-2	.1	-3	-3	...
Exports	1.1	.3	.1		.4	.3	.4	.3	.3	.3	.3	.3	.5	.3	.3	.3
Imports	.1	-1.0	-4		-6	-9	-9	-6	-6	-7	-8	-4	-5	-7	-6	-5
Gov't. cons. & invest. <i>Previous Tealbook</i>	.4	.2	.3		.3	.3	.3	.3	.3	.4	.3	.2	.3	.3	.3	.2
	.6	.0	.3		.3	.4	.4	.4	.4	.3	.3	.3	.3	.4	.3	...
Federal	.2	.1	.2		.2	.2	.2	.2	.2	.3	.2	.1	.2	.2	.2	.1
Defense	.2	.1	.2		.1	.1	.1	.2	.2	.1	.1	.0	.1	.1	.1	.0
Nondefense	.0	.0	.0		.1	.1	.1	.1	.1	.1	.1	.1	.0	.1	.1	.0
State & local	.2	.1	.1		.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
Change in priv. inventories <i>Previous Tealbook</i>	-9	1.2	-3		-1	.1	.2	.0	.0	.0	.1	-.2	.1	.0	.0	-1
	.0	.2	.0		-3	.0	.2	.2	.0	.0	.2	-.2	.1	.0	.0	...

... Not applicable.

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

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

Item	2018				2019				2020				2018 ¹	2019 ¹	2020 ¹	2021 ¹	
	Q2	Q3	Q4		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4					
GDP chain-wt. price index <i>Previous Tealbook</i>	3.0 2.5	1.6 1.7	1.8 1.9		2.0 2.0	2.4 2.3	2.1 2.1	2.0 1.9	2.1 2.1	2.4 2.3	2.1 2.1	2.0 2.0	2.1 2.1	2.1 2.1	2.2 2.1	2.1 ...	
PCE chain-wt. price index <i>Previous Tealbook</i>	1.9 1.9	1.5 1.4	2.1 1.7		2.0 2.0	1.9 2.0	1.9 1.9	1.9 1.9	2.0 2.0	2.0 2.0	2.0 1.9	2.0 1.9	2.0 2.0	1.9 1.9	2.0 2.0	2.0 2.0	
Energy <i>Previous Tealbook</i>	.6 .4	5.0 .4	7.9 1.4		1.0 .2	-8 -5	-9 -6	-12 -9	-1.2 -1.0	-1.2 -1.0	-1.3 -1.1	-1.2 -1.0	-1.2 -1.0	6.5 3.7	-5 -4	-1.2 -1.0	-8 ...
Food <i>Previous Tealbook</i>	1.2 1.2	.6 1.4	1.9 2.0		2.0 2.0	2.2 2.2	2.6 2.6	3.0 3.0	2.8 2.8	2.6 2.6	2.5 2.5	2.4 2.4	2.4 2.4	1.0 1.2	2.4 2.4	2.6 2.6	2.3 ...
Ex. food & energy <i>Previous Tealbook</i>	2.1 2.0	1.5 1.5	1.8 1.7		2.1 2.1	2.0 2.0	2.0 1.9	2.0 1.9	2.1 2.1	2.1 2.1	2.1 2.0	2.1 2.0	2.1 2.0	1.9 1.9	2.0 2.0	2.1 2.1	2.1 2.1
Ex. food & energy, market based <i>Previous Tealbook</i>	2.2 2.0	1.2 1.3	1.7 1.6		1.9 1.9	1.8 1.9	1.8 1.8	1.8 1.8	2.0 2.0	2.0 2.0	2.0 1.9	1.9 1.9	1.9 1.9	1.8 1.8	1.8 1.8	2.0 1.9	1.9 ...
CPI <i>Previous Tealbook</i>	1.7 1.7	2.2 1.9	2.6 2.2		2.1 2.3	2.2 2.2	2.2 2.2	2.2 2.2	2.3 2.3	2.3 2.3	2.3 2.3	2.3 2.3	2.3 2.3	2.5 2.3	2.2 2.2	2.3 2.3	2.3 ...
Ex. food & energy <i>Previous Tealbook</i>	1.8 1.8	2.1 2.1	2.1 2.2		2.2 2.5	2.4 2.5	2.4 2.4	2.4 2.4	2.6 2.6	2.6 2.6	2.5 2.5	2.5 2.5	2.5 2.5	2.2 2.3	2.3 2.4	2.6 2.5	2.6 ...
ECI, hourly compensation ² <i>Previous Tealbook</i> ²	2.4 2.4	2.3 2.3	2.3 2.3		2.8 2.8	2.8 2.8	2.8 2.8	2.9 2.8	3.0 2.8	3.0 2.8	3.0 2.9	3.0 2.9	3.0 2.9	2.8 2.7	2.8 2.8	3.0 2.9	3.0 ...
Business sector Output per hour <i>Previous Tealbook</i>	4.2 4.4	1.5 .9	.8 .1		1.3 .9	1.2 .9	1.1 .9	1.0 .9	1.1 .9	1.2 .9	1.2 .9	1.2 .9	1.2 .9	1.8 1.4	1.1 .9	1.2 .9	1.1 ...
Compensation per hour <i>Previous Tealbook</i>	2.3 1.8	2.9 3.1	3.2 3.2		3.9 4.0	4.0 4.0	4.1 4.0	4.1 4.0	4.1 4.0	4.2 4.1	4.2 4.1	4.1 4.1	4.1 4.1	3.2 3.0	4.0 4.0	4.2 4.1	4.0 ...
Unit labor costs <i>Previous Tealbook</i>	-1.8 -2.4	1.4 2.2	2.3 3.1		2.6 3.1	2.8 3.0	2.9 3.0	3.1 3.0	3.0 3.0	3.0 3.2	2.9 3.1	2.9 3.2	2.9 3.2	1.4 1.5	2.8 3.0	3.0 3.1	2.8 ...
Core goods imports chain-wt. price index ³ <i>Previous Tealbook</i> ³	.5 1.4	-2.2 -1.9	-9 -7		.2 .4	.6 .5	.8 .6	.8 .6	.9 .8	.7 .6	.7 .6	.7 .6	.7 .6	.0 .4	.6 .5	.8 .7	.7 ...

... Not applicable.

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	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
GDP chain-wt. price index <i>Previous Tealbook</i>	2.1 1.9	1.8 1.6	1.6 1.6	.9 1.0	1.5 1.5	2.0 1.9	2.1 2.1	2.1 2.1	2.2 2.1	2.1 ...
PCE chain-wt. price index <i>Previous Tealbook</i>	1.8 1.8	1.2 1.2	1.2 1.2	.3 .4	1.6 1.6	1.8 1.7	2.0 1.9	1.9 1.9	2.0 2.0	2.0 2.0
Energy <i>Previous Tealbook</i>	2.1 2.3	-2.9 -2.5	-6.9 -6.5	-16.4 -16.2	2.1 2.2	8.1 7.6	6.5 3.7	-5 -4	-1.2 -1.0	-8 ...
Food <i>Previous Tealbook</i>	1.3 1.2	.7 .7	2.8 2.6	.3 .3	-1.8 -1.7	.7 .7	1.0 1.2	2.4 2.4	2.6 2.6	2.3 ...
Ex. food & energy <i>Previous Tealbook</i>	1.8 1.8	1.6 1.5	1.5 1.5	1.2 1.3	1.8 1.9	1.6 1.5	1.9 1.9	2.0 2.0	2.1 2.1	2.1 2.1
Ex. food & energy, market based <i>Previous Tealbook</i>	1.5 1.5	1.1 1.1	1.2 1.2	1.1 1.1	1.5 1.5	1.2 1.2	1.8 1.8	1.8 1.8	2.0 1.9	1.9 ...
CPI <i>Previous Tealbook</i>	1.9 1.9	1.2 1.2	1.2 1.2	.4 .4	1.8 1.8	2.1 2.1	2.5 2.3	2.2 2.2	2.3 2.3	2.3 ...
Ex. food & energy <i>Previous Tealbook</i>	1.9 1.9	1.7 1.7	1.7 1.7	2.0 2.0	2.2 2.2	1.7 1.7	2.2 2.3	2.3 2.4	2.6 2.5	2.6 ...
ECL, hourly compensation ¹ <i>Previous Tealbook</i> ¹	1.8 1.8	2.0 2.0	2.3 2.3	1.9 1.9	2.2 2.2	2.6 2.6	2.8 2.7	2.8 2.8	3.0 2.9	3.0 ...
Business sector Output per hour <i>Previous Tealbook</i>	.2 -1	1.8 1.9	.1 .1	.7 .7	1.1 1.1	.8 .9	1.8 1.4	1.1 .9	1.2 .9	1.1 ...
Compensation per hour <i>Previous Tealbook</i>	5.9 5.9	-3 -1	2.8 2.9	2.5 3.1	2.1 -1	3.0 2.8	3.2 3.0	4.0 4.0	4.2 4.1	4.0 ...
Unit labor costs <i>Previous Tealbook</i>	5.7 6.0	-2.0 -2.0	2.7 2.8	1.8 2.4	1.0 -1.2	2.3 1.9	1.4 1.5	2.8 3.0	3.0 3.1	2.8 ...
Core goods imports chain-wt. price index ² <i>Previous Tealbook</i> ²	-4 .1	-2.2 -1.5	-4 .3	-4.4 -3.7	-7 -2	1.1 1.3	.0 .4	.6 .5	.8 .7	.7 ...

... Not applicable.

1. Private-industry workers.

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

Other Macroeconomic Indicators

Item	2018				2019				2020				2018 ¹	2019 ¹	2020 ¹	2021 ¹
	Q2	Q3	Q4		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
<i>Employment and production</i>																
Nonfarm payroll employment ²	217	181	184		187	181	175	165	150	135	120	110	200	177	129	85
Unemployment rate ³	3.9	3.8	3.7		3.6	3.4	3.3	3.3	3.2	3.2	3.2	3.2	3.7	3.3	3.2	3.4
<i>Previous Tealbook³</i>	3.9	3.8	3.7		3.6	3.5	3.4	3.4	3.4	3.4	3.4	3.4	3.7	3.4	3.4	3.6
Natural rate of unemployment ³	4.6	4.6	4.6		4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
<i>Previous Tealbook³</i>	4.7	4.7	4.7		4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	...
Employment-to-Population Ratio ³	60.4	60.4	60.5		60.6	60.7	60.8	60.8	60.8	60.8	60.8	60.8	60.5	60.8	60.8	60.5
Employment-to-Population Trend ³	59.8	59.7	59.7		59.6	59.6	59.6	59.5	59.5	59.4	59.4	59.4	59.7	59.5	59.4	59.2
Output gap ⁴	1.8	2.2	2.4		2.7	2.9	3.0	3.2	3.2	3.2	3.2	3.2	2.4	3.2	3.2	2.7
<i>Previous Tealbook⁴</i>	2.0	2.3	2.6		2.8	3.0	3.1	3.3	3.3	3.3	3.2	3.1	2.6	3.3	3.1	...
Industrial production ⁵	5.1	3.0	1.9		2.4	2.7	2.5	2.3	2.0	1.4	1.3	1.0	3.1	2.5	1.4	.7
<i>Previous Tealbook⁵</i>	6.0	2.8	2.0		2.3	2.4	2.0	1.9	1.9	1.4	1.3	.9	3.3	2.2	1.4	...
Manufacturing industr. prod. ⁵	2.3	2.8	2.5		2.0	2.7	3.0	2.4	1.7	1.5	1.4	1.0	2.4	2.5	1.4	.7
<i>Previous Tealbook⁵</i>	1.9	3.1	2.3		1.8	2.5	2.6	2.1	1.6	1.5	1.4	.9	2.3	2.2	1.4	...
Capacity utilization rate - mfg. ³	75.5	75.8	76.0		76.1	76.4	76.8	77.0	77.2	77.3	77.4	77.5	76.0	77.0	77.5	77.5
<i>Previous Tealbook³</i>	75.4	75.7	75.9		76.0	76.3	76.6	76.8	77.0	77.1	77.2	77.3	75.9	76.8	77.3	...
Housing starts ⁶	1.3	1.2	1.3		1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Light motor vehicle sales ⁶	17.2	16.8	17.0		17.0	17.0	17.0	17.0	16.9	16.8	16.8	16.7	17.0	17.0	16.8	16.6
<i>Income and saving</i>																
Nominal GDP ⁵	8.1	4.7	4.4		4.8	5.1	4.6	4.3	4.2	4.4	4.0	3.8	5.3	4.7	4.1	3.6
Real disposable pers. income ⁵	2.4	2.3	2.6		3.4	2.5	2.3	2.4	3.7	2.3	1.6	2.2	2.9	2.7	2.4	1.8
<i>Previous Tealbook⁵</i>	1.8	2.5	2.9		4.1	2.2	1.8	2.2	3.2	2.2	1.8	2.2	2.7	2.6	2.3	...
Personal saving rate ³	6.7	6.6	6.5		6.7	6.6	6.5	6.4	6.6	6.6	6.4	6.4	6.5	6.4	6.4	6.1
<i>Previous Tealbook³</i>	2.9	2.8	2.9		3.2	3.1	2.9	2.9	3.1	3.0	2.9	2.9	2.9	2.9	2.9	...
Corporate profits ⁷	14.0	8.0	3.6		.1	2.8	.6	-2.4	-2.2	1.0	-.4	-1.9	7.6	.3	-.9	-.4
Profit share of GNP ³	10.9	11.0	11.0		10.9	10.8	10.7	10.6	10.4	10.3	10.2	10.1	11.0	10.6	10.1	9.7
Gross national saving rate ³	18.4	18.7	18.7		18.5	18.6	18.5	18.4	18.2	18.2	18.0	18.0	18.7	18.4	18.0	17.6
Net national saving rate ³	3.8	4.1	3.9		3.6	3.6	3.5	3.2	3.0	2.9	2.7	2.6	3.9	3.2	2.6	2.1

... Not applicable.

1. Change from fourth quarter of previous year to fourth quarter of year indicated, unless otherwise indicated.

2. Average monthly change, thousands.

3. Percent; annual values are for the fourth quarter of the year indicated.

4. Percent difference between actual and potential output; a negative number indicates that the economy is operating below potential.

Annual values are for the fourth quarter of the year indicated.

5. Percent change, annual rate.

6. Level, millions; annual values are annual averages.

7. Percent change, annual rate, with inventory valuation and capital consumption adjustments.

Greensheets

Other Macroeconomic Indicators

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

Item	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
<i>Employment and production</i>										
Nonfarm payroll employment ¹	179	192	250	226	195	182	200	177	129	85
Unemployment rate ²	7.8	7.0	5.7	5.0	4.7	4.1	3.7	3.3	3.2	3.4
<i>Previous Tealbook²</i>	7.8	7.0	5.7	5.0	4.7	4.1	3.7	3.4	3.4	3.6
Natural rate of unemployment ²	5.6	5.4	5.1	4.9	4.8	4.6	4.6	4.6	4.6	4.6
<i>Previous Tealbook²</i>	5.6	5.4	5.1	4.9	4.8	4.7	4.7	4.7	4.7	...
Employment-to-Population Ratio ²	58.7	58.5	59.3	59.4	59.8	60.1	60.5	60.8	60.8	60.5
Employment-to-Population Trend ²	60.3	60.2	60.1	60.0	59.9	59.8	59.7	59.5	59.4	59.2
Output gap ³	-3.7	-2.8	-8	-2	.4	1.2	2.4	3.2	3.2	2.7
<i>Previous Tealbook³</i>	-3.9	-3.0	-9	-1	.3	1.4	2.6	3.3	3.1	...
Industrial production	2.2	2.3	3.4	-3.3	-5	3.0	3.1	2.5	1.4	.7
<i>Previous Tealbook</i>	2.2	2.3	3.4	-3.3	-5	3.0	3.3	2.2	1.4	...
Manufacturing industr. prod.	1.4	1.1	1.4	-1.6	-1	1.9	2.4	2.5	1.4	.7
<i>Previous Tealbook</i>	1.4	1.1	1.4	-1.6	-1	1.9	2.3	2.2	1.4	...
Capacity utilization rate - mfg. ²	74.7	75.1	76.3	75.4	74.4	75.2	76.0	77.0	77.5	77.5
<i>Previous Tealbook²</i>	74.7	75.1	76.3	75.4	74.4	75.2	75.9	76.8	77.3	...
Housing starts ⁴	.8	.9	1.0	1.1	1.2	1.2	1.3	1.3	1.3	1.3
Light motor vehicle sales ⁴	14.4	15.5	16.5	17.4	17.5	17.1	17.0	17.0	16.8	16.6
<i>Income and saving</i>										
Nominal GDP	3.6	4.4	4.4	2.9	3.4	4.5	5.3	4.7	4.1	3.6
Real disposable pers. income	4.9	-2.5	5.2	3.1	1.6	2.8	2.9	2.7	2.4	1.8
<i>Previous Tealbook</i>	5.1	-2.8	4.9	3.2	.2	1.9	2.7	2.6	2.3	...
Personal saving rate ²	10.2	6.3	7.4	7.4	6.4	6.3	6.5	6.4	6.4	6.1
<i>Previous Tealbook²</i>	9.2	4.7	5.9	6.1	3.6	2.7	2.9	2.9	2.9	...
Corporate profits ⁵	.7	3.9	5.9	-10.7	7.6	3.3	7.6	.3	-9	-4
Profit share of GNP ²	11.9	11.8	12.0	10.4	10.8	10.7	11.0	10.6	10.1	9.7
Gross national saving rate ²	18.8	19.2	20.2	19.4	18.3	18.3	18.7	18.4	18.0	17.6
Net national saving rate ²	3.7	4.0	5.1	4.3	3.0	3.1	3.9	3.2	2.6	2.1

... Not applicable.

1. Average monthly change, thousands.

2. Percent; values are for the fourth quarter of the year indicated.

3. Percent difference between actual and potential output; a negative number indicates that the economy is operating below potential.

4. Level, millions; values are annual averages.

5. Percent change, with inventory valuation and capital consumption adjustments.

Staff Projections of Government-Sector Accounts and Related Items

Item	2016	2017	2018	2019	2020	2021	2018			2019
							Q2	Q3	Q4	Q1
Unified federal budget¹										
Receipts	3,268	3,316	3,344	3,471	3,630	3,767	1,044	804	784	726
Outlays	3,853	3,982	4,118	4,408	4,751	5,034	1,051	970	1,119	1,119
Surplus/deficit	-585	-665	-774	-937	-1,121	-1,267	-7	-167	-334	-393
	Nominal dollars, billions									
Surplus/deficit	-3.2	-3.5	-3.8	-4.4	-5.0	-5.5	-1	-3.3	-6.5	-7.6
<i>Previous Tealbook</i>	-3.2	-3.5	-3.9	-4.7	-5.4	-5.3	-1	-3.6	-7.0	-7.7
Primary surplus/deficit	-1.9	-2.1	-2.2	-2.6	-2.8	-3.1	1.8	-2.1	-4.4	-5.7
Net interest	1.3	1.4	1.6	1.8	2.2	2.4	2.0	1.1	2.1	1.9
Cyclically adjusted surplus/deficit	-3.1	-3.7	-4.5	-5.6	-6.5	-6.9	-9	-4.2	-7.5	-8.7
Federal debt held by public	76.4	76.1	77.7	77.6	79.7	82.7	77.4	77.7	78.2	78.6
	Percent of GDP									
Government in the NIPA²										
Purchases	.9	.1	1.7	1.8	1.7	1.1	2.4	1.1	1.6	1.5
Consumption	.9	-1	1.3	1.3	1.2	.7	1.9	.8	1.1	1.1
Investment	1.0	1.1	3.5	3.6	3.4	2.4	5.5	2.6	3.7	3.3
State and local construction	1.8	-2.9	2.4	1.0	1.0	1.0	5.5	.5	.5	1.0
Real disposable personal income	1.6	2.8	2.9	2.7	2.4	1.8	2.4	2.3	2.6	3.4
Contribution from transfers ³	.3	.2	.5	.8	.5	.6	.4	.3	.5	1.7
Contribution from taxes ³	-1	-6	-2	-8	-6	-7	-3	-9	-6	-6
	Real percent change, annual rate									
Government employment										
Federal	3	-1	1	2	1	1	1	1	2	3
State and local	14	3	3	9	9	9	7	-2	7	9
	Average net change in monthly payrolls, thousands									
Fiscal indicators²										
Fiscal effect (FE) ⁴	.4	.1	.4	.7	.6	.4	.6	.4	.6	.7
Discretionary policy actions (FI)	.3	.2	.6	.6	.5	.2	.8	.5	.6	.6
<i>Previous Tealbook</i>	.1	.2	.5	.7	.5	.2	.8	.3	.6	.6
Federal purchases	.0	.1	.2	.2	.2	.1	.2	.1	.2	.2
State and local purchases	.1	-1	.1	.1	.1	.1	.2	.1	.1	.1
Taxes and transfers	.1	.1	.4	.3	.2	.0	.4	.4	.4	.4
Cyclical	-1	-1	-2	-2	-1	.0	-2	-2	-2	-2
Other	.2	.1	.0	.3	.2	.2	.0	.1	.2	.3
	Percentage point contribution to change in real GDP, annual rate									

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

Foreign Real GDP and Consumer Prices: Selected Countries

(Quarterly percent changes at an annual rate)

Measure and country	2018				2019				Projected				
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Real GDP¹													
Total foreign	3.1	2.0	2.5	2.6	2.7	2.7	2.9	2.5	2.7	2.7	2.7	2.7	2.7
<i>Previous Tealbook</i>	3.2	2.6	2.8	2.8	2.8	2.8	2.9	2.4	2.7	2.7	2.7	2.7	2.7
Advanced foreign economies	1.4	2.4	1.7	1.7	1.8	1.7	2.0	1.3	1.7	1.7	1.7	1.7	1.7
Canada	1.4	2.9	1.8	2.1	2.2	2.2	2.2	2.1	2.0	1.8	1.8	1.8	1.8
Japan	-9	3.0	-9	.7	.7	.7	3.1	-3.8	.9	.8	.8	.8	.8
United Kingdom	.9	1.5	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.8
Euro area	1.6	1.5	1.6	1.5	1.4	1.4	1.5	1.6	1.6	1.6	1.6	1.6	1.6
Germany	1.5	1.8	1.7	1.6	1.6	1.6	1.6	1.6	1.5	1.5	1.4	1.4	1.4
Emerging market economies	4.7	1.6	3.3	3.5	3.6	3.6	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Asia	6.2	4.0	4.6	4.7	4.7	4.7	4.7	4.7	4.6	4.6	4.5	4.5	4.5
Korea	4.1	2.4	3.1	3.3	3.1	3.1	3.1	3.1	3.0	3.0	3.0	3.0	3.0
China	7.2	6.5	6.1	6.3	6.3	6.2	6.2	6.1	6.0	6.0	5.9	5.9	5.9
Latin America	3.4	-1.0	2.0	2.3	2.6	2.6	2.9	2.9	2.9	2.9	2.9	2.9	2.9
Mexico	4.0	-6	2.3	2.6	2.7	2.7	2.9	2.9	2.9	2.9	2.9	2.9	2.9
Brazil	.6	.7	3.5	2.3	2.5	2.5	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Consumer prices²													
Total foreign	2.7	1.7	3.5	2.7	2.6	2.6	2.6	2.9	2.4	2.4	2.4	2.4	2.4
<i>Previous Tealbook</i>	2.6	1.6	2.7	2.5	2.5	2.4	2.4	2.8	2.4	2.4	2.4	2.4	2.4
Advanced foreign economies	2.6	1.0	2.3	1.8	1.6	1.6	1.7	2.6	1.6	1.7	1.7	1.7	1.7
Canada	3.6	1.1	2.9	2.4	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.0
Japan	2.5	-2.3	1.3	1.0	1.0	.9	1.0	6.3	1.0	1.0	1.0	1.0	1.0
United Kingdom	2.4	1.9	2.5	2.5	2.4	2.4	2.4	2.3	2.3	2.3	2.2	2.1	2.1
Euro area	2.1	2.1	2.5	1.7	1.3	1.3	1.4	1.5	1.5	1.5	1.5	1.6	1.6
Germany	1.2	2.4	2.9	2.5	2.2	2.1	2.2	2.3	2.3	2.3	2.2	2.2	2.2
Emerging market economies	2.7	2.2	4.4	3.3	3.3	3.2	3.2	3.1	3.0	3.0	2.9	2.9	2.9
Asia	1.8	1.0	3.0	2.6	2.7	2.7	2.7	2.8	2.7	2.7	2.7	2.7	2.7
Korea	1.6	1.8	2.0	3.0	3.0	3.0	3.1	3.1	3.1	3.0	3.0	3.0	3.0
China	1.5	.7	3.8	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Latin America	4.8	4.9	7.8	4.9	4.8	4.4	4.2	4.1	3.7	3.5	3.5	3.4	3.4
Mexico	4.1	3.8	6.6	3.6	3.7	3.5	3.3	3.3	3.2	3.2	3.2	3.2	3.2
Brazil	3.1	4.3	6.3	3.4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3

1. Foreign GDP aggregates calculated using shares of U.S. exports.

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

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

Measure and country	-----Projected-----										
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
Real GDP¹											
Total foreign	2.2	3.0	2.8	2.1	2.7	2.9	2.5	2.7	2.7	2.6	
<i>Previous Tealbook</i>	2.2	3.0	2.8	2.1	2.7	2.9	2.8	2.8	2.7	...	
Advanced foreign economies	.3	2.5	2.0	1.2	1.9	2.6	1.8	1.7	1.7	1.7	
Canada	.7	3.6	2.5	.3	2.0	3.0	2.1	2.2	1.8	1.8	
Japan	.3	2.8	-.3	1.2	1.5	2.0	.9	.1	.8	.8	
United Kingdom	1.6	2.6	3.1	2.2	1.7	1.3	1.5	1.7	1.7	1.6	
Euro area	-1.1	.8	1.6	1.9	2.0	2.7	1.5	1.5	1.6	1.6	
Germany	.2	1.6	2.3	1.3	1.9	2.8	1.6	1.6	1.4	1.4	
Emerging market economies	4.1	3.5	3.6	2.9	3.4	3.2	3.3	3.7	3.7	3.6	
Asia	5.8	5.4	5.0	4.5	4.9	5.2	4.9	4.7	4.6	4.4	
Korea	2.1	3.5	2.8	3.2	2.6	2.8	3.2	3.1	3.0	2.8	
China	8.0	7.6	7.1	6.8	6.8	6.8	6.5	6.2	5.9	5.7	
Latin America	2.9	1.7	2.5	1.6	2.1	1.5	1.7	2.8	2.9	2.9	
Mexico	3.0	1.2	3.4	2.8	3.3	1.6	2.1	2.8	2.9	2.9	
Brazil	2.2	2.6	-1	-5.5	-2.1	2.1	1.7	2.6	2.8	2.8	
Consumer prices²											
Total foreign	2.3	2.4	2.0	1.4	1.9	2.6	2.6	2.7	2.4	2.4	
<i>Previous Tealbook</i>	2.3	2.4	2.0	1.4	1.9	2.6	2.4	2.5	2.4	...	
Advanced foreign economies	1.3	1.0	1.2	.4	.9	1.5	1.9	1.9	1.7	1.7	
Canada	1.0	1.0	2.0	1.3	1.4	1.8	2.5	2.3	2.1	2.0	
Japan	-.2	1.4	2.6	.1	.3	.6	.6	2.3	1.0	1.1	
United Kingdom	2.6	2.1	.9	.1	1.2	3.0	2.3	2.4	2.2	2.1	
Euro area	2.3	.8	.1	.2	.7	1.4	2.1	1.4	1.5	1.7	
Germany	1.9	1.4	.4	.2	1.0	1.6	2.3	2.2	2.2	2.0	
Emerging market economies	3.1	3.4	2.7	2.1	2.7	3.4	3.1	3.2	3.0	2.9	
Asia	2.6	3.1	1.8	1.5	2.0	2.0	2.1	2.7	2.7	2.7	
Korea	1.7	1.1	1.0	.9	1.5	1.5	2.1	3.1	3.0	3.0	
China	2.1	2.9	1.5	1.5	2.1	1.8	2.1	2.5	2.5	2.5	
Latin America	4.4	4.2	4.9	3.4	4.3	6.7	5.6	4.4	3.5	3.4	
Mexico	4.1	3.6	4.2	2.3	3.3	6.6	4.5	3.4	3.2	3.2	
Brazil	5.6	5.8	6.5	10.4	7.1	2.8	4.3	4.3	4.3	4.3	

... Not applicable.

1. Foreign GDP aggregates calculated using shares of U.S. exports.

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

U.S. Current Account

Quarterly Data

	2018				2019				Projected			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
U.S. current account balance	-489.9	-409.4	-494.6	-551.8	-610.1	-638.2	-685.8	-720.9	-769.9	-780.6	-822.1	-834.6
<i>Previous Tealbook</i>	-496.4	-452.0	-500.6	-541.0	-588.8	-613.4	-665.4	-711.0	-764.1	-781.1	-826.1	-842.8
Current account as percent of GDP	-2.4	-2.0	-2.4	-2.6	-2.9	-3.0	-3.2	-3.3	-3.5	-3.5	-3.6	-3.7
<i>Previous Tealbook</i>	-2.5	-2.2	-2.4	-2.6	-2.8	-2.9	-3.1	-3.3	-3.5	-3.5	-3.7	-3.7
Net goods & services	-616.0	-535.2	-588.2	-622.3	-643.3	-651.3	-672.9	-689.8	-714.1	-718.9	-742.9	-751.3
Investment income, net	261.6	269.3	226.2	199.2	170.7	139.7	119.8	97.6	81.8	64.9	53.4	45.4
Direct, net	316.3	319.2	308.0	303.2	294.1	286.4	291.1	293.7	301.6	309.4	322.6	337.9
Portfolio, net	-54.8	-49.9	-81.8	-104.1	-123.4	-146.7	-171.4	-196.1	-219.8	-244.5	-269.1	-292.5
Other income and transfers, net	-135.5	-143.5	-132.7	-128.7	-137.6	-126.6	-132.7	-128.7	-137.6	-126.6	-132.7	-128.7

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

Annual Data

	Projected									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
U.S. current account balance	-426.2	-349.5	-365.1	-409.7	-434.3	-449.1	-486.4	-663.8	-801.8	-880.7
<i>Previous Tealbook</i>	-426.2	-349.5	-365.1	-409.7	-434.3	-449.1	-497.5	-644.6	-803.5	...
Current account as percent of GDP	-2.6	-2.1	-2.1	-2.2	-2.3	-2.3	-2.4	-3.1	-3.6	-3.8
<i>Previous Tealbook</i>	-2.6	-2.1	-2.1	-2.3	-2.3	-2.3	-2.4	-3.0	-3.6	...
Net goods & services	-536.8	-461.9	-489.5	-500.4	-503.5	-552.3	-590.4	-664.3	-731.8	-779.6
Investment income, net	216.1	215.4	229.0	214.7	205.7	235.1	239.1	132.0	61.4	30.3
Direct, net	285.5	283.3	284.2	284.6	272.6	298.4	311.7	291.3	317.9	372.4
Portfolio, net	-69.4	-67.9	-55.3	-70.0	-66.9	-63.3	-72.6	-159.4	-256.5	-342.1
Other income and transfers, net	-105.5	-103.1	-104.6	-123.9	-136.6	-132.0	-135.1	-131.4	-131.4	-131.4

Billions of dollars

... Not applicable.

Abbreviations

ABS	asset-backed securities
AFE	advanced foreign economy
BBA	Bipartisan Budget Act of 2018
BDS	Business Dynamics Statistics
BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
BOC	Bank of Canada
BOE	Bank of England
BOJ	Bank of Japan
BOM	Bank of Mexico
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
EFFR	effective federal funds rate
EME	emerging market economy
EU	European Union
FCI	financial conditions index
FOMC	Federal Open Market Committee; also, the Committee
FPLT	flexible price-level targeting
FRB/US	A large-scale macroeconomic model of the U.S. economy
GDP	gross domestic product

GEMUS	A simplified version of SIGMA better suited to analyze trade policy issues
GS-FCI	Goldman Sachs Financial Conditions Index
IMF	International Monetary Fund
IOER	interest on excess reserves
LFPR	labor force participation rate
M&A	mergers and acquisitions
MBS	mortgage-backed securities
Michigan survey	University of Michigan Surveys of Consumers
MMF	money market fund
NAFTA	North American Free Trade Agreement
NBER	National Bureau of Economic Research
NIPA	national income and product accounts
OECD	Organisation for Economic Co-operation and Development
OIS	overnight index swap
ON RRP	overnight reverse repurchase agreement
PBGC	Pension Benefit Guaranty Corporation
PCE	personal consumption expenditures
PMI	purchasing managers index
PPI	producer price index
repo	repurchase agreement
SEP	Summary of Economic Projections
SIGMA	A calibrated multicountry DSGE model
SLOOS	Senior Loan Officer Opinion Survey on Bank Lending Practices
SOMA	System Open Market Account
S&P	Standard & Poor's
SPF	Survey of Professional Forecasters
STRIPS	separate trading of registered interest and principal of securities
TIPS	Treasury Inflation-Protected Securities
VAR	vector autoregression
VIX	one-month-ahead option-implied volatility on the S&P 500 index