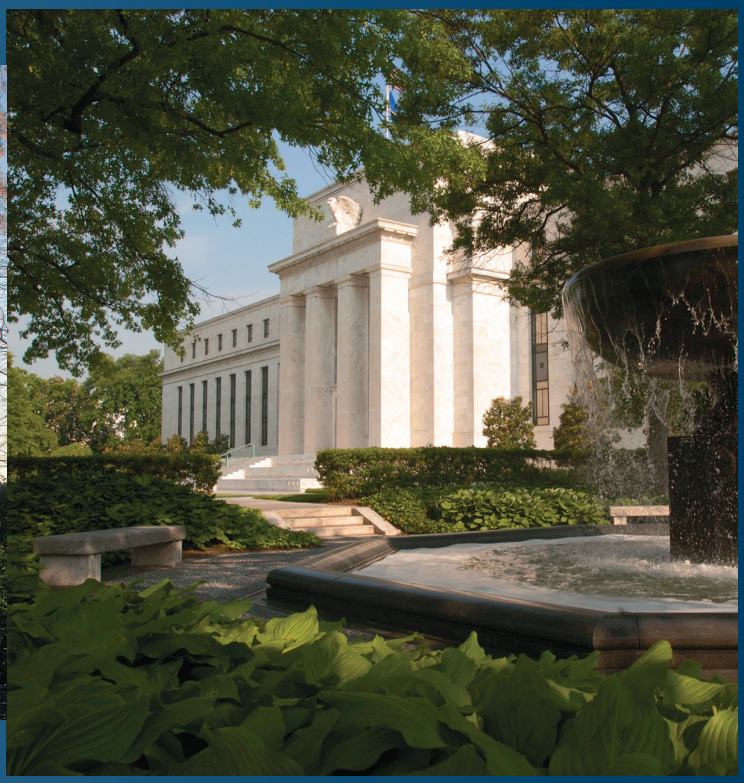
For use at 11:00 a.m., EDT
July 13, 2018

Monetary Policy Report

July 13, 2018



Board of Governors of the Federal Reserve System

Letter of Transmittal

Board of Governors of the
Federal Reserve System

Washington, D.C., July 13, 2018

The President of the Senate
The Speaker of the House of Representatives

The Board of Governors is pleased to submit its *Monetary Policy Report* pursuant to section 2B of the Federal Reserve Act.

Sincerely,

Jerome H. Powell

Jerome H. Powell, Chairman

Statement on Longer-Run Goals and Monetary Policy Strategy

Adopted effective January 24, 2012; as amended effective January 30, 2018

The Federal Open Market Committee (FOMC) is firmly committed to fulfilling its statutory mandate from the Congress of promoting maximum employment, stable prices, and moderate long-term interest rates. The Committee seeks to explain its monetary policy decisions to the public as clearly as possible. Such clarity facilitates well-informed decisionmaking by households and businesses, reduces economic and financial uncertainty, increases the effectiveness of monetary policy, and enhances transparency and accountability, which are essential in a democratic society.

Inflation, employment, and long-term interest rates fluctuate over time in response to economic and financial disturbances. Moreover, monetary policy actions tend to influence economic activity and prices with a lag. Therefore, the Committee's policy decisions reflect its longer-run goals, its medium-term outlook, and its assessments of the balance of risks, including risks to the financial system that could impede the attainment of the Committee's goals.

The inflation rate over the longer run is primarily determined by monetary policy, and hence the Committee has the ability to specify a longer-run goal for inflation. The Committee reaffirms its judgment that inflation at the rate of 2 percent, as measured by the annual change in the price index for personal consumption expenditures, is most consistent over the longer run with the Federal Reserve's statutory mandate. The Committee would be concerned if inflation were running persistently above or below this objective. Communicating this symmetric inflation goal clearly to the public helps keep longer-term inflation expectations firmly anchored, thereby fostering price stability and moderate long-term interest rates and enhancing the Committee's ability to promote maximum employment in the face of significant economic disturbances. The maximum level of employment is largely determined by nonmonetary factors that affect the structure and dynamics of the labor market. These factors may change over time and may not be directly measurable. Consequently, it would not be appropriate to specify a fixed goal for employment; rather, the Committee's policy decisions must be informed by assessments of the maximum level of employment, recognizing that such assessments are necessarily uncertain and subject to revision. The Committee considers a wide range of indicators in making these assessments. Information about Committee participants' estimates of the longer-run normal rates of output growth and unemployment is published four times per year in the FOMC's Summary of Economic Projections. For example, in the most recent projections, the median of FOMC participants' estimates of the longer-run normal rate of unemployment was 4.6 percent.

In setting monetary policy, the Committee seeks to mitigate deviations of inflation from its longer-run goal and deviations of employment from the Committee's assessments of its maximum level. These objectives are generally complementary. However, under circumstances in which the Committee judges that the objectives are not complementary, it follows a balanced approach in promoting them, taking into account the magnitude of the deviations and the potentially different time horizons over which employment and inflation are projected to return to levels judged consistent with its mandate.

The Committee intends to reaffirm these principles and to make adjustments as appropriate at its annual organizational meeting each January.

Contents

List of Boxes

Note: This report reflects information that was publicly available as of noon EDT on July 12, 2018. Unless otherwise stated, the time series in the figures extend through, for daily data, July 11, 2018; for monthly data, June 2018; and, for quarterly data, 2018:Q1. In bar charts, except as noted, the change for a given period is measured to its final quarter from the final quarter of the preceding period.

Summary

Economic activity increased at a solid pace over the first half of 2018, and the labor market has continued to strengthen. Inflation has moved up, and in May, the most recent period for which data are available, inflation measured on a 12-month basis was a little above the Federal Open Market Committee's (FOMC) longer-run objective of 2 percent, boosted by a sizable increase in energy prices. In this economic environment, the Committee judged that current and prospective economic conditions called for a further gradual removal of monetary policy accommodation. In line with that judgment, the FOMC raised the target for the federal funds rate twice in the first half of 2018, bringing it to a range of 1¾ to 2 percent.

Economic and Financial Developments

The labor market. The labor market has continued to strengthen. Over the first six months of 2018, payrolls increased an average of 215,000 per month, which is somewhat above the average pace of 180,000 per month in 2017 and is considerably faster than what is needed, on average, to provide jobs for new entrants into the labor force. The unemployment rate edged down from 4.1 percent in December to 4.0 percent in June, which is about ½ percentage point below the median of FOMC participants' estimates of its longer-run normal level. Other measures of labor utilization were consistent with a tight labor market. However, hourly labor compensation growth has been moderate, likely held down in part by the weak pace of productivity growth in recent years.

Inflation. Consumer price inflation, as measured by the 12-month percentage change in the price index for personal consumption expenditures, moved up from a little below the FOMC's objective of 2 percent at the end of last year to 2.3 percent in May, boosted by a sizable increase in consumer energy prices. The 12-month measure of inflation that excludes food and energy items (so-called core inflation), which historically has been a better indicator of where overall inflation will be in the future than the total figure, was 2 percent in May. This reading was ½ percentage point above where it had been 12 months earlier, as the unusually low readings from last year were not repeated. Measures of longer-run inflation expectations have been generally stable.

Economic growth. Real gross domestic product (GDP) is reported to have increased at an annual rate of 2 percent in the first quarter of 2018, and recent indicators suggest that economic growth stepped up in the second quarter. Gains in consumer spending slowed early in the year, but they rebounded in the spring, supported by strong job gains, recent and past increases in household wealth, favorable consumer sentiment, and higher disposable income due in part to the implementation of the Tax Cuts and Jobs Act. Business investment growth has remained robust, and indexes of business sentiment have been strong. Foreign economic growth has remained solid, and net exports had a roughly neutral effect on real U.S. GDP growth in the first quarter. However, activity in the housing market has leveled off this year.

Financial conditions. Domestic financial conditions for businesses and households have generally continued to support economic growth. After rising steadily through 2017, broad measures of equity prices are modestly higher, on balance, from their levels at the end of last year amid some bouts of heightened volatility in financial markets. While long-term Treasury yields, mortgage rates, and yields on corporate bonds have risen so far this year, longer-term interest rates remain low by historical standards, and corporate bond issuance has continued at a moderate pace. Moreover, most types of consumer loans

remained widely available for households with strong creditworthiness, and credit provided by commercial banks continued to expand. The foreign exchange value of the U.S. dollar has appreciated somewhat against the currencies of our trading partners this year, but it remains below its level at the start of 2017. Foreign financial conditions remain generally supportive of growth despite recent increases in financial stress in several emerging market economies.

Financial stability. The U.S. financial system remains substantially more resilient than during the decade before the financial crisis. Asset valuations continue to be elevated despite declines since the end of 2017 in the forward price-to-earnings ratio of equities and the prices of corporate bonds. In the private nonfinancial sector, borrowing among highly levered and lower-rated businesses remains elevated, although the ratio of household debt to disposable income continues to be moderate. Vulnerabilities stemming from leverage in the financial sector remain low, reflecting in part strong capital positions at banks, whereas some measures of hedge fund leverage have increased. Vulnerabilities associated with maturity and liquidity transformation among banks, insurance companies, money market mutual funds, and asset managers remain below levels that generally prevailed before 2008.

Monetary Policy

Interest rate policy. Over the first half of 2018, the FOMC has continued to gradually increase the target range for the federal funds rate. Specifically, the Committee decided to raise the target range for the federal funds rate at its meetings in March and June, bringing it to the current range of 1¾ to 2 percent. The decisions to increase the target range for the federal funds rate reflected the economy's continued progress toward the Committee's objectives of maximum employment and price stability. Even with these policy rate increases, the stance of monetary policy remains accommodative, thereby supporting strong labor market conditions and a sustained return to 2 percent inflation.

The FOMC expects that further gradual increases in the target range for the federal funds rate will be consistent with a sustained expansion of economic activity, strong labor market conditions, and inflation near the Committee's symmetric 2 percent objective over the medium term. Consistent with this outlook, in the most recent Summary of Economic Projections (SEP), which was compiled at the time of the June FOMC meeting, the median of participants' assessments for the appropriate level for the federal funds rate rises gradually over the period from 2018 to 2020 and stands somewhat above the median projection for its longer-run level by the end of 2019 and through 2020. (The June SEP is presented in Part 3 of this report.) However, as the Committee has continued to emphasize, the timing and size of future adjustments to the target range for the federal funds rate will depend on the Committee's assessment of realized and expected economic conditions relative to its maximum-employment objective and its symmetric 2 percent inflation objective.

Balance sheet policy. The FOMC has continued to implement the balance sheet normalization program described in the Addendum to the Policy Normalization Principles and Plans that the Committee issued about a year ago. Specifically, the FOMC has been reducing its holdings of Treasury and agency securities by decreasing, in a gradual and predictable manner, the reinvestment of principal payments it receives from these securities.

Special Topics

Prime-age labor force participation. Labor force participation rates (LFPRs) for men and women between 25 and 54 years old—that is, the share of these individuals either working or actively seeking work—trended lower

between 2000 and 2013. Those trends likely reflect numerous factors, including a long-run decline in the demand for workers with lower levels of education and an increase in the share of the population with some form of disability. By contrast, the prime-age LFPR has increased notably since 2013, and the share of nonparticipants who report wanting a job remains above pre-recession levels. Thus, some continuation of the recent increase in the prime-age LFPR may be possible if labor demand remains strong. (See the box "The Labor Force Participation Rate for Prime-Age Individuals" in Part 1.)

Oil prices. Oil prices have climbed rapidly over the past year, reflecting both supply and demand factors. Although higher oil prices are likely to restrain household consumption in the United States, much of the negative effect on GDP from lower consumer spending is likely to be offset by increased production and investment in the growing U.S. oil sector. Consequently, higher oil prices now imply much less of a net overall drag on the economy than they did in the past, although they will continue to have important distributional effects. The negative effect of upward moves in oil prices should get smaller still as U.S. oil production grows and net oil imports decline further. (See the box "The Recent Rise in Oil Prices" in Part 1.)

Monetary policy rules. Monetary policymakers consider a wide range of information on current economic conditions and the outlook when deciding on a policy stance they deem most likely to foster the FOMC's statutory mandate of maximum employment and stable prices. They also routinely consult monetary policy rules that connect prescriptions for the policy interest rate with variables associated with the dual mandate. The use of such rules requires, among other considerations, careful judgments about the choice and measurement of the inputs into the rules such as estimates of the neutral interest rate, which are highly uncertain. (See the box "Complexities of Monetary Policy Rules" in Part 2.)

Interest on reserves. The payment of interest on reserves—balances held by banks in their accounts at the Federal Reserve—is an essential tool for implementing monetary policy because it helps anchor the federal funds rate within the FOMC's target range. This tool has permitted the FOMC to achieve a gradual increase in the federal funds rate in combination with a gradual reduction in the Fed's securities holdings and in the supply of reserve balances. The FOMC judged that removing monetary policy accommodation through first raising the federal funds rate and then beginning to shrink the balance sheet would best contribute to achieving and maintaining maximum employment and price stability without causing dislocations in financial markets or institutions that could put the economic expansion at risk. (See the box "Interest on Reserves and Its Importance for Monetary Policy" in Part 2.)

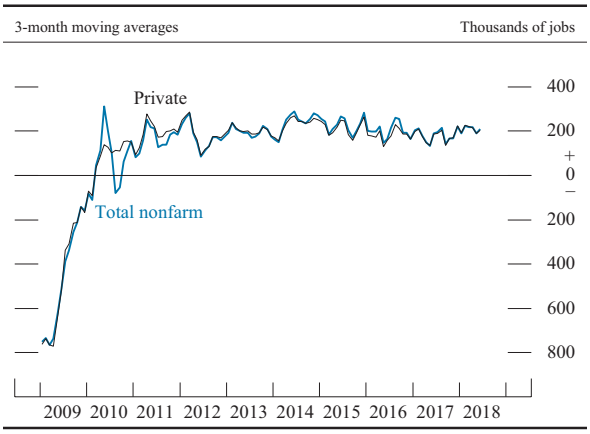
Part 1
Recent Economic and Financial Developments

Domestic Developments

The labor market strengthened further during the first half of the year . . .

Labor market conditions have continued to strengthen so far in 2018. According to the Bureau of Labor Statistics (BLS), gains in total nonfarm payroll employment averaged 215,000 per month over the first half of the year. That pace is up from the average monthly pace of job gains in 2017 and is considerably faster than what is needed to provide jobs for new entrants into the labor force (figure 1).[1] Indeed, the unemployment rate edged down from 4.1 percent in December to 4.0 percent in June (figure 2). This rate is below all Federal Open Market Committee (FOMC) participants' estimates of its longer-run normal level and is about ½ percentage point below the median of those estimates.[2] The unemployment rate in June is close to the lows last reached in 2000.

1. Net change in payroll employment

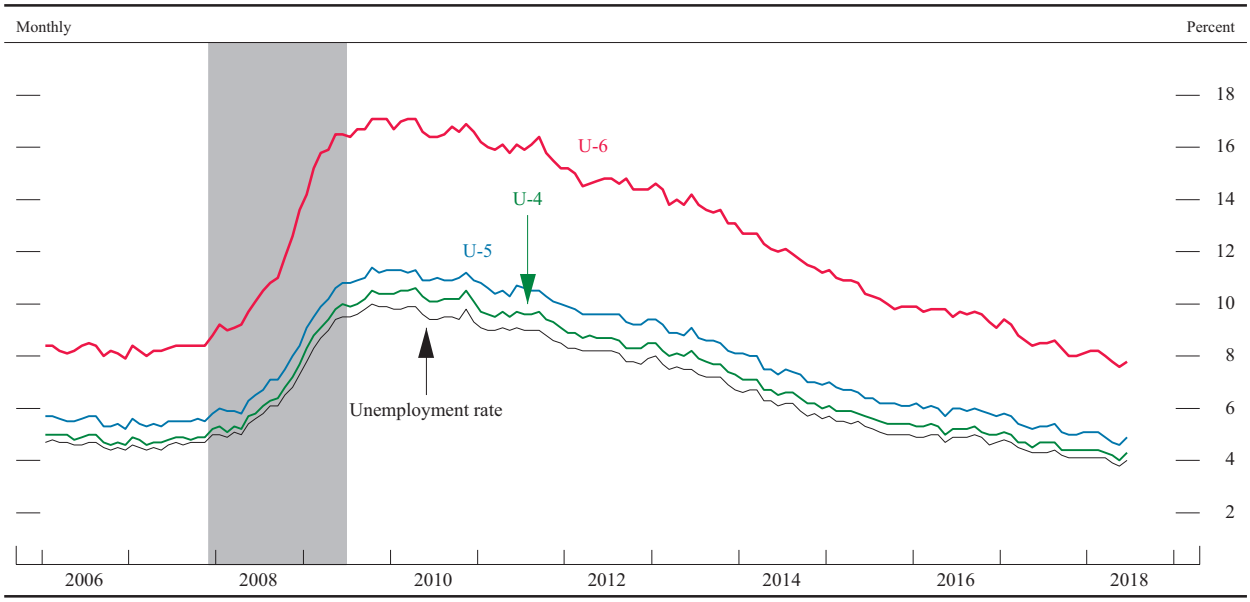


Source: Bureau of Labor Statistics via Haver Analytics.

The labor force participation rate (LFPR), which is the share of individuals aged 16 and older who are either working or actively looking for work, was 62.9 percent in June and has changed little, on net, since late 2013 (figure 3). The aging of the population is an important contributor to a downward trend in the overall participation rate. In particular, members of the baby-boom cohort are increasingly moving into their retirement years, a time when labor force participation is typically low. Indeed, the share of the civilian population aged 65 and over in the United States climbed from 16 percent in 2000 to 19 percent in 2017 and is projected to rise to 24 percent by 2026. Given this trend, the flat trajectory of the

1. Monthly job gains in the range of 130,000 to 160,000 are consistent with an unchanged unemployment rate and an unchanged labor force participation rate.
2. See the Summary of Economic Projections in Part 3 of this report.

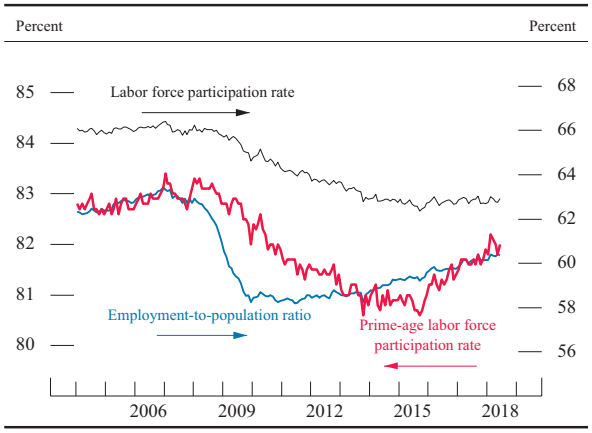
2. Measures of labor underutilization



NOTE: Unemployment rate measures total unemployed as a percentage of the labor force. U-4 measures total unemployed plus discouraged workers, as a percentage of the labor force plus discouraged workers. Discouraged workers are a subset of marginally attached workers who are not currently looking for work because they believe no jobs are available for them. U-5 measures total unemployed plus all marginally attached to the labor force, as a percentage of the labor force plus persons marginally attached to the labor force. Marginally attached workers are not in the labor force, want and are available for work, and have looked for a job in the past 12 months. U-6 measures total unemployed plus all marginally attached workers plus total employed part time for economic reasons, as a percentage of the labor force plus all marginally attached workers. The shaded bar indicates a period of business recession as defined by the National Bureau of Economic Research.

SOURCE: Bureau of Labor Statistics via Haver Analytics.

3. Labor force participation rates and employment-to-population ratio



NOTE: The data are monthly. The prime-age labor force participation rate is a percentage of the population aged 25 to 54. The labor force participation rate and the employment-to-population ratio are percentages of the population aged 16 and over.

SOURCE: Bureau of Labor Statistics via Haver Analytics.

LFPR during the past few years is consistent with strengthening labor market conditions. Similarly, the LFPR for individuals between 25 and 54 years old—which is much less sensitive to population aging—has been rising for the past several years. (The box "The Labor Force Participation Rate for Prime-Age Individuals" examines the prospects for further increases in participation for these individuals.) The employment-to-population ratio for individuals 16 and over—the share of the total population who are working—was 60.4 percent in June and has been gradually increasing since 2011, reflecting the combination of the declining unemployment rate and the flat LFPR.

Other indicators are also consistent with a strong labor market. As reported in the Job Openings and Labor Turnover Survey (JOLTS), the rate of job openings has remained quite elevated.[3] The rate of quits has

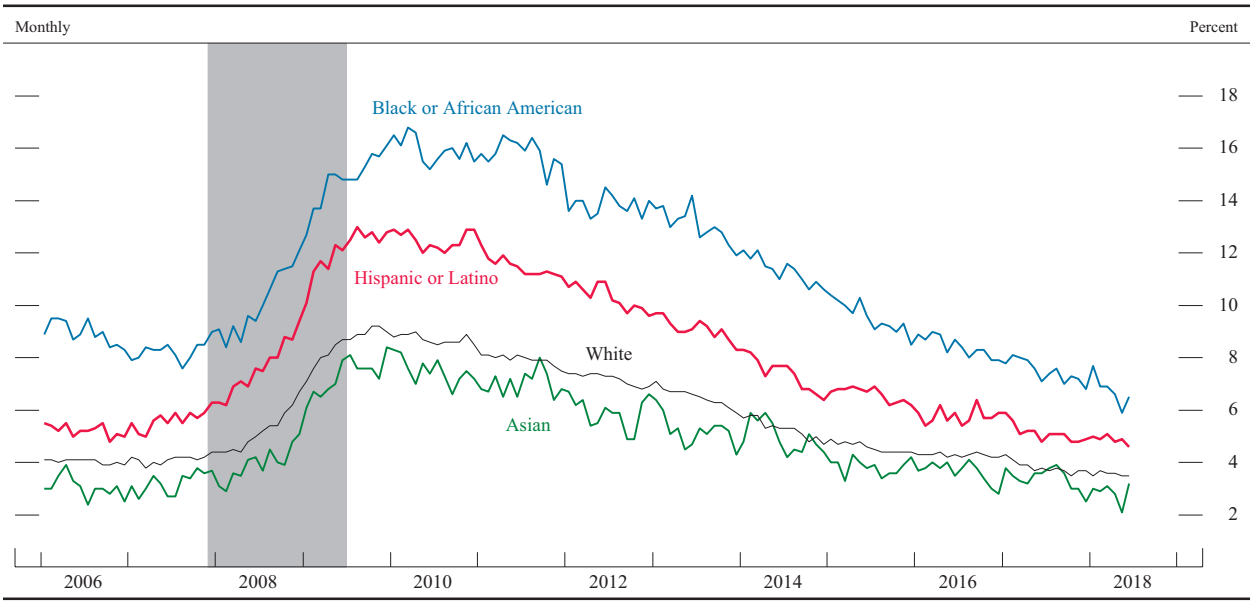
3. Indeed, the number of job openings now about matches the number of unemployed individuals.

stayed high in the JOLTS, an indication that workers are able to successfully switch jobs when they wish to. In addition, the JOLTS layoff rate has been low, and the number of people filing initial claims for unemployment insurance benefits has remained near its lowest level in decades. Other survey evidence indicates that households perceive jobs as plentiful and that businesses see vacancies as hard to fill. Another indicator, the share of workers who are working part time but would prefer to be employed full time—which is part of the U-6 measure of labor underutilization from the BLS—fell further in the first six months of the year and now stands close to its pre-recession level (as shown in figure 2).

. . . and unemployment rates have fallen for all major demographic groups

The continued decline in the unemployment rate has been reflected in the experiences of multiple racial and ethnic groups (figure 4). The unemployment rates for blacks or African Americans and Hispanics tend to rise considerably more than rates for whites and Asians during recessions but decline

4. Unemployment rate by race and ethnicity



NOTE: Unemployment rate measures total unemployed as a percentage of the labor force. Persons whose ethnicity is identified as Hispanic or Latino may be of any race. The shaded bar indicates a period of business recession as defined by the National Bureau of Economic Research.
SOURCE: Bureau of Labor Statistics via Haver Analytics.

The Labor Force Participation Rate for Prime-Age Individuals

The overall labor force participation rate (LFPR) has generally been trending lower since 2000, and while the aging of the baby-boom generation into retirement ages provides an important reason for that decline, it is not the only reason. Another contributing factor, as shown in figure A, is that the LFPRs of prime-age men and women (those between 25 and 54 years old) trended lower through 2013 even though prime-age LFPRs are largely unaffected by the aging of the population: The prime-age male LFPR has been declining for six decades, and the prime-age female LFPR has drifted lower since 2000 after a multidecade increase. Nevertheless, prime-age LFPRs have moved up notably and consistently since 2013, as improving labor market conditions have drawn some individuals back into the labor force and encouraged others not to leave. These recent increases in the prime-age LFPR, in the context of the longer-run trend decline, raise the question of how much additional scope there is for further increases in prime-age labor force participation.

To gauge whether further increases are possible, a useful starting point is understanding the factors behind the longer-run decline in the prime-age LFPR, as these factors may limit additional increases if they continue to exert some downward pressure. One factor may be a secular decline in the demand for workers with lower levels of education. Indeed, as shown in figure B, the long-run declines in prime-age LFPR are much larger among adults without a college degree than among college-educated adults. Research suggests that increases in automation, such as the use of robotics, and various aspects of globalization have spurred the elimination of some types of jobs—in particular, some manufacturing jobs that have historically been held by workers without a college education—and emerging jobs may require a different set of skills. These developments may have led some workers to become discouraged over the lack of suitable job opportunities and drop out of the labor force.[1] The rising share of college-educated workers, which may partly reflect individuals responding over time to the declining demand for jobs that require less education, has likely prevented even steeper declines in the prime-age LFPR, as better-educated workers have higher LFPRs and may be more adaptable to unforeseen disruptions in particular jobs or industries.

Another potential factor may be that an increasing share of the prime-age population has some difficulty working because of physical or mental disabilities. For example, figure C shows that about 5 percent of both prime-age men and women report that they are out of the labor force and do not want a job due to disability or illness; those shares have trended higher over the past several decades. Other research suggests that increased opioid use may be associated with a lower prime-age LFPR, although it is unclear how much of the decline in the prime-age LFPR can be directly explained by opioid use or whether increases

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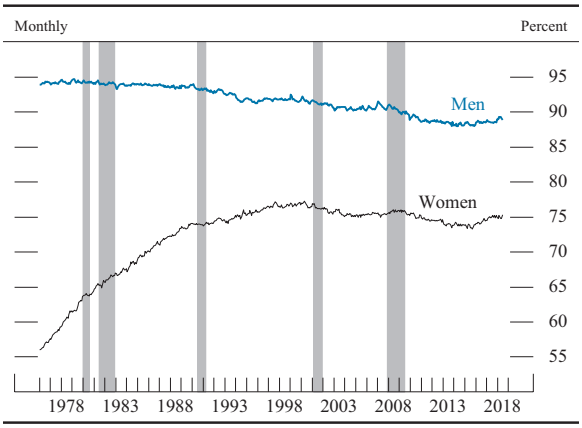
A. Prime-age labor force participation rates

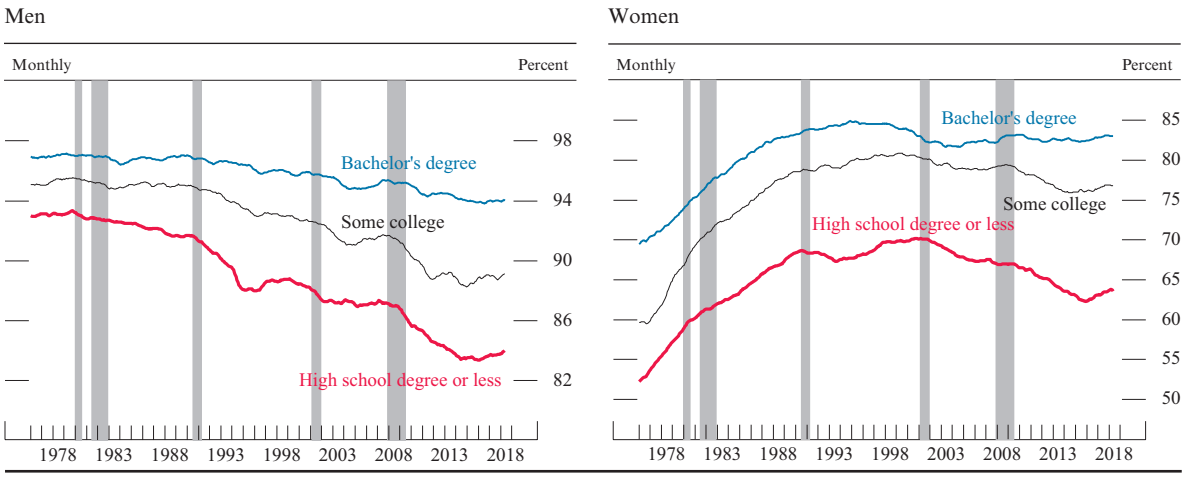


NOTE: The data are seasonally adjusted. The shaded bars indicate periods of business recession as defined by the National Bureau of Economic Research.

SOURCE: Bureau of Labor Statistics.

1. For evidence on displacement from technological changes, see David H. Autor, David Dorn, and Gordon H. Hanson (2015), "Untangling Trade and Technology: Evidence from Local Labor Markets," *Economic Journal*, vol. 125 (May), pp. 621–46; Daron Acemoglu and Pascual Restrepo (2017), "Robots and Jobs: Evidence from U.S. Labor Markets," NBER Working Paper Series 23285 (Cambridge, Mass.: National Bureau of Economic Research, March), www.nber.org/papers/w23285; and Daron Acemoglu and Pascual Restrepo (2018), "Artificial Intelligence, Automation, and Work," NBER Working Paper Series 24196 (Cambridge, Mass.: National Bureau of Economic Research, January), www.nber.org/papers/w24196. For evidence on globalization—in particular, import competition since the 2000s—see David H. Autor, David Dorn, and Gordon H. Hanson (2013), "The China Syndrome: Local Labor Market Effects of Import Competition in the United States," *American Economic Review*, vol. 103 (October), pp. 2121–68. A discussion of these and other explanations is also provided in 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), www.nber.org/papers/w24333.

B. Prime-age labor force participation rates by education



NOTE: The data are seasonally adjusted 12-month moving averages and extend through May 2018. The shaded bars indicate periods of business recession as defined by the National Bureau of Economic Research.
SOURCE: U.S. Census Bureau, Current Population Survey.

in opioid use are an indirect result of poor employment opportunities.[2]

Caregiving responsibilities play an important role in explaining why LFPRs for prime-age women are lower than for men, and they may play an increasing role in explaining declining prime-age LFPRs for men as well. As shown in figure C, roughly 15 percent of prime-age women report being out of the labor force for caregiving reasons—by far the largest reason for prime-age women to report not wanting a job—but this share has been fairly flat over time. In contrast, while a much smaller fraction of men are out of the labor force for caregiving reasons, that share has trended up in recent decades, likely reflecting some shift in household responsibilities as women participate in the workforce in greater numbers. For some—especially those for whom childcare costs are not a major concern—not participating in the labor force may represent an unconstrained choice to care for other members of their families. For others, however, this decision may reflect a lack of affordable childcare.

Additionally, the share of the population—particularly black men—with a history of incarceration has increased over time. Individuals who have previously been incarcerated often have trouble finding work, in part because many employers choose not to hire people with such a background and likely also in part because incarceration prevents people from accumulating work experience and developing skills valuable to employers. Discrimination could also help explain the lack of participation for some minority groups, as they recognize that such discrimination limits their job opportunities.

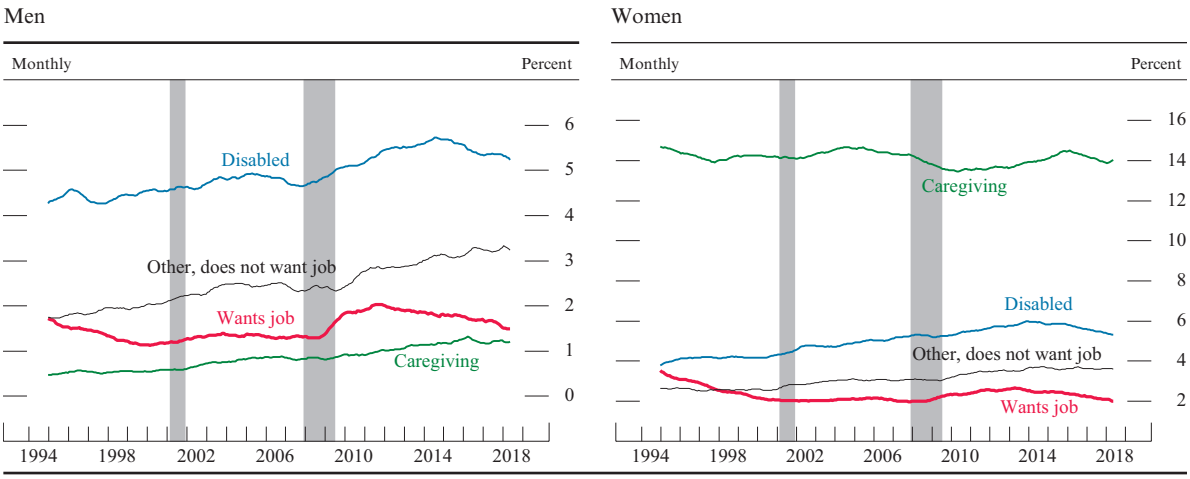
International comparisons may help clarify the importance of some of those factors. Since 1990, the

(continued on next page)

2. Evidence that opioid use could be significant for understanding the declining LFPR is provided by Alan B. Krueger (2017), "Where Have All the Workers Gone? An Inquiry into the Decline of the U.S. Labor Force Participation Rate," *Brookings Papers on Economic Activity*, Fall, pp. 1–82, https://www.brookings.edu/wp-content/uploads/2018/02/kruegertextfa17bpea.pdf, while little relationship between opioid prescriptions and employment at the county level is found in Janet Currie, Jonas Y. Jin, and Molly Schnell (2018), "U.S. Employment and Opioids: Is There a Connection?" NBER Working Paper Series 24440 (Cambridge, Mass.: National Bureau of Economic Research, March), www.nber.org/papers/w24440. Some evidence on whether the opioid epidemic varies with local economic conditions is provided by Jeff Larrimore, Alex Durante, Kimberly Kreiss, Ellen Merry, Christina Park, and Claudia Sahm (2018), "Shedding Light on Our Economic and Financial Lives," FEDS Notes, https://www.federalreserve.gov/econres/notes/feds-notes/shedding-light-on-our-economic-and-financial-lives-20180522.htm.

The Labor Force Participation Rate *(continued)*

C. Prime-age nonparticipation by reason



NOTE: The data are seasonally adjusted 12-month moving averages and extend through May 2018. The shaded bars indicate periods of business recession as defined by the National Bureau of Economic Research.
SOURCE: U.S. Census Bureau, Current Population Survey.

prime-age LFPR in the United States has declined considerably for both men and women relative to other advanced countries. Some factors, like automation and globalization, have affected all advanced economies to some degree and for some time, yet diverging long-run trends in prime-age labor force participation have still occurred. Research suggests that part of the relative decline in the United States is explained by differential changes in work-family policies across countries. Other parts of the divergence may be explained by other policies, including policies designed toward keeping those affected by automation and globalization attached to the labor force, or other factors—such as incarceration or opioid use—that differ across those countries.[3]

Although many of the factors behind the multidecade decline in the prime-age LFPR may persist, some continuation of the increases in the LFPR over the past few years nevertheless seems possible, especially if labor market conditions remain favorable. Indeed, as shown in figure C, although the share of nonparticipating prime-age men and women who self-report as wanting a job (despite not having actively searched for a job recently) has been declining since 2010, that share for men remains between ¼ and ½ percentage point above its 2007 level and earlier expansion peaks. Furthermore, prime-age men and women who had previously reported being out of the labor force and not wanting a job due to disability or illness have been entering the labor force at increasing rates in recent years.

Looking forward, how can policymakers support additional improvements in the prime-age LFPR? Favorable labor market conditions can likely help, and monetary policy can therefore play a role through supporting strong cyclical conditions as part of its maximum-employment objective. However, structural factors (in contrast with cyclical ones) are also important to address; policies to address such factors are beyond the scope of monetary policy.

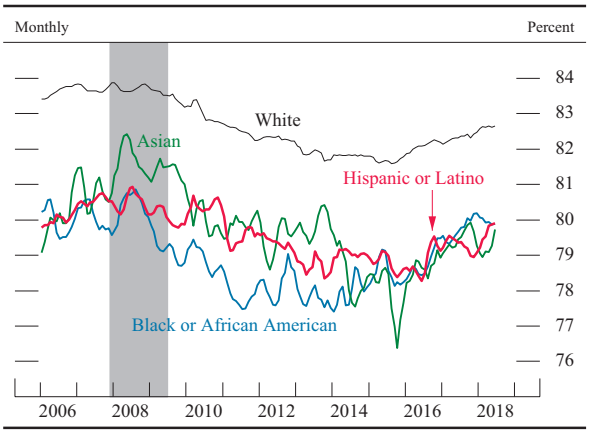
3. For recent trends on prime-age LFPRs in the United States compared with other developed countries, see Organisation for Economic Co-operation and Development (2018), *OECD Economic Surveys: United States 2018* (Paris: OECD Publishing), dx.doi.org/10.1787/eco_surveys-usa-2018-en. For a description of policy differences across countries and how this may affect differences in LFPR, see International Monetary Fund (2018), "Labor Force Participation in Advanced Economies: Drivers and Prospects," chapter 2 in *World Economic Outlook: Cyclical Upswing, Structural Change* (Washington: IMF, April), pp. 71–128. For evidence on how work-family policies may affect prime-age LFPRs in the United States relative to other OECD countries, see Francine D. Blau and Lawrence M. Kahn (2013), "Female Labor Supply: Why Is the United States Falling Behind?" *American Economic Review*, vol. 103 (May), pp. 251–56.

more rapidly during expansions. Indeed, the declines in the unemployment rates for blacks and Hispanics have been particularly striking, and the rates have recently been at or near their lowest readings since these series began in the early 1970s. Although differences in unemployment rates across ethnic and racial groups have narrowed in recent years, they remain substantial and similar to pre-recession levels. The rise in LFPRs for prime-age individuals over the past few years has also been evident in each of these racial and ethnic groups, with increases again particularly notable for African Americans. Even so, the LFPR for whites remains higher than that for the other groups (figure 5).[4]

Increases in labor compensation have been moderate . . .

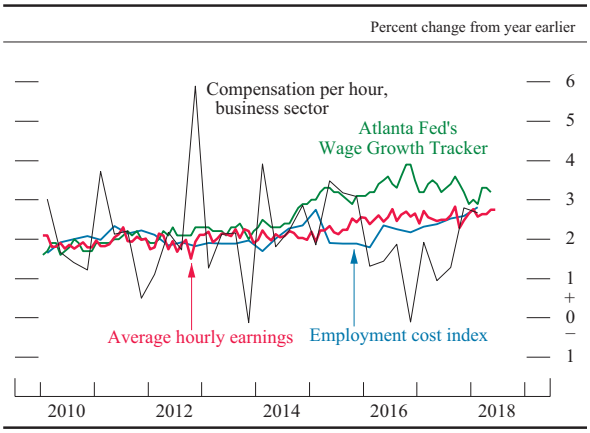
Despite the strong labor market, the available indicators generally suggest that increases in hourly labor compensation have been moderate. Compensation per hour in the business sector—a broad-based measure of wages, salaries, and benefits that is quite volatile—rose 2¾ percent over the four quarters ending in 2018:Q1, slightly more than the average annual increase over the preceding seven or so years (figure 6). The employment cost index—a less volatile measure of both wages and the cost to employers of providing benefits—likewise was 2¾ percent higher in the first quarter of 2018 relative to its year-earlier level; this increase was ½ percentage point faster than its gain a year earlier. Among measures that do not account for benefits, average hourly earnings rose 2¾ percent in June relative to 12 months earlier, a gain in line with the average increase in the preceding few years. According to the Federal Reserve Bank of Atlanta, the median 12-month wage

5. Prime-age labor force participation rate by race and ethnicity



NOTE: The prime-age labor force participation rate is a percentage of the population aged 25 to 54. Persons whose ethnicity is identified as Hispanic or Latino may be of any race. The data are seasonally adjusted by Board staff and are 3-month moving averages. The shaded bar indicates a period of business recession as defined by the National Bureau of Economic Research.
SOURCE: Bureau of Labor Statistics.

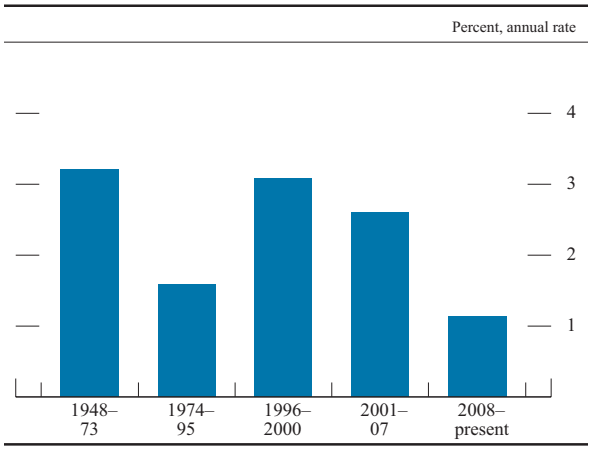
6. Measures of change in hourly compensation



NOTE: Business-sector compensation is on a 4-quarter percentage change basis. For the employment cost index, change is over the 12 months ending in the last month of each quarter; for average hourly earnings, change is from 12 months earlier; for the Atlanta Fed's Wage Growth Tracker, the data are shown as a 3-month moving average of the 12-month percent change and extend through May 2018.
SOURCE: Bureau of Labor Statistics via Haver Analytics; Federal Reserve Bank of Atlanta, Wage Growth Tracker.

4. The lower levels of labor force participation for these other groups differ importantly by sex. For African Americans, men have a lower participation rate relative to white men, while the participation rate for African American women is as high as that of white women. By contrast, the lower LFPRs for Hispanics and Asians reflect lower participation among women.

7. Change in business-sector output per hour



NOTE: Changes are measured from Q4 of the year immediately preceding the period through Q4 of the final year of the period. The final period is measured from 2007:Q4 through 2018:Q1.
SOURCE: Bureau of Labor Statistics via Haver Analytics.

growth of individuals reporting to the Current Population Survey increased about 3¼ percent in May, also similar to its readings from the past few years.[5]

. . . and likely have been restrained by slow growth of labor productivity

Those moderate rates of compensation gains likely reflect the offsetting influences of a strong labor market and persistently weak productivity growth. Since 2008, labor productivity has increased only a little more than 1 percent per year, on average, well below the average pace from 1996 through 2007 of 2.8 percent and also below the average gain in the 1974–95 period of 1.6 percent (figure 7). The weakness in productivity growth may be partly attributable to the sharp pullback in capital investment during the most recent recession and the relatively slow recovery that followed. However, considerable debate remains about the reasons for the recent slowdown in productivity growth and whether it will persist.[6]

Price inflation has picked up from the low readings in 2017

In 2017, inflation remained below the FOMC's longer-run objective of 2 percent. Partly because the softness in some price categories appeared idiosyncratic, Federal Reserve policymakers expected inflation to move higher in 2018.[7] This expectation appears to be

5. The Atlanta Fed's measure differs from others in that it measures the wage growth only of workers who were employed both in the current survey month and 12 months earlier.

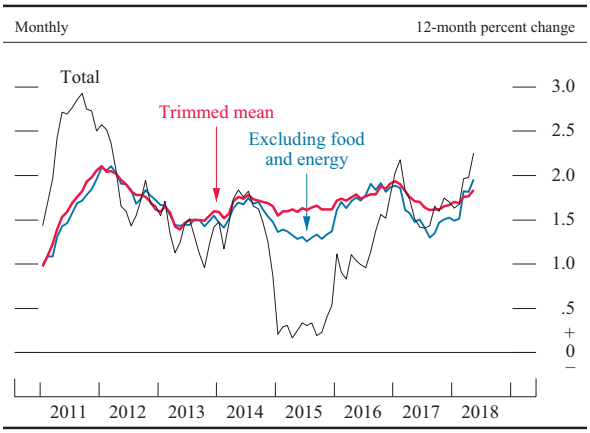
6. The box "Productivity Developments in the Advanced Economies" in the July 2017 *Monetary Policy Report* provides more information. See Board of Governors of the Federal Reserve System (2017), *Monetary Policy Report* (Washington: Board of Governors, July), pp. 12–13, https://www.federalreserve.gov/monetarypolicy/2017-07-mpr-part1.htm.

7. Additional details can be found in the June 2017 Summary of Economic Projections, an addendum to the minutes of the June 2017 FOMC meeting. See Board of Governors of the Federal Reserve System (2017), "Minutes of the Federal Open Market Committee,

on track so far. Consumer price inflation, as measured by the 12-month percentage change in the price index for personal consumption expenditures (PCE), moved up to 2.3 percent in May (figure 8). Core PCE inflation, which excludes consumer food and energy prices that are often quite volatile and typically provides a better indication than the total measure of where overall inflation will be in the future, was 2 percent over the 12 months ending in May—0.5 percentage point higher than it had been one year earlier. The total measure exceeded core inflation because of a sizable increase in consumer energy prices. In contrast, food price inflation has continued to be low by historical standards—data through May show the PCE price index for food and beverages having increased less than ½ percent over the past year.

The higher readings in both total and core inflation relative to a year earlier reflect faster price increases for a wide range of goods and services this year and the dropping out of the 12-month calculation of the steep one-month decline in the price index for wireless telephone services in March last year. The 12-month change in the trimmed mean PCE price index—an alternative indicator of underlying inflation produced by the Federal Reserve Bank of Dallas that may be less sensitive than the core index to idiosyncratic price movements—slowed by less than core inflation over 2017 and has also increased a bit less this year. This index rose 1.8 percent over the 12 months ending in May, up a touch from the increase over the same period last year.[8]

8. Change in the price index for personal consumption expenditures

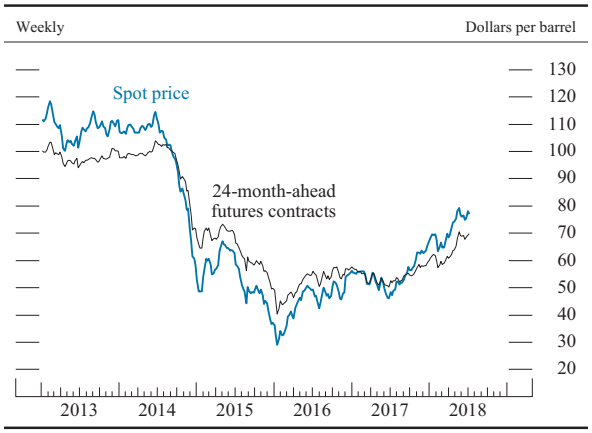


NOTE: The data extend through May 2018; changes are from one year earlier.
SOURCE: For trimmed mean, Federal Reserve Bank of Dallas; for all else, Bureau of Economic Analysis; all via Haver Analytics.

June 13–14, 2017," press release, July 5, https://www.federalreserve.gov/newsevents/pressreleases/monetary20170705a.htm.

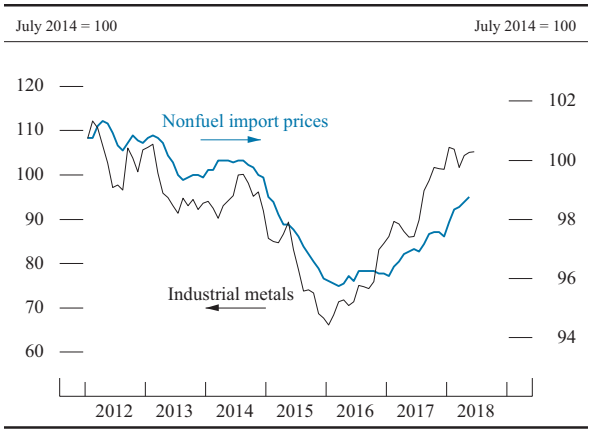
8. The trimmed mean index excludes whatever prices showed the largest increases or decreases in a given month; for example, the sharp decline in prices for wireless telephone services in March 2017 was excluded from this index.

9. Brent spot and futures prices



NOTE: The data are weekly averages of daily data and extend through July 11, 2018.
SOURCE: ICE Brent Futures via Bloomberg.

10. Nonfuel import prices and industrial metals indexes



NOTE: The data for nonfuel import prices are monthly and extend through May 2018. The data for industrial metals are a monthly average of daily data and extend through June 29, 2018.
SOURCE: For nonfuel import prices, Bureau of Labor Statistics; for industrial metals, S&P GSCI Industrial Metals Spot Index via Haver Analytics.

Oil prices have surged amid supply concerns . . .

As noted, the faster pace of total inflation this year relative to core inflation reflects a substantial rise in consumer energy prices. Retail gasoline prices this year were driven higher by a rise in oil prices. The spot price of Brent crude oil rose from about $65 per barrel in December to around $75 per barrel in early July (figure 9). Although that increase took place against a backdrop of continued strength in global demand, supply concerns have become more prevalent in recent months. (For a discussion of the reasons behind the oil price increases along with a review of the effects of oil prices on U.S. economic growth, see the box "The Recent Rise in Oil Prices.")

. . . while prices of imports other than energy have also increased

Nonfuel import prices rose sharply in early 2018, partly reflecting the pass-through of earlier increases in commodity prices (figure 10). In particular, metals prices posted sizable gains late last year due to strong global demand but have retreated somewhat in recent weeks.

Survey-based measures of inflation expectations have been stable . . .

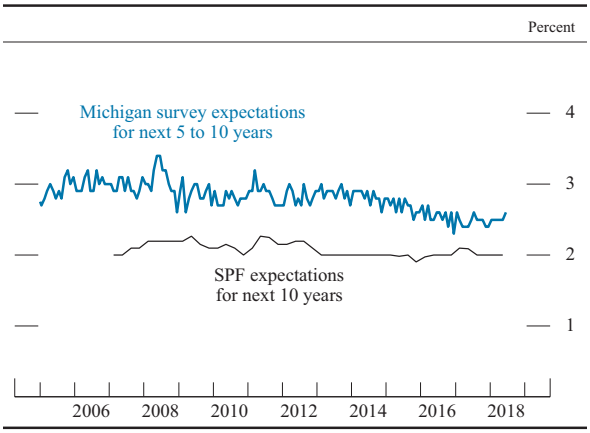
Expectations of inflation likely influence actual inflation by affecting wage- and price-setting decisions. Survey-based measures of inflation expectations at medium- and longer-term horizons have remained generally stable so far this year. In the Survey of Professional Forecasters conducted by the Federal Reserve Bank of Philadelphia, the median expectation for the annual rate of increase in the PCE price index over the next 10 years has been around 2 percent for the past several years (figure 11). In the University of Michigan Surveys of Consumers, the median value for inflation expectations over the next 5 to 10 years has been about 2½ percent since the end of 2016, though this level is about ¼ percentage point lower than had prevailed through 2014. In contrast, in the Survey of Consumer Expectations conducted by the

Federal Reserve Bank of New York, the median of respondents' expected inflation rate three years hence has been moving up recently and is currently at the top of the range it has occupied over the past couple of years.

. . . while market-based measures of inflation compensation have largely moved sideways this year

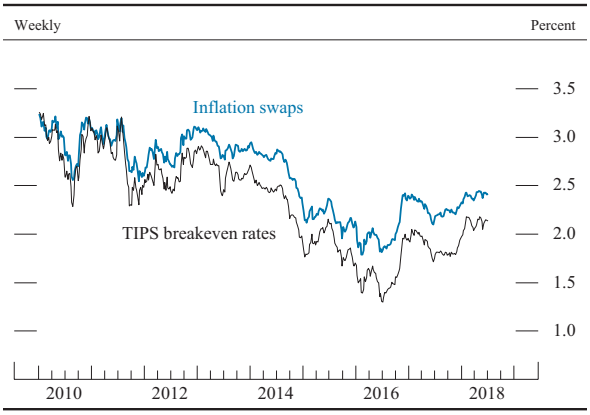
Inflation expectations can also be gauged by market-based measures of inflation compensation. However, the inference is not straightforward, because market-based measures can be importantly affected by changes in premiums that provide compensation for bearing inflation and liquidity risks. Measures of longer-term inflation compensation—derived either from differences between yields on nominal Treasury securities and those on comparable-maturity Treasury Inflation-Protected Securities (TIPS) or from inflation swaps—have moved sideways for the most part this year after having returned to levels seen in early 2017 (figure 12).[9] The TIPS-based measure of 5-to-10-year-forward inflation compensation and the analogous measure of inflation swaps are now about 2 percent and 2½ percent, respectively, with both measures below the ranges that persisted for most of the 10 years before the start of the notable declines in mid-2014.[10]

11. Median inflation expectations



NOTE: The Michigan survey data are monthly. The SPF data for inflation expectations for personal consumption expenditures are quarterly and extend from 2007:Q1 through 2018:Q2.
SOURCE: University of Michigan Surveys of Consumers; Federal Reserve Bank of Philadelphia, Survey of Professional Forecasters (SPF).

12. 5-to-10-year-forward inflation compensation



NOTE: The data are weekly averages of daily data and extend through July 6, 2018. TIPS is Treasury Inflation-Protected Securities.
SOURCE: Federal Reserve Bank of New York; Barclays; Federal Reserve Board staff estimates.

9. Inflation compensation implied by the TIPS breakeven inflation rate is based on the difference, at comparable maturities, between yields on nominal Treasury securities and yields on TIPS, which are indexed to the total consumer price index (CPI). Inflation swaps are contracts in which one party makes payments of certain fixed nominal amounts in exchange for cash flows that are indexed to cumulative CPI inflation over some horizon. Focusing on inflation compensation 5 to 10 years ahead is useful, particularly for monetary policy, because such forward measures encompass market participants' views about where inflation will settle in the long term after developments influencing inflation in the short term have run their course.

10. As these measures are based on CPI inflation, one should probably subtract about ¼ to ½ percentage point—the average differential with PCE inflation over the past two decades—to infer inflation compensation on a PCE basis.

The Recent Rise in Oil Prices

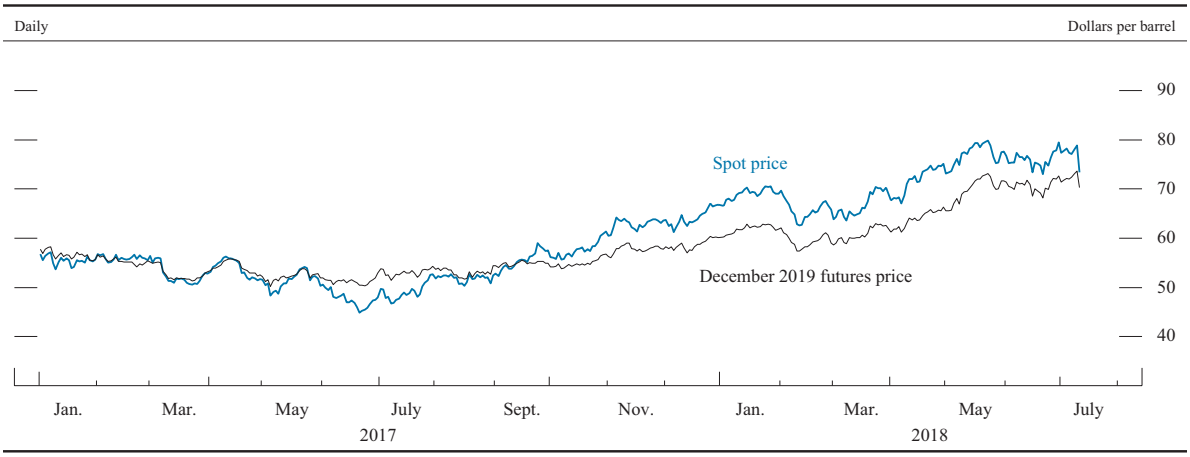
Oil prices have increased more than 50 percent over the past year, with the spot price of Brent crude oil rising from a bit below $50 per barrel to around $75 per barrel (figure A). For much of the period, further-dated futures prices remained relatively stable, in the neighborhood of $55 per barrel; however, since February, futures prices have moved up appreciably, reaching over $70 per barrel.

Both supply and demand factors have contributed to the oil price increase. In particular, the broad-based improvement in the outlook for the global economy was a key driver of the price increase in the second half of 2017. In recent months, supply concerns have become more prevalent, affecting both spot and further-dated futures prices. Despite sharply rising U.S. oil production, markets have been attuned to escalating conflict between Saudi Arabia and Iran as well as the precipitous decline in Venezuelan oil production amid the country's economic and political crisis. Prices also increased after President Trump announced on May 8 that the United States was withdrawing from the Iran nuclear deal and that sanctions against Iranian oil exports would be reinstated.

The pattern of spot and futures prices indicates that market participants generally anticipate that oil prices will decline slowly over the next few years, in part reflecting an expectation that supply, including U.S. shale oil production, will grow to meet demand. In addition, the higher prices put pressure on OPEC's November 2016 agreement with certain non-OPEC countries to restrain production. A stated aim of the agreement was to reduce the glut in global inventories, and, in recent months, inventory levels have fallen rapidly toward long-run averages. In response to both lower inventories and higher prices, OPEC leaders slightly relaxed the production agreement in June this

(continued)

A. Brent spot and futures prices



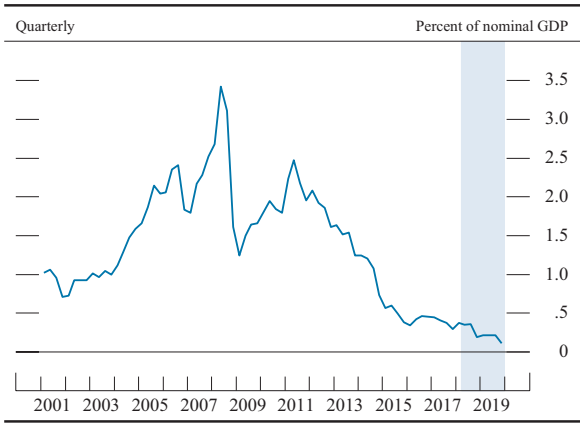
SOURCE: ICE Brent Futures via Bloomberg.

year, reducing some of the upward pressure on prices. That said, futures prices have not returned to their early 2018 levels, implying that market participants expect some of the recent increase in prices to be long lasting.

What is the expected effect of the recent rise in oil prices on the U.S. economy? To begin with, higher oil prices are likely to restrain household consumption. In particular, the increase in oil prices since last year is estimated to have translated into a roughly $300 increase in annual expenditures on gasoline for the average household, from about $2,100 to $2,400. However, as U.S. oil production has grown rapidly over the past decade, the ratio of net U.S. oil imports to U.S. gross domestic product (GDP) has declined substantially (figure B). As a result, higher oil prices now imply much less of a redistribution of purchasing power abroad than in the past, as much of the negative effect on GDP from lower household consumption is likely to be offset by increased production and investment in the growing U.S. oil sector. On net, the drag on GDP from higher oil prices is likely a small fraction of what it was a decade ago and should get smaller still if U.S. oil production continues to grow as projected—figure C—and the net oil import share shrinks toward zero.

Indeed, if U.S. oil trade moves fully into balance, the offsetting effects of a change in the relative price of oil might be expected to net out within the domestic economy. However, even if the United States is no longer a net oil importer, to the extent that higher oil prices cause credit-constrained consumers to cut spending by more than oil producers expand their investment, this redistribution of purchasing power could still have negative effects on overall GDP.

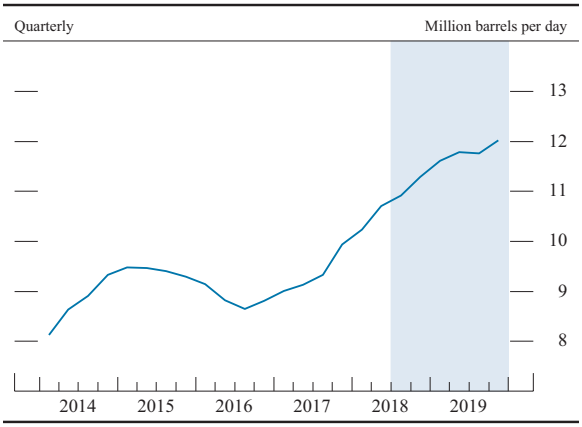
B. Net oil import share



NOTE: The data extending through 2018:Q1 are quarterly averages of daily oil futures prices, quarterly averages of monthly oil imports and exports, and quarterly GDP. The data from 2018:Q2 through 2019:Q4 are projections based on quarterly averages of monthly oil futures prices, quarterly averages of monthly oil imports and exports, and quarterly GDP.

SOURCE: Department of Energy via Haver Analytics; ICE Brent Futures via Bloomberg; Bureau of Economic Analysis; staff calculations.

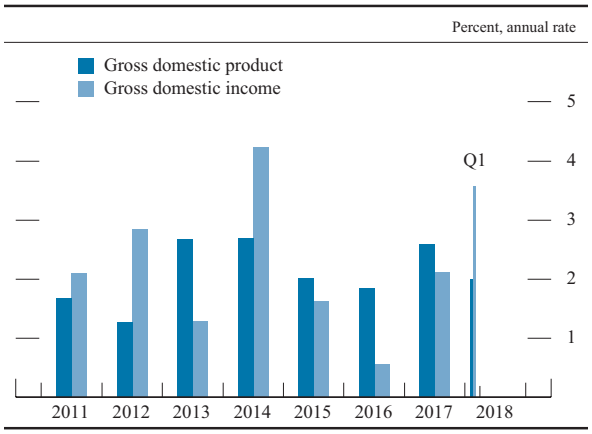
C. U.S. crude oil production



NOTE: The data are quarterly averages of monthly data. The data extend through 2018:Q2. Data from 2018:Q3 through 2019:Q4 are projections.

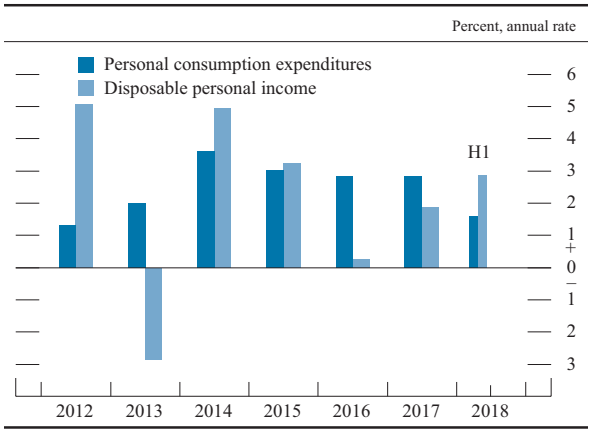
SOURCE: Department of Energy via Haver Analytics.

13. Change in real gross domestic product and gross domestic income



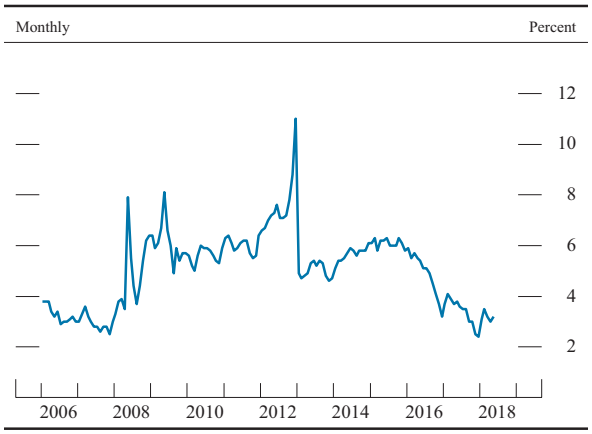
SOURCE: Bureau of Economic Analysis via Haver Analytics.

14. Change in real personal consumption expenditures and disposable personal income



NOTE: The values for 2018:H1 are the annualized May/Q4 changes.
SOURCE: Bureau of Economic Analysis via Haver Analytics.

15. Personal saving rate



NOTE: Data are through May 2018.
SOURCE: Bureau of Economic Analysis via Haver Analytics.

Real gross domestic product growth slowed in the first quarter, but spending by households appears to have picked up in recent months

After having expanded at an annual rate of 3 percent in the second half of 2017, real gross domestic product (GDP) is now reported to have increased 2 percent in the first quarter of this year (figure 13). The step-down in growth during the first quarter was largely attributable to a sharp slowing in the growth of consumer spending that appears transitory, and gains in GDP appear to have rebounded in the second quarter. Meanwhile, business investment has remained strong, and net exports had little effect on output growth in the first quarter. On balance, over the first half of this year, overall economic activity appears to have expanded at a solid pace.

The economic expansion continues to be supported by favorable consumer and business sentiment, past increases in household wealth, solid economic growth abroad, and accommodative domestic financial conditions, including moderate borrowing costs and easy access to credit for many households and businesses.

Gains in income and wealth continue to support consumer spending . . .

Following exceptionally strong growth in the fourth quarter of 2017, consumer spending in the first quarter of this year was tepid, rising at an annual rate of 0.9 percent. The slowdown in growth was evident in outlays for motor vehicles and in retail sales more generally; moreover, unseasonably warm weather depressed spending on energy services. However, consumer spending picked up in more recent months as retail sales firmed, and PCE in April and May rose at an annual rate of 2¼ percent relative to the average over the first quarter (figure 14).

Real disposable personal income (DPI), a measure of after-tax income adjusted for inflation, has increased at a solid annual rate of about 3 percent so far this year. Real DPI

has been supported by the reduction in income taxes owing to the implementation of the Tax Cuts and Jobs Act (TCJA) as well as the continued strength in the labor market. With consumer spending rising just a little less than the gains in disposable income so far this year, the personal saving rate has edged up after having fallen for the past two years (figure 15).

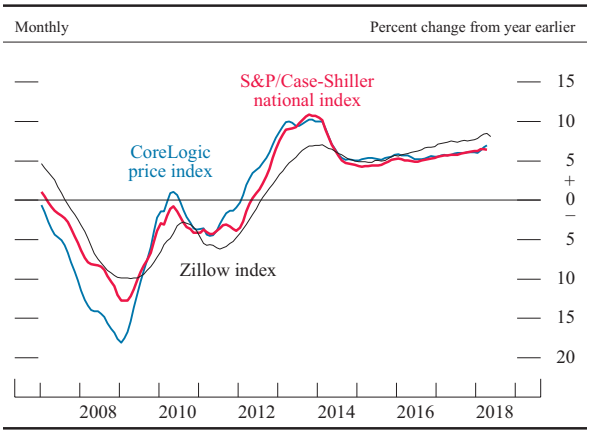
Ongoing gains in household net worth likely have also supported consumer spending. House prices, which are of particular importance for the balance sheet positions of a large set of households, have been increasing at an average annual pace of about 6 percent in recent years (figure 16).[11] Although U.S. equity prices have posted modest gains, on net, so far this year, this flattening followed several years of sizable gains. Buoyed by the cumulative increases in home and equity prices, aggregate household net worth was 6.8 times household income in the first quarter, down just slightly from its ratio in the fourth quarter—the highest-ever reading for that ratio, which dates back to 1947 (figure 17).

. . . and borrowing conditions for consumers remain generally favorable . . .

Financing conditions for consumers are generally favorable and remain supportive of growth in household spending. However, banks have continued to tighten standards for credit cards and auto loans for borrowers with low credit scores, possibly in response to some upward moves in the delinquency rates of those borrowers. Mortgage credit has remained readily available for households with solid credit profiles. For borrowers with low credit scores, mortgage financing conditions have eased somewhat further but remain tight overall. In this environment, consumer credit continued to increase in the first few months of 2018, though the rate of increase moderated some from its robust pace in the previous year (figure 18).

11. For the majority of households, home equity makes up the largest share of their wealth.

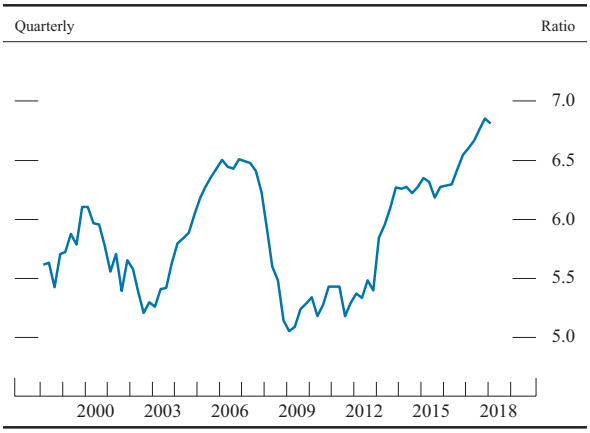
16. Prices of existing single-family houses



NOTE: The data for the S&P/Case-Shiller index extend through April 2018. The data for the Zillow index and the CoreLogic index extend through May 2018.

SOURCE: CoreLogic Home Price Index; Zillow; S&P/Case-Shiller U.S. National Home Price Index. The S&P/Case-Shiller Index is a product of S&P Dow Jones Indices LLC and/or its affiliates. (For Dow Jones Indices licensing information, see the note on the Contents page.)

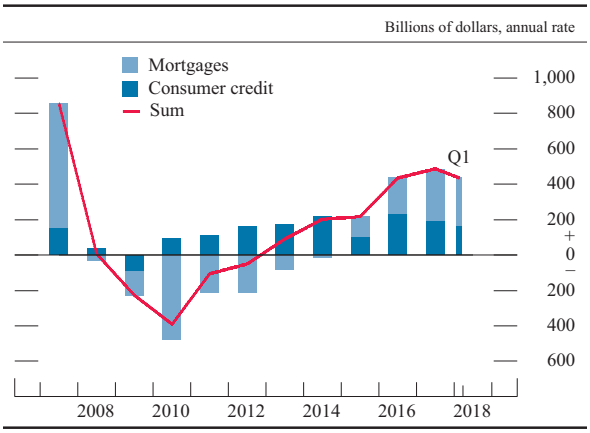
17. Wealth-to-income ratio



NOTE: The series is the ratio of household net worth to disposable personal income.

SOURCE: For net worth, Federal Reserve Board, Statistical Release Z.1, "Financial Accounts of the United States"; for income, Bureau of Economic Analysis via Haver Analytics.

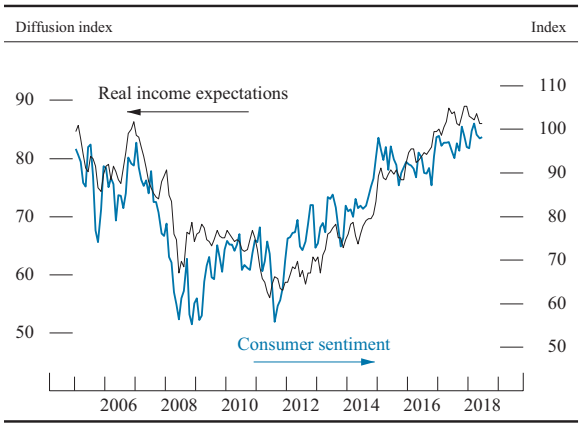
18. Changes in household debt



NOTE: Changes are calculated from year-end to year-end except 2018 changes, which are calculated from 2017:Q4 to 2018:Q1.

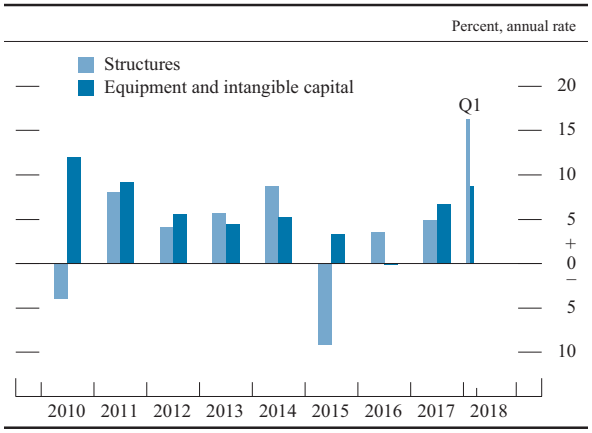
SOURCE: Federal Reserve Board, Statistical Release Z.1, "Financial Accounts of the United States."

19. Indexes of consumer sentiment and income expectations



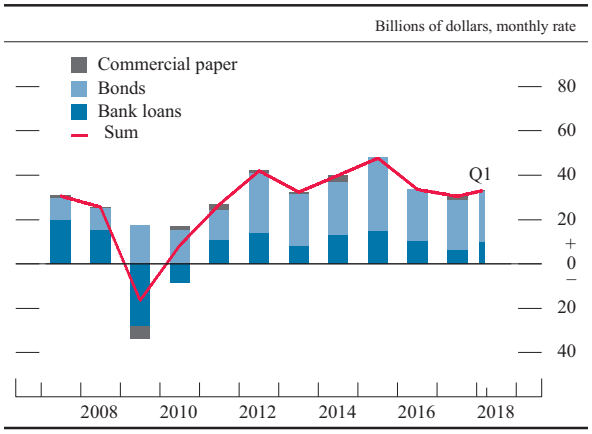
NOTE: The consumer sentiment data are monthly and are indexed to 100 in 1966. The real income expectations data are calculated as the net percentage of survey respondents expecting family income to go up more than prices during the next year or two plus 100 and are shown as a three-month moving average.
SOURCE: University of Michigan Surveys of Consumers.

20. Change in real private nonresidential fixed investment



SOURCE: Bureau of Economic Analysis via Haver Analytics.

21. Selected components of net debt financing for nonfinancial businesses



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

. . . while consumer confidence remains strong

Consumers have remained upbeat. So far this year, the Michigan survey index of consumer sentiment has been near its highest level since 2000, likely reflecting rising income, job gains, and low inflation (figure 19). Indeed, households' expectations for real income changes over the next year or two now stand above levels preceding the previous recession.

Business investment has continued to rebound . . .

Investment spending by businesses has continued to increase so far this year, with notable gains for spending, both on equipment and intangibles and on nonresidential structures (figure 20). Within structures, the rise in oil prices propelled another steep ramp-up in investment in drilling and mining structures—albeit not yet back to the levels recorded from 2012 to 2014—while investment in nonresidential structures outside of the energy sector picked up after declining in 2017. Forward-looking indicators of business investment spending remain favorable on balance. Business sentiment and the profit expectations of industry analysts have been positive overall, while new orders of capital goods have advanced on net this year.

. . . while corporate financing conditions have remained accommodative

Aggregate flows of credit to large nonfinancial firms remained strong in the first quarter, supported in part by relatively low interest rates and accommodative financing conditions (figure 21). The gross issuance of corporate bonds stayed robust during the first half of 2018, while yields on both investment- and speculative-grade corporate bonds moved up notably but remained low by historical standards (figure 22). Despite strong growth in business investment, outstanding commercial and industrial (C&I) loans on banks' books rose only modestly in the first quarter, although their pace of expansion in more recent months has strengthened on average. In

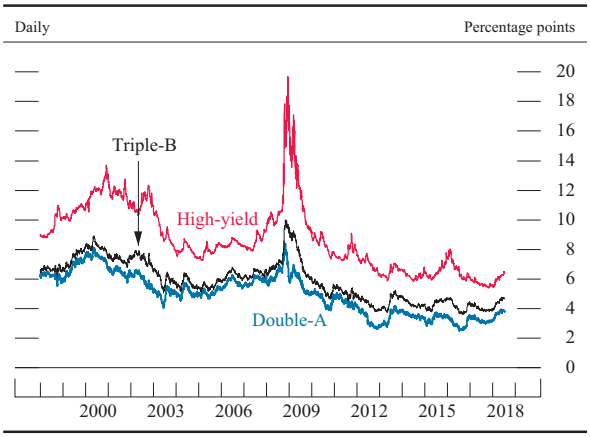
April, respondents to the Senior Loan Officer Opinion Survey on Bank Lending Practices, or SLOOS, reported that demand for C&I loans weakened in the first quarter even as lending standards and terms on such loans eased.[12] Respondents attributed this decline in demand in part to firms drawing on internally generated funds or using alternative sources of financing. Meanwhile, growth in commercial real estate loans has moderated some but remains strong. In addition, financing conditions for small businesses appear to have remained generally accommodative, with lending standards little changed at most banks and with most firms reporting that they are able to obtain credit. Although small business credit growth has been subdued, survey data suggest this sluggishness is largely due to continued weak demand for credit by small businesses.

But activity in the housing sector has leveled off

Residential investment, which rose a modest 2½ percent in 2017, appears to have largely moved sideways over the first five months of the year. The slowing in residential investment likely is partly a result of higher mortgage interest rates. Although these rates are still low by historical standards, they have moved up and are near their highest levels in seven years (figure 23). In addition, higher lumber prices and tight supplies of skilled labor and developed lots reportedly have been restraining home construction. While starts of both single-family and multifamily housing units rose in the fourth quarter, single-family starts have been little changed, on net, since then, whereas multifamily starts continued to climb earlier this year before flattening out (figure 24). Meanwhile, over the first five months of this year, new home sales have held at around the rate of late last year, but sales of existing homes have eased somewhat (figure 25). Despite the continued increases in house prices, the pace of construction has

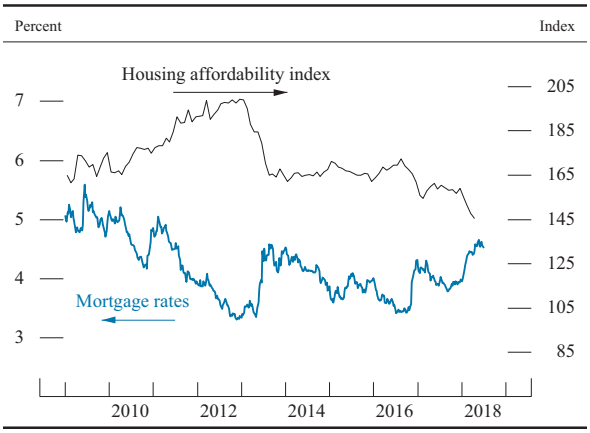
12. The SLOOS is available on the Board's website at https://www.federalreserve.gov/data/sloos/sloos.htm.

22. Corporate bond yields, by securities rating



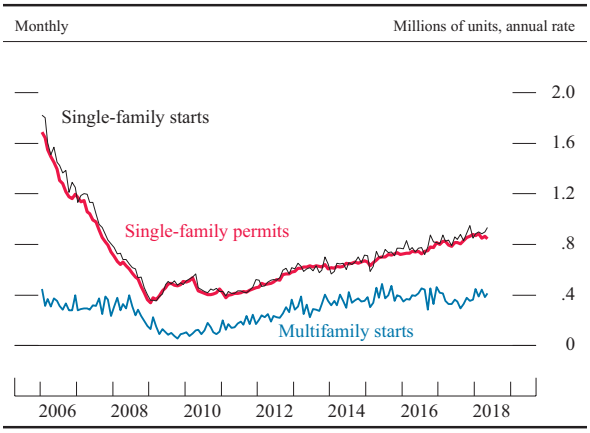
NOTE: The yields shown are yields on 10-year bonds.
SOURCE: ICE Bank of America Merrill Lynch Indices, used with permission.

23. Mortgage rates and housing affordability



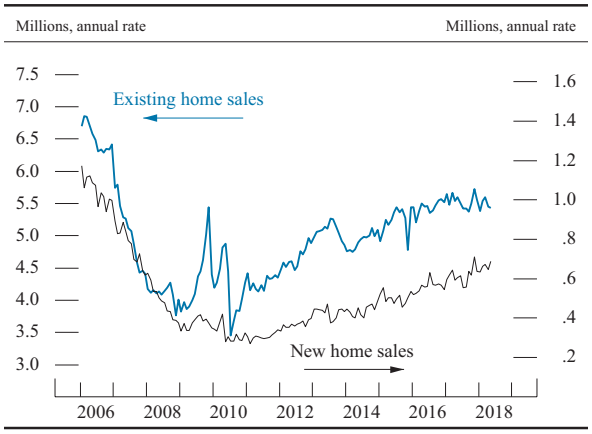
NOTE: The housing affordability index data are monthly through April 2018, and the mortgage rate data are weekly through July 5, 2018. At an index value of 100, a median-income family has exactly enough income to qualify for a median-priced home mortgage. Housing affordability is seasonally adjusted by Board staff.
SOURCE: For housing affordability index, National Association of Realtors; for mortgage rates, Freddie Mac Primary Mortgage Market Survey.

24. Private housing starts and permits



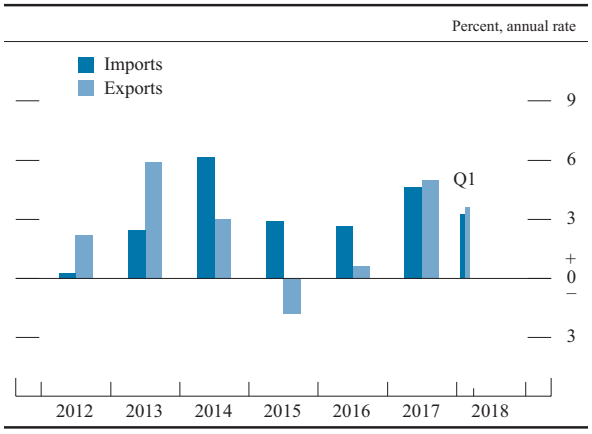
NOTE: The data extend through May 2018.
SOURCE: U.S. Census Bureau via Haver Analytics.

25. New and existing home sales



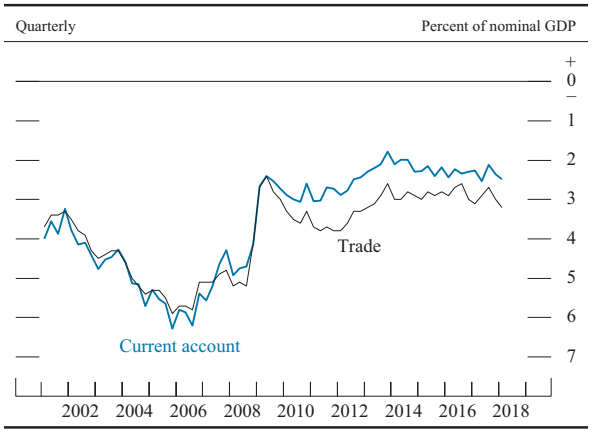
NOTE: Data are monthly and extend through May 2018. New home sales includes only single-family sales. Existing home sales includes single-family, condo, townhome, and co-op sales.
SOURCE: For new home sales, U.S. Census Bureau; for existing home sales, National Association of Realtors; all via Haver Analytics.

26. Change in real imports and exports of goods and services



SOURCE: Bureau of Economic Analysis via Haver Analytics.

27. U.S. trade and current account balances



NOTE: GDP is gross domestic product.
SOURCE: Bureau of Economic Analysis via Haver Analytics.

not kept up with demand. As a result, the months' supply of inventories of homes for sale has remained at a relatively low level, and the aggregate vacancy rate stands at the lowest level since 2003.

Net exports had a neutral effect on GDP growth in the first quarter

After being a small drag on U.S. real GDP growth last year, net exports had a neutral effect on growth in the first quarter. Real U.S. exports increased about 3½ percent at an annual rate, as exports of automobiles and consumer goods remained robust. Real import growth slowed sharply following a surge late last year (figure 26). Nominal trade data through May suggest that export growth picked up in the second quarter, led by agricultural exports, while import growth was tepid. All told, the available data suggest that the nominal trade deficit likely narrowed relative to GDP in the second quarter (figure 27).

Fiscal policy became more expansionary this year . . .

Federal fiscal policy will likely provide a moderate boost to GDP growth this year. The individual and corporate tax cuts in the TCJA should lead to increased private consumption and investment, while the Bipartisan Budget Act of 2018 (BBA) enables increased federal spending on goods and services. As the effects of the BBA had yet to show through, federal government purchases posted only a modest gain in the first quarter (figure 28).

After narrowing significantly for several years, the federal unified deficit widened from about 2½ percent of GDP in fiscal year 2015 to 3½ percent in fiscal 2017, and it is on pace to move up further in fiscal 2018. Although expenditures as a share of GDP in 2017 were relatively stable at 21 percent, receipts moved lower to roughly 17 percent of GDP and have remained at about the same level so far this year (figure 29). The ratio of federal

debt held by the public to nominal GDP was 76½ percent at the end of fiscal 2017 and is quite elevated relative to historical norms (figure 30).

. . . and the fiscal position of most state and local governments is stable

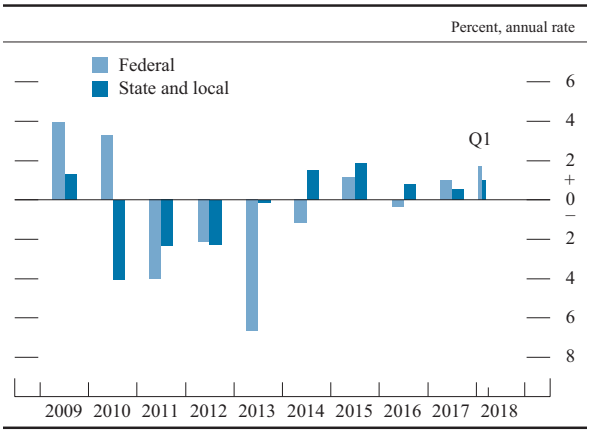
The fiscal position of most state and local governments remains stable, although there is a range of experiences across these governments and some states are still struggling. After several years of slow growth, revenue gains of state governments have strengthened notably as sales and income tax collections have picked up over the past few quarters. In addition, house price gains have continued to push up property tax revenues at the local level. But expenditures by state and local governments have been restrained. Employment growth in this sector has been moderate, while real outlays for construction by these governments have largely been moving sideways at a relatively low level.

Financial Developments

The expected path of the federal funds rate has moved up

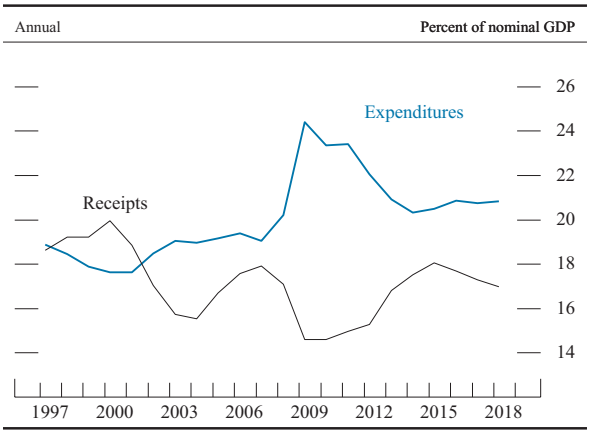
Market-based measures of the path of the federal funds rate continue to suggest that market participants expect further gradual increases in the federal funds rate. Relative to the end of last year, the expected policy rate path has moved up, boosted in part by investors' perception of a strengthening in the domestic economic outlook (figure 31). In particular, the policy path moved higher in response to incoming economic data so far this year, especially the employment reports, which were seen as supporting expectations for a solid pace of growth in domestic economic activity. In addition, investors reportedly interpreted FOMC communications in the first half of 2018 as signaling an upbeat economic outlook and as reinforcing expectations for further gradual removal of monetary policy accommodation.

28. Change in real government expenditures on consumption and investment



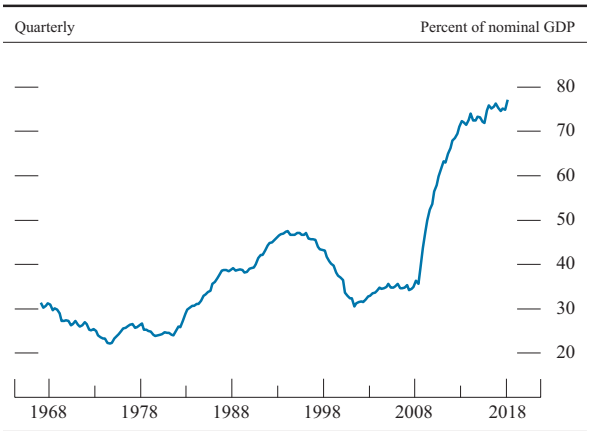
SOURCE: Bureau of Economic Analysis.

29. Federal receipts and expenditures



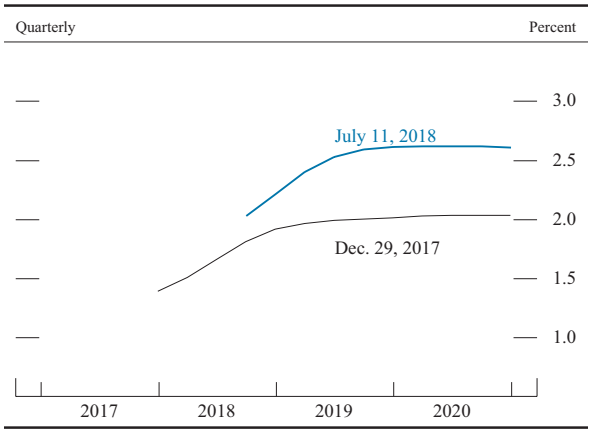
NOTE: Through 2017, receipts and expenditures are for fiscal years (October to September); gross domestic product (GDP) is for the four quarters ending in Q3. For 2018, receipts and expenditures are for the 12 months ending in May; GDP is the average of 2017:Q4 and 2018:Q1. Receipts and expenditures are on a unified-budget basis.
SOURCE: Office of Management and Budget via Haver Analytics.

30. Federal government debt held by the public



NOTE: The data for gross domestic product (GDP) are at an annual rate. Federal debt held by the public equals federal debt less Treasury securities held in federal employee defined benefit retirement accounts, evaluated at the end of the quarter.
SOURCE: For GDP, Bureau of Economic Analysis via Haver Analytics; for federal debt, Federal Reserve Board, Statistical Release Z.1, "Financial Accounts of the United States."

31. Market-implied federal funds rate



NOTE: The federal funds rate path is implied by quotes on overnight index swaps—a derivative contract tied to the effective federal funds rate. The implied path as of July 11, 2018, is compared with that as of December 29, 2017. The path is estimated with a spline approach, assuming a term premium of 0 basis points. The paths extend through 2020:Q4.
SOURCE: Bloomberg; Federal Reserve Board staff estimates.

32. Yields on nominal Treasury securities

NOTE: The Treasury ceased publication of the 30-year constant maturity series on February 18, 2002, and resumed that series on February 9, 2006.
SOURCE: Department of the Treasury.

Survey-based measures of the expected path of the policy rate over the next few years have also increased modestly since the end of last year. According to the results of the most recent Survey of Primary Dealers and Survey of Market Participants, both conducted by the Federal Reserve Bank of New York just before the June FOMC meeting, the median of respondents' projections for the path of the federal funds rate shifted up about 25 basis points for 2018 and beyond, compared with the median of assessments last December.[13] Market-based measures of uncertainty about the policy rate approximately one to two years ahead increased slightly, on balance, from their levels at the end of last year.

The nominal Treasury yield curve has shifted up

The nominal Treasury yield curve has shifted up and flattened somewhat further during the first half of 2018 after flattening considerably in the second half of 2017. In particular, the yields on 2- and 10-year nominal Treasury securities increased about 70 basis points and 45 basis points, respectively, from their levels at the end of 2017 (figure 32). The increase in Treasury yields seems to largely reflect investors' greater optimism about the domestic growth outlook and firming expectations for further gradual removal of monetary policy accommodation. Expectations for increases in the supply of Treasury securities following the federal budget agreement in early February also appear to have contributed to the increase in Treasury yields, while increased concerns about trade policy both domestically and abroad, political developments in Europe, and the foreign economic outlook weighed on longer-dated Treasury yields. Yields on 30-year agency mortgage-backed securities (MBS)—an important determinant of mortgage interest

13. The results of the Survey of Primary Dealers and the Survey of Market Participants are available on the Federal Reserve Bank of New York's website at https://www.newyorkfed.org/markets/primarydealer_survey_questions.html and https://www.newyorkfed.org/markets/survey_market_participants, respectively.

rates—increased about 60 basis points over the first half of the year, a bit more than the rise in the 10-year nominal Treasury yield, but remain low by historical standards (figure 33). Yields on corporate debt securities—both investment grade and high yield—rose more than Treasury yields, leaving the spreads on corporate bond yields over comparable-maturity Treasury yields notably wider than at the beginning of the year.

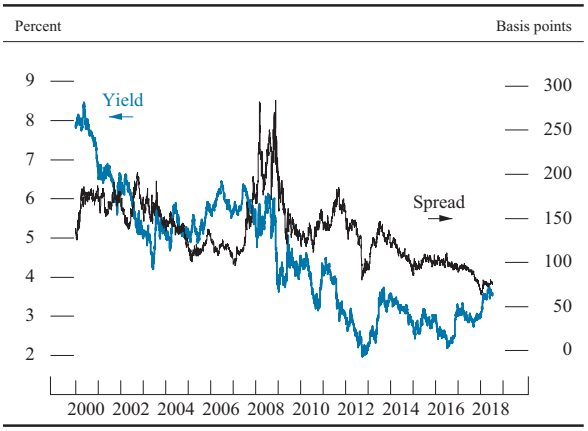
Broad equity indexes rose modestly amid some bouts of market volatility

After surging as much as 20 percent in 2017, broad stock market indexes rose modestly, on balance, so far this year amid some bouts of heightened volatility in financial markets (figure 34). The boost to equity prices from first-quarter earnings reports that generally beat analysts' expectations was reportedly offset by increased uncertainty about trade policy, rising interest rates, and concerns about political developments abroad. While stock prices for companies in the technology and consumer discretionary sectors rose notably, those of companies in the industrial and financial sectors declined modestly. After spiking considerably in early February, the implied volatility for the S&P 500 index—the VIX—declined and ended the period slightly above the low levels that prevailed in 2017. (For a discussion of financial stability issues, see the box "Developments Related to Financial Stability.")

Markets for Treasury securities, mortgage-backed securities, and municipal bonds have functioned well

On balance, indicators of Treasury market functioning remained broadly stable over the first half of 2018. A variety of liquidity metrics—including bid-ask spreads, bid sizes, and estimates of transaction costs—have displayed minimal signs of liquidity pressures overall, with the exception of a brief period of reduced liquidity in early February amid elevated financial market volatility. Liquidity conditions in the agency MBS market were

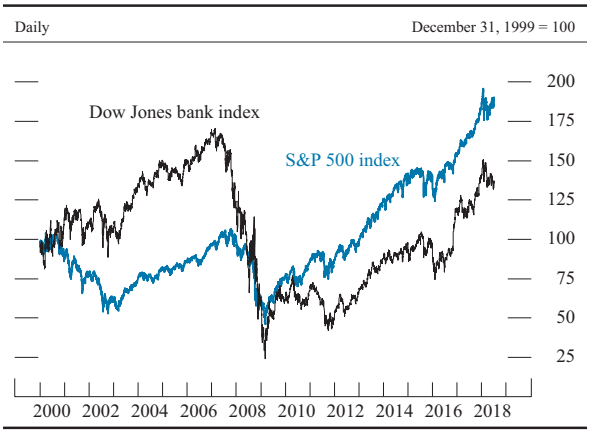
33. Yield and spread on agency mortgage-backed securities



NOTE: The data are daily. Yield shown is for the Fannie Mae 30-year current coupon, the coupon rate at which new mortgage-backed securities would be priced at par, or face, value. Spread shown is to the average of the 5- and 10-year nominal Treasury yields. The data extend through July 11, 2018.

SOURCE: Department of the Treasury; Barclays.

34. Equity prices



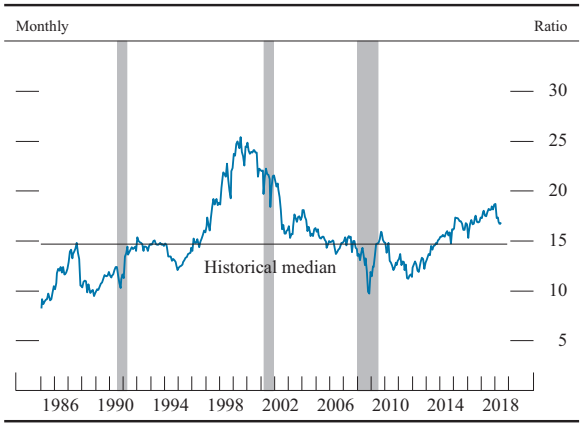
SOURCE: Standard & Poor's Dow Jones Indices via Bloomberg. (For Dow Jones Indices licensing information, see the note on the Contents page.)

Developments Related to Financial Stability

The U.S. financial system remains substantially more resilient than during the decade before the financial crisis.[1] Valuations continue to be elevated for a range of assets. In the private nonfinancial sector, the ratio of total debt to gross domestic product (GDP) is about in line with an estimate of its trend, and vulnerabilities associated with debt remain moderate on balance. While borrowing among highly levered and lower-rated firms is elevated and a future weakening in economic activity could amplify some vulnerabilities in the corporate sector, the ratio of household debt to disposable income has remained stable in recent years. Vulnerabilities associated with leverage in the financial sector appear low, reflecting in part strong capital positions of banks. However, some measures of hedge fund leverage have increased. Vulnerabilities associated with maturity and liquidity transformation continue to be low compared with levels that generally prevailed before 2008.

Valuation pressures in various asset markets remain elevated by historical standards, although they have declined somewhat since the start of the year, as corporate bond prices have fallen and higher earnings have helped rationalize equity prices. Market movements were outsized in February, around the time of the previous *Monetary Policy Report*. Since then, volatility has receded, although it has ended up slightly above the low levels seen in 2017. Even with higher expected earnings due in part to changes in tax law, the forward equity price-to-earnings ratio for the S&P 500 remains in the upper end of its historical distribution (figure A). Treasury term premiums have increased modestly from the beginning of the year but remain low relative to historically observed values. Corporate bond yields and their spreads to yields on comparable-maturity Treasury securities have increased notably, but they continue to be low by historical standards. In particular, speculative-grade yields and spreads lie in the bottom fifth and bottom fourth of their respective historical distributions. In leveraged loan markets, issuance has been robust, spreads have reached their lowest levels since the financial crisis, and the presence of loan covenants has decreased further. In real estate markets, commercial property valuations continue to be stretched. Capitalization rates (computed as the ratio of net operating income relative to property values) remain low, and, in recent quarters, their spreads to yields on 10-year Treasury securities have moved down considerably. Finally, valuation pressures in residential real estate markets increased modestly. Aggregate price-to-rent ratios, adjusted for an estimate of their long-run trend and the carrying cost of housing, are approaching the cycle peaks of the early 1980s and early 1990s but remain well below the levels observed on the eve of the financial crisis.

A. Forward price-to-earnings ratio of S&P 500 firms



NOTE: The data depict the aggregate forward price-to-earnings ratio of S&P 500 firms. The historical median is based on data from 1985 to the present. Shaded bars indicate periods of recession as defined by the National Bureau of Economic Research. Data are based on 12-month-ahead expected earnings per share.

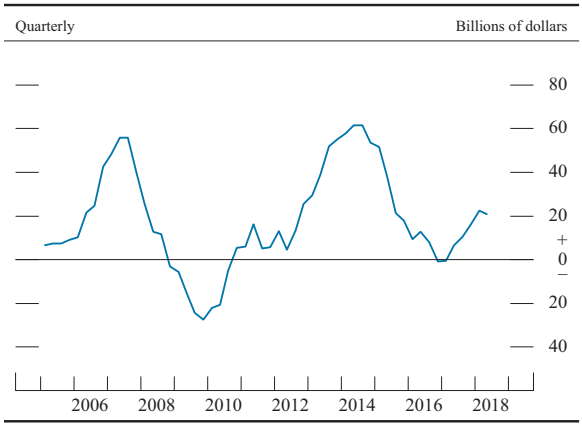
SOURCE: Staff estimates based on Thomson Reuters, IBES.

With households and businesses taken together, the ratio of total debt to GDP is about in line with estimates of its trend, although pockets of stress are evident. In the household sector, the net expansion of household debt has been in line with income growth and is concentrated among prime-rated borrowers. However, delinquency rates for some forms of consumer credit have moved up, suggesting rising strains among riskier borrowers even with unemployment very low. Banks are reportedly tightening standards on credit card and auto loans. In the nonfinancial business sector, leverage of corporate businesses remains high, as indicated by a positive sectoral credit-to-GDP gap. Net issuance of risky debt has risen in recent quarters, mainly driven by the growth in leveraged loans (figure B). While current

(continued)

1. An overview of the framework for assessing financial stability in the United States is provided in Lael Brainard (2018), "An Update on the Federal Reserve's Financial Stability Agenda," speech delivered at the Center for Global Economy and Business, Stern School of Business, New York University, New York, April 3, https://www.federalreserve.gov/newsevents/speech/brainard20180403a.htm.

B. Total net issuance of risky debt



NOTE: Data are 4-quarter moving averages and extend through 2018:Q2. Total net issuance of risky debt is the sum of the net issuance of speculative-grade and unrated bonds and leveraged loans.

SOURCE: Mergent Fixed Investment Securities Database, S&P Leveraged Commentary & Data.

corporate credit conditions are favorable overall, with low interest expenses and defaults, the elevated leverage in this sector could result in higher future default rates. In addition, weak protection from loan covenants could reduce early intervention by lenders and lower recovery rates for investors on default. Investors may also be exposed to significant repricing risks because bond yields and credit risk premiums are both low.

Vulnerabilities from financial-sector leverage continue to be relatively low. Core financial intermediaries, including large banks, insurance companies, and broker-dealers, appear well positioned to weather economic stress. Regulatory capital ratios for the global systemically important banks have remained well above the fully phased-in enhanced regulatory requirements and are close to historical highs. Capital levels at insurance companies and broker-dealers also remain relatively robust by historical standards. However, some indicators of hedge fund leverage in the equity market, such as the provision of total margin credit to equity investors, have risen to historically elevated levels, and in the past few quarters dealers have reportedly eased, on net, price terms to their hedge fund clients.

The results of supervisory stress tests released in June by the Federal Reserve Board confirm that the nation's largest banks are strongly capitalized and would be able to lend to households and businesses even during a severe global recession.[2] The hypothetical "severely adverse" scenario—the most stringent scenario yet used in the Board's stress tests, with the U.S. unemployment rate rising almost 6 percentage points to 10 percent—projects $578 billion in total losses for the 35 participating banks during the nine quarters tested. Since 2009, these firms have added about $800 billion in common equity capital. The Board also evaluates the capital planning processes of the participating banks, including the firms' planned capital actions, such as dividend payments and share buybacks.[3] The Board did not object to the capital plans of 34 firms. Although the recent U.S. tax legislation is expected to increase banks' post-tax earnings, and hence their ability to accrete capital, it did lead to one-time losses, decreasing banks' capital ratios at the end of 2017, the jumping-off point of the stress tests. In part because of these effects, evident in text figure 36, two firms were required to maintain their capital distributions at the levels they paid in recent years. Separately, one firm will be required to address the management and analysis of its counterparty exposure under stress. The Board objected to the capital plan of one bank because of qualitative concerns.

Vulnerabilities associated with liquidity and maturity transformation—that is, the financing of illiquid assets or long-maturity assets with short-maturity debt—continue to be low, owing in part to liquidity regulations for banks and money market reform. Large banks have strong liquidity positions, because their use of core deposits as a source of funding and their holdings of high-quality liquid assets remain near historical highs, while their use of short-term wholesale funding as a share of liabilities is near historical lows. Since the money market fund reforms implemented in October 2016, assets under management at prime funds, institutions that proved vulnerable to runs in the past, have remained far below pre-reform levels. In addition, the growth in alternative short-term investment vehicles, which may have some

(continued on next page)

2. See Board of Governors of the Federal Reserve System (2018), "Federal Reserve Board Releases Results of Supervisory Bank Stress Tests," press release, June 21, https://www.federalreserve.gov/newsevents/pressreleases/bcreg20180621a.htm.

3. See Board of Governors of the Federal Reserve System (2018), "Federal Reserve Releases Results of Comprehensive Capital Analysis and Review (CCAR)," press release, June 29, https://www.federalreserve.gov/newsevents/pressreleases/bcreg20160629a.htm.

Financial Stability *(continued)*

similar vulnerabilities, continues to be limited, as investors have shifted primarily from prime funds into government funds.

Risks from abroad are moderate overall. Advanced foreign economies (AFEs), many of which have significant financial and real linkages to the United States, continue to have notable or elevated valuations in some asset markets and, in a few countries, high levels of household debt relative to GDP. These factors have contributed to some AFEs announcing or implementing macroprudential actions, including increases in countercyclical capital buffers, over the past couple of years. More generally, AFE financial sectors continue their slow pace of deleveraging that started after the global financial and euro-area sovereign debt crises. In addition, low corporate debt spreads in the past few years have yet to translate into any marked increase in leverage in most of these countries' nonfinancial corporate sectors. Some major emerging market economies continue to harbor more pronounced vulnerabilities, reflecting some combination of the following: substantial corporate leverage, fiscal concerns, or excessive reliance on foreign funding. Globally, potential downside risks to international financial markets and financial stability include political uncertainty, an intensification of trade tensions, and challenges posed by rising interest rates.

The countercyclical capital buffer (CCyB) is a macroprudential tool the Federal Reserve Board can use to increase the resilience of the financial system by raising capital requirements on the largest banks. Activating the CCyB is appropriate when systemic vulnerabilities are meaningfully above normal.[4] The Board is closely monitoring the level and configuration of systemic vulnerabilities described earlier.

4. See Board of Governors of the Federal Reserve System (2016), "Regulatory Capital Rules: The Federal Reserve Board's Framework for Implementing the U.S. Basel III Countercyclical Capital Buffer," final policy statement (Docket No. R-1529), *Federal Register*, vol. 81 (September 16), pp. 63682–88.

also generally stable. Overall, the functioning of Treasury and agency MBS markets has not been materially affected by the implementation of the Federal Reserve's balance sheet normalization program, including the accompanying reduction in reinvestment of principal payments from the Federal Reserve's securities holdings. Credit conditions in municipal bond markets have remained stable since the turn of the year. Over that period, yield spreads on 20-year general obligation municipal bonds over comparable-maturity Treasury securities edged up a bit.

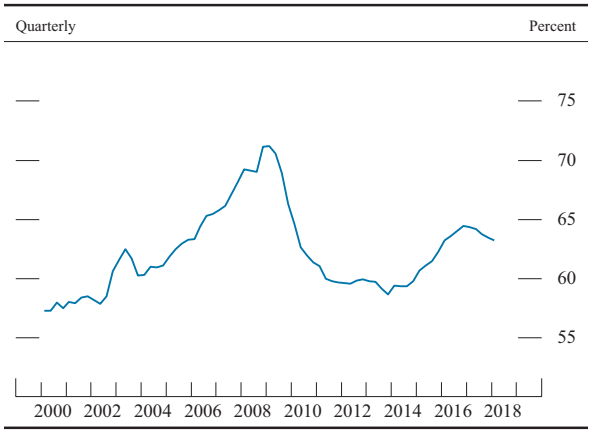
Money market rates have moved up in line with increases in the FOMC's target range

Conditions in domestic short-term funding markets have also remained generally stable so far in 2018. Yields on a broad set of money market instruments moved higher in response to the FOMC's policy actions in March and June. Some money market rates rose during the first quarter more than what would normally occur with monetary tightening. For example, the spreads of certificates of deposit and term London interbank offered rates relative to overnight index swap (OIS) rates increased notably, reportedly reflecting increased issuance of Treasury bills and perhaps also the anticipated tax-induced repatriation of foreign earnings by U.S. corporations. The upward pressure on short-term funding rates, beyond that driven by expected monetary policy, eased in recent months, leading to a narrowing of spreads of some money market rates to OIS rates. However, the spreads remain wider than at the beginning of the year.

Bank credit continued to expand and bank profitability improved

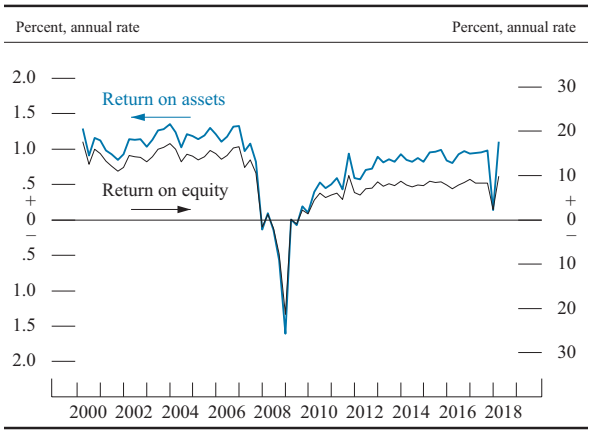
Aggregate credit provided by commercial banks continued to increase through the first quarter of 2018 at a pace similar to the one seen in 2017. Its pace was slower than that of nominal GDP, thus leaving the ratio of total commercial bank credit to current-dollar

35. Ratio of total commercial bank credit to nominal gross domestic product



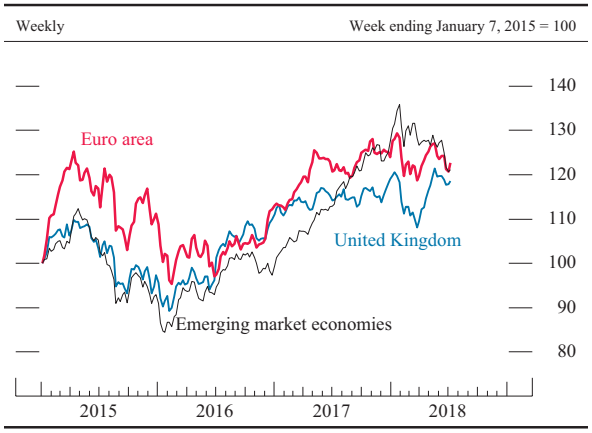
SOURCE: Federal Reserve Board, Statistical Release H.8, "Assets and Liabilities of Commercial Banks in the United States"; Bureau of Economic Analysis via Haver Analytics.

36. Profitability of bank holding companies



NOTE: The data are quarterly and are seasonally adjusted.
SOURCE: Federal Reserve Board, Form FR Y-9C, Consolidated Financial Statements for Bank Holding Companies.

37. Equity indexes for selected foreign economies



NOTE: The data are weekly averages of daily data and extend through July 11, 2018.
SOURCE: For euro area, DJ Euro Stoxx Index; for United Kingdom, FTSE 100 Stock Index; for emerging market economies, MSCI Emerging Markets Local Currency Index; all via Bloomberg.

GDP slightly lower than in the previous year (figure 35). Available data for the second quarter suggest that growth in banks' core loans continued to be moderate. Measures of bank profitability improved in the first quarter of 2018 after having experienced a temporary decline in the last quarter of 2017. Weaker fourth-quarter measures of bank profitability were partly driven by higher write-downs of deferred tax assets in response to the U.S. tax legislation (figure 36).

International Developments

Political developments and signs of moderating growth weighed on advanced foreign economy asset prices

Since February, political developments in Europe and moderation in economic growth outside of the United States weighed on some risky asset prices in advanced foreign economies (AFEs). Interest rates on sovereign bonds in several countries in the European periphery rose notably relative to core countries, and European bank shares came under pressure, as investors focused on the formation of the Italian government. Nonetheless, peripheral bond spreads remained well below their levels at the height of the euro-area crisis, and the moves partly retraced as a government was put in place. Broad stock price indexes were little changed on net (figure 37). In contrast to the United States, long-term sovereign yields and market-implied paths of policy rates in the core euro area as well as the United Kingdom declined somewhat, and rates were little changed in Japan (figure 38).

Heightened investor focus on vulnerabilities in emerging market economies led asset prices to come under pressure

Investor concerns about financial vulnerabilities in several emerging market economies (EMEs) intensified this spring against the backdrop of rising U.S. interest rates. Broad measures of EME sovereign

bond spreads over U.S. Treasury yields widened notably, and benchmark EME equity indexes declined, as investors scrutinized macroeconomic policy approaches in several countries. Turkey and Argentina, which faced persistently high inflation, expansionary fiscal policies, and large current account deficits, were among the worst performers. Trade policy developments between the United States and its trading partners also weighed on EME asset prices, especially on stock prices in China and some emerging Asian countries. EME mutual funds saw net outflows in May and June after generally solid inflows earlier in the year (figure 39). While movements in asset prices and capital flows were notable for a number of economies, broad indicators of financial stress in EMEs remained low relative to levels seen during other periods of stress in recent years.

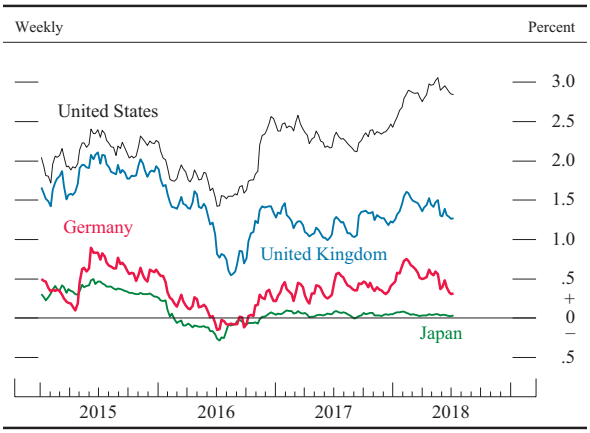
The dollar appreciated

After depreciating during 2017, the broad exchange value of the U.S. dollar has appreciated moderately in recent months (figure 40). Factors contributing to the appreciation of the dollar likely include moderating growth in some foreign economies combined with continued output strength and ongoing policy tightening in the United States, downside risks stemming from political developments in Europe and several EMEs, and the recent developments in trade policy. Several currencies appeared particularly sensitive to trade policy developments, including the Canadian dollar and the Mexican peso, related to the North American Free Trade Agreement negotiations, as well as the Chinese renminbi, which fell notably against the dollar in June.

The pace of economic activity moderated in the AFEs

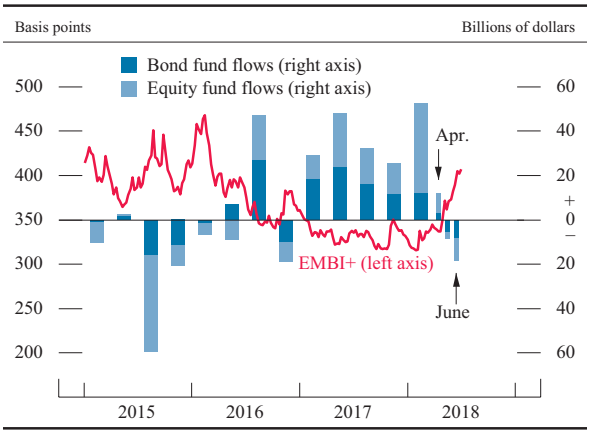
In the first quarter, real GDP growth decelerated in all major AFEs and turned negative in Japan, down from robust rates of activity in 2017 (figure 41). Part of this slowing is a result of temporary factors, though,

38. Nominal 10-year government bond yields in selected advanced economies



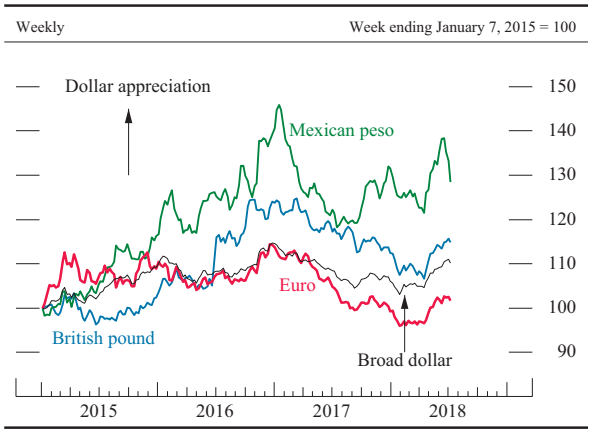
NOTE: The data are weekly averages of daily benchmark yields and extend through July 11, 2018.
SOURCE: Bloomberg.

39. Emerging market mutual fund flows and spreads



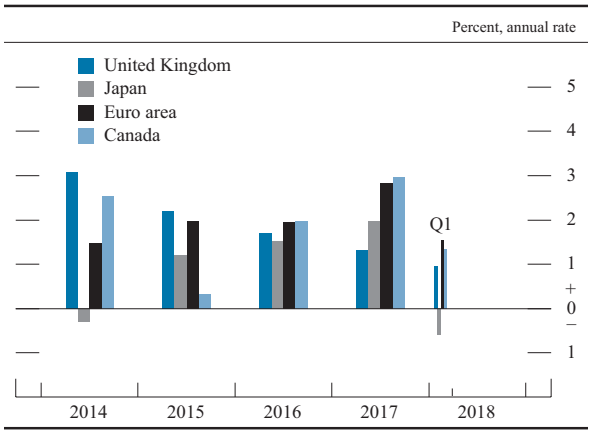
NOTE: The bond and equity fund flow data are quarterly sums of weekly data from January 1, 2015, to March 31, 2018, and monthly sums of weekly data from April 1, 2018, to June 30, 2018. The fund flows data exclude funds located in China. The J.P. Morgan Emerging Markets Bond Index Plus (EMBI+) data are weekly averages of daily data and extend through July 4, 2018.
SOURCE: For bond and equity fund flows, EPFR Global; for EMBI+, J.P. Morgan Emerging Markets Bond Index Plus via Bloomberg.

40. U.S. dollar exchange rate indexes



NOTE: The data, which are in foreign currency units per dollar, are weekly averages of daily data and extend through July 11, 2018. As indicated by the arrow, increases in the data represent U.S. dollar appreciation, and decreases represent U.S. dollar depreciation.
SOURCE: Federal Reserve Board, Statistical Release H.10, "Foreign Exchange Rates."

41. Real gross domestic product growth in selected advanced foreign economies



SOURCE: For the United Kingdom, Office for National Statistics; for Japan, Cabinet Office, Government of Japan; for the euro area, Eurostat; for Canada, Statistics Canada; all via Haver Analytics.

including unusually cold weather in Japan and the United Kingdom, labor strikes in the euro area, and disruptions in oil production in Canada. In most AFEs, economic indicators for the second quarter, including purchasing manager surveys and exports, are generally consistent with solid economic growth.

Despite tight labor markets, inflation pressures remain subdued in most AFEs . . .

Sustained increases in oil prices provided upward pressure on consumer price inflation across all AFEs in the first half of the year (figure 42). However, core inflation has generally remained muted in most AFEs, despite further improvement in labor market conditions. In Canada, in contrast, core inflation picked up amid solid wage growth, pushing the total inflation rate above the central bank target.

. . . prompting central banks to maintain highly accommodative monetary policies

With underlying inflation still subdued, the Bank of Japan and the European Central Bank (ECB) kept their policy rates at historically low levels, although the ECB indicated it would again reduce the pace of its asset purchases starting in October. The Bank of England and the Bank of Canada, which both began raising interest rates last year, signaled that further rate increases will be gradual, given a moderation in the pace of economic activity.

In emerging Asia, growth remained solid . . .

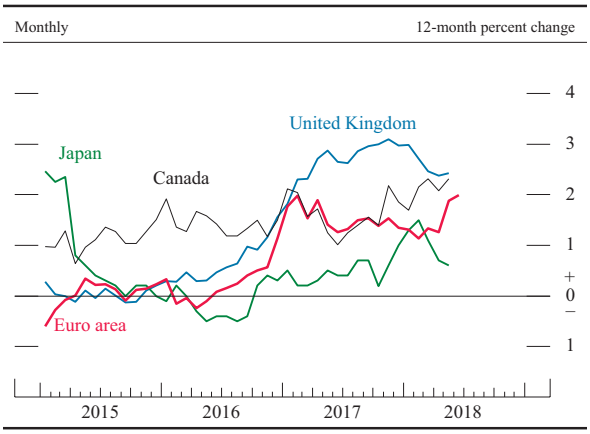
Economic growth in China remained solid in the first quarter of 2018, as a rebound in steel production and strong external demand bolstered a recovery in industrial activity and overall growth (figure 43). Indicators of investment and retail sales have slowed in recent months, however, suggesting that the authorities' effort to rein in credit may have softened domestic demand. Most other

emerging Asian economies registered strong growth in the first quarter of 2018, partly reflecting solid external demand.

. . . while growth in some Latin American economies was mixed

In Mexico, real GDP surged in the first quarter as economic activity rebounded from two major earthquakes and a hurricane last year. Following a brief recovery in the first half of 2017, Brazil's economy stalled in the fourth quarter and grew tepidly in the first quarter, and a truckers' strike paralyzed economic activity in late May.

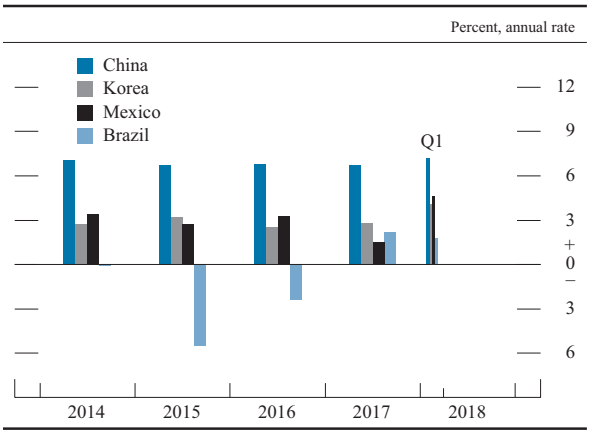
42. Consumer price inflation in selected advanced foreign economies



NOTE: The data for the euro area incorporate the flash estimate for June 2018. The data for Canada, Japan, and the United Kingdom extend through May 2018.

SOURCE: For the United Kingdom, Office for National Statistics; for Japan, Ministry of International Affairs and Communications; for the euro area, Statistical Office of the European Communities; for Canada, Statistics Canada; all via Haver Analytics.

43. Real gross domestic product growth in selected emerging market economies



NOTE: The data for China are seasonally adjusted by Board staff. The data for Korea, Mexico, and Brazil are seasonally adjusted by their respective government agencies.

SOURCE: For China, China National Bureau of Statistics; for Korea, Bank of Korea; for Mexico, Instituto Nacional de Estadistica y Geografia; for Brazil, Instituto Brasileiro de Geografia e Estatistica; all via Haver Analytics.

Part 2
Monetary Policy

The Federal Open Market Committee continued to gradually increase the federal funds target range in the first half of the year . . .

Since December 2015, the Federal Open Market Committee (FOMC) has been gradually increasing its target range for the federal funds rate as the economy has continued to make progress toward the Committee's congressionally mandated objectives of maximum employment and price stability. In the first half of this year, the Committee continued this gradual process of scaling back monetary policy accommodation, increasing its target range for the federal funds rate ¼ percentage point at its meetings in both March and June. With these increases, the federal funds rate is currently in the range of 1¾ to 2 percent (figure 44).[14] The Committee's decisions reflected the continued strengthening of the labor market and the accumulating evidence that, after many years of running below the Committee's 2 percent longer-run objective, inflation had moved close to 2 percent.

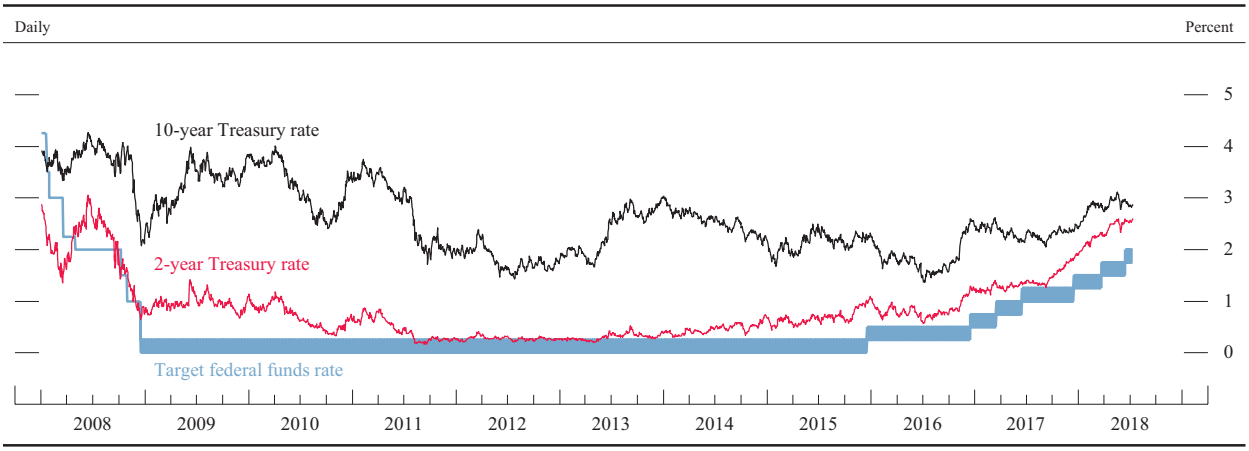
. . . but monetary policy continues to support economic growth

Even after the gradual increases in the federal funds rate over the first half of the year, the Committee judges that the stance of monetary policy remains accommodative, thereby supporting strong labor market conditions and a sustained return to 2 percent inflation. In particular, the federal funds rate remains somewhat below most FOMC participants' estimates of its longer-run value.

The Committee expects that a gradual approach to increasing the target range for the federal funds rate will be consistent with a sustained expansion of economic activity, strong labor market conditions, and inflation near the Committee's symmetric 2 percent objective over the medium term. Consistent with this outlook, in the most recent Summary of Economic Projections (SEP), which was compiled at the time of the June FOMC meeting, the median of participants'

14. See Board of Governors of the Federal Reserve System (2018), "Federal Reserve Issues FOMC Statement," press release, March 21, https://www.federalreserve.gov/newsevents/pressreleases/monetary20180321a.htm; and Board of Governors of the Federal Reserve System (2018), "Federal Reserve Issues FOMC Statement," press release, June 13, https://www.federalreserve.gov/newsevents/pressreleases/monetary20180613a.htm.

44. Selected interest rates



Note: The 2-year and 10-year Treasury rates are the constant-maturity yields based on the most actively traded securities.
Source: Department of the Treasury; Federal Reserve Board.

assessments for the appropriate level of the target range for the federal funds rate at year-end rises gradually over the period from 2018 to 2020 and stands somewhat above the median projection for its longer-run level by the end of 2019 and through 2020.[15]

Future changes in the federal funds rate will depend on the economic outlook as informed by incoming data

The FOMC has continued to emphasize that, in determining the timing and size of future adjustments to the target range for the federal funds rate, it will assess realized and expected economic conditions relative to its maximum-employment objective and its symmetric 2 percent inflation objective. This assessment will take into account a wide range of information, including measures of labor market conditions, indicators of inflation pressures and inflation expectations, and readings on financial and international developments.

In evaluating the stance of monetary policy, policymakers routinely consult prescriptions from a variety of policy rules, which can serve as useful benchmarks. However, the use and interpretation of such prescriptions require, among other considerations, careful judgments about the choice and measurement of the inputs to these rules such as estimates of the neutral interest rate, which are highly uncertain (see the box "Complexities of Monetary Policy Rules").

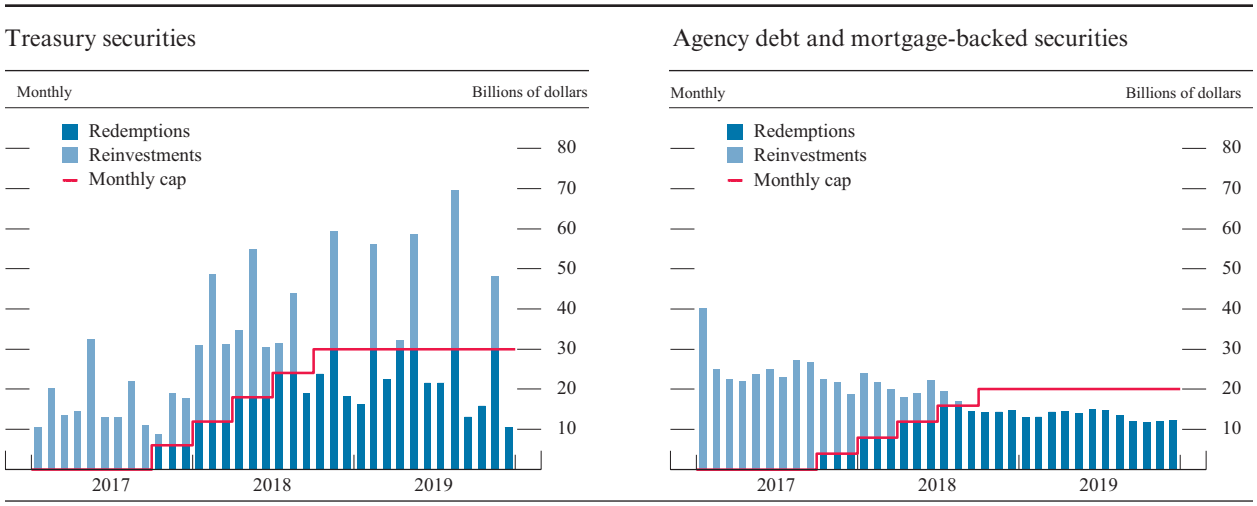
The FOMC has continued to implement its program to gradually reduce the Federal Reserve's balance sheet

The Committee has continued to implement the balance sheet normalization program described in the June 2017 Addendum to the Policy Normalization Principles and Plans.[16] This program is gradually and predictably reducing the Federal Reserve's securities holdings by decreasing the reinvestment of the principal payments it receives from securities held in the System Open Market Account. Since the initiation of the balance sheet normalization program in October of last year, such payments have been reinvested to the extent that they exceeded gradually rising caps (figure 45).

15. See the June SEP, which appeared as an addendum to the minutes of the June 12–13, 2018, meeting of the FOMC and is presented in Part 3 of this report.

16. The addendum, adopted on June 13, 2017, is available at https://www.federalreserve.gov/monetarypolicy/files/FOMC_PolicyNormalization.20170613.pdf.

45. Principal payments on SOMA securities



NOTE: Reinvestment and redemption amounts of agency mortgage-backed securities are projections starting in June 2018. The data extend through December 2019.

SOURCE: Federal Reserve Bank of New York; Federal Reserve Board staff calculations.

Complexities of Monetary Policy Rules

Overview

Monetary policy rules are mathematical formulas that relate a policy interest rate, such as the federal funds rate, to a small number of other economic variables—typically including the deviation of inflation from its target value along with an estimate of resource slack in the economy. Policy rules can provide helpful guidance for policymakers. Indeed, since 2004, prescriptions from policy rules have been included in written materials that are routinely sent to the Federal Open Market Committee (FOMC). However, interpretation of the prescriptions of policy rules requires careful judgment about the measurement of the inputs to the rules and the implications of the many considerations that the rules do not take into account.

Policy rules can incorporate key principles of good monetary policy.[1] One key principle is that monetary policy should respond in a predictable way to changes in economic conditions. A second key principle is that monetary policy should be accommodative when inflation is below the desired level and employment is below its maximum sustainable level; conversely, monetary policy should be restrictive when the opposite holds. A third key principle is that, to stabilize inflation, the policy rate should be adjusted by more than one-for-one in response to persistent increases or decreases in inflation.

Economists have analyzed many monetary policy rules, including the well-known Taylor (1993) rule. Other rules include the "balanced approach" rule, the "adjusted Taylor (1993)" rule, the "price level" rule, and the "first difference" rule (figure A).[2] These policy rules reflect the three key principles of good monetary policy noted earlier. Each rule takes into account estimates of how far the economy is from achieving the Federal Reserve's dual-mandate goals of maximum employment and price stability.

Four of the five rules include the difference between the rate of unemployment that is sustainable in the longer run and the current unemployment rate (the unemployment rate gap); the first-difference rule includes the change in the unemployment gap rather than its level.[3] In addition, four of the five rules include the difference between recent inflation and the FOMC's longer-run objective (2 percent as measured by the annual change in the price index for personal consumption expenditures, or PCE), while the price-level rule includes the gap between the level of prices today and the level of prices that would be observed if inflation had been constant at 2 percent from a specified starting year ($PLgap_t$).[4] The price-level rule thereby takes account of the deviation of inflation from

(continued on next page)

1. For discussion regarding principles for the conduct of monetary policy and monetary policy rules, see Board of Governors of the Federal Reserve System (2018), "Monetary Policy Principles and Practice," Board of Governors, https://www.federalreserve.gov/monetarypolicy/monetary-policy-principles-and-practice.htm.

2. The Taylor (1993) rule was suggested in John B. Taylor (1993), "Discretion versus Policy Rules in Practice," *Carnegie-Rochester Conference Series on Public Policy,* vol. 39 (December), pp. 195–214. The balanced-approach rule was analyzed in John B. Taylor (1999), "A Historical Analysis of Monetary Policy Rules," in John B. Taylor, ed., *Monetary Policy Rules* (Chicago: University of Chicago Press), pp. 319–41. The adjusted Taylor (1993) rule was studied in David Reifschneider and John C. Williams (2000), "Three Lessons for Monetary Policy in a Low-Inflation Era," *Journal of Money, Credit and Banking,* vol. 32 (November), pp. 936–66. A price-level rule was discussed in Robert E. Hall (1984), "Monetary Strategy with an Elastic Price Standard," in *Price Stability and Public Policy*, proceedings of a symposium sponsored by the Federal Reserve Bank of Kansas City, held in Jackson Hole, Wyo., August 2–3 (Kansas City: Federal Reserve Bank of Kansas City), pp. 137–59, https://www.kansascityfed.org/publicat/sympos/1984/s84.pdf. Finally, the first-difference rule was introduced by Athanasios Orphanides (2003), "Historical Monetary Policy Analysis and the Taylor Rule," *Journal of Monetary Economics,* vol. 50 (July), pp. 983–1022. A comprehensive review of policy rules is in John B. Taylor and John C. Williams (2011), "Simple and Robust Rules for Monetary Policy," in Benjamin M. Friedman and Michael Woodford, eds., *Handbook of Monetary Economics*, vol. 3B (Amsterdam: North-Holland), pp. 829–59. The same volume of the *Handbook of Monetary Economics* also discusses approaches other than policy rules for deriving policy rate prescriptions.

3. The Taylor (1993) rule represented slack in resource utilization using an output gap (the difference between the current level of real gross domestic product (GDP) and what GDP would be if the economy was operating at maximum employment). The rules in figure A represent slack in resource utilization using the unemployment gap instead, because that gap better captures the FOMC's statutory goal to promote maximum employment. Movements in these alternative measures of resource utilization are highly correlated. For more information, see the note below figure A.

4. Calculating the prescriptions of the price-level rule requires selecting a starting year for the price level from which to cumulate the 2 percent annual inflation. Figure B uses 1998 as the starting year. Around that time, the underlying trend of inflation and longer-term inflation expectations stabilized at a level consistent with PCE price inflation being close to 2 percent.

Monetary Policy Rules *(continued)*

A. Monetary policy rules

Taylor (1993) rule	$R_t^{T93} = r_t^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + (u_t^{LR} - u_t)$
Balanced-approach rule	$R_t^{BA} = r_t^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + 2(u_t^{LR} - u_t)$
Taylor (1993) rule, adjusted	$R_t^{T93\,adj} = maximum\ \{R_t^{T93} - Z_t, 0\}$
Price-level rule	$R_t^{PL} = maximum\ \{r_t^{LR} + \pi_t + (u_t^{LR} - u_t) + 0.5(PLgap_t), 0\}$
First-difference rule	$R_t^{FD} = R_{t-1} + 0.5(\pi_t - \pi^{LR}) + (u_t^{LR} - u_t) - (u_{t-4}^{LR} - u_{t-4})$

NOTE: R_t^{T93}, R_t^{BA}, R_t^{T93adj}, R_t^{PL}, and R_t^{FD} represent the values of the nominal federal funds rate prescribed by the Taylor (1993), balanced-approach, adjusted Taylor (1993), price-level, and first-difference rules, respectively.

R_t denotes the actual nominal federal funds rate for quarter t, π_t is four-quarter price inflation for quarter t, u_t is the unemployment rate in quarter t, and r_t^{LR} is the level of the neutral real federal funds rate in the longer run that, on average, is expected to be consistent with sustaining maximum employment and inflation at the FOMC's 2 percent longer-run objective, π^{LR}. In addition, u_t^{LR} is the rate of unemployment in the longer run. Z_t is the cumulative sum of past deviations of the federal funds rate from the prescriptions of the Taylor (1993) rule when that rule prescribes setting the federal funds rate below zero. $PLgap_t$ is the percent deviation of the actual level of prices from a price level that rises 2 percent per year from its level in a specified starting period.

The Taylor (1993) rule and other policy rules are generally written in terms of the deviation of real output from its full capacity level. In these equations, the output gap has been replaced with the gap between the rate of unemployment in the longer run and its actual level (using a relationship known as Okun's law) in order to represent the rules in terms of the FOMC's statutory goals. Historically, movements in the output and unemployment gaps have been highly correlated. Box note 2 provides references for the policy rules.

the long-run objective in earlier periods as well as the current period. Thus, if inflation had been running persistently above 2 percent, the price-level rule would prescribe a higher level for the federal funds rate than rules that use the current inflation gap. Likewise, if inflation had been running persistently below 2 percent, the price-level rule would prescribe setting the policy rate lower than rules that use the current inflation gap.

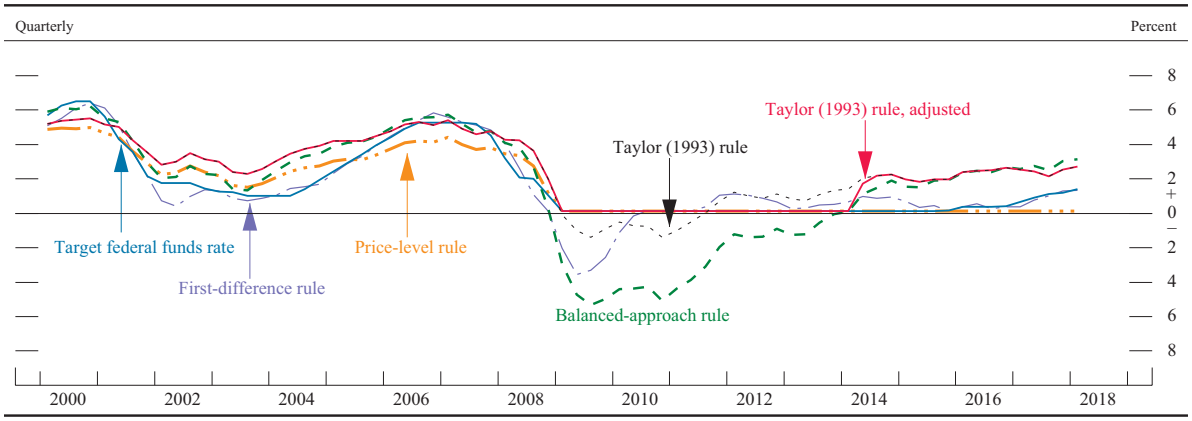
The adjusted Taylor (1993) rule recognizes that the federal funds rate cannot be reduced materially below zero, and that following the prescriptions of the standard Taylor (1993) rule after a recession during which interest rates have fallen to their lower bound may, for a time, not provide enough policy accommodation. To make up for the cumulative shortfall in accommodation (Z_t), the adjusted rule prescribes only a gradual return of the policy rate to the (positive) levels prescribed by the standard Taylor (1993) rule after the economy begins to recover. The particular price-level rule specified in figure A also recognizes that the federal funds rate cannot be reduced materially below zero. If inflation runs below the 2 percent objective during periods when the rule prescribes setting the federal funds rate well below zero, the price-level rule will, over time, provide accommodation to make up for the past inflation shortfall.

The U.S. economy is complex, and the monetary policy rules shown in figure A do not capture many elements that are relevant to the conduct of monetary policy. Moreover, as shown in figure B, different monetary policy rules often offer quite different prescriptions for the federal funds rate.[5] In practice, there is no unique criterion for favoring one rule over another. In recent years, almost all of the policy rules

(continued)

5. These prescriptions are calculated using (1) published data for inflation and the unemployment rate and (2) survey-based estimates of the longer-run value of the neutral real interest rate and the longer-run value of the unemployment rate.

B. Historical federal funds rate prescriptions from simple policy rules



NOTE: The rules use historical values of inflation, the federal funds rate, and the unemployment rate. Inflation is measured as the 4-quarter percent change in the price index for personal consumption expenditures (PCE) excluding food and energy. Quarterly projections of long-run values for the federal funds rate and the unemployment rate are derived through interpolations of biannual projections from Blue Chip Economic Indicators. The long-run value for inflation is taken as 2 percent. The target value of the price level is the average level of the price index for PCE excluding food and energy in 1998 extrapolated at 2 percent per year.

SOURCE: Federal Reserve Bank of Philadelphia; Wolters Kluwer, Blue Chip Economic Indicators; Federal Reserve Board staff estimates.

shown have called for rising values of the federal funds rate, but the pace of tightening that the rules prescribe has varied widely.

Uncertainty about the neutral interest rate in the longer run

The Taylor (1993), balanced-approach, adjusted Taylor (1993), and price-level rules provide prescriptions for the *level* of the federal funds rate; all require an estimate of the neutral real interest rate in the longer run (r_t^{LR})—that is, the level of the real federal funds rate that is expected to be consistent, in the longer run, with maximum employment and stable inflation.[6] The neutral real interest rate in the longer run is determined by structural features of the economy and is not observable. In addition, its value may vary over time because of fluctuations in trend productivity growth, changing demographics, and other shifts in the structure of the economy. As a result, estimates of the neutral real interest rate in the longer run made today may differ substantially from estimates made later.

Academic studies have estimated the longer-run value of the neutral real interest rate using statistical techniques to capture the variations among inflation, interest rates, real gross domestic product, unemployment, and other data series. The range of estimates is wide but suggests that the neutral real rate has declined since the turn of the century (figure C).[7] There is substantial statistical uncertainty surrounding each estimate of the longer-run value of the neutral real rate, as evidenced by the width of the 95 percent

(continued on next page)

6. The first-difference rule shown in figure A does not require an estimate of the neutral real interest rate in the longer run. However, this rule has its own shortcomings. For example, research suggests that this sort of rule will result in greater volatility in employment and inflation relative to what would be obtained under the Taylor (1993) and balanced-approach rules unless the estimates of the neutral real federal funds rate in the longer run and the rate of unemployment in the longer run that are included in those rules are sufficiently far from their true values.

7. The range of estimates is computed using published values or values computed using the methodology from the following studies: Marco Del Negro, Domenico Giannone, Marc P. Giannoni, and Andrea Tambalotti (2017), "Safety, Liquidity, and the Natural Rate of Interest," *Brookings Papers on Economic Activity*, Spring, pp. 235–94, https://www.brookings.edu/wp-content/uploads/2017/08/delnegrotextsp17bpea.pdf; Kathryn Holston, Thomas Laubach, and John C. Williams (2017), "Measuring the Natural Rate of Interest: International Trends and Determinants," *Journal of International Economics*, supp. 1, vol. 108 (May), pp. S59–75; Benjamin K. Johannsen and Elmar Mertens (2016), "The Expected Real Interest Rate in the Long Run: Time Series Evidence with the Effective Lower Bound," FEDS Notes (Washington: Board of Governors

Monetary Policy Rules *(continued)*

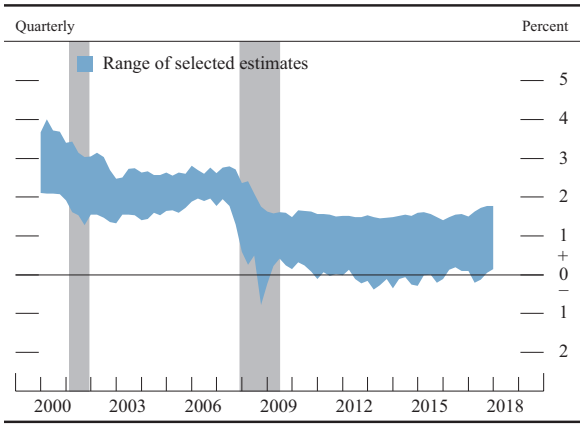
uncertainty bands for the estimated values in the first quarter of 2018 (figure D).

The longer-run normal level of the federal funds rate under appropriate monetary policy—equal to the sum of the neutral real interest rate in the longer run and the FOMC's 2 percent inflation objective—is one benchmark for evaluating the current stance of monetary policy. Uncertainty about the longer-run value of the neutral real interest rate leads to uncertainty about how far the current federal funds rate is from its longer-run normal level. For the Taylor (1993), balanced-approach, adjusted Taylor (1993), and price-level rules, different estimates of the neutral real interest rate in the longer run translate one-for-one to differences in the prescribed setting of the federal funds rate. As a result, the substantial statistical uncertainty accompanying estimates of the neutral rate in the longer run implies substantial uncertainty surrounding the prescriptions of each policy rule. Following the prescriptions of a policy rule with an incorrect value of the neutral rate could lead to poor economic outcomes.

If the longer-run value of the neutral real interest rate is currently at the low end of the range of estimates, then monetary policy is more likely to be constrained by the lower bound on nominal interest rates in the future. Historically, the FOMC has cut the federal funds rate by 5 percentage points, on average, during downturns in the economy. Cutting the federal funds rate by this much in response to a future economic downturn may not be feasible if the neutral federal funds rate is as low as most of the estimates suggest.

(continued)

C. Range of selected estimates for the neutral real federal funds rate in the longer run



NOTE: The shaded bars indicate periods of business recession as defined by the National Bureau of Economic Research.

SOURCE: Federal Reserve Board staff calculations, along with references listed in box note 7.

of the Federal Reserve System, February 9), https://www.federalreserve.gov/econresdata/notes/feds-notes/2016/the-expected-real-interest-rate-in-the-long-run-time-series-evidence-with-the-effective-lower-bound-20160209.html; Michael T. Kiley (2015), "What Can the Data Tell Us about the Equilibrium Real Interest Rate?" Finance and Economics Discussion Series 2015-77 (Washington: Board of Governors of the Federal Reserve System, September), http://dx.doi.org/10.17016/FEDS.2015.077; Thomas Laubach and John C. Williams (2015), "Measuring the Natural Rate of Interest Redux," Hutchins Center Working Paper 15 (Washington: Brookings Institution, November), https://www.brookings.edu/wp-content/uploads/2016/07/WP15-Laubach-Williams-natural-interest-rate-redux.pdf; Kurt F. Lewis 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://doi.org/10.17016/FEDS.2017.059; Thomas A. Lubik and Christian Matthes (2015), "Calculating the Natural Rate of Interest: A Comparison of Two Alternative Approaches," Economic Brief 15-10 (Richmond, Va.: Federal Reserve Bank of Richmond, October), https://www.richmondfed.org/-/media/richmondfedorg/publications/research/economic_brief/2015/pdf/eb_15-10.pdf.

D. Point estimates and uncertainty bands for neutral real rate in the longer run as of 2018:Q1

Study	Point estimate	95 percent uncertainty band
Del Negro and others (2017)	1.3	(.7, 2.1)
Holston and others (2017)	.6	(-2.5, 3.7)
Johannsen and Mertens (2016)	.7	(-1.3, 2.5)
Kiley (2015)	.4	(-.6, 1.6)
Laubach and Williams (2015)	.1	(-5.4, 5.6)
Lewis and Vazquez-Grande (2017)	1.8	(.5, 3.1)
Lubik and Matthes (2015)	1.0	(-2.3, 4.5)

Source: Federal Reserve Board staff calculations, along with references listed in box note 7.

As a result, it may not be feasible to provide the levels of accommodation prescribed by many policy rules, potentially leading to elevated unemployment and inflation averaging below the Committee's 2 percent objective.[8] Rules that try to offset the cumulative shortfall of accommodation posed by the lower bound on nominal interest rates, such as the adjusted Taylor (1993) rule, or make up the cumulative shortfall in the level of prices, such as the price-level rule, are intended to mitigate the effects of the lower bound on the economy by providing more accommodation than prescribed by rules that do not have these makeup features.[9]

In the years following the financial crisis, with the federal funds rate close to zero, the FOMC recognized that it would have limited scope to respond to an unexpected weakening in the economy by lowering short-term interest rates. This risk has, in recent years, provided a sound rationale for following a more gradual path of rate increases than that prescribed by some policy rules. In these circumstances, increasing the policy rate quickly in order to have room to cut rates during an economic downturn could be counterproductive because it might make a downturn more likely to happen.

8. For further discussion of these issues, see Michael T. Kiley and John M. Roberts (2017), "Monetary Policy in a Low Interest Rate World," *Brookings Papers on Economic Activity,* Spring, pp. 317–72, https://www.brookings.edu/wp-content/uploads/2017/08/kileytextsp17bpea.pdf.

9. Economists have found that a "makeup" policy can be the best response in theory when the policy interest rate is constrained at zero. See Ben S. Bernanke (2017), "Monetary Policy in a New Era," paper presented at "Rethinking Macroeconomic Policy," a conference held at the Peterson Institute for International Economics, Washington, October 12–13, https://piie.com/system/files/documents/bernanke20171012paper.pdf; and Michael Woodford (1999), "Commentary: How Should Monetary Policy Be Conducted in an Era of Price Stability?" in *New Challenges for Monetary Policy*, proceedings of a symposium sponsored by the Federal Reserve Bank of Kansas City (Kansas City, Mo.: Federal Reserve Bank of Kansas City) pp. 277–316, https://www.kansascityfed.org/publications/research/escp/symposiums/escp-1999.

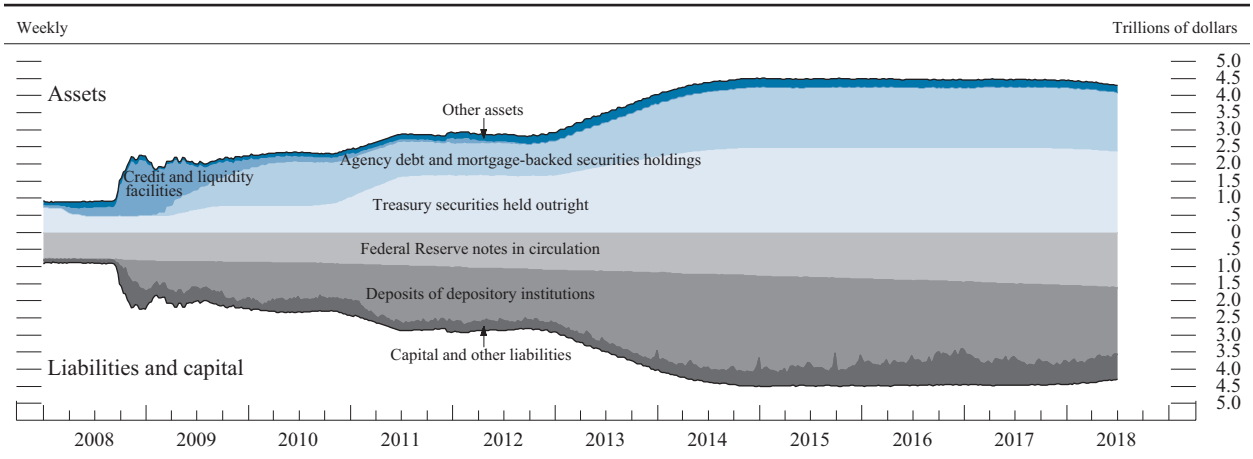
In the first quarter, the Open Market Desk at the Federal Reserve Bank of New York, as directed by the Committee, reinvested principal payments from the Federal Reserve's holdings of Treasury securities maturing during each calendar month in excess of $12 billion. The Desk also reinvested in agency mortgage-backed securities (MBS) the amount of principal payments from the Federal Reserve's holdings of agency debt and agency MBS received during each calendar month in excess of $8 billion. Over the second quarter, payments of principal from maturing Treasury securities and from the Federal Reserve's holdings of agency debt and agency MBS were reinvested to the extent that they exceeded $18 billion and $12 billion, respectively. At its meeting in June, the FOMC increased the cap for Treasury securities to $24 billion and the cap for agency debt and agency MBS to $16 billion, both effective in July. The Committee has indicated that the caps for Treasury securities and for agency securities will increase to $30 billion and $20 billion per month, respectively, in October. These terminal caps will remain in place until the Committee judges that the Federal Reserve is holding no more securities than necessary to implement monetary policy efficiently and effectively.

The implementation of the program has proceeded smoothly without causing disruptive price movements in Treasury and MBS markets. As the caps have increased gradually and predictably, the Federal Reserve's total assets have started to decrease, from about $4.4 trillion last October to about $4.3 trillion at present, with holdings of Treasury securities at approximately $2.4 trillion and holdings of agency and agency MBS at approximately $1.7 trillion (figure 46).

The Federal Reserve's implementation of monetary policy has continued smoothly

To implement the FOMC's decisions to raise the target range for the federal funds rate in March and June of 2018, the Federal Reserve increased the rate of interest on excess reserves (IOER) along with the interest rate offered on overnight reverse repurchase agreements (ON RRPs). Specifically, the Federal Reserve increased the IOER rate to 1¾ percent and the ON RRP offering rate to 1½ percent in March. In June, the Federal Reserve increased the IOER rate to 1.95 percent—5 basis points below the top of the target range—and the ON RRP offering rate to 1¾ percent. In addition, the Board of Governors approved

46. Federal Reserve assets and liabilities



NOTE: "Credit and liquidity facilities" consists of primary, secondary, and seasonal credit; term auction credit; central bank liquidity swaps; support for Maiden Lane, Bear Stearns, and AIG; and other credit facilities, including the Primary Dealer Credit Facility, the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility, the Commercial Paper Funding Facility, and the Term Asset-Backed Securities Loan Facility. "Other assets" includes unamortized premiums and discounts on securities held outright. "Capital and other liabilities" includes reverse repurchase agreements, the U.S. Treasury General Account, and the U.S. Treasury Supplementary Financing Account. The data extend through July 4, 2018.

SOURCE: Federal Reserve Board, Statistical Release H.4.1, "Factors Affecting Reserve Balances."

a ¼ percentage point increase in the discount rate (the primary credit rate) in both March and June. Yields on a broad set of money market instruments moved higher, roughly in line with the federal funds rate, in response to the FOMC's policy decisions in March and June. Usage of the ON RRP facility has declined, on net, since the turn of the year, reflecting relatively attractive yields on alternative investments.

The effective federal funds rate moved up toward the IOER rate in the months before the June FOMC meeting and, therefore, was trading near the top of the target range. At its June meeting, the Committee made a small technical adjustment in its approach to implementing monetary policy by setting the IOER rate modestly below the top of the target range for the federal funds rate. This adjustment resulted in the effective federal funds rate running closer to the middle of the target range since mid-June. In an environment of large reserve balances, the IOER rate has been an essential policy tool for keeping the federal funds rate within the target range set by the FOMC (see the box "Interest on Reserves and Its Importance for Monetary Policy").

Interest on Reserves and Its Importance for Monetary Policy

The financial crisis that began in 2007 triggered the deepest recession in the United States since the Great Depression. In response, the Federal Open Market Committee (FOMC) cut its target for the federal funds rate to nearly zero by late 2008. Other short-term interest rates declined roughly in line with the federal funds rate. Additional monetary stimulus was necessary to address the significant economic downturn and the associated downward pressure on inflation. The FOMC undertook other monetary policy actions to put downward pressure on longer-term interest rates, including large-scale purchases of longer-term Treasury securities and agency-guaranteed mortgage-backed securities.

These policy actions made financial conditions more accommodative and helped spur an economic recovery that has become a long-lasting economic expansion. The unemployment rate has declined from 10 percent to less than 4 percent over the course of the recovery and expansion, and inflation has been low and fairly stable. The FOMC's actions were critical to fostering progress toward maximum employment and stable prices—the statutory goals for the conduct of monetary policy established by the Congress.

The Federal Reserve's large-scale asset purchases had the side effect of generating a sizable increase in the supply of reserve balances, which are the balances that banks maintain in their accounts at the Federal Reserve.[1] From the onset of the financial crisis in August 2007 until October 2014, when the FOMC ended the last of its asset purchase programs, the supply of reserve balances rose from about $15 billion to about $2½ trillion.[2] Reserve balances rose well above the level necessary to meet reserve requirements, thus swelling the quantity of excess reserves held by the banking system.

As the economic expansion continued and unemployment declined—and with labor market conditions projected to continue improving—the FOMC decided that it would scale back policy support by increasing the level of short-term interest rates and by reducing the Federal Reserve's securities holdings. To that end, the Committee began gradually raising its target range for the federal funds rate in December 2015. Later, in October 2017, it began gradually reducing holdings of Treasury and agency securities; this gradual reduction results in a decline in the supply of reserve balances. The FOMC judged that removing monetary policy stimulus through this mix of first raising the federal funds rate and then beginning to shrink the balance sheet would best contribute to achieving and maintaining maximum employment and price stability without causing dislocations in financial markets or institutions that could put the economic expansion at risk.

Interest on reserves—the payment of interest on balances held by banks in their accounts at the Federal Reserve—has been an essential policy tool that has permitted the FOMC to achieve a gradual increase in the federal funds rate in combination with a gradual reduction in the Fed's securities holdings and in the supply of reserve balances.[3] Interest on reserves is a monetary policy tool used by all of the world's major central banks.

Interest on reserves is the principal tool the FOMC uses to anchor the federal funds rate in the target range. The federal funds rate, in turn, establishes an important benchmark for the borrowing and lending decisions in the banking sector (figure A). When the Federal Reserve increases the target range for the federal funds rate and the interest rate it pays on reserve balances, banks bid up the rates in short-term funding markets to levels consistent with those increases; rates in other short-term funding markets—such as commercial paper rates, Treasury bill rates, and rates on repurchase

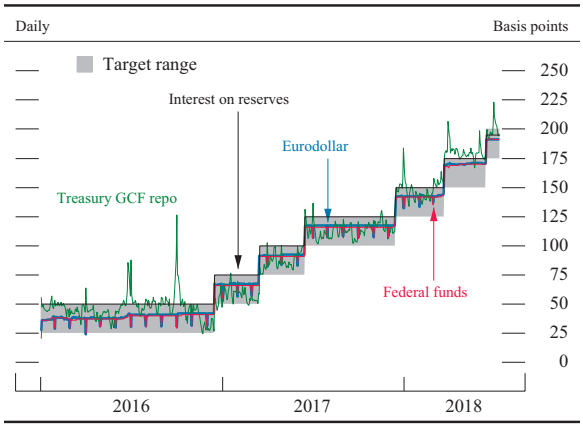
(continued)

1. All depository institutions (commercial banks, savings banks, thrift institutions, credit unions, and most U.S. branches and agencies of foreign banks) that maintain reserve balances are eligible to earn interest on those balances. We refer to these institutions as "banks."

2. For a detailed discussion of how the changes in Federal Reserve securities holdings affect the Federal Reserve's balance sheet and sectors of the U.S. economy, see Jane Ihrig, Lawrence Mize, and Gretchen C. Weinbach (2017), "How Does the Fed Adjust Its Securities Holdings and Who Is Affected?" Finance and Economics Discussion Series 2017-099 (Washington: Board of Governors of the Federal Reserve System, September), https://www.federalreserve.gov/econres/feds/files/2017099pap.pdf.

3. The Financial Services Regulatory Relief Act of 2006 authorized the Federal Reserve Banks to pay interest on balances held by or on behalf of depository institutions at Federal Reserve Banks, subject to regulations of the Board of Governors, effective October 1, 2011. The effective date of this authority was changed to October 1, 2008, by the Emergency Economic Stabilization Act of 2008. The Congress authorized the payment of interest on reserves to help minimize the incentives for costly reserve avoidance schemes and to provide the Federal Reserve with a policy tool that could be useful for monetary policy implementation more broadly.

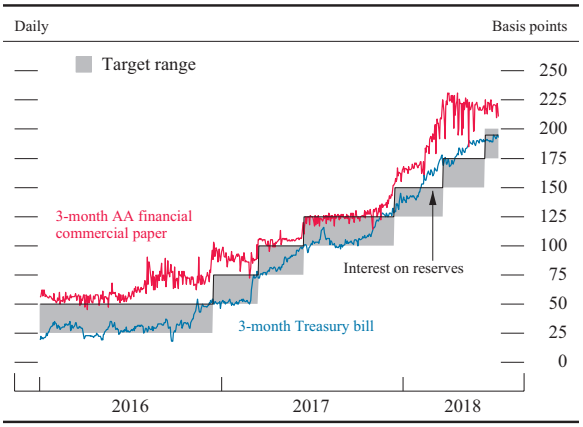
A. Overnight money market rates



NOTE: The upper bound of the target range is the interest on reserves rate until June 13, 2018, after which it is 5 basis points higher. The federal funds and Eurodollar rates closely track one another over the period shown. GCF is General Collateral Finance.

SOURCE: For Treasury GCF repo, DTCC Solutions LLC, an affiliate of The Depository Trust & Clearing Corporation; for federal funds, Federal Reserve Bank of New York; for Eurodollar, Bloomberg; for interest on reserves and target range, Federal Reserve Board.

B. Term money market rates



NOTE: The upper bound of the target range is the interest on reserves rate until June 13, 2018, after which it is 5 basis points higher.

SOURCE: For U.S. Treasury bill, Department of the Treasury; for AA financial commercial paper, interest on reserves, and target range, Federal Reserve Board.

agreements—all tend to move higher as well (figure B). This increase in the general level of short-term rates, together with the expected future path of short-term rates, then influences the level of other financial asset prices and overall financial conditions in the economy. Thus, changing the interest rate on reserves has proven to be an effective tool for transmitting changes in the FOMC's target range for the federal funds rate to other interest rates in the economy.

The rate of interest the Federal Reserve pays on banks' reserve balances is far lower than the rate that banks can earn on alternative safe assets, including most U.S. government or agency securities, municipal securities, and loans to businesses and consumers.[4] Indeed, the bank prime rate—the base rate that banks use for loans to many of their customers—is currently around 300 basis points above the level of interest on reserves. Banks continue to find lending attractive, and bank lending has been expanding at a solid pace since 2012. Households have begun to see interest rates on retail deposits rising as well. Moreover, the configuration of interest rates implies that the return the Federal Reserve earns on its holdings of securities is higher than the interest it pays on reserve balances. Each year, the Federal Reserve remits its earnings—that is, its income net of expenses—to the Treasury Department; in 2017, remittances totaled more than $80 billion.

Had the Federal Reserve not been able to pay interest on reserve balances at the same time that excess reserves in the banking system were large, it would not have been able to gradually raise the federal funds rate and other short-term interest rates while reserve balances were abundant; the FOMC would have had to take a different approach to scaling back monetary policy accommodation. This approach likely would have involved a rapid and sizable reduction in the Federal Reserve's securities holdings in order to put sufficient upward pressure on interest rates.

(continued on next page)

4. The Congress's authorization allows the Federal Reserve to pay interest on deposits maintained by depository institutions at a rate not to exceed the "general level of short-term interest rates." The Federal Reserve Board's Regulation D defines short-term interest rates for the purposes of this authority as "rates on obligations with maturities of no more than one year, such as the primary credit rate and rates on term federal funds, term repurchase agreements, commercial paper, term Eurodollar deposits, and other similar instruments." The rate of interest on reserves has been well within a range of short-term interest rates as defined in Board regulations. For current rates on a number of short-term money market instruments, see Board of Governors of the Federal Reserve System, Statistical Release H.15, "Selected Interest Rates," www.federalreserve.gov/releases/h15/current.

Interest on Reserves *(continued)*

Getting the pace of asset sales just right for achieving the Federal Reserve's objectives would have been extremely challenging. Such an approach to removing accommodation would have run the risk of disrupting financial markets, with adverse effects on the economy.

Indeed, as observed during the early summer of 2013, market reactions to changes in the outlook for the Federal Reserve's holdings of long-term securities can have outsized effects in bond markets. At that time, FOMC communications that pointed to the eventual cessation of asset purchases seemed to alarm investors and reportedly contributed to a rise in longer-term rates of 150 basis points over just a few months. That rise in rates quickly pushed up the cost of mortgage credit and rates on other forms of borrowing for households and businesses.

Thus, Federal Reserve policymakers judged that the best strategy for adjusting the stance of monetary policy would be gradual increases in the target range for the federal funds rate, supplemented later on by gradual reductions in the Federal Reserve's securities holdings. The ongoing, gradual reduction in the Federal Reserve's securities holdings that the FOMC set in motion in 2017 will bring the level of reserve balances down substantially over the next few years. The size of reserves that banks eventually want to hold will reflect balances held to meet reserve requirements and payments needs as well as balances held to address regulatory and structural changes in the banking system since the financial crisis.[5] Although the level of reserve balances that banks will eventually want to hold is not yet known, that level is likely to be much lower than it is today, though appreciably higher than it was before the crisis.[6] In addition, the amount of U.S. currency—Federal Reserve notes—that people in the United States and elsewhere want to hold has increased substantially since the crisis. If banks want to hold more reserve balances and the public wants to hold more U.S. currency than before the crisis, the Federal Reserve will need to supply the reserves and currency, so the Federal Reserve's securities holdings also will have to be larger than before the financial crisis.[7]

Interest on reserves will remain an important policy tool for keeping the federal funds rate within the target range set by the FOMC and thus managing the level of short-term interest rates, even as the ongoing reduction in the Federal Reserve's securities holdings generates a gradual decline in the amount of reserve balances on which the Federal Reserve pays interest. In June 2018, the Federal Reserve made a small technical adjustment to de-link the rate of interest on reserves from the top of the Committee's target range for the federal funds rate. At the June 2018 FOMC meeting, the Committee increased the federal funds target range by 25 basis points, while the rate of interest on reserve balances was increased by 20 basis points. This change is intended to ensure that the federal funds rate continues to trade well within the Committee's target range. The spread between the effective federal funds rate and the rate of interest on reserves could continue to narrow over time as the Federal Reserve's securities holdings and the supply of reserve balances gradually decline.

5. For a discussion of the changes in the banking system since the financial crisis and their potential effects on the demand for reserve balances, see Randal K. Quarles (2018), "Liquidity Regulation and the Size of the Fed's Balance Sheet," speech delivered at "Currencies, Capital, and Central Bank Balances: A Policy Conference," Hoover Institution, Stanford University, Stanford, Calif., May 4, https://www.federalreserve.gov/newsevents/speech/quarles20180504a.htm.

6. Uncertainty about the eventual level of reserve balances is another reason that the FOMC has been reducing the Federal Reserve's holdings of securities, and the supply of reserve balances, gradually.

7. Currency grows roughly in line with nominal gross domestic product. In December 2008, currency in circulation was around $850 billion, compared with $1.6 trillion at the end of June 2018.

Part 3
Summary of Economic Projections

The following material appeared as an addendum to the minutes of the June 12–13, 2018, meeting of the Federal Open Market Committee.

In conjunction with the Federal Open Market Committee (FOMC) meeting held on June 12–13, 2018, meeting participants submitted their projections of the most likely outcomes for real gross domestic product (GDP) growth, the unemployment rate, and inflation for each year from 2018 to 2020 and over the longer run.[17] Each participant's projections were based on information available at the time of the meeting, together with his or her assessment of appropriate monetary policy—including a path for the federal funds rate and its longer-run value—and assumptions about other factors likely to affect economic outcomes. The longer-run projections represent each participant's assessment of the value to which each variable would be expected to converge, over time, under appropriate monetary policy and in the absence of further shocks to the economy.[18] "Appropriate monetary policy" is defined as the future path of policy that each participant deems most likely to foster outcomes for economic activity and inflation that best satisfy his or her individual interpretation of the statutory mandate to promote maximum employment and price stability.

All participants who submitted longer-run projections expected that, in 2018, real GDP would expand at a pace exceeding their individual estimates of the longer-run growth rate of real GDP. Participants generally saw real GDP growth moderating somewhat in each of the following two years but remaining above their estimates of the longer-run rate.

All participants who submitted longer-run projections expected that, throughout the projection period, the unemployment rate would run below their estimates of its longer-run level. All participants projected that inflation, as measured by the four-quarter percentage change in the price index for personal consumption expenditures (PCE), would run at or slightly above the Committee's 2 percent objective by the end of 2018 and remain roughly flat through 2020. Compared with the Summary of Economic Projections (SEP) from March, most participants slightly marked up their projections of real GDP growth in 2018 and somewhat lowered their projections for the unemployment rate from 2018 through 2020; participants indicated that these revisions reflected, in large part, strength in incoming data. A large majority of participants made slight upward adjustments to their projections of inflation in 2018. Table 1 and figure 1 provide summary statistics for the projections.

As shown in figure 2, participants generally continued to expect that the evolution of the economy relative to their objectives of maximum employment and 2 percent inflation would likely warrant further gradual increases in the federal funds rate. The central tendencies of participants' projections of the federal funds rate for both 2018 and 2019 were roughly unchanged, but the medians for both years were 25 basis points higher relative to March. Nearly all participants who submitted longer-run projections expected that, during part of the projection period, evolving economic conditions would make it appropriate for the federal funds rate to move somewhat above their estimates of its longer-run level.

17. Three members of the Board of Governors were in office at the time of the June 2018 meeting.

18. One participant did not submit longer-run projections for real GDP growth, the unemployment rate, or the federal funds rate.

Table 1. Economic projections of Federal Reserve Board members and Federal Reserve Bank presidents, under their individual assessments of projected appropriate monetary policy, June 2018

Percent

Variable	Median[1]				Central tendency[2]				Range[3]			
	2018	2019	2020	Longer run	2018	2019	2020	Longer run	2018	2019	2020	Longer run
Change in real GDP	2.8	2.4	2.0	1.8	2.7–3.0	2.2–2.6	1.8–2.0	1.8–2.0	2.5–3.0	2.1–2.7	1.5–2.2	1.7–2.1
March projection	2.7	2.4	2.0	1.8	2.6–3.0	2.2–2.6	1.8–2.1	1.8–2.0	2.5–3.0	2.0–2.8	1.5–2.3	1.7–2.2
Unemployment rate	3.6	3.5	3.5	4.5	3.6–3.7	3.4–3.5	3.4–3.7	4.3–4.6	3.5–3.8	3.3–3.8	3.3–4.0	4.1–4.7
March projection	3.8	3.6	3.6	4.5	3.6–3.8	3.4–3.7	3.5–3.8	4.3–4.7	3.6–4.0	3.3–4.2	3.3–4.4	4.2–4.8
PCE inflation	2.1	2.1	2.1	2.0	2.0–2.1	2.0–2.2	2.1–2.2	2.0	2.0–2.2	1.9–2.3	2.0–2.3	2.0
March projection	1.9	2.0	2.1	2.0	1.8–2.0	2.0–2.2	2.1–2.2	2.0	1.8–2.1	1.9–2.3	2.0–2.3	2.0
Core PCE inflation[4]	2.0	2.1	2.1		1.9–2.0	2.0–2.2	2.1–2.2		1.9–2.1	2.0–2.3	2.0–2.3	
March projection	1.9	2.1	2.1		1.8–2.0	2.0–2.2	2.1–2.2		1.8–2.1	1.9–2.3	2.0–2.3	
Memo: Projected appropriate policy path												
Federal funds rate	2.4	3.1	3.4	2.9	2.1–2.4	2.9–3.4	3.1–3.6	2.8–3.0	1.9–2.6	1.9–3.6	1.9–4.1	2.3–3.5
March projection	2.1	2.9	3.4	2.9	2.1–2.4	2.8–3.4	3.1–3.6	2.8–3.0	1.6–2.6	1.6–3.9	1.6–4.9	2.3–3.5

NOTE: Projections of change in real gross domestic product (GDP) and projections for both measures of inflation are percent changes from the fourth quarter of the previous year to the fourth quarter of the year indicated. PCE inflation and core PCE inflation are the percentage rates of change in, respectively, the price index for personal consumption expenditures (PCE) and the price index for PCE excluding food and energy. Projections for the unemployment rate are for the average civilian unemployment rate in the fourth quarter of the year indicated. Each participant's projections are based on his or her assessment of appropriate monetary policy. Longer-run projections represent each participant's assessment of the rate to which each variable would be expected to converge under appropriate monetary policy and in the absence of further shocks to the economy. The projections for the federal funds rate are the value of the midpoint of the projected appropriate target range for the federal funds rate or the projected appropriate target level for the federal funds rate at the end of the specified calendar year or over the longer run. The March projections were made in conjunction with the meeting of the Federal Open Market Committee on March 20–21, 2018. One participant did not submit longer-run projections for the change in real GDP, the unemployment rate, or the federal funds rate in conjunction with the March 20–21, 2018, meeting, and one participant did not submit such projections in conjunction with the June 12–13, 2018, meeting.

1. For each period, the median is the middle projection when the projections are arranged from lowest to highest. When the number of projections is even, the median is the average of the two middle projections.

2. The central tendency excludes the three highest and three lowest projections for each variable in each year.

3. The range for a variable in a given year includes all participants' projections, from lowest to highest, for that variable in that year.

4. Longer-run projections for core PCE inflation are not collected.

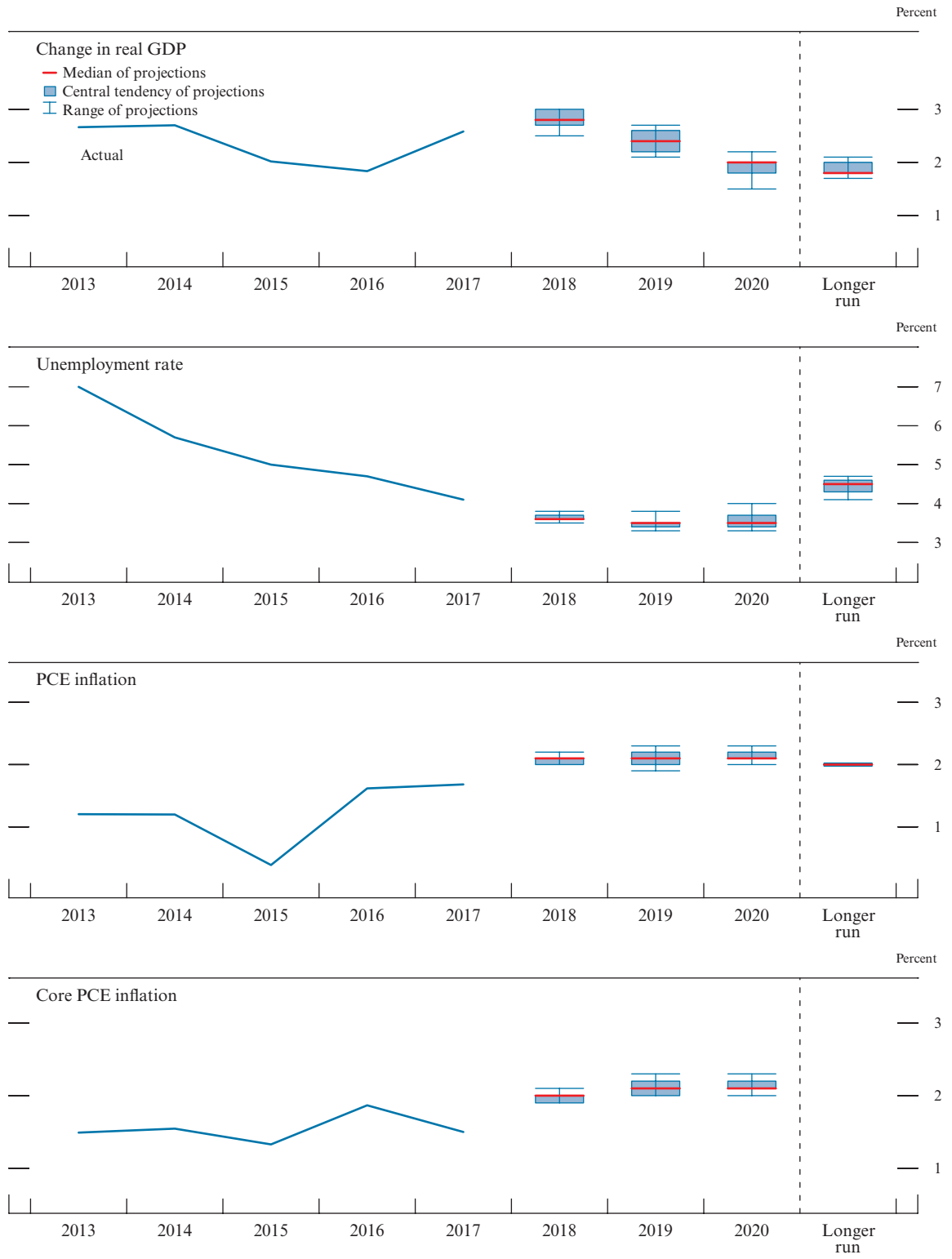
In general, participants continued to view the uncertainty attached to their economic projections as broadly similar to the average of the past 20 years. As in March, most participants judged the risks around their projections for real GDP growth, the unemployment rate, and inflation to be broadly balanced.

The Outlook for Economic Activity

The median of participants' projections for the growth rate of real GDP, conditional on their individual assessments of appropriate monetary policy, was 2.8 percent for this year and 2.4 percent for next year. The median was 2.0 percent for 2020, a touch above the median projection of longer-run growth. Most participants continued to cite fiscal policy as a driver of strong economic activity over the next couple of years. Many participants also mentioned accommodative monetary policy and financial conditions, strength in the global outlook, continued momentum in the labor market, or positive readings on business and consumer sentiment as important factors shaping the economic outlook. Compared with the March SEP, the median of participants' projections for the rate of real GDP growth was 0.1 percentage point higher for this year and unchanged for the next two years.

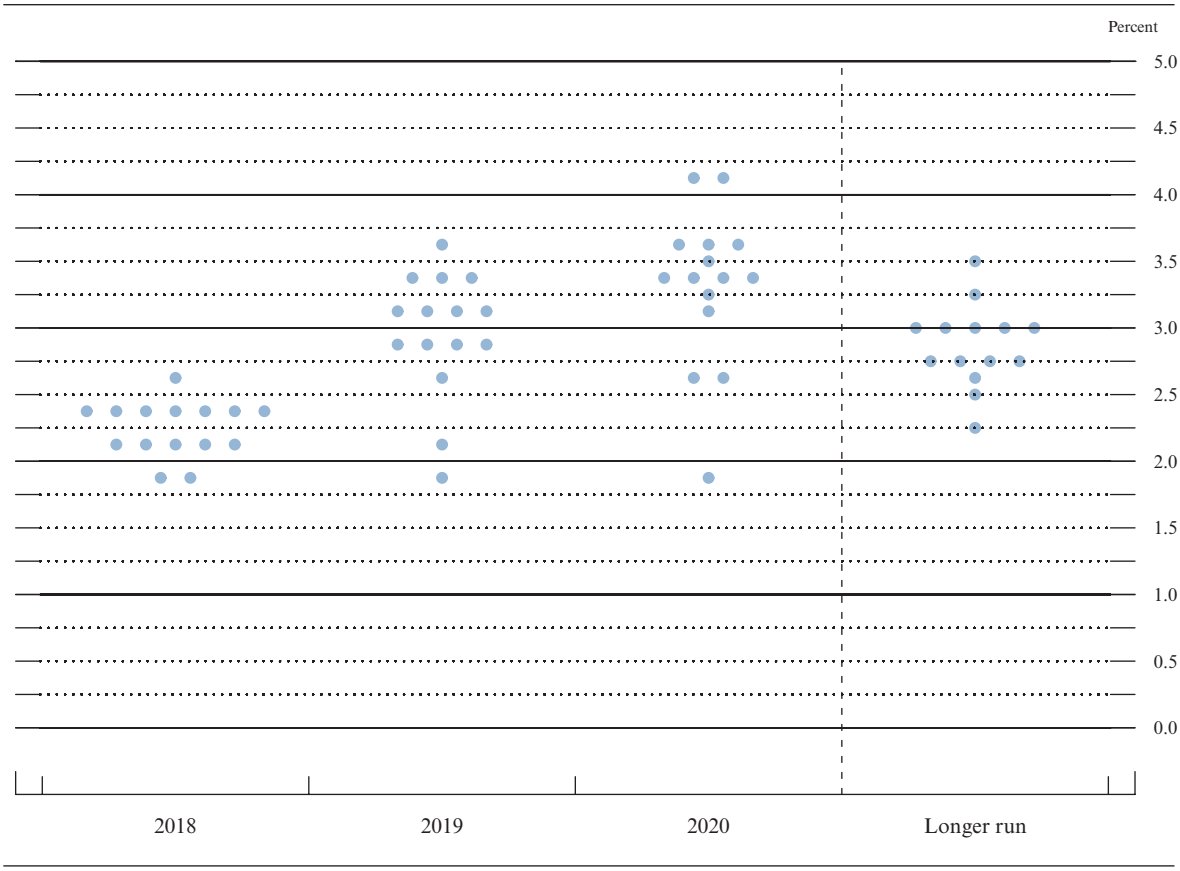
Almost all participants expected the unemployment rate to decline somewhat further over the projection period. The median of participants' projections for the unemployment rate was 3.6 percent for the final quarter of this year and 3.5 percent for the final quarters of 2019 and 2020. The median of participants' estimates of the longer-run unemployment rate was unchanged at 4.5 percent.

Figure 1. Medians, central tendencies, and ranges of economic projections, 2018–20 and over the longer run



NOTE: Definitions of variables and other explanations are in the notes to table 1. The data for the actual values of the variables are annual.

Figure 2. FOMC participants' assessments of appropriate monetary policy: Midpoint of target range or target level for the federal funds rate



NOTE: Each shaded circle indicates the value (rounded to the nearest 1/8 percentage point) of an individual participant's judgment of the midpoint of the appropriate target range for the federal funds rate or the appropriate target level for the federal funds rate at the end of the specified calendar year or over the longer run. One participant did not submit longer-run projections for the federal funds rate.

Figures 3.A and 3.B show the distributions of participants' projections for real GDP growth and the unemployment rate from 2018 to 2020 and over the longer run. The distribution of individual projections for real GDP growth this year shifted up noticeably from that in the March SEP. By contrast, the distributions of projected real GDP growth in 2019 and 2020 and over the longer run were little changed. The distributions of individual projections for the unemployment rate in 2018 to 2020 shifted down relative to the distributions in March, while the downward shift in the distribution of longer-run projections was very modest.

The Outlook for Inflation

The medians of participants' projections for total and core PCE price inflation in 2018 were 2.1 percent and 2.0 percent, respectively, and the median for each measure was 2.1 percent in 2019 and 2020. Compared with the March SEP, the medians of participants' projections for total PCE price inflation for this year and next were revised up slightly. Some participants pointed to incoming data on energy prices as a reason for their upward revisions. The median of participants' forecasts for core PCE price inflation was up a touch for this year and unchanged for subsequent years.

Figures 3.C and 3.D provide information on the distributions of participants' views about the outlook for inflation. The distributions of both total and core PCE price inflation for 2018 shifted to the right relative to the distributions in March. The distributions of projected inflation in 2019, 2020, and over the longer run were roughly unchanged. Participants generally expected each measure to be at or slightly above 2 percent in 2019 and 2020.

Appropriate Monetary Policy

Figure 3.E provides the distribution of participants' judgments regarding the appropriate target—or midpoint of the target range—for the federal funds rate at the end of each year from 2018 to 2020 and over the longer run. The distributions of projected policy rates through 2020 shifted modestly higher, consistent with the revisions to participants' projections of real GDP growth, the unemployment rate, and inflation. As in their March projections, a large majority of participants anticipated that evolving economic conditions would likely warrant the equivalent of a total of either three or four increases of 25 basis points in the target range for the federal funds rate over 2018. There was a slight reduction in the dispersion of participants' views, with no participant regarding the appropriate target at the end of the year to be below 1.88 percent. For each subsequent year, the dispersion of participants' year-end projections was somewhat smaller than that in the March SEP.

The medians of participants' projections of the federal funds rate rose gradually to 2.4 percent at the end of this year, 3.1 percent at the end of 2019, and 3.4 percent at the end of 2020. The median of participants' longer-run estimates, at 2.9 percent, was unchanged relative to the March SEP.

In discussing their projections, many participants continued to express the view that the appropriate trajectory of the federal funds rate over the next few years would likely involve gradual increases. This view was predicated on several factors, including a judgment that a gradual path of policy firming likely would appropriately balance the risks associated with, among other considerations, the possibilities that U.S. fiscal policy could have larger or more persistent positive effects on real activity and that shifts in trade policy or developments abroad could weigh on the expansion. As always, the appropriate path of the federal funds rate would depend on evolving economic conditions and their implications for participants' economic outlooks and assessments of risks.

Uncertainty and Risks

In assessing the path for the federal funds rate that, in their view, is likely to be appropriate, FOMC participants take account of the range of possible economic outcomes, the likelihood of those outcomes, and the potential benefits and costs should they occur. As a reference, table 2 provides measures of forecast uncertainty, based on the forecast errors of various private and government forecasts over the past 20 years, for real GDP growth, the unemployment rate, and total PCE price inflation. Those measures are represented

Table 2. Average historical projection error ranges

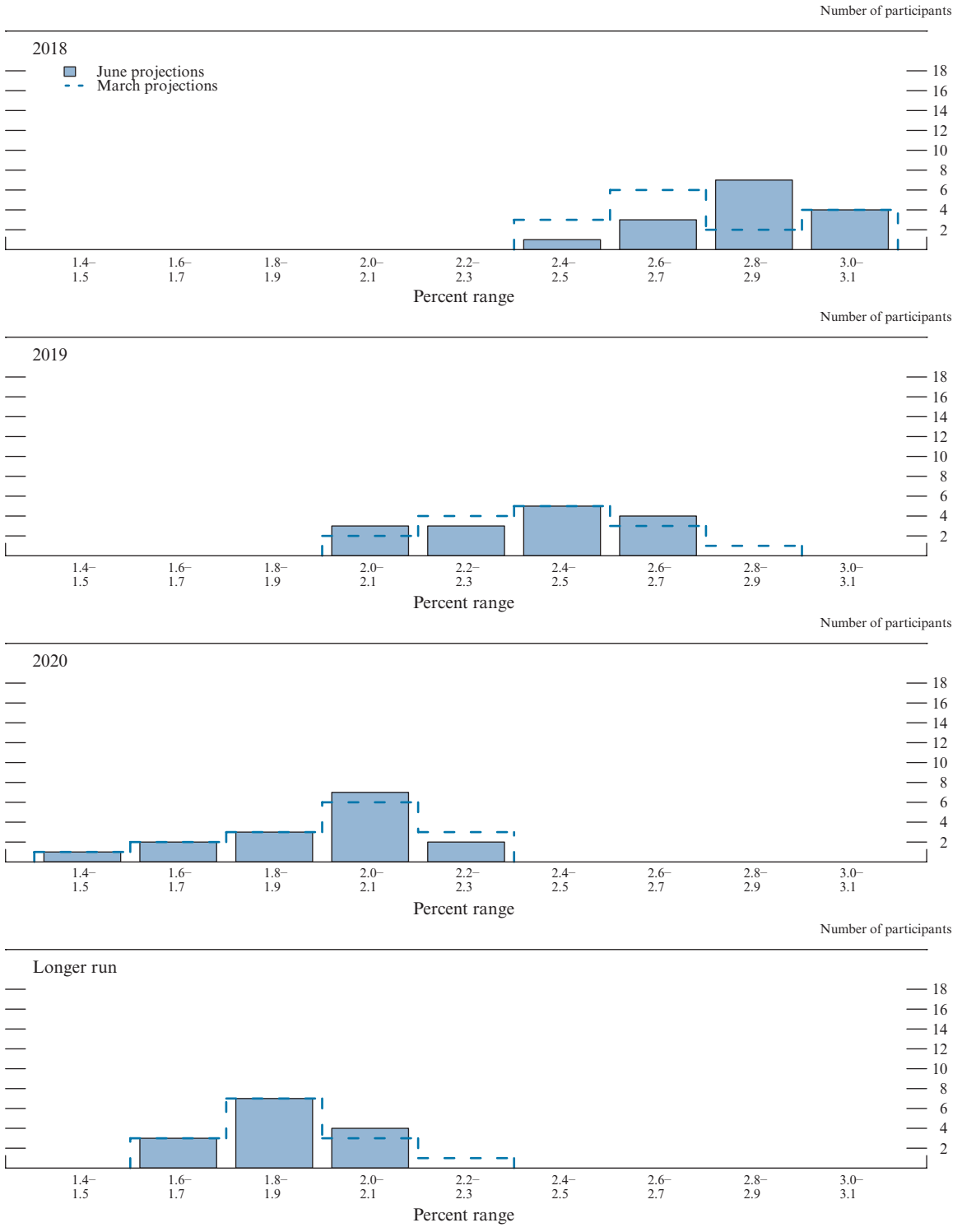
Percentage points

Variable	2018	2019	2020
Change in real GDP[1]	±1.3	±2.0	±2.1
Unemployment rate[1]	±0.4	±1.2	±1.8
Total consumer prices[2]	±0.7	±1.0	±1.0
Short-term interest rates[3]	±0.7	±2.0	±2.2

Note: Error ranges shown are measured as plus or minus the root mean squared error of projections for 1998 through 2017 that were released in the summer by various private and government forecasters. As described in the box "Forecast Uncertainty," under certain assumptions, there is about a 70 percent probability that actual outcomes for real GDP, unemployment, consumer prices, and the federal funds rate will be in ranges implied by the average size of projection errors made in the past. For more information, see David Reifschneider and Peter Tulip (2017), "Gauging the Uncertainty of the Economic Outlook Using Historical Forecasting Errors: The Federal Reserve's Approach," Finance and Economics Discussion Series 2017-020 (Washington: Board of Governors of the Federal Reserve System, February), www.federalreserve.gov/econresdata/feds/2017/files/2017020pap.pdf.

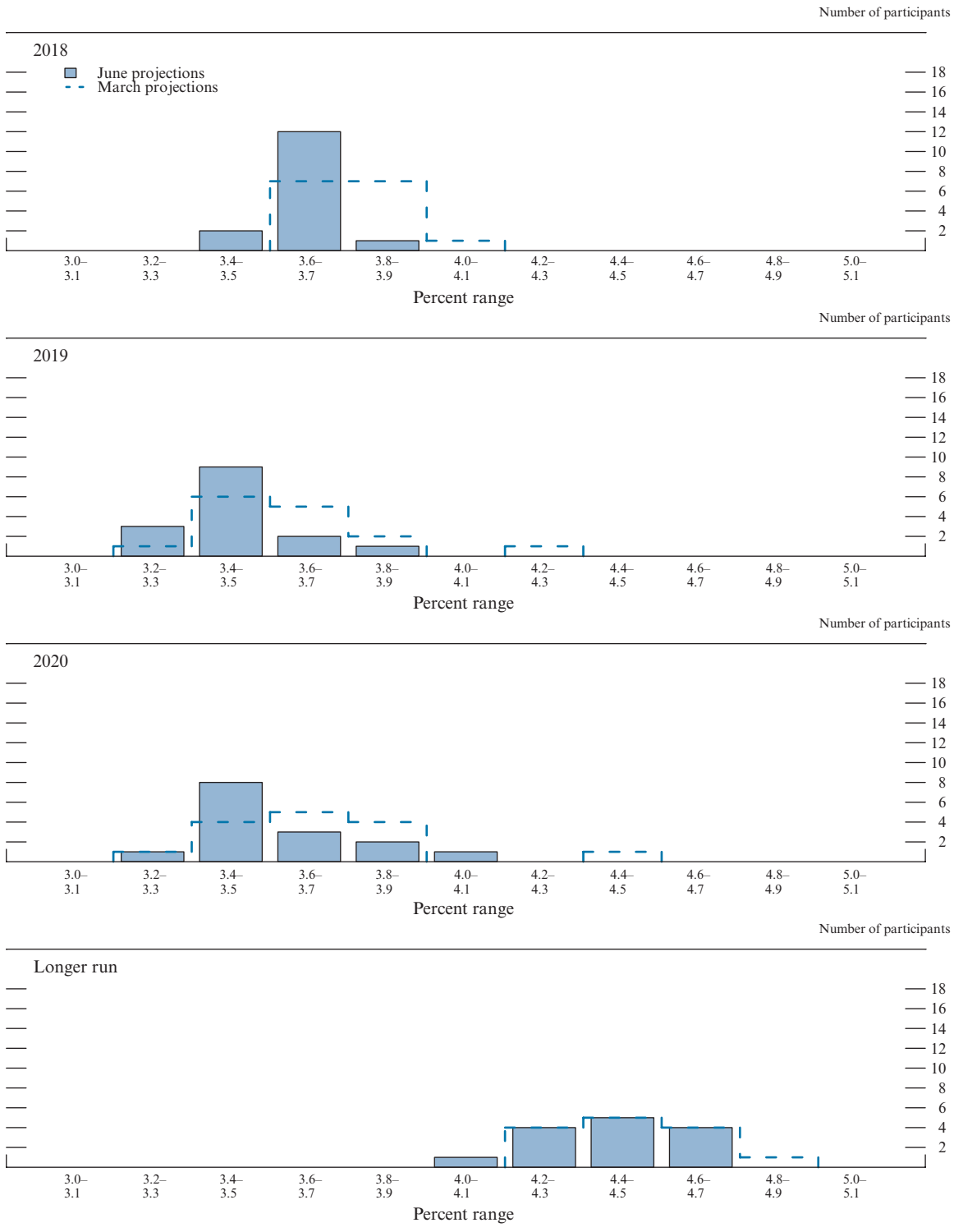
1. Definitions of variables are in the general note to table 1.
2. Measure is the overall consumer price index, the price measure that has been most widely used in government and private economic forecasts. Projections are percent changes on a fourth quarter to fourth quarter basis.
3. For Federal Reserve staff forecasts, measure is the federal funds rate. For other forecasts, measure is the rate on 3-month Treasury bills. Projection errors are calculated using average levels, in percent, in the fourth quarter.

Figure 3.A. Distribution of participants' projections for the change in real GDP, 2018–20 and over the longer run



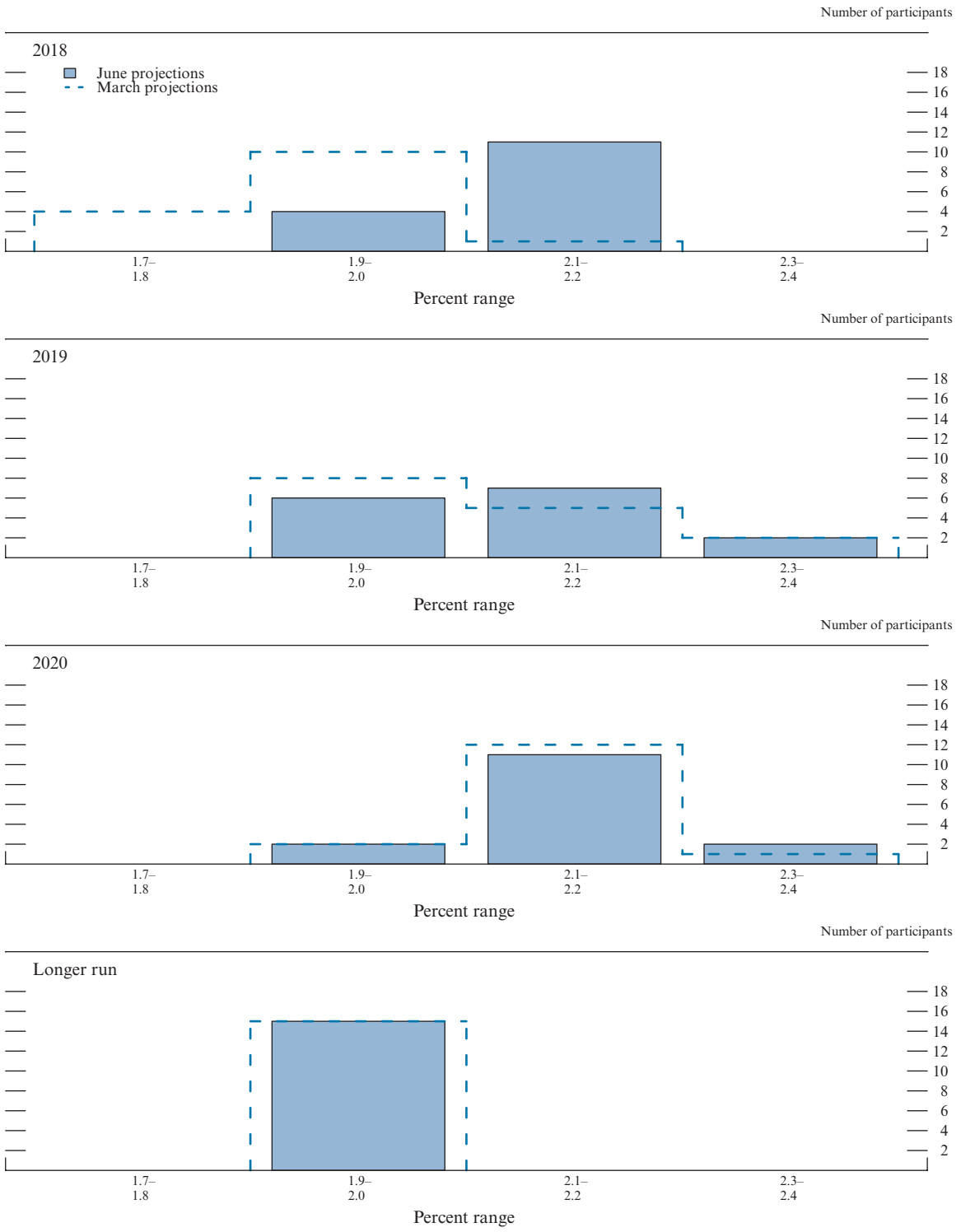
NOTE: Definitions of variables and other explanations are in the notes to table 1.

Figure 3.B. Distribution of participants' projections for the unemployment rate, 2018–20 and over the longer run



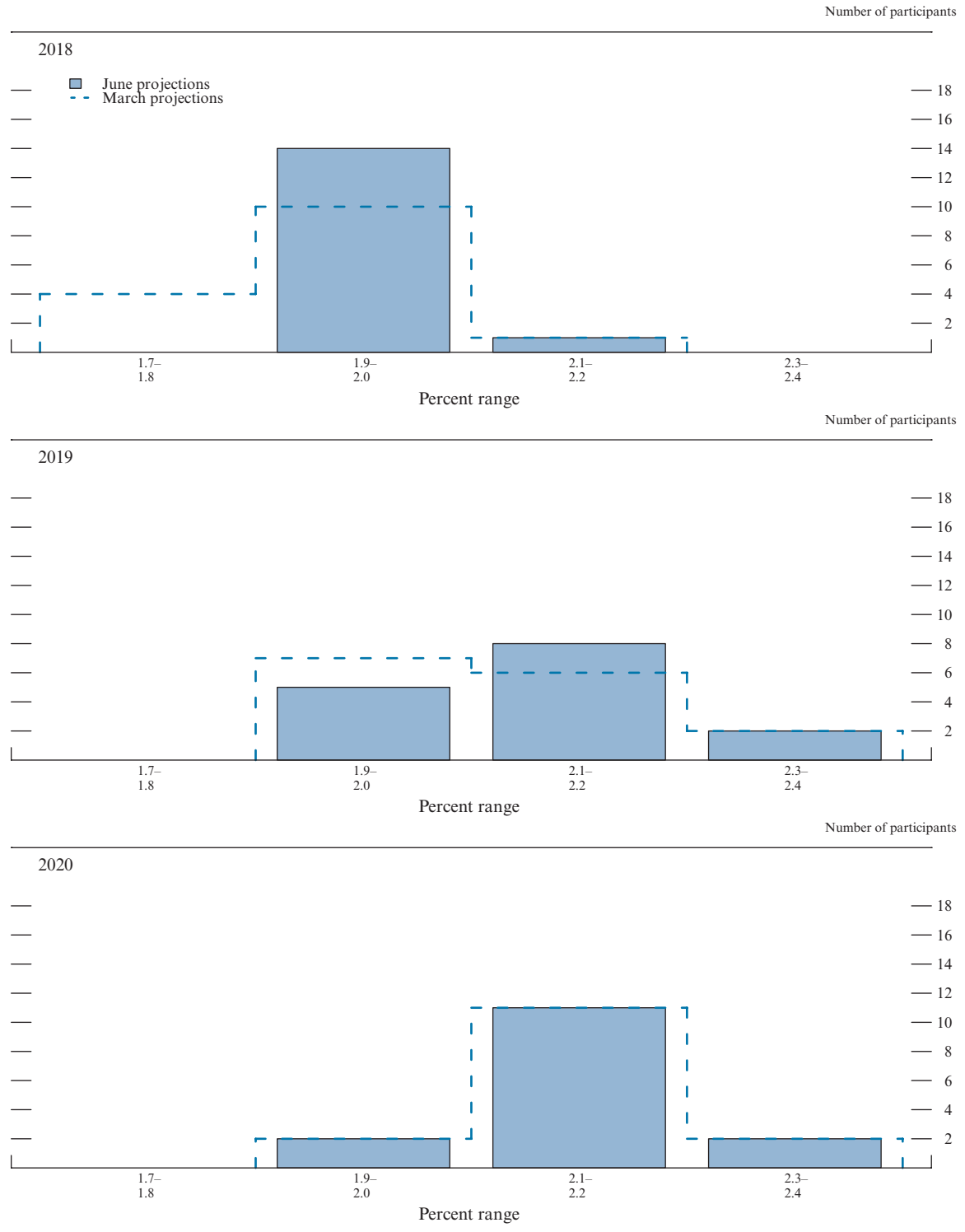
NOTE: Definitions of variables and other explanations are in the notes to table 1.

Figure 3.C. Distribution of participants' projections for PCE inflation, 2018–20 and over the longer run



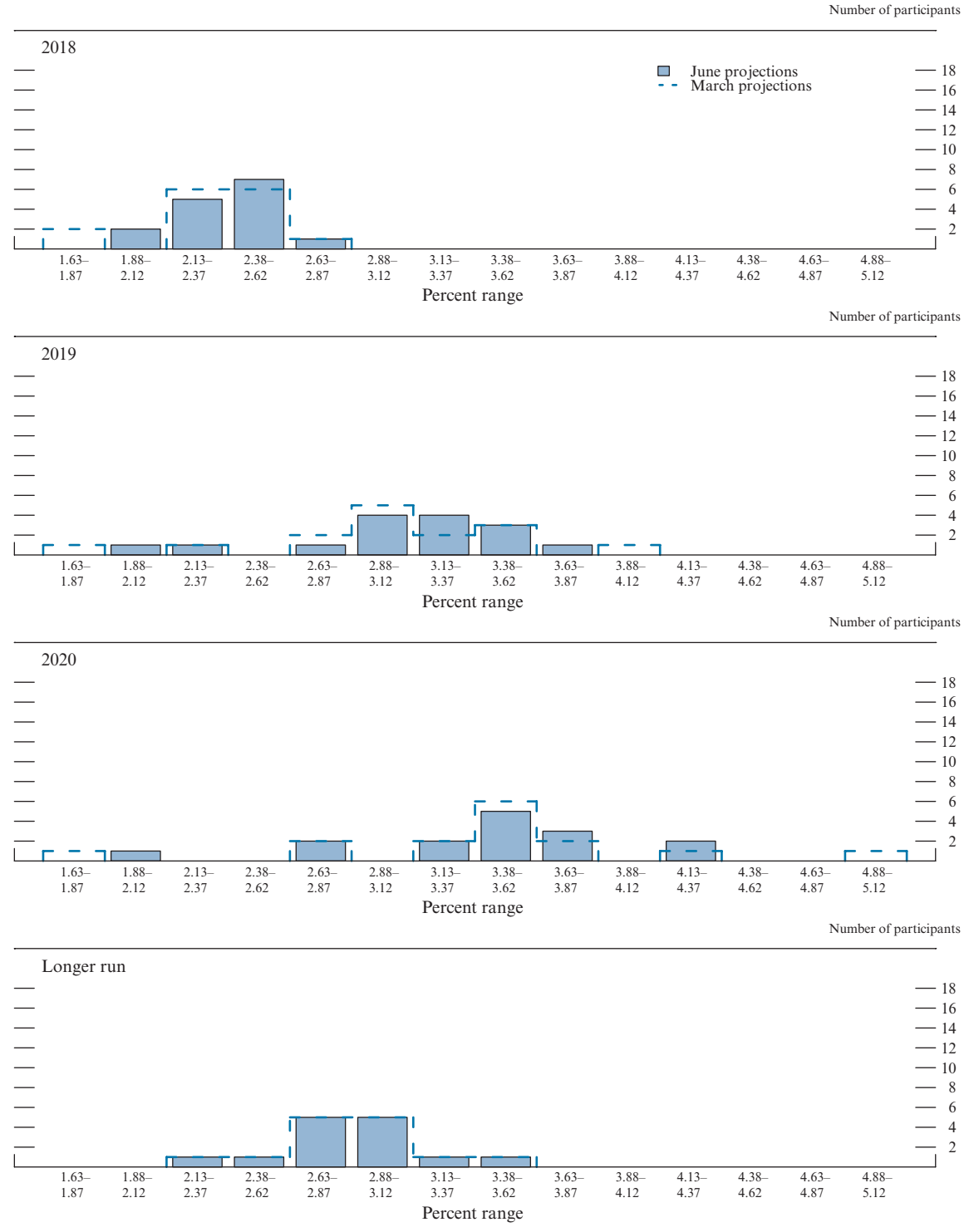
NOTE: Definitions of variables and other explanations are in the notes to table 1.

Figure 3.D. Distribution of participants' projections for core PCE inflation, 2018–20



NOTE: Definitions of variables and other explanations are in the notes to table 1.

Figure 3.E. Distribution of participants' judgments of the midpoint of the appropriate target range for the federal funds rate or the appropriate target level for the federal funds rate, 2018–20 and over the longer run



NOTE: Definitions of variables and other explanations are in the notes to table 1.

graphically in the "fan charts" shown in the top panels of figures 4.A, 4.B, and 4.C. The fan charts display the median SEP projections for the three variables surrounded by symmetric confidence intervals derived from the forecast errors reported in table 2. If the degree of uncertainty attending these projections is similar to the typical magnitude of past forecast errors and the risks around the projections are broadly balanced, then future outcomes of these variables would have about a 70 percent probability of being within these confidence intervals. For all three variables, this measure of uncertainty is substantial and generally increases as the forecast horizon lengthens.

Participants' assessments of the level of uncertainty surrounding their individual economic projections are shown in the bottom-left panels of figures 4.A, 4.B, and 4.C. Nearly all participants viewed the degree of uncertainty attached to their economic projections for real GDP growth, the unemployment rate, and inflation as broadly similar to the average of the past 20 years, a view that was essentially unchanged from March.[19]

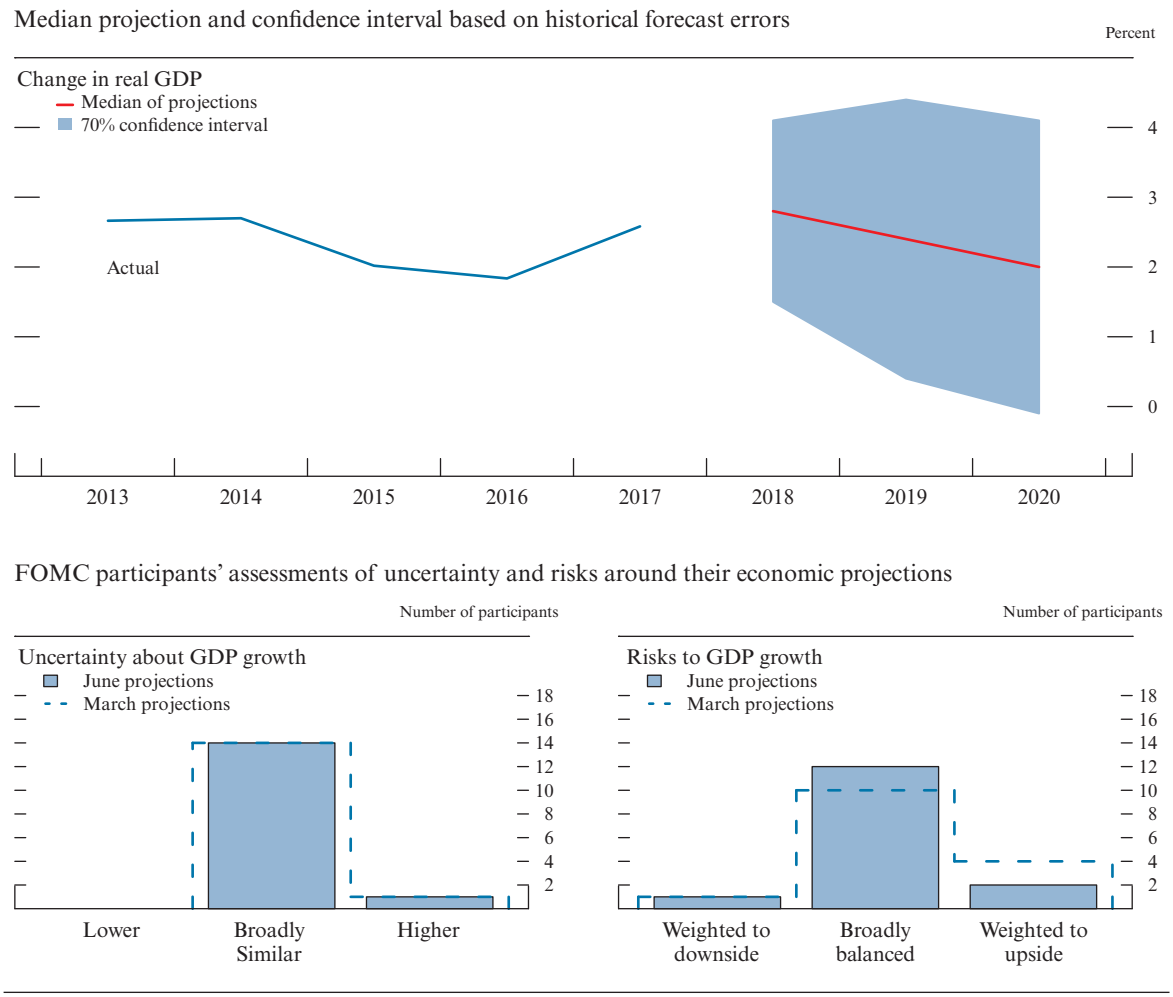
Because the fan charts are constructed to be symmetric around the median projections, they do not reflect any asymmetries in the balance of risks that participants may see in their economic projections. Participants' assessments of the balance of risks to their economic projections are shown in the bottom-right panels of figures 4.A, 4.B, and 4.C. Most participants judged the risks to their projections of real GDP growth, the unemployment rate, total inflation, and core inflation as broadly balanced—in other words, as broadly consistent with a symmetric fan chart. Compared with March, even more participants saw the risks to their projections as broadly balanced. Specifically, for GDP growth, only one participant viewed the risks as tilted to the downside, and the number of participants who viewed the risks as tilted to the upside dropped from four to two. For the unemployment rate, the number of participants who saw the risks as tilted toward low readings dropped from four to two. For inflation, all but one participant judged the risks to either total or core PCE price inflation as broadly balanced.

In discussing the uncertainty and risks surrounding their projections, several participants continued to point to fiscal developments as a source of upside risk, many participants cited developments related to trade policy as posing downside risks to their growth forecasts, and a few participants also pointed to political developments in Europe or the global outlook more generally as downside-risk factors. A few participants noted that the appreciation of the dollar posed downside risks to the inflation outlook. A few participants also noted the risk of inflation moving higher than anticipated as the unemployment rate falls.

Participants' assessments of the appropriate future path of the federal funds rate were also subject to considerable uncertainty. Because the Committee adjusts the federal funds rate in response to actual and prospective developments over time in real GDP growth, the unemployment rate, and inflation, uncertainty surrounding the projected path for the federal funds rate importantly reflects the uncertainties about the paths for those key economic variables. Figure 5 provides a graphical representation of this uncertainty, plotting the median SEP projection for the federal funds rate surrounded by confidence intervals derived from the results presented in table 2. As with the macroeconomic variables, forecast uncertainty surrounding the appropriate path of the federal funds rate is substantial and increases for longer horizons.

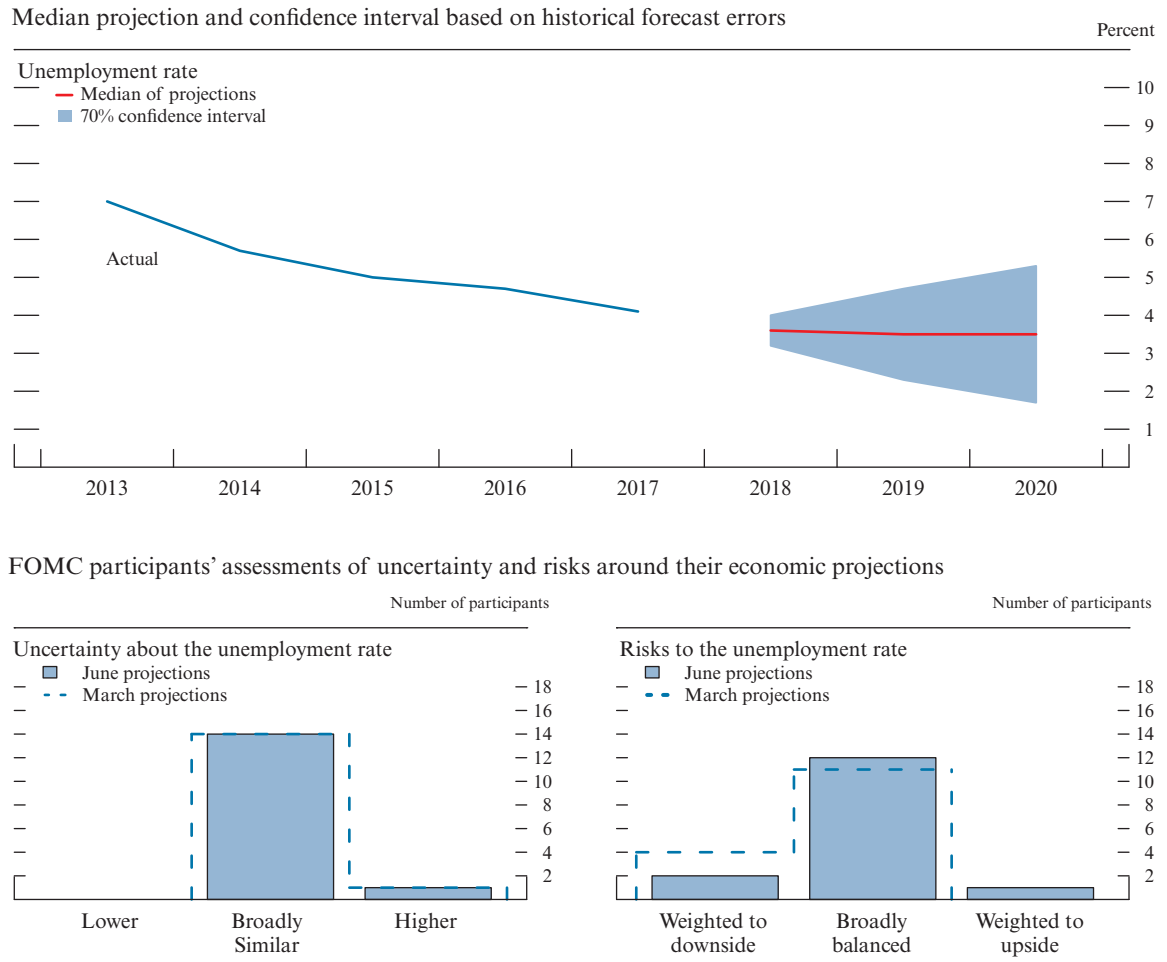
19. At the end of this summary, the box "Forecast Uncertainty" discusses the sources and interpretation of uncertainty surrounding the economic forecasts and explains the approach used to assess the uncertainty and risks attending the participants' projections.

Figure 4.A. Uncertainty and risks in projections of GDP growth



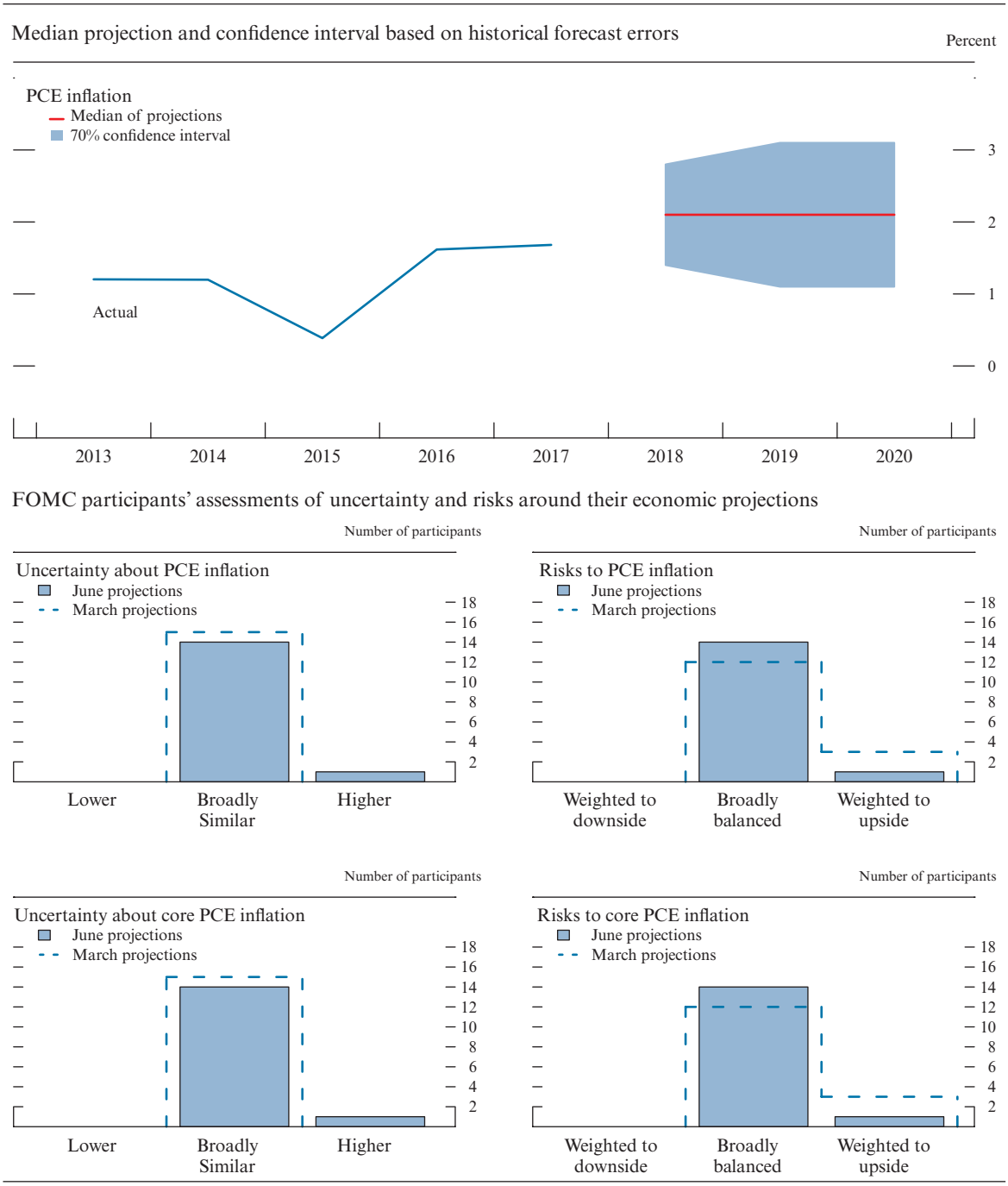
NOTE: The blue and red lines in the top panel show actual values and median projected values, respectively, of the percent change in real gross domestic product (GDP) from the fourth quarter of the previous year to the fourth quarter of the year indicated. The confidence interval around the median projected values is assumed to be symmetric and is based on root mean squared errors of various private and government forecasts made over the previous 20 years; more information about these data is available in table 2. Because current conditions may differ from those that prevailed, on average, over the previous 20 years, the width and shape of the confidence interval estimated on the basis of the historical forecast errors may not reflect FOMC participants' current assessments of the uncertainty and risks around their projections; these current assessments are summarized in the lower panels. Generally speaking, participants who judge the uncertainty about their projections as "broadly similar" to the average levels of the past 20 years would view the width of the confidence interval shown in the historical fan chart as largely consistent with their assessments of the uncertainty about their projections. Likewise, participants who judge the risks to their projections as "broadly balanced" would view the confidence interval around their projections as approximately symmetric. For definitions of uncertainty and risks in economic projections, see the box "Forecast Uncertainty."

Figure 4.B. Uncertainty and risks in projections of the unemployment rate



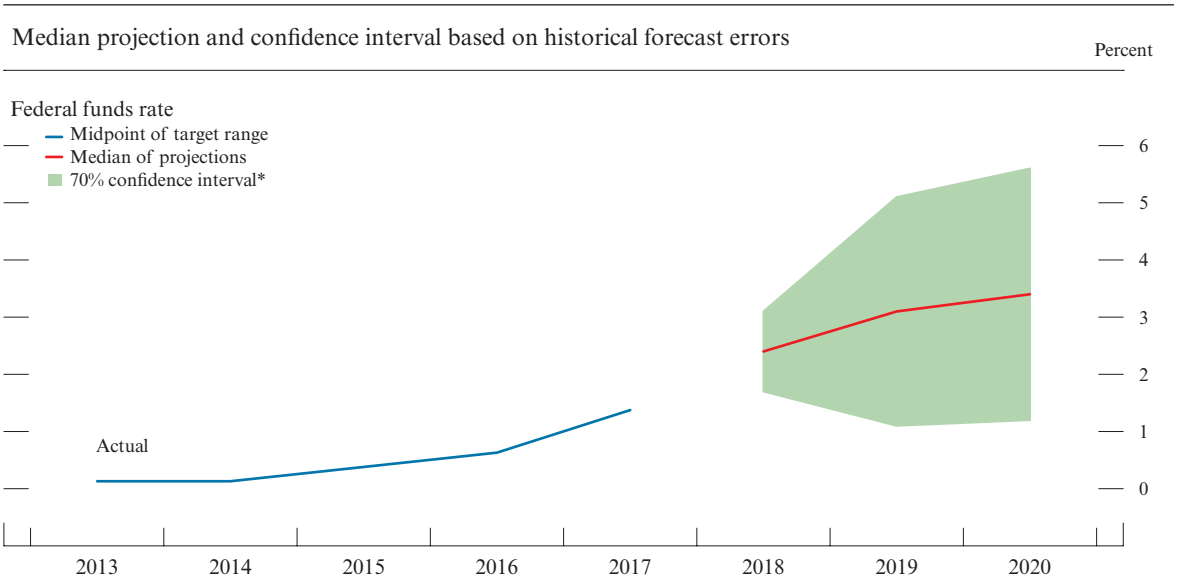
NOTE: The blue and red lines in the top panel show actual values and median projected values, respectively, of the average civilian unemployment rate in the fourth quarter of the year indicated. The confidence interval around the median projected values is assumed to be symmetric and is based on root mean squared errors of various private and government forecasts made over the previous 20 years; more information about these data is available in table 2. Because current conditions may differ from those that prevailed, on average, over the previous 20 years, the width and shape of the confidence interval estimated on the basis of the historical forecast errors may not reflect FOMC participants' current assessments of the uncertainty and risks around their projections; these current assessments are summarized in the lower panels. Generally speaking, participants who judge the uncertainty about their projections as "broadly similar" to the average levels of the past 20 years would view the width of the confidence interval shown in the historical fan chart as largely consistent with their assessments of the uncertainty about their projections. Likewise, participants who judge the risks to their projections as "broadly balanced" would view the confidence interval around their projections as approximately symmetric. For definitions of uncertainty and risks in economic projections, see the box "Forecast Uncertainty."

Figure 4.C. Uncertainty and risks in projections of PCE inflation



NOTE: The blue and red lines in the top panel show actual values and median projected values, respectively, of the percent change in the price index for personal consumption expenditures (PCE) from the fourth quarter of the previous year to the fourth quarter of the year indicated. The confidence interval around the median projected values is assumed to be symmetric and is based on root mean squared errors of various private and government forecasts made over the previous 20 years; more information about these data is available in table 2. Because current conditions may differ from those that prevailed, on average, over the previous 20 years, the width and shape of the confidence interval estimated on the basis of the historical forecast errors may not reflect FOMC participants' current assessments of the uncertainty and risks around their projections; these current assessments are summarized in the lower panels. Generally speaking, participants who judge the uncertainty about their projections as "broadly similar" to the average levels of the past 20 years would view the width of the confidence interval shown in the historical fan chart as largely consistent with their assessments of the uncertainty about their projections. Likewise, participants who judge the risks to their projections as "broadly balanced" would view the confidence interval around their projections as approximately symmetric. For definitions of uncertainty and risks in economic projections, see the box "Forecast Uncertainty."

Figure 5. Uncertainty in projections of the federal funds rate



NOTE: The blue and red lines are based on actual values and median projected values, respectively, of the Committee's target for the federal funds rate at the end of the year indicated. The actual values are the midpoint of the target range; the median projected values are based on either the midpoint of the target range or the target level. The confidence interval around the median projected values is based on root mean squared errors of various private and government forecasts made over the previous 20 years. The confidence interval is not strictly consistent with the projections for the federal funds rate, primarily because these projections are not forecasts of the likeliest outcomes for the federal funds rate, but rather projections of participants' individual assessments of appropriate monetary policy. Still, historical forecast errors provide a broad sense of the uncertainty around the future path of the federal funds rate generated by the uncertainty about the macroeconomic variables as well as additional adjustments to monetary policy that may be appropriate to offset the effects of shocks to the economy.

The confidence interval is assumed to be symmetric except when it is truncated at zero—the bottom of the lowest target range for the federal funds rate that has been adopted in the past by the Committee. This truncation would not be intended to indicate the likelihood of the use of negative interest rates to provide additional monetary policy accommodation if doing so was judged appropriate. In such situations, the Committee could also employ other tools, including forward guidance and large-scale asset purchases, to provide additional accommodation. Because current conditions may differ from those that prevailed, on average, over the previous 20 years, the width and shape of the confidence interval estimated on the basis of the historical forecast errors may not reflect FOMC participants' current assessments of the uncertainty and risks around their projections.

* The confidence interval is derived from forecasts of the average level of short-term interest rates in the fourth quarter of the year indicated; more information about these data is available in table 2. The shaded area encompasses less than a 70 percent confidence interval if the confidence interval has been truncated at zero.

Forecast Uncertainty

The economic projections provided by the members of the Board of Governors and the presidents of the Federal Reserve Banks inform discussions of monetary policy among policymakers and can aid public understanding of the basis for policy actions. Considerable uncertainty attends these projections, however. The economic and statistical models and relationships used to help produce economic forecasts are necessarily imperfect descriptions of the real world, and the future path of the economy can be affected by myriad unforeseen developments and events. Thus, in setting the stance of monetary policy, participants consider not only what appears to be the most likely economic outcome as embodied in their projections, but also the range of alternative possibilities, the likelihood of their occurring, and the potential costs to the economy should they occur.

Table 2 summarizes the average historical accuracy of a range of forecasts, including those reported in past *Monetary Policy Reports* and those prepared by the Federal Reserve Board's staff in advance of meetings of the Federal Open Market Committee (FOMC). The projection error ranges shown in the table illustrate the considerable uncertainty associated with economic forecasts. For example, suppose a participant projects that real gross domestic product (GDP) and total consumer prices will rise steadily at annual rates of, respectively, 3 percent and 2 percent. If the uncertainty attending those projections is similar to that experienced in the past and the risks around the projections are broadly balanced, the numbers reported in table 2 would imply a probability of about 70 percent that actual GDP would expand within a range of 1.7 to 4.3 percent in the current year, 1.0 to 5.0 percent in the second year, and 0.9 to 5.1 percent in the third year. The corresponding 70 percent confidence intervals for overall inflation would be 1.3 to 2.7 percent in the current year and 1.0 to 3.0 percent in the second and third years. Figures 4.A through 4.C illustrate these confidence bounds in "fan charts" that are symmetric and centered on the medians of FOMC participants' projections for GDP growth, the unemployment rate, and inflation. However, in some instances, the risks around the projections may not be symmetric. In particular, the unemployment rate cannot be negative; furthermore, the risks around a particular projection might be tilted to either the upside or the downside, in which case the corresponding fan chart would be asymmetrically positioned around the median projection.

Because current conditions may differ from those that prevailed, on average, over history, participants provide judgments as to whether the uncertainty attached to their projections of each economic variable is greater than, smaller than, or broadly similar to typical levels of forecast uncertainty seen in the past 20 years, as presented in table 2 and reflected in the widths of the confidence intervals shown in the top panels of figures 4.A through 4.C. Participants' current assessments of the uncertainty surrounding their projections are summarized in the bottom-left panels of those figures. Participants also provide judgments as to whether the risks to their projections are weighted to the upside, are weighted to the downside, or are broadly balanced. That is, while the symmetric historical fan charts shown in the top panels of figures 4.A through 4.C imply that the risks to participants' projections are balanced, participants may judge that there is a greater risk that a given variable will be above rather than below their projections. These judgments are summarized in the lower-right panels of figures 4.A through 4.C.

As with real activity and inflation, the outlook for the future path of the federal funds rate is subject to considerable uncertainty. This uncertainty arises primarily because each participant's assessment of the appropriate stance of monetary policy depends importantly on the evolution of real activity and inflation over time. If economic conditions evolve in an unexpected manner, then assessments of the appropriate setting of the federal funds rate would change from that point forward. The final line in table 2 shows the error ranges for forecasts of short-term interest rates. They suggest that the historical confidence intervals associated with projections of the federal funds rate are quite wide. It should be noted, however, that these confidence intervals are not strictly consistent with the projections for the federal funds rate, as these projections are not forecasts of the most likely quarterly outcomes but rather are projections of participants' individual assessments of appropriate monetary policy and are on an end-of-year basis. However, the forecast errors should provide a sense of the uncertainty around the future path of the federal funds rate generated by the uncertainty about the macroeconomic variables as well as additional adjustments to monetary policy that would be appropriate to offset the effects of shocks to the economy.

If at some point in the future the confidence interval around the federal funds rate were to extend below zero, it would be truncated at zero for purposes of the fan chart shown in figure 5; zero is the bottom of the lowest target range for the federal funds rate that has been adopted by the Committee in the past. This approach to the construction of the federal funds rate fan chart would be merely a convention; it would not have any implications for possible future policy decisions regarding the use of negative interest rates to provide additional monetary policy accommodation if doing so were appropriate. In such situations, the Committee could also employ other tools, including forward guidance and asset purchases, to provide additional accommodation.

While figures 4.A through 4.C provide information on the uncertainty around the economic projections, figure 1 provides information on the range of views across FOMC participants. A comparison of figure 1 with figures 4.A through 4.C shows that the dispersion of the projections across participants is much smaller than the average forecast errors over the past 20 years.

Abbreviations

AFE	advanced foreign economy
BBA	Bipartisan Budget Act of 2018
BLS	Bureau of Labor Statistics
C&I	commercial and industrial
Desk	Open Market Desk at the Federal Reserve Bank of New York
DPI	disposable personal income
ECB	European Central Bank
EME	emerging market economy
FOMC	Federal Open Market Committee; also, the Committee
GDP	gross domestic product
IOER	interest on excess reserves
JOLTS	Job Openings and Labor Turnover Survey
LFPR	labor force participation rate
MBS	mortgage-backed securities
Michigan survey	University of Michigan Surveys of Consumers
OIS	overnight index swap
ON RRP	overnight reverse repurchase agreement
PCE	personal consumption expenditures
SEP	Summary of Economic Projections
SLOOS	Senior Loan Officer Opinion Survey on Bank Lending Practices
S&P	Standard & Poor's
TCJA	Tax Cuts and Jobs Act
TIPS	Treasury Inflation-Protected Securities
VIX	implied volatility for the S&P 500 index