# Minutes of the Federal Open Market Committee
## December 12–13, 2017

A joint meeting of the Federal Open Market Committee and the Board of Governors was held in the offices of the Board of Governors of the Federal Reserve System in Washington, D.C., on Tuesday, December 12, 2017, at 1:00 p.m. and continued on Wednesday, December 13, 2017, at 9:00 a.m.[1]

PRESENT:
Janet L. Yellen, Chair
William C. Dudley, Vice Chairman
Lael Brainard
Charles L. Evans
Patrick Harker
Robert S. Kaplan
Neel Kashkari
Jerome H. Powell
Randal K. Quarles

Raphael W. Bostic, Loretta J. Mester, Mark L. Mullinix, Michael Strine, and John C. Williams, Alternate Members of the Federal Open Market Committee

James Bullard, Esther L. George, and Eric Rosengren, Presidents of the Federal Reserve Banks of St. Louis, Kansas City, and Boston, respectively

James A. Clouse, Secretary
Matthew M. Luecke, Deputy Secretary
David W. Skidmore, Assistant Secretary
Michelle A. Smith, Assistant Secretary
Mark E. Van Der Weide, General Counsel
Michael Held, Deputy General Counsel
Steven B. Kamin, Economist
Thomas Laubach, Economist
David W. Wilcox, Economist

Thomas A. Connors, Michael Dotsey, Eric M. Engen, Evan F. Koenig, Daniel G. Sullivan, William Wascher, and Beth Anne Wilson, Associate Economists

Simon Potter, Manager, System Open Market Account

Lorie K. Logan, Deputy Manager, System Open Market Account

Ann E. Misback, Secretary, Office of the Secretary, Board of Governors

Matthew J. Eichner,[2] Director, Division of Reserve Bank Operations and Payment Systems, Board of Governors; Andreas Lehnert, Director, Division of Financial Stability, Board of Governors

Jennifer Burns, Deputy Director, Division of Supervision and Regulation, Board of Governors; Rochelle M. Edge and Stephen A. Meyer, Deputy Directors, Division of Monetary Affairs, Board of Governors; Michael T. Kiley, Deputy Director, Division of Financial Stability, Board of Governors

Trevor A. Reeve, Senior Special Adviser to the Chair, Office of Board Members, Board of Governors

Joseph W. Gruber, David Reifschneider, and John M. Roberts, Special Advisers to the Board, Office of Board Members, Board of Governors

Linda Robertson, Assistant to the Board, Office of Board Members, Board of Governors

Antulio N. Bomfim, Edward Nelson, Ellen E. Meade, and Robert J. Tetlow, Senior Advisers, Division of Monetary Affairs, Board of Governors

Shaghil Ahmed, Associate Director, Division of International Finance, Board of Governors; Elizabeth Kiser, John J. Stevens, and Stacey Tevlin, Associate Directors, Division of Research and Statistics, Board of Governors; David López-Salido, Associate Director, Division of Monetary Affairs, Board of Governors

Norman J. Morin and Shane M. Sherlund, Assistant Directors, Division of Research and Statistics, Board of Governors

[1] The Federal Open Market Committee is referenced as the "FOMC" and the "Committee" in these minutes.

[2] Attended through the discussion of developments in financial markets and open market operations.

Eric C. Engstrom, Adviser, Division of Monetary Affairs, and Adviser, Division of Research and Statistics, Board of Governors

Penelope A. Beattie,[3] Assistant to the Secretary, Office of the Secretary, Board of Governors

David H. Small, Project Manager, Division of Monetary Affairs, Board of Governors

Cynthia L. Doniger, Senior Economist, Division of Monetary Affairs, Board of Governors

Randall A. Williams, Senior Information Manager, Division of Monetary Affairs, Board of Governors

Kelly J. Dubbert, First Vice President, Federal Reserve Bank of Kansas City

David Altig, Kartik B. Athreya, Mary Daly, Beverly Hirtle, Geoffrey Tootell, and Christopher J. Waller, Executive Vice Presidents, Federal Reserve Banks of Atlanta, Richmond, San Francisco, New York, Boston, and St. Louis, respectively

Todd E. Clark and Marc Giannoni, Senior Vice Presidents, Federal Reserve Banks of Cleveland and Dallas, respectively

Jonathan L. Willis, Vice President, Federal Reserve Bank of Kansas City

Benjamin Malin, Senior Research Economist, Federal Reserve Bank of Minneapolis

**Developments in Financial Markets and Open Market Operations**

The manager of the System Open Market Account (SOMA) reported on developments in domestic and international financial markets over the intermeeting period. Equity prices moved higher over the period, with market participants pointing to the likely passage of tax reform legislation as an important factor contributing to the rise. The narrowing of the spread between long- and short-term Treasury yields over recent months had been a focus of market attention. Market participants cited a range of factors as contributing to this narrowing, including the gradual firming in the stance of monetary policy as well as an increasing expectation among investors that the Treasury Department would issue substantial volumes of shorter-term securities in meeting its financing needs over coming years.

The deputy manager discussed open market operations over the period. Take-up at the System's overnight reverse repurchase (ON RRP) agreement facility dropped to relatively low levels over the period. In part, the decline appeared to reflect an increase in yields on alternative investments; Treasury bill yields, for example, had moved higher over recent weeks as the Treasury boosted net issuance of Treasury bills. The Open Market Desk continued to execute reinvestment operations for Treasury and agency securities in the SOMA in accordance with the procedure specified in the Committee's directive to the Desk. The deputy manager also provided an update on plans for the Federal Reserve Bank of New York, in conjunction with the Treasury's Office of Financial Research, to begin publishing reference interest rates for repurchase agreements involving Treasury securities by the middle of next year.

By unanimous vote, the Committee ratified the Desk's domestic transactions over the intermeeting period. There were no intervention operations in foreign currencies for the System's account during the intermeeting period.

**Staff Review of the Economic Situation**

The information reviewed for the December 12–13 meeting indicated that labor market conditions continued to strengthen through November and suggested that real gross domestic product (GDP) was rising at a solid pace in the second half of 2017. Total consumer price inflation, as measured by the 12-month percentage change in the price index for personal consumption expenditures (PCE), remained below 2 percent in October and was lower than early in the year. Survey-based measures of longer-run inflation expectations were little changed on balance.

Total nonfarm payroll employment increased strongly in October and November, likely reflecting in part a rebound from the negative effects of the hurricanes in September. The national unemployment rate declined to 4.1 percent in October and remained at that level in November. The unemployment rates for Hispanics, for Asians, and for whites were lower in November than two months earlier, while the rate for African Americans was a little higher; the unemployment rates for each of these groups were close to the levels seen just before the most recent recession. The national labor force participation rate was lower in November than it had been in

[3] Attended Tuesday session only.

September but remained in the range seen over the past several years. The share of workers employed part time for economic reasons declined in October and was about unchanged in November. The rates of private-sector job openings and quits were little changed at relatively high levels in September and October, and the four-week moving average of initial claims for unemployment insurance benefits continued to be at a low level in early December. Recent readings showed that wage gains remained modest. Compensation per hour in the nonfarm business sector increased 1 percent over the four quarters ending in the third quarter, and average hourly earnings for all employees rose 2½ percent over the 12 months ending in November.

Total industrial production increased briskly in October, boosted in part by a continued return to more-normal operations that reflected the waning of the negative effects of recent hurricanes in the previous two months. Automakers' schedules indicated that light motor vehicle assemblies would likely move up in the coming months. Broader indicators of manufacturing production, such as the new orders indexes from national and regional manufacturing surveys, pointed to further increases in factory output in the near term.

Real PCE increased modestly in October after expanding strongly in September. The pace of light motor vehicle sales slowed in November from the elevated rate in the preceding two months but continued to be above levels seen earlier in the year. Recent readings on key factors that influence consumer spending—including gains in employment, real disposable personal income, and households' net worth—continued to be supportive of moderate real PCE growth in the fourth quarter. Consumer sentiment in early December, as measured by the University of Michigan Surveys of Consumers, remained at a high level.

Recent information on housing activity suggested that real residential investment spending was edging up in the fourth quarter after declining in the previous two quarters. Both starts and building permit issuance for new single-family homes increased somewhat in October, and starts for multifamily units moved up considerably. Sales of both new and existing homes rose moderately in October.

Real private expenditures for business equipment and intellectual property appeared to be rising further in the fourth quarter. Nominal shipments of nondefense capital goods excluding aircraft increased in October, and new orders of these goods continued to exceed shipments, which pointed to further gains in shipments in the near term. In addition, readings on business sentiment remained upbeat. Firms' nominal spending for nonresidential structures excluding drilling and mining rose in October, and the number of oil and gas rigs in operation—an indicator of spending for structures in the drilling and mining sector—started to edge up in late November after declining earlier in the fourth quarter.

Total real government purchases looked to be rising in the fourth quarter. Nominal defense expenditures in October and November pointed to a flattening in real federal government purchases. However, real purchases by state and local governments appeared to be moving up, as these governments expanded their payrolls modestly over the two months ending in November and their nominal construction spending increased in October.

The nominal U.S. international trade deficit widened slightly in September and sharply in October. Exports picked up in September, led by exports of industrial supplies, but were flat in October. Imports grew significantly in both months, reflecting strength in most categories, although imports of automobiles declined. The available trade data suggested that the change in real net exports would make a neutral contribution to real U.S. GDP growth in the fourth quarter.

Total U.S. consumer prices, as measured by the PCE price index, increased slightly more than 1½ percent over the 12 months ending in October. Core PCE price inflation, which excludes changes in consumer food and energy prices, was nearly 1½ percent over that same period. The consumer price index (CPI) rose 2¼ percent over the 12 months ending in November, while core CPI inflation was 1¾ percent. Recent readings on survey-based measures of longer-run inflation expectations—including those from the Michigan survey, the Survey of Professional Forecasters, and the Desk's Survey of Primary Dealers and Survey of Market Participants—were little changed on balance.

Economic activity expanded at a solid pace in most foreign economies in the third quarter. In several advanced foreign economies (AFEs), economic growth slowed but remained firm. Economic activity in the emerging market economies (EMEs) continued to grow briskly for the most part, especially in Asia. However, the Mexican economy contracted in the third quarter, as hurricanes and earthquakes disrupted economic activity. Despite a boost from recent increases in oil prices, inflation remained relatively subdued in most AFEs and moderate in EMEs.

**Staff Review of the Financial Situation**

Movements in domestic financial asset prices over the intermeeting period reflected slightly stronger-than-expected economic data releases, announcements related to Treasury debt issuance, and an increase in the perceived probability that the Congress would enact tax legislation. On net, the Treasury yield curve flattened, U.S. equity prices moved up, and the foreign exchange value of the dollar was little changed. Financing conditions for businesses and households remained broadly supportive of continued growth in household spending and business investment.

Federal Reserve communications and economic data releases over the intermeeting period were characterized by market participants as reinforcing perceptions of a likely increase in the target range for the federal funds rate at the December meeting. The probability of an increase as implied by quotes on federal funds futures contracts edged up to around 95 percent, roughly consistent with the average probability indicated by responses to the Desk's surveys of primary dealers and market participants in December.

The nominal Treasury yield curve flattened over the intermeeting period, as short-dated Treasury yields rose and the 10-year Treasury yield moved up only slightly. Market participants pointed to the November 1 release of the Treasury's quarterly financing statement and accompanying analysis by the Treasury Borrowing Advisory Committee that highlighted some advantages of increasing issuance of relatively short-dated Treasury securities as factors contributing to the flattening of the yield curve over the period. Measures of inflation compensation based on Treasury Inflation-Protected Securities were little changed, on net, over the intermeeting period. Option-adjusted spreads of yields on current-coupon mortgage-backed securities (MBS) over Treasury yields also were little changed. Overall, market participants did not attribute any price changes in Treasury and agency MBS markets to the implementation of reductions in reinvestments of the SOMA portfolio.

Broad equity price indexes rose over the intermeeting period, likely reflecting in part investors' perceptions of increased odds for the passage of federal tax legislation and an associated potential boost to corporate earnings. One-month-ahead option-implied volatility on the S&P 500 index—the VIX—was little changed, on net, at levels close to historical lows. Spreads on both investment- and speculative-grade corporate bond yields over comparable-maturity Treasury yields were about flat on net.

Conditions in short-term funding markets remained stable over the intermeeting period. The effective federal funds rate held steady, and rates and volumes in other overnight markets were little changed. Take-up of ON RRPs declined notably as Treasury bill supply continued to increase, and short-dated bill yields rose to levels significantly above the ON RRP offering rate. On December 11, the Treasury declared a debt issuance suspension period to keep outstanding federal debt below the debt ceiling and began to use extraordinary measures to allow continued financing of government operations.

Financing conditions for large nonfinancial corporations continued to be accommodative on balance. Gross issuance of corporate bonds and gross equity issuance remained robust. Institutional leveraged loan issuance in November was brisk. Growth of bank-intermediated credit to nonfinancial firms, however, was tepid. On balance, the credit quality of nonfinancial corporations was little changed over the intermeeting period and appeared to remain solid. Financing conditions for small businesses also appeared to have remained favorable. In municipal bond markets, gross issuance was strong and credit quality remained stable.

In commercial real estate (CRE) markets, spreads of commercial mortgage-backed securities (CMBS) yields over comparable-maturity Treasury yields remained near the lower end of the range seen since the financial crisis, and delinquency rates on loans in CMBS pools continued to decrease. The growth of CRE loans held by the largest banks continued to slow, while CRE loan growth at smaller banks remained strong overall and even picked up a bit in October.

In the residential mortgage market, although credit standards had loosened gradually for borrowers with low credit scores, they continued to be tight for borrowers with low credit scores and hard-to-document incomes. Mortgage credit remained readily available for borrowers with strong credit scores. Similarly, consumer credit remained readily available to borrowers with strong credit histories, but conditions for subprime borrowers stayed tight in credit card markets and continued to tighten for auto loans. Issuance of asset-backed securities (ABS) funding consumer loans was robust in recent months, and ABS spreads were about unchanged over the intermeeting period.

On balance, the broad index of the foreign exchange value of the dollar was little changed, longer-term sovereign bond yields in AFEs declined modestly, and most foreign equity indexes moved lower over the intermeeting period. The euro appreciated modestly against the U.S. dollar, in part because of strong economic data for

the euro area early in the intermeeting period. The British pound was somewhat volatile amid Brexit-related developments, and the Mexican peso fluctuated on news about negotiations associated with the North American Free Trade Agreement, but both currencies ended the period little changed. Following missed interest payments on its sovereign bonds, Venezuela was assigned selective default status by two credit rating agencies in early November, which precipitated a "credit event" ruling by the International Swaps and Derivatives Association. However, developments related to Venezuela generated little spillover to global financial markets.

**Staff Economic Outlook**

The U.S. economic projection prepared by the staff for the December FOMC meeting was generally comparable with the staff's previous forecast. Real GDP was forecast to have increased at a solid pace in the second half of 2017. Beyond 2017, the forecast for real GDP growth was revised up modestly, reflecting the staff's updated assumption that the reduction in federal income taxes expected to begin next year would be larger than assumed in the previous projection. The staff projected that real GDP would increase at a modestly faster pace than potential output through 2019. The unemployment rate was projected to decline further over the next few years and to continue running below the staff's slightly downward-revised estimate of the longer-run natural rate over this period.

The staff's forecast for total PCE price inflation was revised up a little for 2017, as somewhat higher forecasts for core PCE prices and for consumer energy prices were offset only partially by a lower forecast for consumer food prices. Total PCE price inflation in 2018 was projected to be about the same as in 2017, despite projected declines in consumer energy prices; core PCE prices were forecast to rise faster in 2018, reflecting the expected waning of transitory factors that held down those prices in 2017. Beyond 2018, the inflation forecast was little changed from the previous projection. The staff projected that inflation would be very close to the Committee's 2 percent objective in 2019 and at that objective in 2020.

The staff viewed the uncertainty around its projections for real GDP growth, the unemployment rate, and inflation as similar to the average of the past 20 years. On the one hand, many indicators of uncertainty about the macroeconomic outlook continued to be subdued; on the other hand, considerable uncertainty remained about a number of federal government policies relevant for the economic outlook. The staff saw the risks to the forecasts for real GDP growth and the unemployment rate as balanced. The risks to the projection for inflation also were seen as balanced. Downside risks to inflation included the possibility that longer-term inflation expectations may move lower or that the run of soft core inflation readings this year could prove to be more persistent than the staff expected. These downside risks were seen as essentially counterbalanced by the upside risk that inflation could increase more than expected in an economy that was projected to move further above its potential.

**Participants' Views on Current Conditions and the Economic Outlook**

In conjunction with this FOMC meeting, members of the Board of Governors and Federal Reserve Bank presidents submitted their projections of the most likely outcomes for real GDP growth, the unemployment rate, and inflation for each year from 2017 through 2020 and over the longer run, based on their individual assessments of the appropriate path for the federal funds rate.[4] The longer-run projections represented each participant's assessment of the rate 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. These projections and policy assessments are described in the Summary of Economic Projections (SEP), which is an addendum to these minutes.

In their discussion of economic conditions and the outlook, meeting participants agreed that information received since the FOMC met in November indicated that economic activity had been rising at a solid rate and that the labor market had continued to strengthen. Averaging through fluctuations associated with the recent hurricanes, job gains had been solid and the unemployment rate had declined further. Household spending had been expanding at a moderate rate, and growth in business fixed investment had picked up in recent quarters. On a 12-month basis, both overall inflation and inflation for items other than food and energy had declined this year and were running below 2 percent. Market-based measures of inflation compensation remained low; survey-based measures of longer-term inflation expectations were little changed, on balance.

[4] The incoming president of the Federal Reserve Bank of Richmond is scheduled to assume office on January 1, 2018; First Vice President Mark L. Mullinix submitted economic projections for this meeting. One participant did not submit longer-run projections for real output growth, the unemployment rate, or the federal funds rate.

Real economic activity appeared to be growing at a solid pace, buttressed by gains in consumer and business spending, supportive financial conditions, and an improving global economy. Participants judged that hurricane-related disruptions and rebuilding had affected economic activity, employment, and inflation in recent months but had not materially altered the outlook for the national economy. They saw the incoming information on spending and the labor market as consistent with continued above-trend growth and a further strengthening in labor market conditions. Consequently, participants continued to expect that, with gradual adjustments in the stance of monetary policy, economic activity would expand at a moderate pace and labor market conditions would remain strong. Inflation on a 12-month basis was expected to remain somewhat below 2 percent in the near term but to stabilize around the Committee's 2 percent objective over the medium term. Near-term risks to the economic outlook appeared to be roughly balanced, but participants agreed that it would be important to continue to monitor inflation developments closely.

Participants expected moderate growth in consumer spending in the near term, underpinned by ongoing strength in the labor market, further improvements in households' net worth, and buoyant consumer sentiment. Business contacts in a few Districts reported strong pre-holiday sales. Many participants expected the proposed cuts in personal taxes to provide some boost to consumer spending. A few participants noted that expectations of tax reform may have already raised consumer spending somewhat to the extent that those expectations had spurred increases in asset valuations and household net worth. A number of participants expressed uncertainty about the magnitude of the effects of tax reform on consumer spending.

District contacts were optimistic, and their reports were generally consistent with continued steady growth in business spending. Reports from District contacts about both the manufacturing and service sectors were generally positive. In contrast, reports on housing and nonresidential construction were mixed. Activity in the energy sector continued to firm, with transportation bottlenecks and residual effects of the hurricanes putting some upward pressure on gasoline prices. In the agricultural sector, farm income was under downward pressure due to low crop prices, and contacts expressed concern about the effects of the possible renegotiation of trade agreements on exports.

Many participants judged that the proposed changes in business taxes, if enacted, would likely provide a modest boost to capital spending, although the magnitude of the effects was uncertain. The resulting increase in the capital stock could contribute to positive supply-side effects, including an expansion of potential output over the next few years. However, some business contacts and respondents to business surveys suggested that firms were cautious about expanding capital spending in response to the proposed tax changes or noted that the increase in cash flow that would result from corporate tax cuts was more likely to be used for mergers and acquisitions or for debt reduction and stock buybacks.

Labor market conditions continued to strengthen in recent months, with the unemployment rate declining further and payroll gains well above a pace consistent with maintaining a stable unemployment rate over time. Other indicators, such as consumer and business surveys of job availability and job openings, also pointed to a further tightening in labor market conditions. A couple of participants noted that broad improvements in labor market conditions over the past several years were evident across demographic groups. In several Districts, reports from business contacts or evidence from surveys pointed to some difficulty in finding qualified workers; in some cases, labor shortages were making it hard to fill customer demand or expand business. A few participants noted that a reduction in personal tax rates could potentially increase labor supply, but the magnitude of such effects was quite uncertain.

Against the backdrop of the continued strengthening in labor market conditions, participants discussed recent wage developments. Overall, the pace of wage increases had generally been modest and in line with inflation and productivity growth. In some Districts, reports from business contacts or evidence from surveys pointed to a pickup in wage gains, particularly for unskilled or entry-level workers. In a couple of regions, businesses facing tight labor market conditions were said to be offering more flexible work arrangements or taking advantage of technology to use employees more efficiently, rather than raising wages. A few participants judged that the tightness in labor markets was likely to translate into an acceleration in wages; however, another observed that the absence of broad-based upward wage pressures suggested that there might be scope for further improvement in labor market conditions.

PCE price inflation over the 12 months ending in October, at 1.6 percent, continued to run below the Committee's longer-run objective of 2 percent; core PCE price inflation for items other than consumer food and energy prices was only 1.4 percent over the same period. It was noted that recent readings on monthly inflation had

edged up, and a couple of participants observed that core inflation on a year-over-year basis appeared to be stabilizing. Many indicated that they expected cyclical pressures associated with a tightening labor market to show through to higher inflation over the medium term. These participants generally judged that much of the softness in core inflation this year reflected transitory factors and that inflation would begin to rise as the influence of these factors waned. However, one of them noted that secular trends, such as technological innovation or globalization, could be affecting competition and business pricing, and muting inflationary pressures. With core inflation readings having moved down this year and remaining well below 2 percent, some participants observed that there was a possibility that inflation might stay below the objective for longer than they currently expected. Several of them expressed concern that persistently weak inflation may have led to a decline in longer-term inflation expectations; they pointed to low market-based measures of inflation compensation, declines in some survey measures of inflation expectations, or evidence from statistical models suggesting that the underlying trend in inflation had fallen in recent years. A few participants, however, noted that measures of inflation expectations had remained broadly stable this year despite the low readings on inflation and judged that this stability should support the return of inflation to the Committee's 2 percent objective.

With regard to financial markets, some participants observed that financial conditions remained accommodative, citing a range of indicators including low interest rates, narrow credit spreads, high equity values, a lower dollar, and some evidence of easier terms for lending to risky borrowers. In light of elevated asset valuations and low financial market volatility, a couple of participants expressed concern that the persistence of highly accommodative financial conditions could, over time, pose risks to financial stability. Participants also noted that term premiums on longer-term nominal Treasury securities remained low. A number of factors were seen as possibly contributing to the low levels of term premiums, including large holdings of longer-term assets by major central banks, persistently low global inflation, and substantial global demand for assets with long durations.

Meeting participants also discussed the recent narrowing of the gap between the yields on long- and short-maturity nominal Treasury securities, which had resulted in a flatter profile of the term structure of interest rates. Among the factors contributing to the flattening, participants pointed to recent increases in the target range for the federal funds rate, reductions in investors' estimates of the longer-run neutral real interest rate, lower longer-term inflation expectations, and lower term premiums. They generally agreed that the current degree of flatness of the yield curve was not unusual by historical standards. However, several participants thought that it would be important to continue to monitor the slope of the yield curve. Some expressed concern that a possible future inversion of the yield curve, with short-term yields rising above those on longer-term Treasury securities, could portend an economic slowdown, noting that inversions have preceded recessions over the past several decades, or that a protracted yield curve inversion could adversely affect the financial condition of banks and other financial institutions and pose risks to financial stability. A couple of other participants viewed the flattening of the yield curve as an expected consequence of increases in the Committee's target range for the federal funds rate, and judged that a yield curve inversion under such circumstances would not necessarily foreshadow or cause an economic downturn. It was also noted that contacts in the financial sector generally did not express concern about the recent flattening of the term structure.

In their discussion of monetary policy, participants saw the outlook for economic activity and the labor market as having remained strong or having strengthened since their previous meeting, in part reflecting a modest boost from the expected passage of the tax legislation under consideration. Regarding inflation, participants generally viewed the medium-term outlook as little changed, and a majority commented that they continued to expect inflation to gradually return to the Committee's 2 percent longer-run objective. A few participants again noted that transitory factors had likely held down inflation earlier this year. However, several participants observed that survey-based measures of inflation expectations or market-based measures of inflation compensation remained low, or that other persistent factors may be holding down inflation, which would present challenges for the Committee in promoting a return of inflation to 2 percent over the medium term.

Based on their current assessments, almost all participants expressed the view that it would be appropriate for the Committee to raise the target range for the federal funds rate 25 basis points at this meeting. These participants agreed that, even after an increase in the target range at this meeting, the stance of monetary policy would remain accommodative, supporting strong labor market conditions and a sustained return to 2 percent inflation. A couple of participants did not believe it was appropriate to raise the target range for the federal funds rate at this meeting; these participants suggested that the Committee should maintain the target range at 1 to

1¼ percent until the actual rate of inflation had moved further toward the Committee's 2 percent longer-run objective or inflation expectations had increased. They judged that leaving the target range at its current level would better support an increase in inflation expectations and thereby increase the likelihood that inflation will rise to 2 percent.

Regarding the determination of the appropriate timing and size of future adjustments to the target range for the federal funds rate, participants reaffirmed the need to continue to assess realized and expected economic conditions. Most participants reiterated their support for continuing a gradual approach to raising the target range, noting that this approach helped to balance risks to the outlook for economic activity and inflation. Participants discussed several risks that, if realized, could necessitate a steeper path of increases in the target range; these risks included the possibility that inflation pressures could build unduly if output expanded well beyond its maximum sustainable level, perhaps owing to fiscal stimulus or accommodative financial market conditions. Participants also discussed risks that could lead to a flatter trajectory for the federal funds rate in the medium term, including a failure of actual or expected inflation to move up to the Committee's 2 percent objective. While participants generally saw the risks to the economic outlook as roughly balanced, they agreed that inflation developments should be monitored closely. A few participants indicated that they were not comfortable with the degree of additional policy tightening through the end of 2018 implied by the median projections for the federal funds rate in the December SEP. They expressed concern that such a path of increases in the policy rate, while gradual, might prove inconsistent with a sustained return of inflation to 2 percent, or that the level of the federal funds rate might already be near its current neutral value. A few other participants mentioned that they saw as appropriate a pace of additional policy tightening through the end of 2018 that was somewhat faster than that implied by the December SEP median forecast. They noted that financial conditions had not materially tightened since the removal of monetary policy accommodation began, that continued low interest rates risked financial instability in the future, or that the labor market was increasingly tight. A couple of participants noted the need to continue to monitor and evaluate the effects of balance sheet normalization on long-term interest rates and economic performance.

Due to the persistent shortfall of inflation from the Committee's 2 percent objective, or the risk that monetary policy could again become constrained by the zero lower bound, a few participants suggested that further study of potential alternative frameworks for the conduct of monetary policy such as price-level targeting or nominal GDP targeting could be useful.

**Committee Policy Action**

In their discussion of monetary policy for the period ahead, members judged that information received since the Committee met in November indicated that the labor market had continued to strengthen and that economic activity had been rising at a solid rate. Averaging through hurricane-related fluctuations, job gains had been solid, and the unemployment rate had declined further. Household spending had been expanding at a moderate rate, and growth in business fixed investment had picked up in recent quarters. On a 12-month basis, both overall inflation and inflation for items other than food and energy had declined for the year to date and were running below 2 percent. Market-based measures of inflation compensation had remained low; survey-based measures of longer-term inflation expectations had changed little, on balance.

Members acknowledged that hurricane-related disruptions and rebuilding had affected economic activity, employment, and inflation in recent months but had not materially altered the outlook for the national economy. They continued to expect that, with gradual adjustments in the stance of monetary policy, economic activity would expand at a moderate pace and labor market conditions would remain strong. Members expected inflation on a 12-month basis to remain somewhat below 2 percent in the near term. They also expected inflation to stabilize around the Committee's 2 percent objective over the medium term, but a couple of members expressed concern about whether inflation would return to 2 percent on a sustained basis in the medium term if the Committee increased the target range for the federal funds rate at the pace that is implied by the medians of the projections from the December SEP. Members saw the near-term risks to the economic outlook as roughly balanced, but they agreed to monitor inflation developments closely.

After assessing current conditions and the outlook for economic activity, the labor market, and inflation, nearly all members agreed to raise the target range for the federal funds rate to 1¼ to 1½ percent. These members noted that the stance of monetary policy remains accommodative, thereby supporting strong labor market conditions and a sustained return to 2 percent inflation. Two members preferred to leave the target range at 1 to 1¼ percent, suggesting that the Committee should wait to raise the target range until inflation moves up closer

to 2 percent on a sustained basis or inflation expectations increase.

Members agreed that the timing and size of future adjustments to the target range for the federal funds rate would depend on their assessments of realized and expected economic conditions relative to the Committee's objectives of maximum employment and 2 percent inflation. They noted that their assessments would 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. Members agreed that their assessments would also take into account actual and expected inflation developments relative to the Committee's symmetric inflation goal. Almost all members reaffirmed their expectation that economic conditions would evolve in a manner that would warrant gradual increases in the federal funds rate, and that the federal funds rate would be likely to remain, for some time, below levels that were expected to prevail in the longer run. Nonetheless, members reiterated that the actual path of the federal funds rate would depend on the economic outlook as informed by incoming data.

At the conclusion of the discussion, the Committee voted to authorize and direct the Federal Reserve Bank of New York, until it was instructed otherwise, to execute transactions in the SOMA in accordance with the following domestic policy directive, to be released at 2:00 p.m.:

> "Effective December 14, 2017, the Federal Open Market Committee directs the Desk to undertake open market operations as necessary to maintain the federal funds rate in a target range of 1¼ to 1½ percent, including overnight reverse repurchase operations (and reverse repurchase operations with maturities of more than one day when necessary to accommodate weekend, holiday, or similar trading conventions) at an offering rate of 1.25 percent, in amounts limited only by the value of Treasury securities held outright in the System Open Market Account that are available for such operations and by a per-counterparty limit of $30 billion per day.
>
> The Committee directs the Desk to continue rolling over at auction the amount of principal payments from the Federal Reserve's holdings of Treasury securities maturing during December that exceeds $6 billion, and to continue reinvesting in agency mortgage-backed securities the amount of principal payments from the Federal Reserve's holdings of agency debt and agency mortgage-backed securities received during December that exceeds $4 billion. Effective in January, the Committee directs the Desk to roll over at auction the amount of principal payments from the Federal Reserve's holdings of Treasury securities maturing during each calendar month that exceeds $12 billion, and to reinvest in agency mortgage-backed securities the amount of principal payments from the Federal Reserve's holdings of agency debt and agency mortgage-backed securities received during each calendar month that exceeds $8 billion. Small deviations from these amounts for operational reasons are acceptable.
>
> The Committee also directs the Desk to engage in dollar roll and coupon swap transactions as necessary to facilitate settlement of the Federal Reserve's agency mortgage-backed securities transactions."

The vote also encompassed approval of the statement below to be released at 2:00 p.m.:

> "Information received since the Federal Open Market Committee met in November indicates that the labor market has continued to strengthen and that economic activity has been rising at a solid rate. Averaging through hurricane-related fluctuations, job gains have been solid, and the unemployment rate declined further. Household spending has been expanding at a moderate rate, and growth in business fixed investment has picked up in recent quarters. On a 12-month basis, both overall inflation and inflation for items other than food and energy have declined this year and are running below 2 percent. Market-based measures of inflation compensation remain low; survey-based measures of longer-term inflation expectations are little changed, on balance.
>
> Consistent with its statutory mandate, the Committee seeks to foster maximum employment and price stability. Hurricane-related disruptions and rebuilding have affected economic activity, employment, and inflation in recent months but have not materially altered the outlook for the national economy. Consequently, the Committee continues to expect that, with gradual adjustments in the stance of monetary policy, economic activity will expand at a moderate pace and labor market conditions will remain strong. Inflation on a 12-month basis is

expected to remain somewhat below 2 percent in the near term but to stabilize around the Committee's 2 percent objective over the medium term. Near-term risks to the economic outlook appear roughly balanced, but the Committee is monitoring inflation developments closely.

In view of realized and expected labor market conditions and inflation, the Committee decided to raise the target range for the federal funds rate to 1¼ to 1½ percent. The stance of monetary policy remains accommodative, thereby supporting strong labor market conditions and a sustained return to 2 percent inflation.

In determining the timing and size of future adjustments to the target range for the federal funds rate, the Committee will assess realized and expected economic conditions relative to its objectives of maximum employment and 2 percent inflation. 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. The Committee will carefully monitor actual and expected inflation developments relative to its symmetric inflation goal. The Committee expects that economic conditions will evolve in a manner that will warrant gradual increases in the federal funds rate; the federal funds rate is likely to remain, for some time, below levels that are expected to prevail in the longer run. However, the actual path of the federal funds rate will depend on the economic outlook as informed by incoming data."

**Voting for this action:** Janet L. Yellen, William C. Dudley, Lael Brainard, Patrick Harker, Robert S. Kaplan, Jerome H. Powell, and Randal K. Quarles.

**Voting against this action:** Charles L. Evans and Neel Kashkari.

Messrs. Evans and Kashkari dissented because they preferred to maintain the existing target range for the federal funds rate at this meeting.

In Mr. Evans's view, with inflation continuing to run substantially below 2 percent and measures of inflation expectations lower than he believed to be consistent with a symmetric 2 percent inflation objective, it was important to pause in the process of policy normalization. Leaving the target range at 1 to 1¼ percent for a time would better support an increase in inflation expectations, increase the likelihood that inflation will rise to 2 percent and perhaps modestly beyond, and thus provide more support for the symmetry of the Committee's inflation objective. Such a pause also would better allow the Committee time to assess the degree to which earlier soft readings on inflation were transitory or more persistent.

In Mr. Kashkari's view, while employment growth remained strong, wage growth had not picked up and inflation remained notably below the Committee's 2 percent target. In addition, the yield curve had flattened as long-term rates had not moved higher even though the Committee raised the federal funds rate target range. He was concerned that the flattening yield curve was partly due to falling longer-term inflation expectations or a lower neutral real rate of interest. He preferred to wait for inflation to move closer to 2 percent on a sustained basis or for inflation expectations to move up before further raising the target range for the federal funds rate.

To support the Committee's decision to raise the target range for the federal funds rate, the Board of Governors voted unanimously to raise the interest rates on required and excess reserve balances ¼ percentage point, to 1½ percent, effective December 14, 2017. The Board of Governors also voted unanimously to approve a ¼ percentage point increase in the primary credit rate (discount rate) to 2 percent, effective December 14, 2017.[5]

It was agreed that the next meeting of the Committee would be held on Tuesday–Wednesday, January 30–31, 2018. The meeting adjourned at 10:15 a.m. on December 13, 2017.

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[5] In taking this action, the Board approved requests submitted by the boards of directors of the Federal Reserve Banks of Boston, New York, Philadelphia, Cleveland, Richmond, Atlanta, Kansas City, Dallas, and San Francisco. This vote also encompassed approval by the Board of Governors of the establishment of a 2 percent primary credit rate by the remaining Federal Reserve Banks, effective on the later of December 14, 2017, and the date such Reserve Banks informed the Secretary of the Board of such a request. (Secretary's note: Subsequently, the Federal Reserve Banks of Chicago, St. Louis, and Minneapolis were informed by the Secretary of the Board of the Board's approval of their establishment of a primary credit rate of 2 percent, effective December 14, 2017.) The second vote of the Board also encompassed approval of the establishment of the interest rates for secondary and seasonal credit under the existing formulas for computing such rates.

**Notation Vote**

By notation vote completed on November 21, 2017, the Committee unanimously approved the minutes of the Committee meeting held on October 31–November 1, 2017.

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**James A. Clouse**
**Secretary**

# Summary of Economic Projections

In conjunction with the Federal Open Market Committee (FOMC) meeting held on December 12–13, 2017, 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 2017 to 2020 and over the longer run.[1] Each participant's projection was 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.[2] "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, under appropriate monetary policy, growth in real GDP in 2018 would be somewhat stronger than their individual estimates of its longer-run rate. All participants projected that real GDP growth would moderate in 2019, and nearly all predicted that it would ease further in 2020; a solid majority of participants thought that growth in real GDP would be at or close to their individual estimates of the economy's longer-run growth rate by 2020. All participants who submitted longer-run projections expected that the unemployment rate would run below their estimates of its longer-run normal level through 2020. Participants generally projected that inflation, as measured by the four-quarter percentage change in the price index for personal consumption expenditures (PCE), would step up toward the Committee's 2 percent objective in 2018 and be at or close to that objective by 2019. Most participants indicated that prospective changes in federal tax policy were a factor that led them to boost their projections of real GDP growth over the next couple of years; some participants, however, noted that they had already incorporated at least some effects of future tax cuts in their September projections. Several also noted the possibility that changes to tax policy could raise the level of potential GDP in the longer run.[3] Table 1 and figure 1 provide summary statistics for the projections.

As shown in figure 2, participants generally expected 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. Compared with the projections they submitted in September, some participants raised their federal funds rate projections for 2018 and 2019, while several others lowered their projections, leaving the median projection for the federal funds rate in those years unchanged; the median projection for 2020 was slightly higher, and the median projection for the longer-run normal level of the federal funds rate was unchanged. Nearly all participants saw it as likely to be appropriate for the federal funds rate to rise above their estimates of its longer-run normal level at some point during the forecast period. Participants generally noted several sources of uncertainty about the future course of the federal funds rate, including the details of potential changes in tax policy, how those changes would affect the economy, and the range of factors influencing inflation over the medium term.

In general, participants viewed the uncertainty attached to their economic projections as broadly similar to the average of the past 20 years, and all participants saw the uncertainty associated with their projections for real GDP growth, the unemployment rate, and inflation as essentially unchanged from September. As in Septem-

[1] Four members of the Board of Governors were in office at the time of the December 2017 meeting, the same number as in September 2017. However, since the September meeting, one member, Stanley Fischer, resigned from the Board and another, Randal K. Quarles, joined. The incoming president of the Federal Reserve Bank of Richmond is scheduled to assume office on January 1, 2018; First Vice President Mark L. Mullinix submitted economic projections at this meeting as he did in September.

[2] One participant did not submit longer-run projections for real output growth, the unemployment rate, or the federal funds rate.

[3] Participants completed their submissions for the Summary of Economic Projections before the reconciliation of the House and Senate tax bills in the Congress.

## Table 1. Economic projections of Federal Reserve Board members and Federal Reserve Bank presidents, under their individual assessments of projected appropriate monetary policy, December 2017

Percent

| Variable | Median[1] | | | | | Central tendency[2] | | | | | Range[3] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | Longer run | 2017 | 2018 | 2019 | 2020 | Longer run | 2017 | 2018 | 2019 | 2020 | Longer run |
| Change in real GDP | 2.5 | 2.5 | 2.1 | 2.0 | 1.8 | 2.4 – 2.5 | 2.2 – 2.6 | 1.9 – 2.3 | 1.7 – 2.0 | 1.8 – 1.9 | 2.4 – 2.6 | 2.2 – 2.8 | 1.7 – 2.4 | 1.1 – 2.2 | 1.7 – 2.2 |
| September projection | 2.4 | 2.1 | 2.0 | 1.8 | 1.8 | 2.2 – 2.5 | 2.0 – 2.3 | 1.7 – 2.1 | 1.6 – 2.0 | 1.8 – 2.0 | 2.2 – 2.7 | 1.7 – 2.6 | 1.4 – 2.3 | 1.4 – 2.0 | 1.5 – 2.2 |
| Unemployment rate | 4.1 | 3.9 | 3.9 | 4.0 | 4.6 | 4.1 | 3.7 – 4.0 | 3.6 – 4.0 | 3.6 – 4.2 | 4.4 – 4.7 | 4.1 | 3.6 – 4.0 | 3.5 – 4.2 | 3.5 – 4.5 | 4.3 – 5.0 |
| September projection | 4.3 | 4.1 | 4.1 | 4.2 | 4.6 | 4.2 – 4.3 | 4.0 – 4.2 | 3.9 – 4.4 | 4.0 – 4.5 | 4.5 – 4.8 | 4.2 – 4.5 | 3.9 – 4.5 | 3.8 – 4.5 | 3.8 – 4.8 | 4.4 – 5.0 |
| PCE inflation | 1.7 | 1.9 | 2.0 | 2.0 | 2.0 | 1.6 – 1.7 | 1.7 – 1.9 | 2.0 | 2.0 – 2.1 | 2.0 | 1.5 – 1.7 | 1.7 – 2.1 | 1.8 – 2.3 | 1.9 – 2.2 | 2.0 |
| September projection | 1.6 | 1.9 | 2.0 | 2.0 | 2.0 | 1.5 – 1.6 | 1.8 – 2.0 | 2.0 | 2.0 – 2.1 | 2.0 | 1.5 – 1.7 | 1.7 – 2.0 | 1.8 – 2.2 | 1.9 – 2.2 | 2.0 |
| Core PCE inflation[4] | 1.5 | 1.9 | 2.0 | 2.0 | | 1.5 | 1.7 – 1.9 | 2.0 | 2.0 – 2.1 | | 1.4 – 1.5 | 1.7 – 2.0 | 1.8 – 2.3 | 1.9 – 2.3 | |
| September projection | 1.5 | 1.9 | 2.0 | 2.0 | | 1.5 – 1.6 | 1.8 – 2.0 | 2.0 | 2.0 – 2.1 | | 1.4 – 1.7 | 1.7 – 2.0 | 1.8 – 2.2 | 1.9 – 2.2 | |
| Memo: Projected appropriate policy path | | | | | | | | | | | | | | | |
| Federal funds rate | 1.4 | 2.1 | 2.7 | 3.1 | 2.8 | 1.4 | 1.9 – 2.4 | 2.4 – 3.1 | 2.6 – 3.1 | 2.8 – 3.0 | 1.1 – 1.4 | 1.1 – 2.6 | 1.4 – 3.6 | 1.4 – 4.1 | 2.3 – 3.0 |
| September projection | 1.4 | 2.1 | 2.7 | 2.9 | 2.8 | 1.1 – 1.4 | 1.9 – 2.4 | 2.4 – 3.1 | 2.5 – 3.5 | 2.5 – 3.0 | 1.1 – 1.6 | 1.1 – 2.6 | 1.1 – 3.4 | 1.1 – 3.9 | 2.3 – 3.5 |

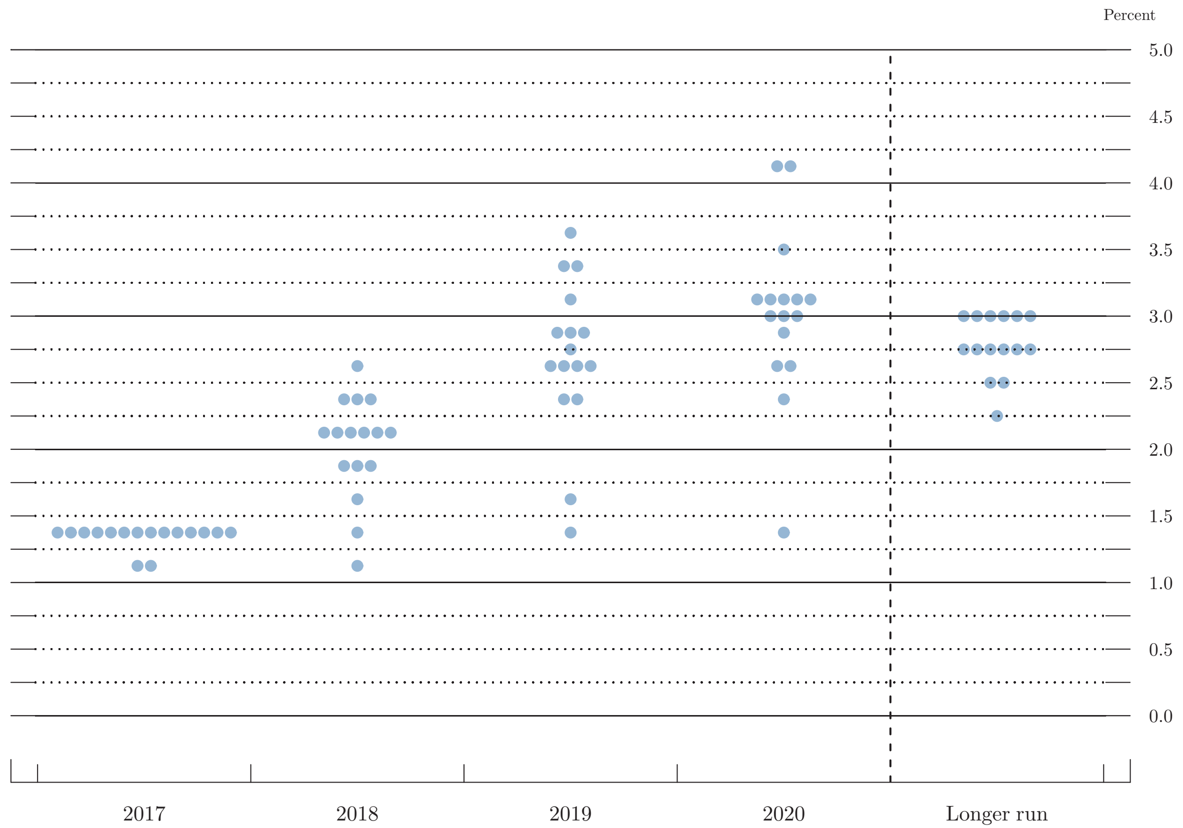
NOTE: Projections of change in real gross domestic product (GDP) and projections for both measures of inflation are percent changes from the fourth quarter of the previous year to the fourth quarter of the year indicated. PCE inflation and core PCE inflation are the percentage rates of change in, respectively, 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 September projections were made in conjunction with the meeting of the Federal Open Market Committee on September 19–20, 2017. 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 September 19–20, 2017, meeting, and one participant did not submit such projections in conjunction with the December 12–13, 2017, 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.

Figure 1. Medians, central tendencies, and ranges of economic projections, 2017–20 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.

ber, most participants judged the risks around their projections for economic growth, the unemployment rate, and inflation as broadly balanced.

**The Outlook for Economic Activity**

The median of participants' projections for the growth rate of real GDP for 2018, conditional on their individual assessments of appropriate monetary policy, was 2.5 percent, the same as for 2017. The median projections for GDP growth in 2019 and 2020 were slightly lower, at 2.1 and 2.0 percent, respectively. Compared with the Summary of Economic Projections (SEP) from September, the median of the projections for real GDP growth for 2018 was notably higher, while the medians for real GDP growth for 2019 and 2020 were modestly higher. The median of projections for the longer-run normal rate of real GDP growth remained at 1.8 percent. Most participants pointed to changes in tax policy as likely to provide some boost to real GDP growth over the forecast period; in September, fewer than half of the participants incorporated prospective tax policy changes in their projections. Several participants indicated that they had marked up their estimates of the magnitude of tax cuts, relative to their assumptions in September.

The medians of projections for the unemployment rate in the fourth quarter of both 2018 and 2019 were 3.9 percent, 0.2 percentage point below the medians from September and about ¾ percentage point below the median assessment of its longer-run normal level. The median projection for the unemployment rate ticked up slightly to 4.0 percent in 2020.

Figures 3.A and 3.B show the distributions of participants' projections for real GDP growth and the unemployment rate from 2017 to 2020 and in the longer run. The distribution of individual projections for real GDP growth for 2018 shifted up, with more than half of the participants now expecting real GDP growth of 2.5 percent or more and none seeing it below 2.2 percent. The distribution of projected real GDP growth in 2019 and 2020 also shifted up, albeit only slightly. The distribution for the longer-run normal rate of GDP growth was little changed from September. The distributions of individual projections for the unemployment rate in 2018 and 2019 shifted down relative to those in September, broadly consistent with the changes in the distributions for real GDP growth.

**The Outlook for Inflation**

The median of projections for headline PCE price inflation was 1.9 percent in 2018 and 2 percent in 2019 and 2020, the same as in the September SEP. Most participants anticipated that inflation would continue to run a bit below 2 percent in 2018, and only one participant expected inflation above 2 percent that year. A majority of participants projected that inflation would be equal to the Committee's objective in 2019 and 2020. Several participants projected that inflation would slightly exceed 2 percent in 2019 or 2020. The medians of projections for core PCE price inflation over the 2018–20 period were the same as those for headline inflation.

Figures 3.C and 3.D provide information on the distributions of participants' views about the outlook for inflation. On the whole, the distributions of projections for headline PCE price inflation and core PCE price inflation beyond 2017 were little changed from September.

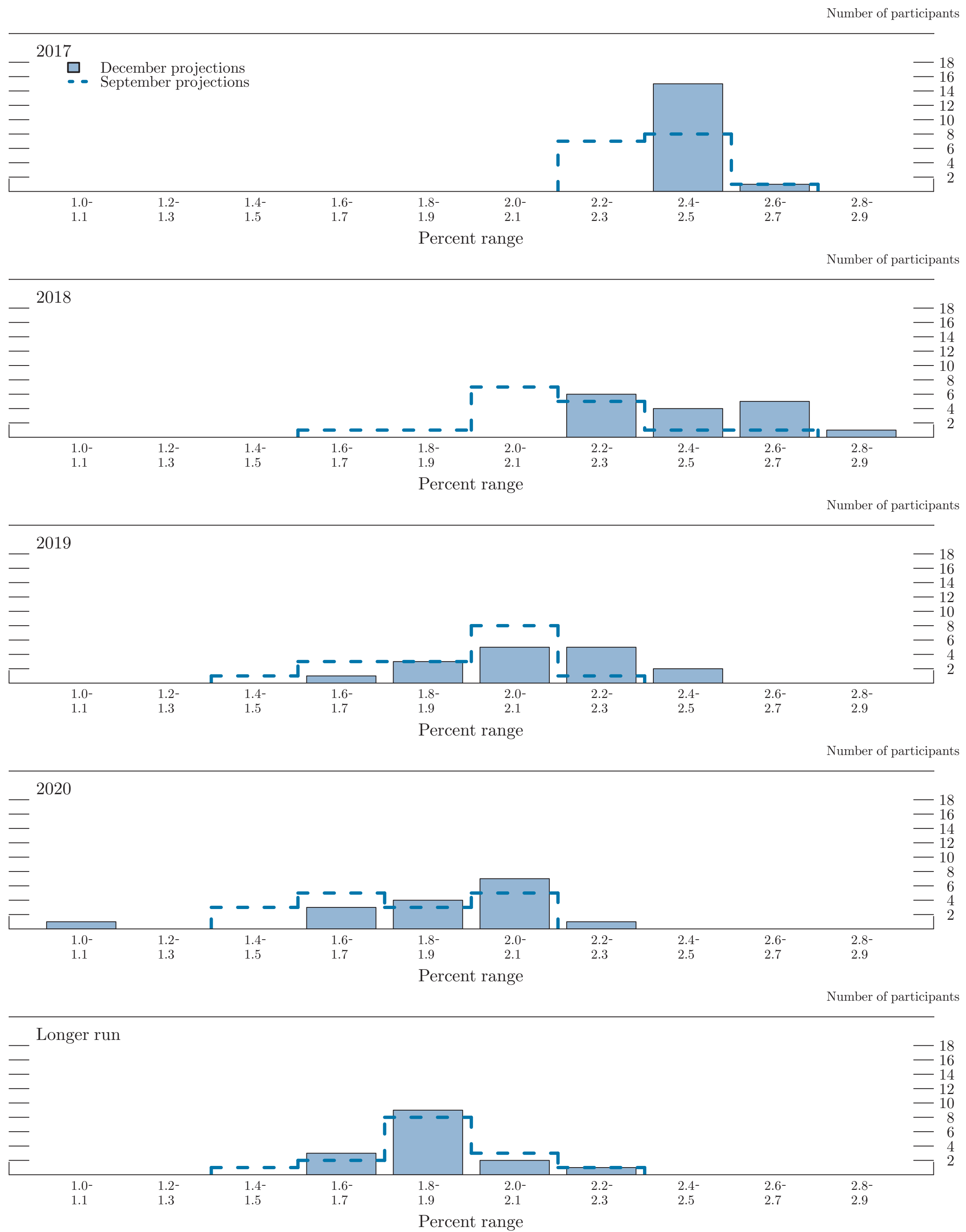
**Appropriate Monetary Policy**

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 2017 to 2020 and in the longer run. Overall, the distributions differed in only small ways from those reported in the September SEP. There was a moderate reduction in the dispersion of the distribution for 2020 and for the longer run; some of the lower-end projections for those horizons from the September SEP were revised up in the current projections.

The median projection of the year-end federal funds rate continued to rise gradually over the 2018–20 period. The median projection for the end of 2018 was 2.13 percent; the medians of the projections were 2.69 percent at the end of 2019 and 3.07 percent at the end of 2020. Nearly all participants projected that it would likely be appropriate for the federal funds rate to rise above their individual estimates of the longer-run normal rate at some point over the forecast period. Compared with their projections prepared for the September SEP, a few participants raised their projections for the federal funds rate in the longer run and one lowered it; the median was unchanged at 2.75 percent.

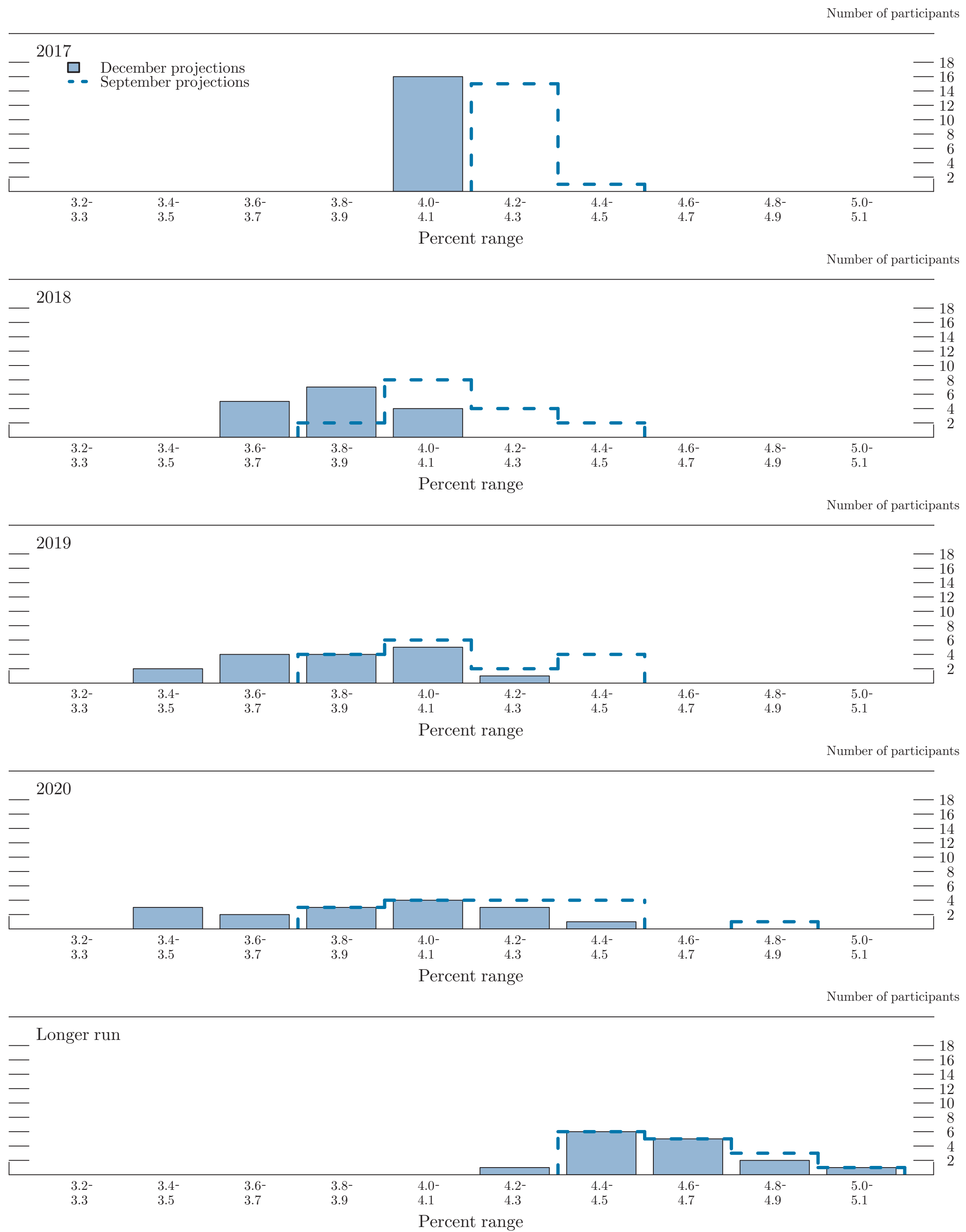
In discussing their projections, many participants once again expressed the view that the appropriate trajectory of the federal funds rate over the next few years would likely involve gradual increases. This view was predicated on several factors, including a judgment that the neutral real interest rate was currently low and would move up only slowly, as well as the balancing of risks associated with, among other things, the possibility that inflation pressures could build if the economy expands well beyond its long-run sustainable level, and the possibility that the forces depressing inflation could prove to be more persistent than currently anticipated. As always, the actual path of the federal funds rate will depend on

Figure 3.A. Distribution of participants' projections for the change in real GDP, 2017–20 and over the longer run



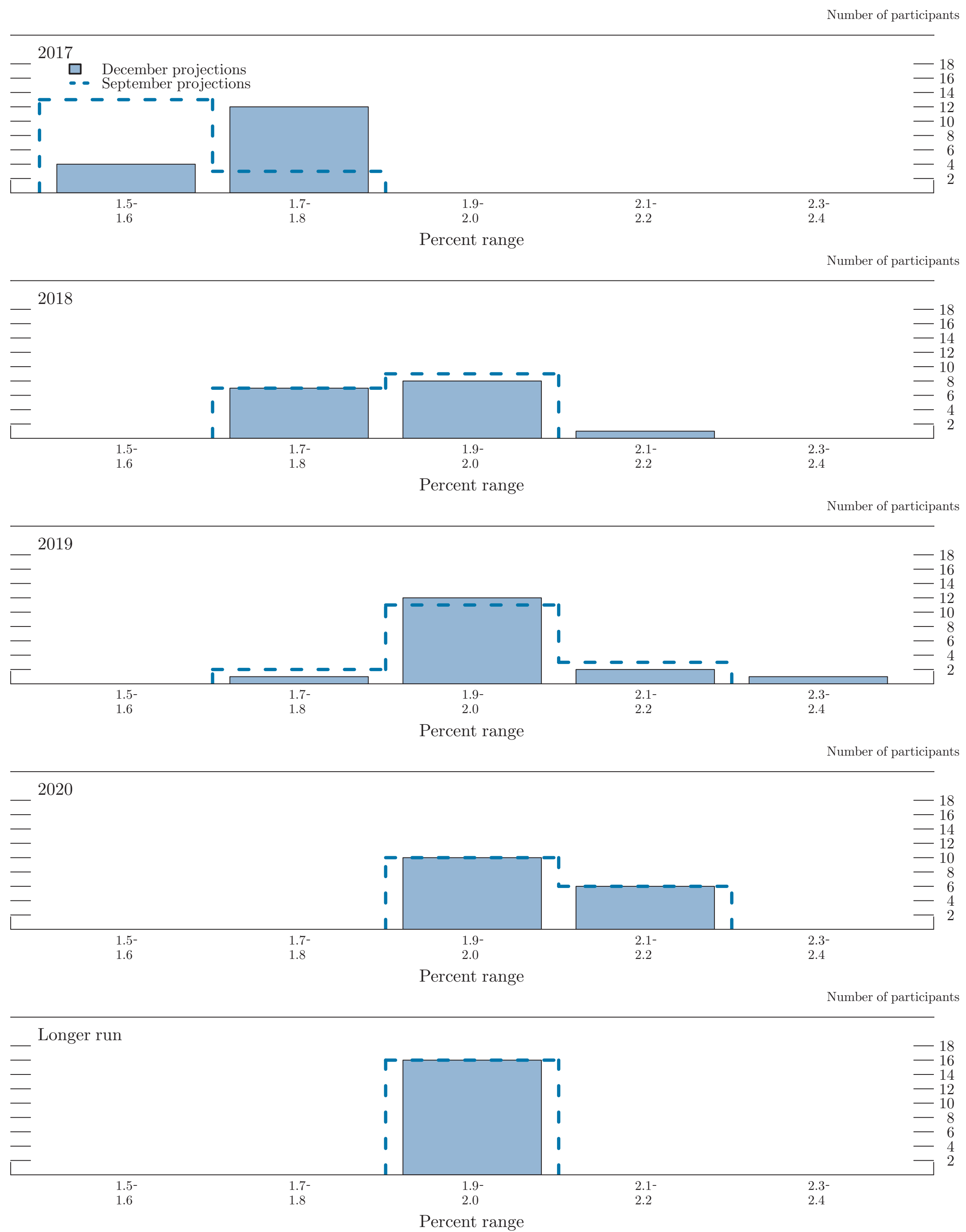

Note: Definitions of variables and other explanations are in the notes to table 1.

Figure 3.B. Distribution of participants' projections for the unemployment rate, 2017–20 and over the longer run



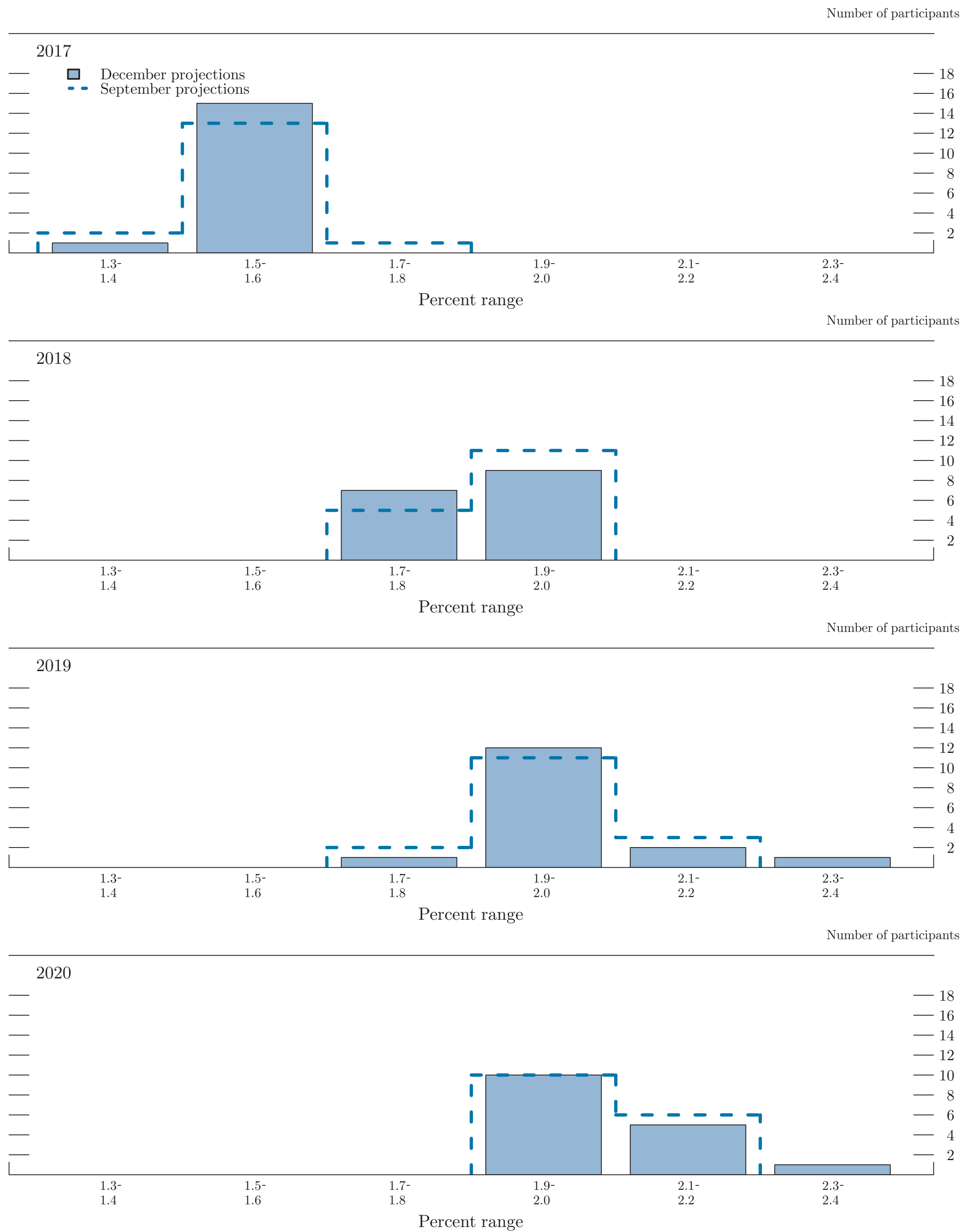

Note: Definitions of variables and other explanations are in the notes to table 1.

Figure 3.C. Distribution of participants' projections for PCE inflation, 2017–20 and over the longer run



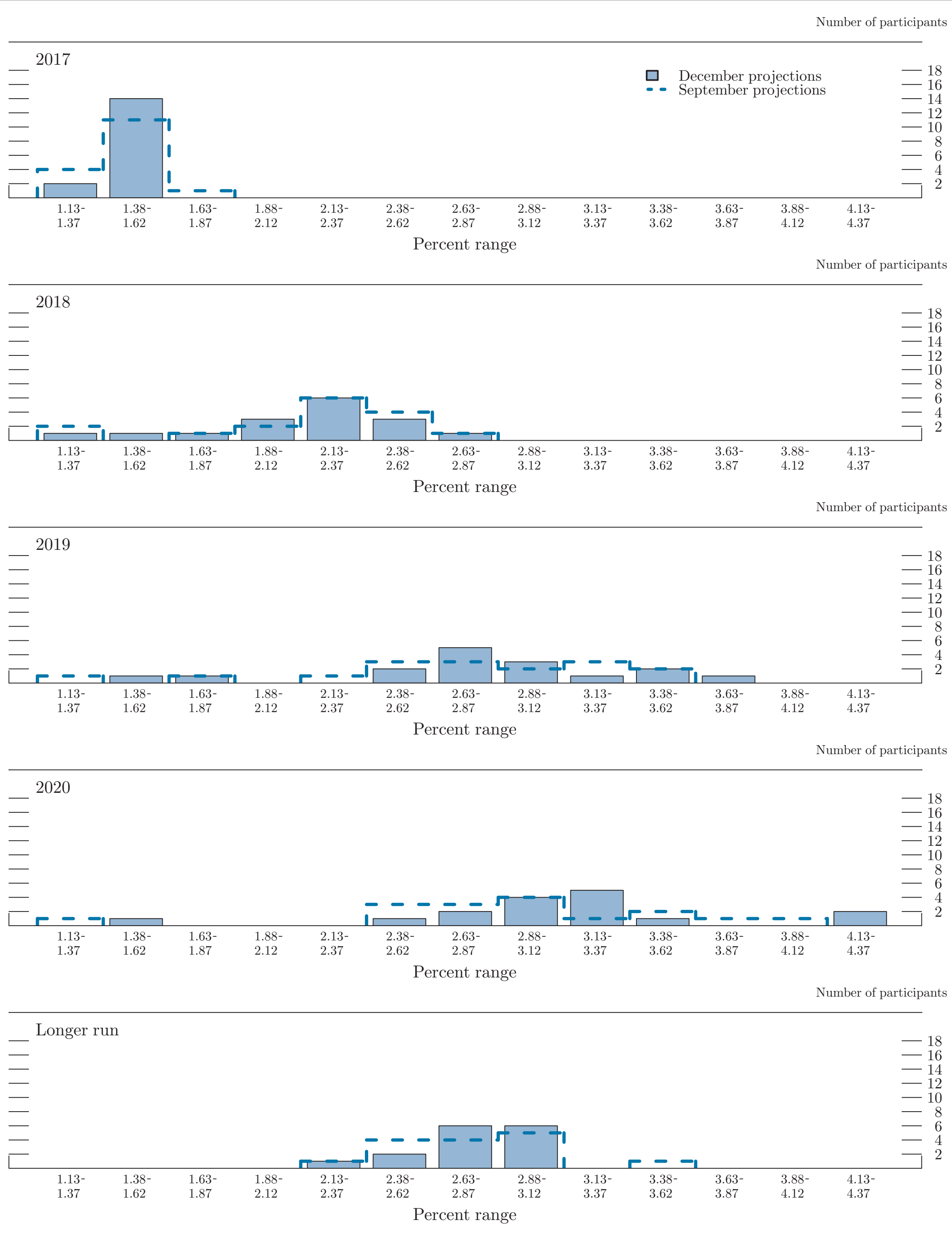

NOTE: Definitions of variables and other explanations are in the notes to table 1.

Figure 3.D. Distribution of participants' projections for core PCE inflation, 2017–20




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, 2017–20 and over the longer run




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

evolving economic conditions and their implications for the economic outlook.

**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 a measure 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 consumer price inflation. That measure is incorporated graphically in the top panels of figures 4.A, 4.B, and 4.C, which display "fan charts" plotting the median SEP projections for the three variables surrounded by symmetric confidence intervals derived from the forecast errors presented 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, future outcomes of these variables would have about a 70 percent probability of occurring within these confidence intervals. For all three variables, this measure of projection uncertainty is substantial and generally increases as the forecast horizon lengthens.

Table 2. Average historical projection error ranges
Percentage points

| Variable | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|
| Change in real GDP[1] . . . . . . | ±0.8 | ±1.7 | ±2.1 | ±2.2 |
| Unemployment rate[1] . . . . . . | ±0.1 | ±0.8 | ±1.5 | ±1.9 |
| Total consumer prices[2] . . . . | ±0.2 | ±1.0 | ±1.1 | ±1.0 |
| Short-term interest rates[3] . . . | ±0.1 | ±1.4 | ±1.9 | ±2.4 |

NOTE: Error ranges shown are measured as plus or minus the root mean squared error of projections for 1997 through 2016 that were released in the winter 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.

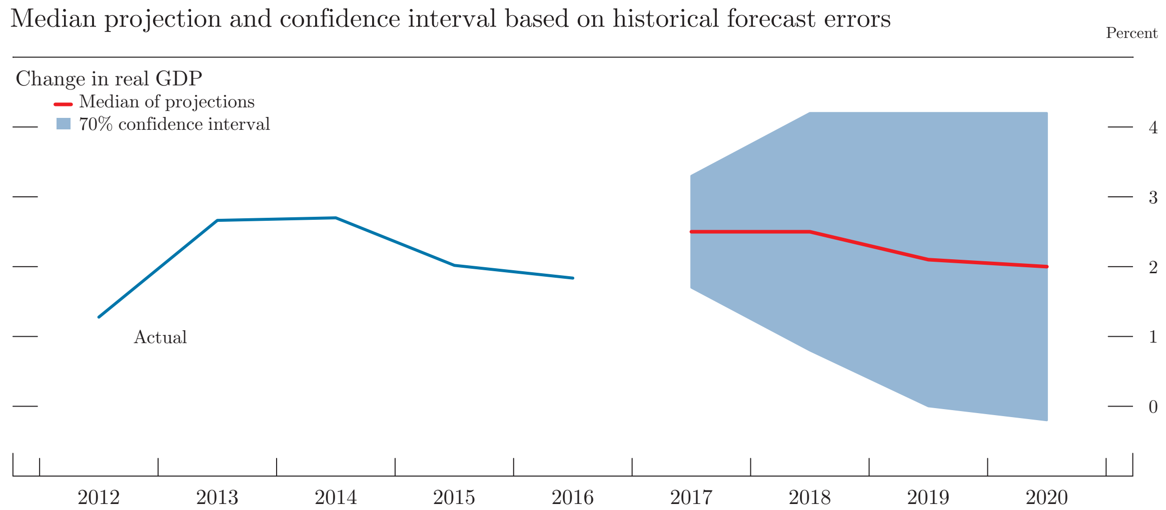
Participants' assessments of the level of uncertainty surrounding their economic projections are shown in the bottom-left panels of figures 4.A, 4.B, and 4.C. Nearly all participants viewed the degree of uncertainty attached to their economic projections about GDP growth, the unemployment rate, and inflation as broadly similar to the average of the past 20 years, a view that was essentially unchanged from September.[4] About half of the participants who commented on this topic suggested that uncertainties about the details of the pending tax legislation had raised their assessment of uncertainty for GDP growth, albeit not by enough to tip their assessments into the higher-than-average category.

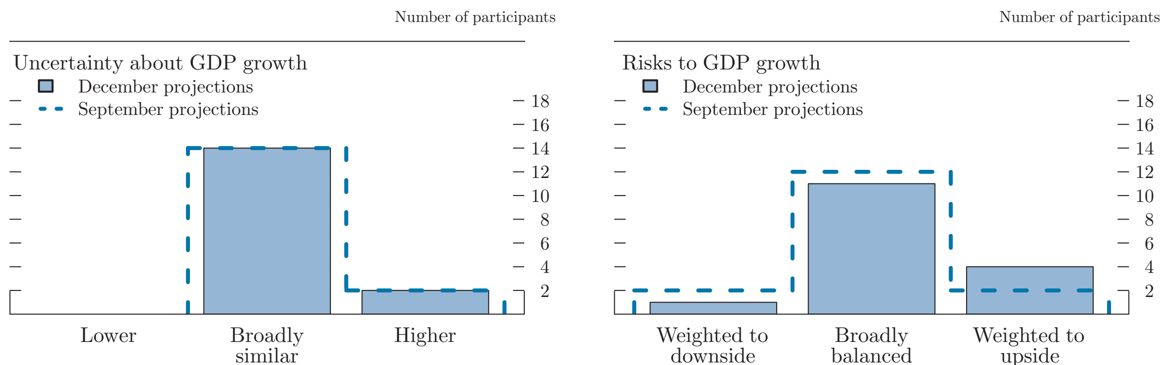
Because the fan charts are constructed to be symmetric around the median projection, they do not reflect any asymmetries in the balance of risks that participants may see in their economic projections. Accordingly, participants' assessments of the balance of risks to their economic projections are shown in the bottom-right panels of figures 4.A, 4.B, and 4.C. As in September, most participants judged the risks to their projections of real GDP growth, the unemployment rate, headline inflation and core inflation as broadly balanced—in other words, as broadly consistent with a symmetric fan chart. The balance of risks to the economic outlook shifted slightly in the direction of strength, with two more participants seeing upside risks to growth in real GDP than in September and one more seeing risks to the unemployment rate as weighted to the downside. In addition, one more participant than before saw risks to inflation as weighted to the upside.

Participants' assessments of the future path of the federal funds rate consistent with appropriate policy are 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, unemployment, and inflation, uncertainty surrounding the projected path for the funds rate importantly reflects the uncertainties about the path 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 is substantial and increases for longer horizons.

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

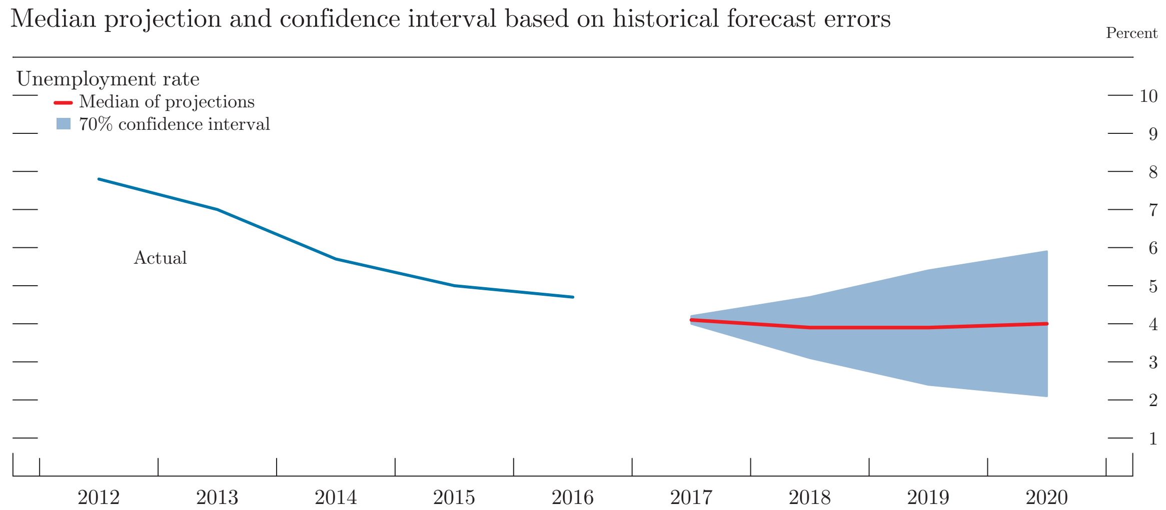
Figure 4.A. Uncertainty and risks in projections of GDP growth

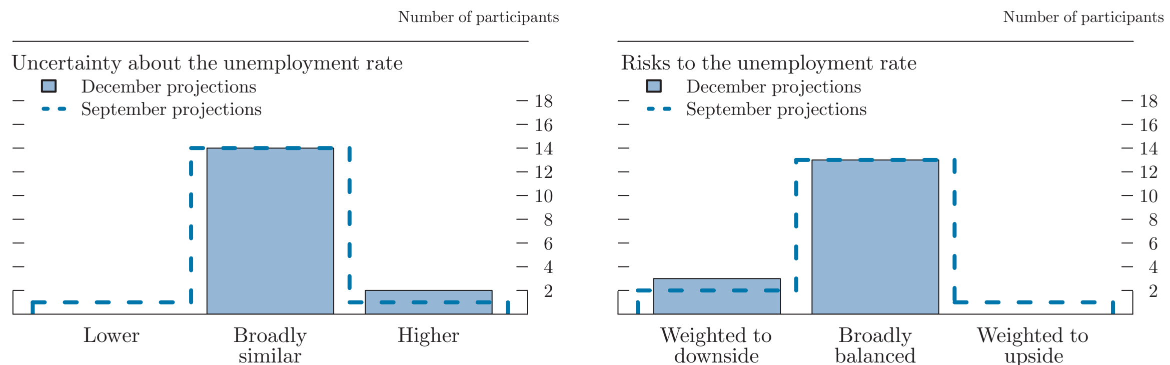



Note: The blue and red lines in the top panel show actual values and median projected values, respectively, of the percent change in real gross domestic product (GDP) from the fourth quarter of the previous year to the fourth quarter of the year indicated. The confidence interval around the median projected 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."

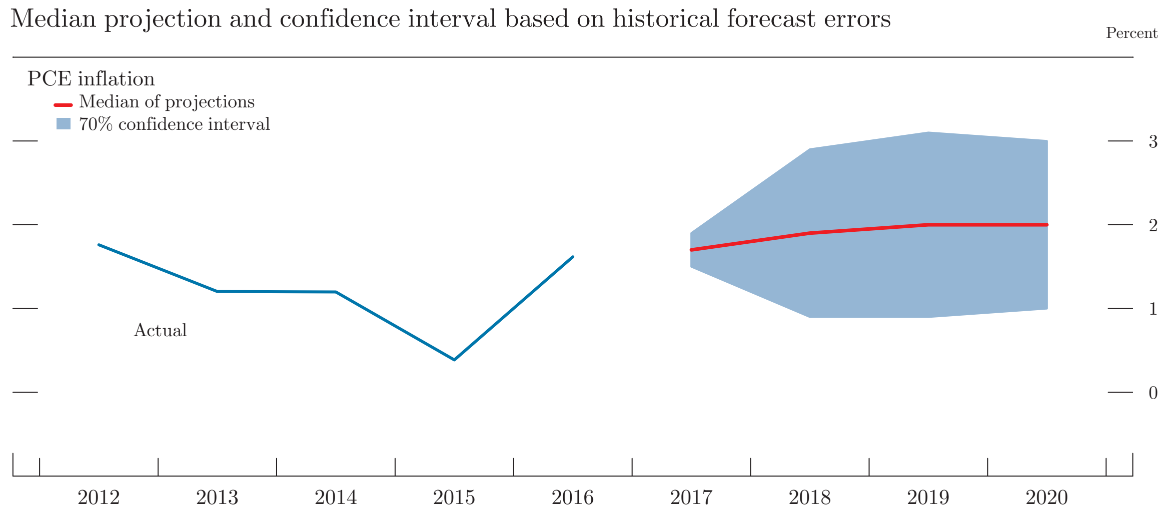
Figure 4.B. Uncertainty and risks in projections of the unemployment rate

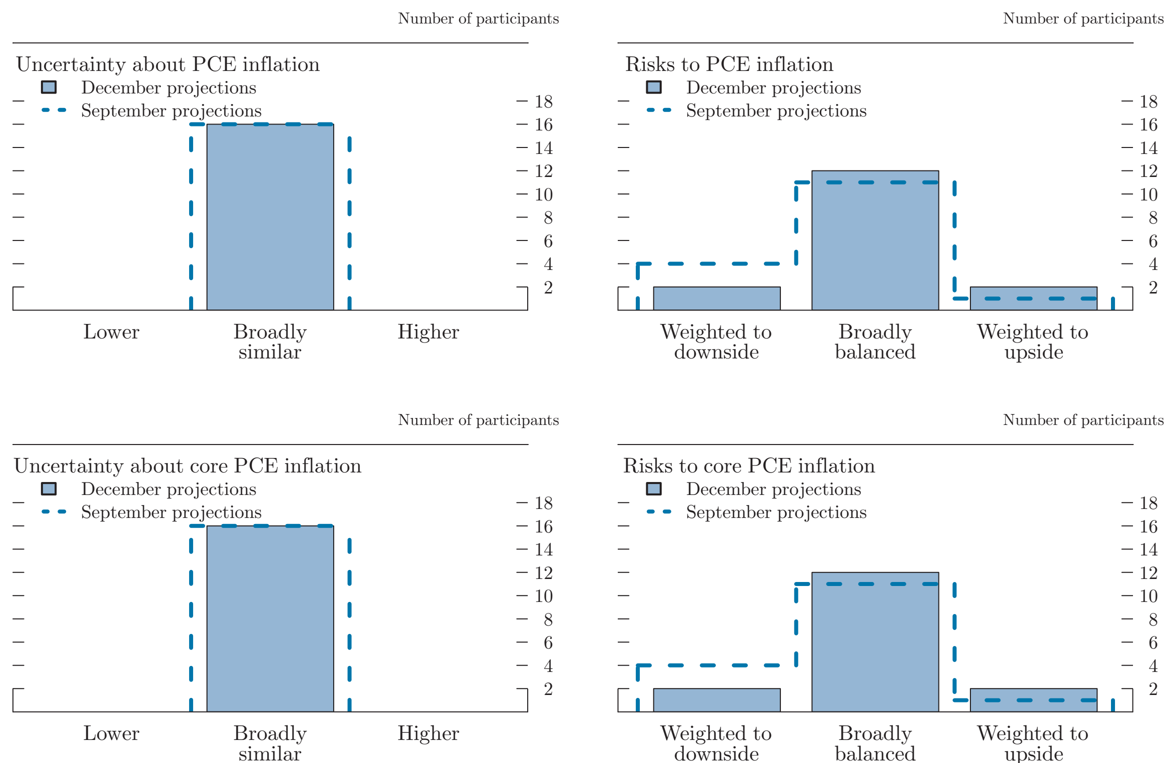



Note: The blue and red lines in the top panel show actual values and median projected values, respectively, of the average civilian unemployment rate in the fourth quarter of the year indicated. The confidence interval around the median projected values is assumed to be symmetric and is based on root 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."

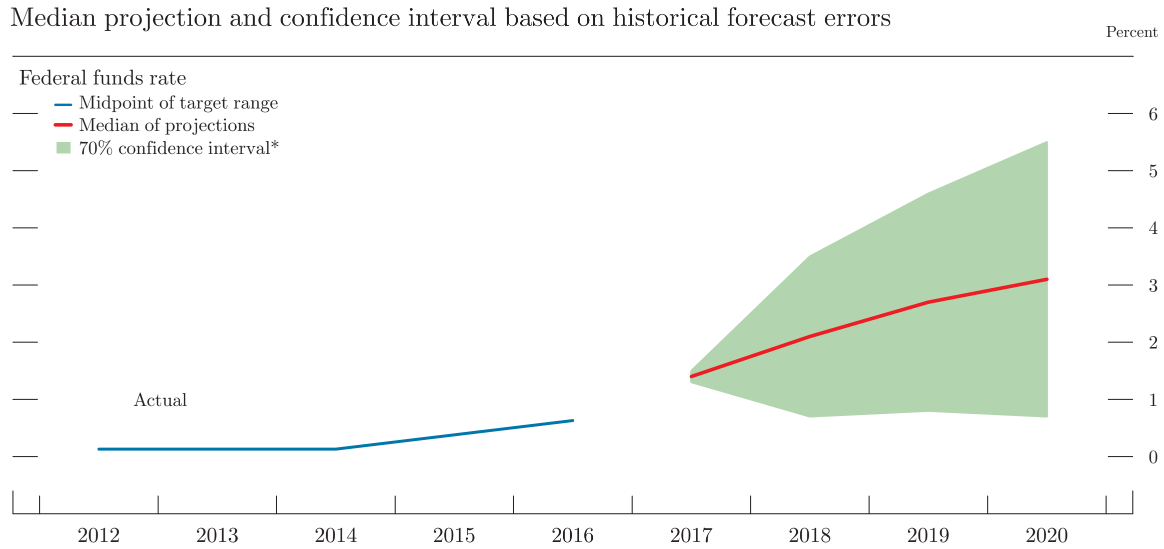
Figure 4.C. Uncertainty and risks in projections of PCE inflation




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 Report*s 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 2.2 to 3.8 percent in the current year, 1.3 to 4.7 percent in the second year, 0.9 to 5.1 percent in the third year, and 0.8 to 5.2 percent in the fourth year. The corresponding 70 percent confidence intervals for overall inflation would be 1.8 to 2.2 percent in the current year, 1.0 to 3.0 percent in the second year, 0.9 to 3.1 percent in the third year, and 1.0 to 3.0 percent in the fourth year. 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.