

MONETARY POLICY REPORT

February 10, 2016



Board of Governors of the Federal Reserve System

LETTER OF TRANSMITTAL



BOARD OF GOVERNORS OF THE
FEDERAL RESERVE SYSTEM

Washington, D.C., February 10, 2016

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,

A handwritten signature in cursive script that reads "Janet L. Yellen".

Janet L. Yellen, Chair

STATEMENT ON LONGER-RUN GOALS AND MONETARY POLICY STRATEGY

Adopted effective January 24, 2012; as amended effective January 26, 2016

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 4.9 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

Summary	1
Part 1: Recent Economic and Financial Developments	3
Domestic Developments	3
Financial Developments	16
International Developments	22
Part 2: Monetary Policy	29
Part 3: Summary of Economic Projections	35
The Outlook for Economic Activity	36
The Outlook for Inflation	38
Appropriate Monetary Policy	41
Uncertainty and Risks	45
Abbreviations	49
List of Boxes	
Effects of Movements in Oil Prices and the Dollar on Inflation	8
Developments Related to Financial Stability	20
Monetary Policy Divergence in the Advanced Economies	24
The Neutral Federal Funds Rate in the Longer Run	32
Monetary Policy Implementation following the December 2015 FOMC Meeting ...	34
Forecast Uncertainty	47

NOTE: Unless stated otherwise, the time series in the figures extend through, for daily data, February 4, 2016; for monthly data, January 2016; and, for quarterly data, 2015:Q4. 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.

For figures 32 and 36, note that the Dow Jones Bank Index and the S&P 500 Index (“Indexes”) are a product of S&P Dow Jones Indices LLC and/or its affiliates and have been licensed for use by the Board. Copyright © 2016 S&P Dow Jones Indices LLC, a subsidiary of the McGraw Hill Financial Inc., and/or its affiliates. All rights reserved. Redistribution, reproduction and/or photocopying in whole or in part are prohibited without written permission of S&P Dow Jones Indices LLC. For more information on any of S&P Dow Jones Indices LLC’s indices please visit www.spdji.com. S&P® is a registered trademark of Standard & Poor’s Financial Services LLC and Dow Jones® is a registered trademark of Dow Jones Trademark Holdings LLC. Neither S&P Dow Jones Indices LLC, Dow Jones Trademark Holdings LLC, their affiliates nor their third party licensors make any representation or warranty, express or implied, as to the ability of any index to accurately represent the asset class or market sector that it purports to represent and neither S&P Dow Jones Indices LLC, Dow Jones Trademark Holdings LLC, their affiliates nor their third party licensors shall have any liability for any errors, omissions, or interruptions of any index or the data included therein.

SUMMARY

Labor market conditions continued to improve during the second half of 2015 and into early 2016. Payroll employment has increased at a solid average pace of 225,000 per month since June. The unemployment rate, which had reached a high of 10 percent in late 2009, declined from 5.3 percent last June to 4.9 percent in January. Although the unemployment rate now equals the median of Federal Open Market Committee (FOMC) participants' estimates of its longer-run normal level, other considerations suggest that some further improvement in labor market conditions is needed to achieve the Committee's maximum employment mandate. The labor force participation rate remains somewhat below most assessments of its trend, and an unusually large number of people continue to work part time when they would prefer full-time employment.

Inflation remains below the FOMC's longer-run goal of 2 percent: The price index for personal consumption expenditures (PCE) rose only ½ percent over the 12 months ending in December. The PCE price index excluding food and energy items, which often provides a better indication of future inflation, also remained subdued, rising 1½ percent over that period. Inflation has been held down substantially by the drop in energy prices; declines in the prices of non-oil imported goods have contributed as well. Meanwhile, survey-based measures of longer-run inflation expectations have drifted down a little since the middle of last year and generally stand near the lower ends of their historical ranges; market-based measures of inflation compensation have fallen and are at low levels.

Real gross domestic product (GDP) is reported to have increased at an annual rate of about 1¼ percent over the second half of the year, slower than the first-half pace. The expansion in economic activity reflected continued increases in private domestic final

demand, supported by ongoing job gains and accommodative monetary policy. Government purchases rose modestly. By contrast, the rise in the foreign exchange value of the dollar over the past year and a half and the sluggish pace of economic activity abroad have continued to weigh on exports. In addition, the pace of inventory accumulation slowed markedly from its elevated first-half pace, thereby reducing overall GDP growth in the second half of 2015.

Domestic financial conditions have become somewhat less supportive of economic growth since mid-2015. Recent months have been marked by bouts of turbulence in financial markets that largely reflected concerns about the global economic outlook and developments in oil markets. Broad measures of U.S. equity prices have declined, on net, roughly returning these indexes to levels that prevailed during the first half of 2014. And the dollar has strengthened further, on balance, since the summer of 2015. Corporate risk spreads have widened, particularly for lower-rated issuers. Nonetheless, interest rates for investment-grade issuers are generally still low, reflecting declines in yields on longer-term Treasury securities. Moreover, although debt issuance by lower-rated firms has slowed, credit flows to nonfinancial businesses have remained solid since the middle of last year, supported by continued strong bond issuance of higher-rated firms and by bank lending. Household access to credit was mixed, with mortgages and credit cards still difficult to access for some borrowers while student and auto loans remained broadly available, even to borrowers with lower credit scores. Overall, debt growth in the household sector has remained modest and continues to be concentrated among borrowers with strong credit histories.

The U.S. financial system overall has been resilient to the stresses that have emerged since mid-2015, and financial vulnerabilities

remain moderate. Regulatory capital ratios and holdings of liquid assets at large banking firms are at historically high levels. Usage of short-term wholesale funding in the financial system is relatively low, and the use of leverage to finance securities purchases has declined somewhat. The ratio of aggregate private nonfinancial credit to GDP is below most estimates of its long-run trend, although leverage of speculative-grade nonfinancial corporations has risen further since the middle of last year and is relatively high. Risk premiums for many asset classes have increased. For instance, the rise in spreads on corporate debt has been larger than would be expected given the evolution of expected defaults. The direct exposures of the largest U.S. banking firms to the oil sector and to emerging market economies are limited. If conditions in those sectors worsen, however, wider stresses could emerge and be transmitted to the United States through indirect global financial linkages.

In December, after holding the federal funds rate near zero for seven years, the FOMC raised the target range for that rate to $\frac{1}{4}$ to $\frac{1}{2}$ percent. The decision to increase the federal funds rate reflected the Committee's assessment that there had been considerable improvement in the labor market last year and that the Committee was reasonably confident that inflation would move back to 2 percent over the medium term; thus, the criteria set out by the Committee in March 2015 had been met.

The Committee anticipates that economic conditions will evolve in a manner that will warrant only gradual increases in the federal funds rate. This expectation is consistent with the view that the neutral nominal federal funds rate—defined as the value of the federal funds rate that would be neither expansionary nor contractionary if the economy was operating at its productive potential—is currently low by historical standards and is likely to rise only

gradually over time, as headwinds to economic growth dissipate slowly and as inflation rises toward the Committee's goal of 2 percent. Consistent with this outlook, in the most recent Summary of Economic Projections (SEP), which was compiled at the time of the December FOMC meeting, FOMC participants projected that the appropriate level of the federal funds rate would be below its longer-run level through 2018. (The December SEP is included as Part 3 of this report.)

With respect to its securities holdings, the Committee will continue to reinvest principal payments from its securities portfolio, and it expects to maintain this reinvestment policy until normalization of the level of the federal funds rate is well under way. This policy, by keeping the Committee's holdings of longer-term securities at sizable levels, should help maintain accommodative financial conditions.

The Committee has emphasized that the actual path of monetary policy will depend on how incoming data affect the economic outlook. In determining the timing and size of future adjustments to the target range of the federal funds rate, the Committee will assess realized and expected economic conditions relative to its objectives of maximum employment and 2 percent inflation. Stronger growth or a more rapid increase in inflation than the Committee currently anticipates would likely call for faster increases in the federal funds rate; conversely, if conditions prove weaker, a lower path of the federal funds rate would likely be appropriate.

To move the federal funds rate into the new target range announced in December, the Federal Reserve raised the rate of interest paid on required and excess reserve balances and also employed an overnight reverse repurchase agreement facility. The effective federal funds rate was moved successfully into the increased target range. The FOMC remains confident that it has the tools it needs to adjust short-term interest rates as appropriate.

PART 1

RECENT ECONOMIC AND FINANCIAL DEVELOPMENTS

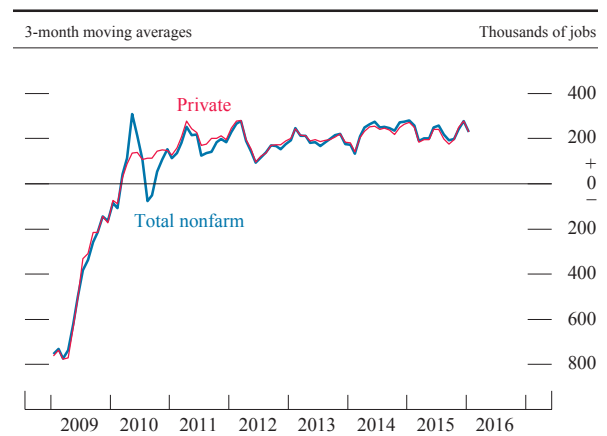
The labor market continued to improve during the second half of last year and early this year. Payroll employment has increased 225,000 per month, on average, since June. The unemployment rate fell from 5.3 percent in June to 4.9 percent in January and thus has reached the median estimate among Federal Open Market Committee (FOMC) participants of the level of unemployment that is considered to be normal in the longer run. Even so, the relatively low labor force participation rate and the unusually large number of people working part time who would prefer full-time employment suggest that some cyclical weakness is still present in the labor market. Since mid-2014, a steep drop in crude oil prices has exerted significant downward pressure on overall inflation, and declines in the prices of non-oil imported goods have held down inflation as well. The price index for personal consumption expenditures (PCE) increased only ½ percent during the 12 months ending in December, a rate that is well below the FOMC’s longer-run objective of 2 percent; the index excluding food and energy prices rose 1½ percent over the same period. Both survey- and market-based measures of inflation expectations have moved down since June. Meanwhile, real gross domestic product (GDP) increased at an annual rate of 1¼ percent over the second half of 2015, slower than in the first half. The growth in GDP has been supported by accommodative monetary policy, favorable consumer confidence, and the boost to household purchasing power from lower oil prices. However, lower oil prices have also exerted downward pressure on domestic investment in the energy sector. In addition, sluggish growth abroad and the higher foreign exchange value of the dollar have weighed on exports, and financial conditions more generally have become somewhat less supportive of economic growth. Concerns about economic conditions abroad and the energy sector have contributed to lower equity prices and higher borrowing rates for some businesses.

Domestic Developments

The labor market has continued to improve . . .

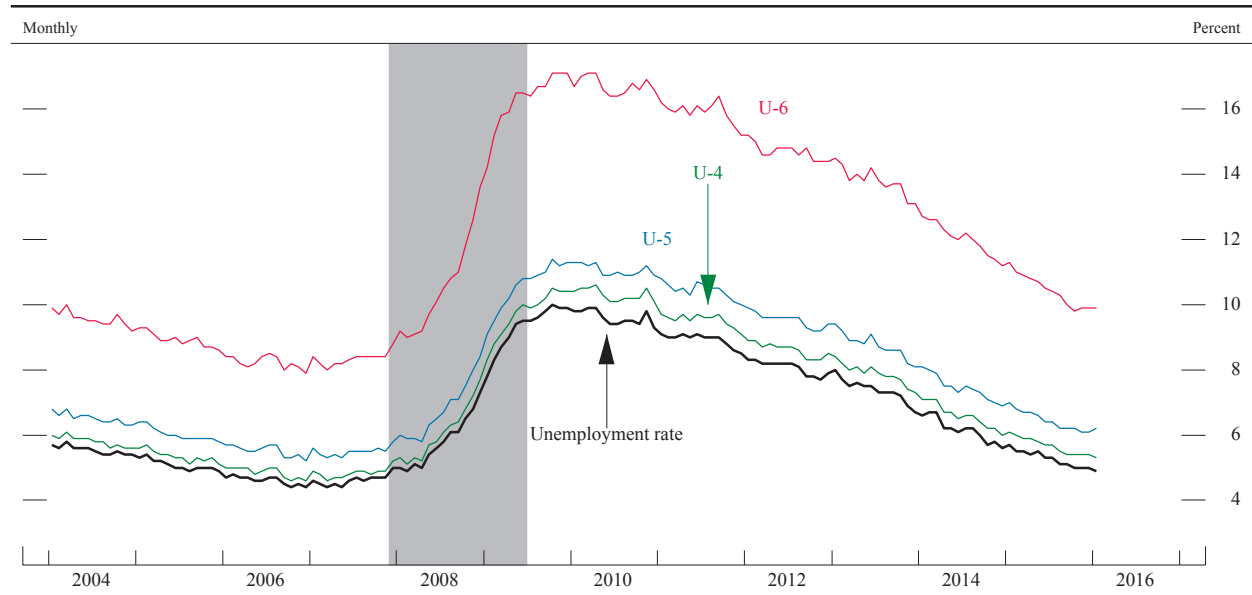
Labor market conditions strengthened further across a variety of dimensions over the second half of 2015 and early this year. Payroll employment gains remained robust, averaging about 235,000 per month over the second half of last year, similar to the gains over the first half; factoring in the January increase of about 150,000, monthly gains since June have averaged about 225,000 (figure 1). The increase in 2015 followed an even faster pace of job gains in 2014, and, in total, some 5¾ million jobs were added over the two years. In addition, the unemployment rate—which had reached 10 percent in late 2009—declined from 5.3 percent in June 2015 to 4.9 percent in January of this year; this level is ¾ percentage point lower than a year earlier and is equal to

1. Net change in payroll employment



SOURCE: Department of Labor, Bureau of Labor Statistics.

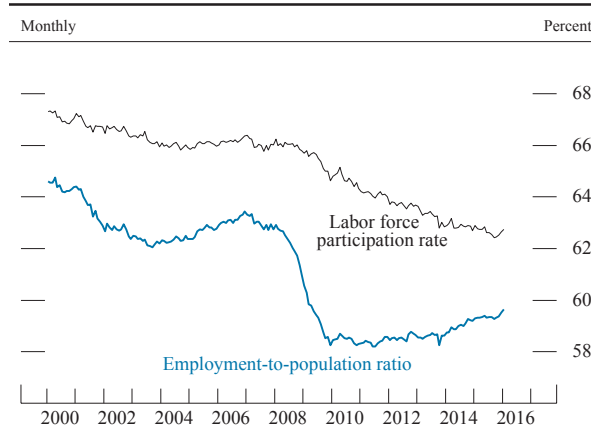
2. Measures of labor underutilization



NOTE: U-4 measures total unemployed plus discouraged workers, as a percent 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 percent 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 percent 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: Department of Labor, Bureau of Labor Statistics.

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



NOTE: Both series are a percent of the population aged 16 and over.
SOURCE: Department of Labor, Bureau of Labor Statistics.

the median of FOMC participants’ estimates of its longer-run normal level (figure 2). Broader measures of labor underutilization, such as those including individuals who are classified as marginally attached to the labor force, declined by similar amounts. (A “marginally attached” individual is defined as someone who is not looking for work currently and therefore treated as not in the labor force, but who wants and is available for work and has looked for a job in the past 12 months.)

... though some labor market slack likely remains ...

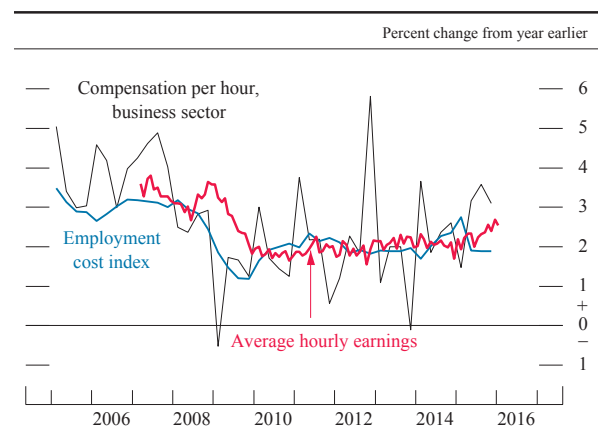
While payroll employment and the unemployment rate have improved further since mid-2015, the labor force participation rate fell from an average of 62.7 percent of the working-age population during the second quarter of 2015 to 62.5 percent in the fourth quarter; the participation rate moved back up to 62.7 percent in January (figure 3). Changing demographics—most notably the increasing

share of older people in the population, who are less likely to be in the labor force—and other longer-run structural changes in the labor market have continued to push down the participation rate even as cyclical forces have been pushing it up. That said, labor force participation appears to remain a little weaker than can be explained by structural factors alone, pointing to the likelihood that some slack remains in this dimension of labor utilization. In addition, although the share of workers who are employed part time but would like to work full time has fallen noticeably since June, it is still relatively high, indicating some scope for improvement on this dimension as well.

... while labor compensation has shown some tentative signs of accelerating ...

As the labor market has continued to improve, the rates of increase in some measures of hourly labor compensation have begun to pick up while others remain relatively subdued. For example, average hourly earnings for all employees increased 2½ percent over the 12 months ending in January, above the 2 percent pace seen throughout most of the recovery (figure 4). In addition, compensation per hour in the business sector—a volatile measure derived from the labor compensation data in the national income and product accounts, or NIPA—is reported to have increased more quickly in 2015 than its average pace throughout most of the recovery. In contrast, the employment cost index for private industry workers, which measures both wages and the cost to employers of providing benefits, increased about 2 percent over the 12 months ending in December, similar to the pace seen throughout most of the recovery. All of these measures of compensation are increasing at slower rates than those seen prior to the recession. This deceleration probably reflects a variety of factors, including the slower growth of productivity, the slower pace of inflation, and perhaps some remaining slack in the labor market. Despite the continued relatively small increases in nominal wages, the recent very low inflation led to a noticeably

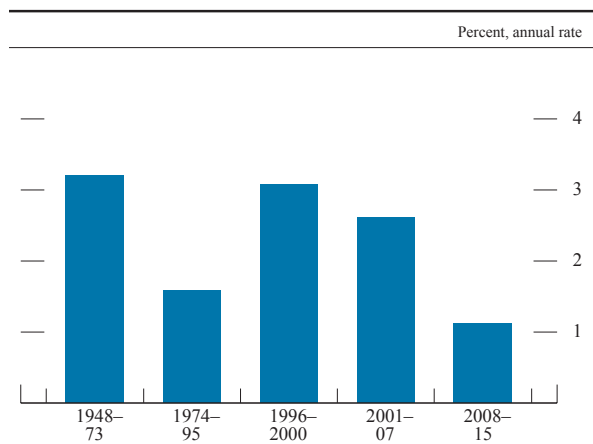
4. Measures of change in hourly compensation



NOTE: The average hourly earnings data series begins in March 2007 and extends through January 2016. The compensation per hour and employment cost index data extend through 2015:Q4. For business-sector compensation, change is over four quarters; 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.

SOURCE: Department of Labor, Bureau of Labor Statistics.

5. 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.

SOURCE: Department of Labor, Bureau of Labor Statistics.

larger wage gain last year on a purchasing-power-adjusted (or so-called real) basis than had been evident earlier in the expansion.

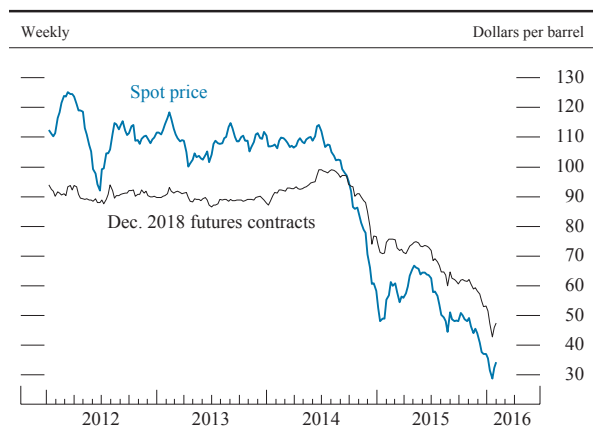
... and productivity growth has been lackluster

Over time, increases in productivity are a key determinant of the rise in real wages and living standards. Labor productivity in the business sector increased at an annual rate of just $\frac{1}{2}$ percent in 2015 and at an average annual rate of just 1 percent since the last business cycle peak in 2007 (figure 5). The average pace since 2007 is a little below the 1974–95 average and well below the pace during the period from the mid-1990s to 2007. The reasons behind the slower productivity performance in recent years are not well understood, but one factor seems to be the slower pace of capital accumulation.

Falling oil prices continue to hold down overall consumer prices ...

Consumer price increases have remained muted and below the FOMC's longer-run objective of 2 percent. As discussed in the box "Effects of Movements in Oil Prices and the Dollar on Inflation," crude oil prices have plummeted since June 2014, and the dollar has moved appreciably higher; both factors have contributed importantly to the low inflation readings of the past year.

6. Brent spot and futures prices



NOTE: The data are weekly averages of daily data and extend through February 4, 2016.

SOURCE: NYMEX.

Since July, the price of crude oil has fallen appreciably further, on net, with the spot price of Brent crude oil dropping below \$35 per barrel, a level last seen more than a decade ago (the blue line in figure 6). Futures prices have also dropped significantly and indicate that market participants expect only modest price increases over the next few years. Although concerns about global growth have contributed to the fall in prices, much of the recent decline can be attributed to the abundance of global supply. Reductions in U.S. production have been slower and smaller than expected, and OPEC has abandoned its official production target in favor of maintaining robust production despite declining prices and the

likely increase in Iranian oil exports in the coming months. The drop in crude oil prices continues to pass through to gasoline prices: The national average of retail gasoline prices (on a seasonally adjusted basis) moved down from more than \$2.50 per gallon in June to about \$2.00 per gallon in January.

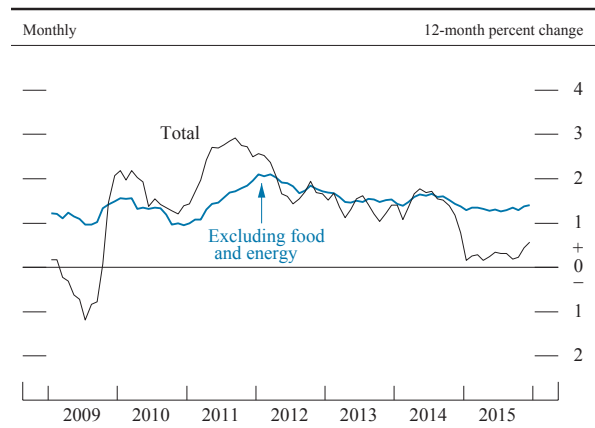
Largely because of the decline in energy prices, overall consumer price inflation, as measured by the PCE price index, was running at just ¼ percent for the 12 months ending in June 2015; the 12-month change remained near that pace until year-end, when it edged up to ½ percent as some of the sharpest declines from a year earlier fell out of the 12-month calculation (figure 7).

Food prices were little changed over the past six months after edging down during the first half of 2015. Consumer food prices were held down in 2015 by falling food commodity prices, but futures markets suggest that these commodity prices will flatten out, implying that this source of downward pressure on consumer food price inflation is likely to wane.

... but even outside of the energy and food categories, inflation has remained subdued

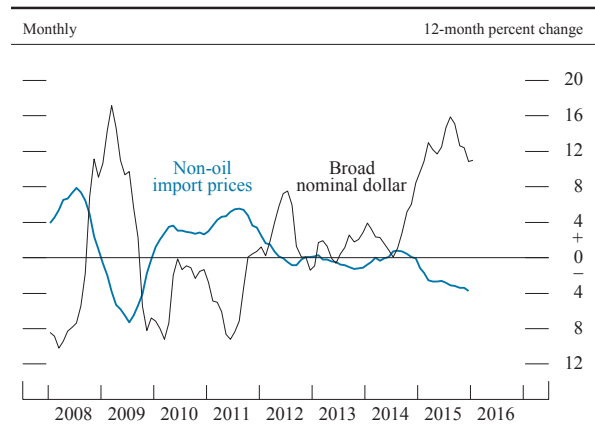
As is also discussed in the box “Effects of Movements in Oil Prices and the Dollar on Inflation,” another important factor holding down inflation has been the behavior of import prices. After declining sharply in the first half of 2015, non-oil import prices continued to fall in the second half, albeit at a slightly more modest pace; the further declines in the second half reflected lower commodity prices as well as additional increases in the foreign exchange value of the dollar (figure 8). In addition, slack in labor and product markets likely placed downward pressure on inflation, although this factor has probably waned significantly. For all of these reasons, inflation for items other than food and energy (so-called core inflation) remained modest. Core PCE prices rose about 1½ percent over the 12 months ending in December, similar to the increase in 2014.

7. Change in the price index for personal consumption expenditures



NOTE: The data extend through December 2015; changes are from one year earlier.
SOURCE: Department of Commerce, Bureau of Economic Analysis.

8. Non-oil import prices and U.S. dollar exchange rate



NOTE: The data for non-oil import prices extend through December 2015.
SOURCE: Department of Labor, Bureau of Labor Statistics; Federal Reserve Board, Statistical Release H.10, “Foreign Exchange Rates.”

Effects of Movements in Oil Prices and the Dollar on Inflation

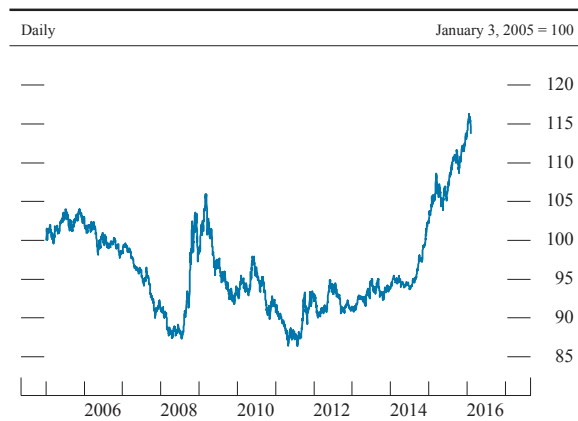
Over the past year, inflation has continued to run well below the Federal Open Market Committee's longer-run objective of 2 percent (text figure 7). The 12-month change in the personal consumption expenditures (PCE) price index, which was about ½ percent in 2015, was held down most clearly by falling prices for oil and farm commodities. Falling prices for other commodities and the rise in the foreign exchange value of the dollar have also contributed importantly to continued low rates of inflation. Indeed, reflecting these influences, inflation for items other than food and energy remained relatively low, with core PCE price inflation at slightly under 1½ percent last year.

Since the middle of 2014, crude oil prices have tumbled, with the spot price of the global benchmark Brent crude oil falling from over \$115 per barrel to under \$35 per barrel in recent weeks; prices for a wide variety of other commodities have also declined considerably. The pass-through of falling oil prices into lower gasoline prices is typically relatively rapid, and the drop in consumer energy prices held down overall PCE inflation directly by more than ½ percentage point in 2015. Falling farm commodity prices also reduced consumer food price inflation over the past year, although the pass-through of these commodity price changes into overall PCE inflation tends to be somewhat smaller and more gradual than with oil prices. Additionally, the sustained reduction in both oil and non-oil commodity prices has likely lowered core inflation somewhat by holding down firms' production and distribution costs. Empirical estimates of the pass-through of energy costs into core inflation are generally quite small, with long and variable lags. Nonetheless, even with a small degree of pass-through, the very large

declines in energy prices since the middle of 2014 have likely been holding down core consumer price inflation somewhat.

The broad dollar has appreciated more than 20 percent since the middle of 2014, reflecting both heightened concerns about the global outlook, which have resulted in safe-haven flows toward dollar assets, and diverging expectations regarding domestic and foreign monetary policy (figure A). A stronger dollar makes foreign goods cheaper for U.S. consumers. An extensive literature, however, has found that the pass-through of exchange rate changes to U.S. import prices is incomplete—that is, less than proportionate—as foreign exporters prefer to absorb part of the exchange rate change by narrowing profit margins. For example, a typical estimate is that a 10 percent appreciation

A. U.S. dollar exchange rate: Broad nominal dollar



SOURCE: Federal Reserve Board, Statistical Release H.10, "Foreign Exchange Rates."

of the dollar causes the prices of non-oil imported goods to decline about 3 percent after one year.¹ Roughly one-third of this effect occurs through the effect on imported commodities, as an increase in the value of the dollar tends to lower commodity prices proportionately.

Because imported goods and services make up only a modest share of U.S. consumption, a given percentage decline in import prices causes a much smaller percentage reduction in core PCE prices. Figure B uses a simple econometric model to illustrate how a 10 percent appreciation of the dollar might affect core PCE inflation through this channel.² According to this model, core PCE inflation dips in the two quarters following the appreciation before gradually returning to the baseline, leading to a four-quarter decline in core PCE inflation of about ¼ percentage point relative to the baseline in the first year following the shock. Given the size of the dollar’s appreciation since the middle of 2014, this model suggests that falling import prices depressed core PCE inflation about ½ percentage point last year. Although the exact magnitude of the dollar’s effect on inflation depends on the specific model used,

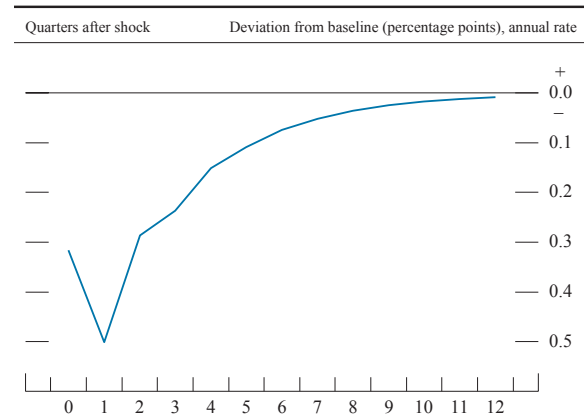
1. For more detail, see Joseph Gruber, Andrew McCallum, and Robert J. Vigfusson (2016), “The Dollar in the U.S. International Transactions (USIT) Model,” IFDP Notes (Washington: Board of Governors of the Federal Reserve System, February 8), www.federalreserve.gov/econresdata/notes/ifdp-notes/2016/the-dollar-in-the-us-international-transactions-model-20160208.html.

2. This model was discussed in a recent speech by Chair Yellen and is described in its appendix. See Janet L. Yellen (2015), “Inflation Dynamics and Monetary Policy,” speech delivered at the Philip Gamble Memorial Lecture, University of Massachusetts, Amherst, Mass., September 24, www.federalreserve.gov/newsevents/speech/yellen20150924a.htm.

this exercise suggests that the stronger dollar has played a material role in holding down PCE inflation.

Although further declines in energy prices or a further rise in the exchange value of the dollar are certainly possible, those movements will eventually stop. As these prices stabilize, the drag on consumer price inflation from oil and import prices will dissipate. Moreover, with margins of resource utilization having already diminished appreciably and longer-run inflation expectations reasonably stable, both core and overall inflation are likely to rise gradually toward 2 percent over the medium term as these transitory factors fade and the labor market improves further.

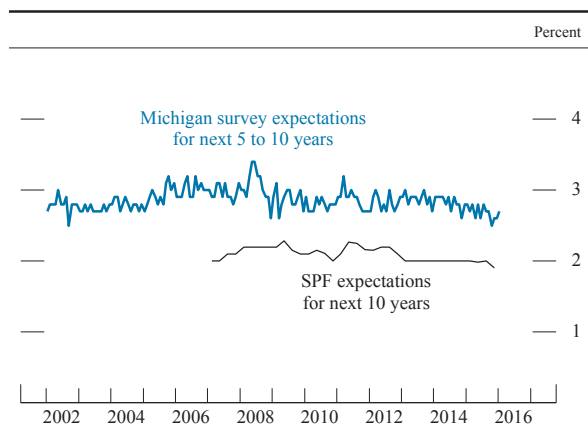
B. Effect of 10 percent appreciation on core PCE inflation



NOTE: The x-axis represents the quarters following the 10 percent appreciation shock.

SOURCE: Federal Reserve Board staff calculations based on an econometric model described in the appendix to Janet L. Yellen (2015), “Inflation Dynamics and Monetary Policy,” speech delivered at the Philip Gamble Memorial Lecture, University of Massachusetts, Amherst, Mass., September 24, www.federalreserve.gov/newsevents/speech/yellen20150924a.htm.

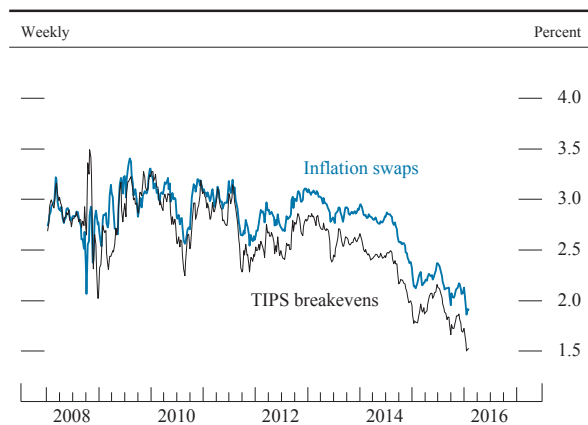
9. Median inflation expectations



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 2015:Q4.

SOURCE: University of Michigan Surveys of Consumers; Federal Reserve Bank of Philadelphia, Survey of Professional Forecasters (SPF).

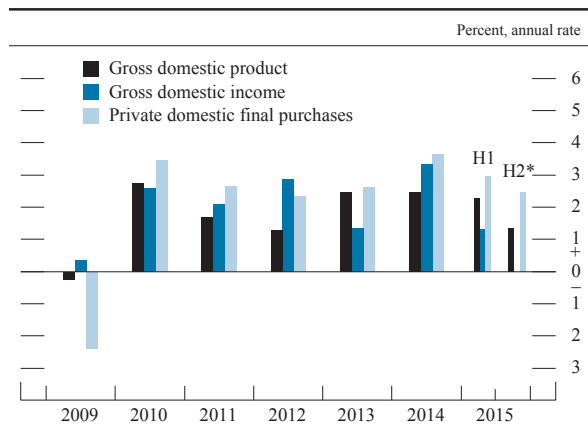
10. 5-to-10-year-forward inflation compensation



NOTE: The data are weekly averages of daily data and extend through February 3, 2016, for inflation swaps, and February 4, 2016, for TIPS breakevens. TIPS is Treasury Inflation-Protected Securities.

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

11. Change in real gross domestic product, gross domestic income, and private domestic final purchases



* Gross domestic income is not yet available for 2015:H2.
SOURCE: Department of Commerce, Bureau of Economic Analysis.

Survey- and market-based measures of inflation expectations have moved down since June

Wage- and price-setting decisions are likely influenced by expectations for inflation. Survey measures of longer-term inflation expectations have been quite stable over the past 15 years but appear to have moved down some lately, including over the past 6 months, to the lower end of their historical ranges. This decline has occurred both for the measure of inflation expectations over the next 5 to 10 years as reported in the University of Michigan Surveys of Consumers and for the median expectation for the annual rate of increase in the PCE price index over the next 10 years from the Survey of Professional Forecasters, conducted by the Federal Reserve Bank of Philadelphia (figure 9). Market-based measures of medium- (5-year) and longer-term (5-to-10-year-ahead) inflation compensation derived from the difference between yields on nominal Treasury securities and Treasury Inflation-Protected Securities moved down further, on net, over the second half of the year after having declined notably between mid-2014 and mid-2015 (figure 10). Although changes in inflation compensation could reflect changes in expected inflation, they also may reflect a variety of other considerations, including an inflation risk premium, liquidity premiums, and other factors.¹

Economic activity expanded at a moderate pace in the second half of 2015

Real GDP is reported to have increased at an annual rate of 1¼ percent in the second half of last year, slower than the first-half pace (figure 11). As in the first half of the year, economic activity during the second half was supported by solid gains in private

1. For further discussion of inferring inflation expectations from market-based measures, see the box “Challenges in Interpreting Measures of Longer-Term Inflation Expectations” in Board of Governors of the Federal Reserve System (2015), *Monetary Policy Report* (Washington: Board of Governors, February), www.federalreserve.gov/monetarypolicy/mpr_20150224_part1.htm.

domestic final purchases—that is, final purchases by households and businesses—and by modest increases in government purchases of goods and services. By contrast, aggregate demand continued to be held down by weak export performance, reflecting the rise in the foreign exchange value of the dollar and sluggish foreign economic growth. In addition, inventory investment slowed markedly from its elevated first-half pace, thereby reducing overall GDP growth in the second half of 2015.

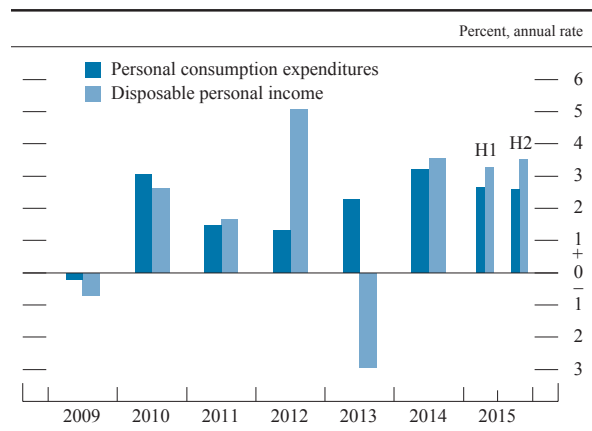
Gains in income and wealth are supporting consumer spending . . .

Real personal consumption expenditures rose at an annual rate of 2½ percent in the second half of 2015, about the same as the first-half pace (figure 12). These increases have been supported by income gains from the improving labor market as well as the fall in gasoline and other energy prices, which has bolstered consumers’ purchasing power. As a result, real disposable income—that is, income after taxes and adjusted for price changes—rose a robust 3½ percent in 2015 after a similar gain in 2014.

Consumer spending last year was also likely supported by further increases in household net worth. Although the value of corporate equities edged down last year, prices of houses—which are owned much more widely than are corporate equities—posted significant gains, and the wealth-to-income ratio remained elevated relative to its historical average (figure 13). In nominal terms, national house price indexes are now close to their peaks of the mid-2000s, but relative to rents, house price valuations are much lower than a decade ago (figure 14).

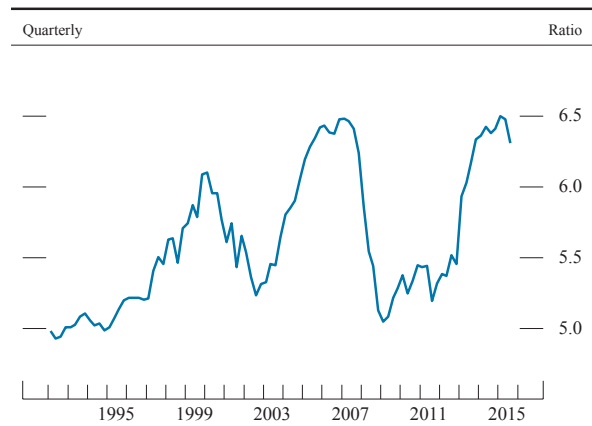
Coupled with low interest rates, the rise in incomes has lowered debt payment burdens for many households. The household debt service burden—the ratio of required principal and interest payments on outstanding household debt to disposable income, measured for the household sector as a whole—has remained at a very low level by historical standards

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



SOURCE: Department of Commerce, Bureau of Economic Analysis.

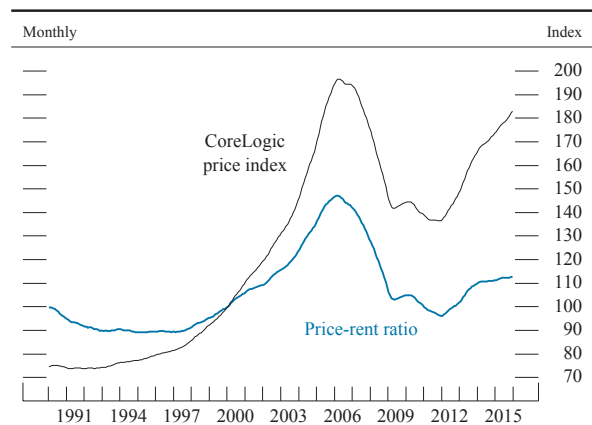
13. Wealth-to-income ratio



NOTE: The data extend through 2015:Q3. 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, Department of Commerce, Bureau of Economic Analysis.

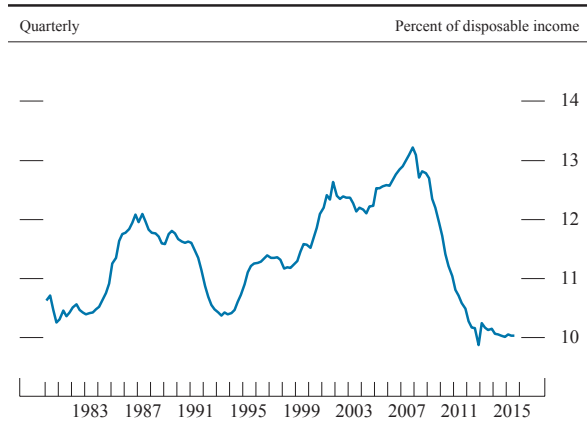
14. Nominal house prices and price-rent ratio



NOTE: The data extend through December 2015. The CoreLogic price index is seasonally adjusted by Federal Reserve Board staff. The price-rent ratio is the ratio of nominal house prices to the consumer price index of rent of primary residence. The data are indexed to 100 in January 2000.

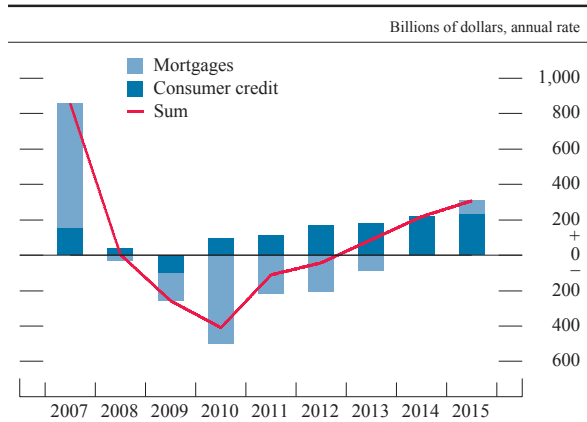
SOURCE: For prices, CoreLogic; for rents, Department of Labor, Bureau of Labor Statistics.

15. Household debt service



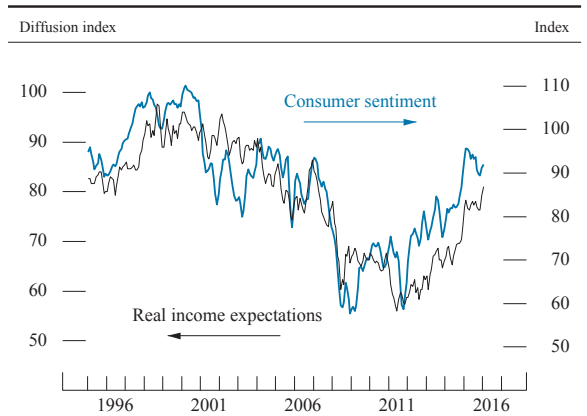
NOTE: The data extend through 2015:Q3. Debt service payments consist of estimated required payments on outstanding mortgage and consumer debt.
SOURCE: Federal Reserve Board, Statistical Release, "Household Debt Service and Financial Obligations Ratios."

16. Changes in household debt



NOTE: Changes are calculated from year-end to year-end, except 2015 changes, which are calculated from Q3 to Q3.
SOURCE: Federal Reserve Board, Statistical Release Z.1, "Financial Accounts of the United States."

17. Indexes of consumer sentiment and income expectations



NOTE: The data are three-month moving averages and extend through January 2016. Consumer sentiment is indexed to 100 in 1966. Real income expectations are calculated as the net percent of survey respondents expecting family income to go up more than prices during the next year or two.
SOURCE: University of Michigan Surveys of Consumers.

(figure 15). As interest rates rise, the debt burden will move up only gradually, as most household debt is in fixed-interest products.

... as is credit availability

Consumer credit continued to expand moderately through late 2015, as lending standards for both auto lending and student loans remained accommodative (figure 16). In addition, credit card lending has been rebounding since early last year. Standards and terms on credit cards are still relatively tight for riskier borrowers, although there has been some modest increase in access for borrowers with subprime credit histories. Delinquencies on credit card and auto loans are still near historical lows, in part due to the tight standards.

Consumer confidence remains high

Household spending has also been supported by favorable consumer sentiment. For the past year or so, the overall index of consumer sentiment from the University of Michigan Surveys of Consumers has registered levels comparable to those that prevailed before the recession (figure 17). Rising real incomes, partly driven by falling energy prices and improvements in the labor market, have likely driven up consumer confidence. These same factors are probably behind the more upbeat expectations that households report for real income changes over the next year or two, which are now near pre-recession levels.

Residential construction has improved modestly

The gradual recovery in residential construction activity continued over the second half of last year. Both single- and multifamily housing starts registered moderate increases in 2015 (figure 18). Sales of new and existing homes also rose moderately, abstracting from the temporary plunge in existing home sales in November, which reportedly reflected a lengthening in closing times due to new mortgage disclosure rules (figure 19). But while multifamily starts have recovered to their

pre-recession level, single-family construction continues to be well below its earlier pace. The level of housing starts is still being held down by a meager pace of household formation, tighter-than-average mortgage credit supply, and shortages of skilled labor and other inputs in the construction sector.

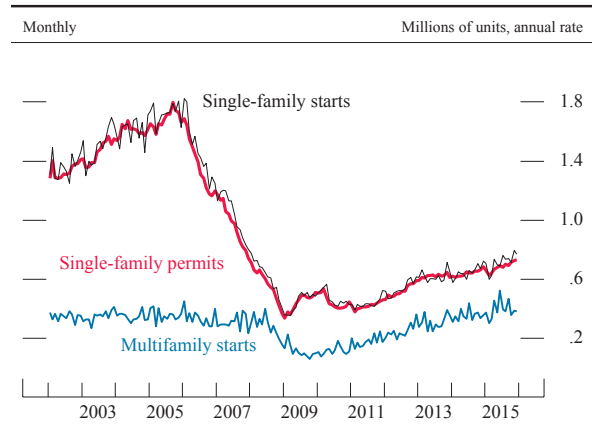
Although the October 2015 and January 2016 Senior Loan Officer Opinion Survey on Bank Lending Practices (SLOOS) reports suggest that a gradual easing of bank lending standards has continued over the past six months, mortgage credit is still difficult to access for borrowers with low credit scores, undocumented income, or high debt-to-income ratios.² For borrowers who can obtain credit, interest rates on mortgages remain near their historical lows, although they inched up, on net, over the second half of the year (figure 20). In 2015, outstanding mortgage debt rose for the first time since the recession as mortgage originations for home purchases increased and write-downs of mortgage debt continued to ebb.

Overall business investment has slowed as a result of a sharp drop in investment in the energy sector

Business investment (private nonresidential fixed investment) rose at an annual rate of only ½ percent during the second half of 2015 after increasing at a 3 percent pace during the first half of the year (figure 21). Spending on equipment rose modestly, and a bit faster than during the first half of 2015, but spending on intangibles, such as research and development, and investment in structures outside of drilling and mining flattened out after posting strong gains during the first half of the year. Investment in structures used in the energy sector continued to fall precipitously, as the drop in oil prices has scuttled investment in higher-cost oil and gas wells. For the year as a whole, the pace of overall business investment

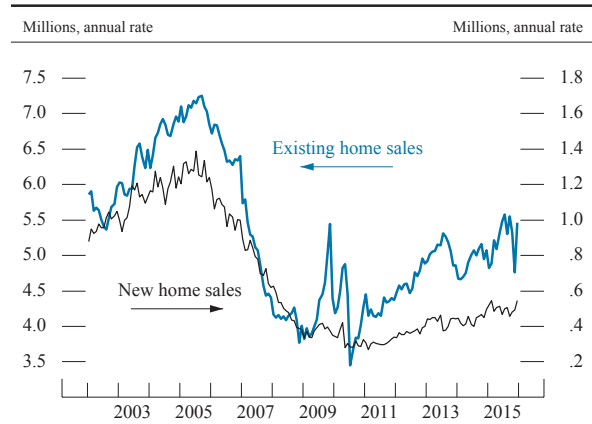
2. The SLOOS is available on the Board’s website at www.federalreserve.gov/boarddocs/snloansurvey.

18. Private housing starts and permits



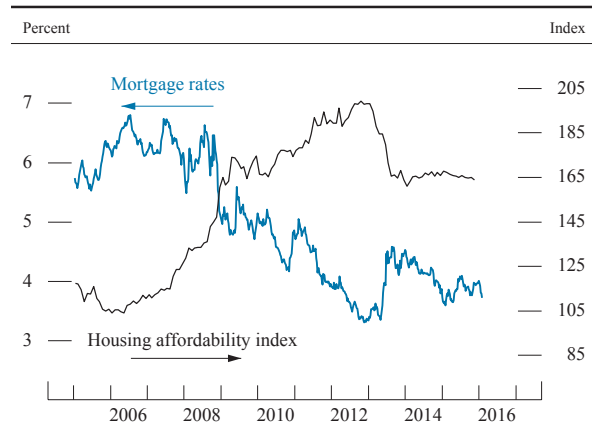
NOTE: The data extend through December 2015.
SOURCE: Department of Commerce, Bureau of the Census.

19. New and existing home sales



NOTE: The data extend through December 2015. “Existing home sales” includes single-family, condo, townhome, and co-op sales.
SOURCE: For new single-family home sales, Census Bureau; for existing home sales, National Association of Realtors.

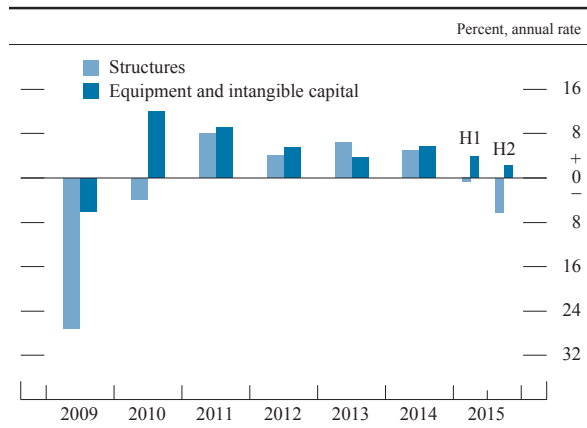
20. Mortgage rates and housing affordability



NOTE: The housing affordability index data are monthly through November 2015 and the mortgage rate data are weekly through February 3, 2016. 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.

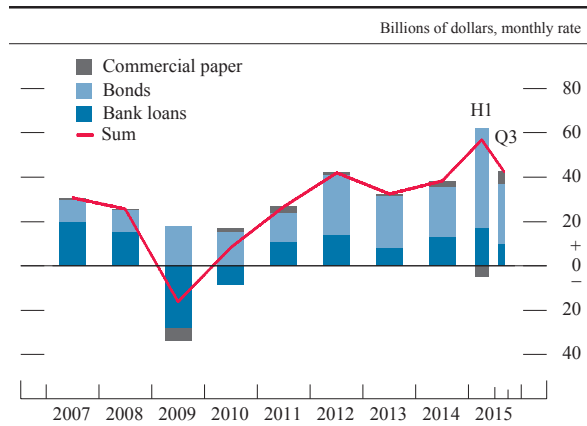
SOURCE: For housing affordability index, National Association of Realtors; for mortgage rates, Freddie Mac Primary Mortgage Market Survey.

21. Change in real private nonresidential fixed investment



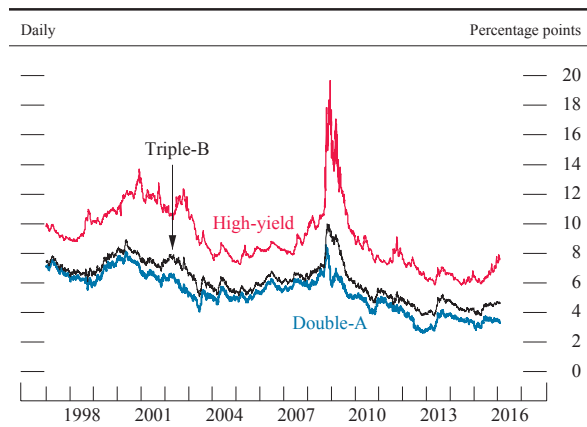
SOURCE: Department of Commerce, Bureau of Economic Analysis.

22. Selected components of net financing for nonfinancial businesses



NOTE: The data for the components except bonds are seasonally adjusted. SOURCE: Federal Reserve Board, Statistical Release Z.1, "Financial Accounts of the United States."

23. Corporate bond yields, by securities rating



NOTE: The yields shown are yields on 10-year bonds. SOURCE: BofA Merrill Lynch Global Research, used with permission.

slowed compared with 2014, mostly as a result of the drop in the energy sector. Investment has been supported by low interest rates and financing conditions that are still generally accommodative, though somewhat less so than earlier.

Corporate financing conditions have become somewhat less supportive

Domestic financial conditions for nonfinancial firms have become somewhat less supportive of growth since last June, particularly for non-investment-grade firms. Equity prices have declined and bond spreads have widened amid concerns about the global economic outlook and oil prices. Downgrades of bonds issued by nonfinancial companies have increased, and the leverage of these companies is near the top end of its range over the past few decades. Nonetheless, profitability has remained high outside the energy sector. Against a backdrop of low interest rates, investment-grade nonfinancial businesses have continued to raise substantial amounts of funds in bond and loan markets since last June, in part to finance mergers and acquisitions activity (figure 22). Speculative-grade bond issuance also was solid for much of 2015 but diminished toward the end of the year as spreads widened notably, particularly for firms in the energy sector (figure 23).

Loan demand remained strong across most major categories through the end of 2015. Of note, demand for commercial real estate (CRE) loans strengthened further and issuance of commercial mortgage-backed securities (CMBS) remained robust. Credit conditions tightened for this sector as concerns about credit quality led to wider spreads on CMBS and, according to the results of the October and January SLOOS reports, a moderate number of banks had tightened lending standards for CRE loans, particularly for construction and land development. A modest fraction of banks also reported having tightened lending standards for commercial and industrial loans to firms of all sizes since the second quarter.

The drag from federal fiscal policy has ended . . .

After being a drag on aggregate demand during much of the expansion, federal fiscal policy has shifted to a more neutral stance as fiscal consolidation efforts have abated. During 2015, policy actions had little effect on taxes and transfers, and real federal purchases of goods and services edged up (figure 24).

The federal budget deficit narrowed further in fiscal year 2015 to 2½ percent of GDP, largely reflecting the increase in tax receipts owing to the ongoing economic expansion as well as the modest increase in purchases (figure 25). A deficit of this size is small enough to stabilize the ratio of the debt held by the public to nominal GDP; that said, the current level of that ratio is elevated relative to its average over the post–World War II period (figure 26). The Congressional Budget Office projects the deficit to move up to about 3 percent of GDP in fiscal 2016.

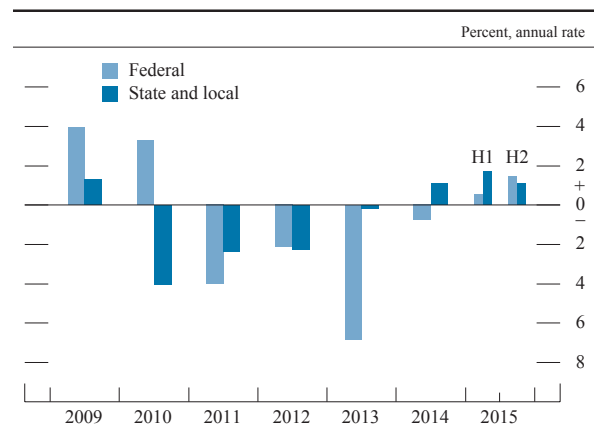
. . . and state and local government expenditures are rising moderately

Fiscal conditions of most state and local governments continue to improve gradually. Tax revenues have been rising moderately, supported by the expansion of economic activity and increasing house prices. These governments boosted spending at a moderate rate in 2015. In particular, real state and local purchases of goods and services rose 1½ percent last year, as employment posted another modest gain and real construction spending rose markedly for the first time since the recession (figure 27).

In contrast, net exports still held down growth in gross domestic product slightly

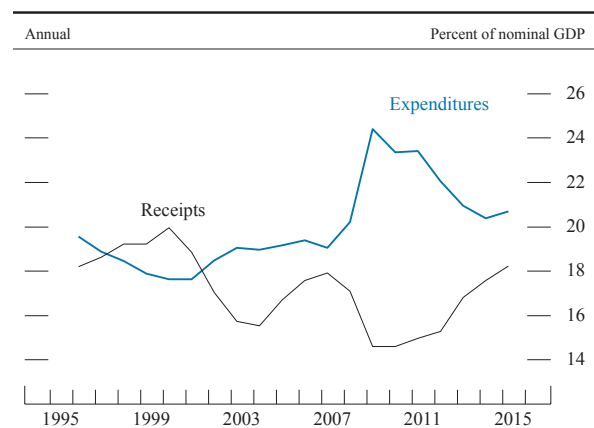
Exports held about flat in the second half of 2015, weighed down by the appreciation of the dollar and by soft foreign economic growth (figure 28). Although the stronger dollar made imports more affordable, import growth was also relatively subdued. Imports for inputs related to oil exploration and production

24. Change in real government expenditures on consumption and investment



SOURCE: Department of Commerce, Bureau of Economic Analysis.

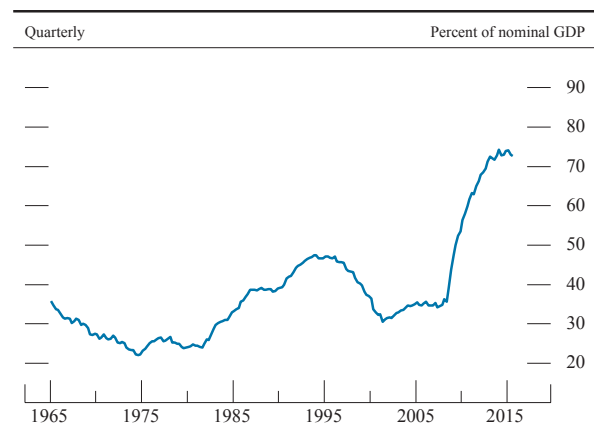
25. Federal receipts and expenditures



NOTE: The receipts and expenditures data are on a unified-budget basis and are for fiscal years (October through September); gross domestic product (GDP) data are for the four quarters ending in Q3.

SOURCE: Office of Management and Budget.

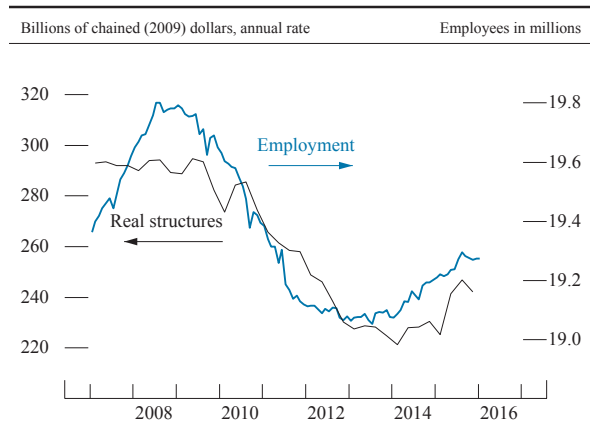
26. Federal government debt held by the public



NOTE: The data extend through 2015:Q3. 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, Department of Commerce, Bureau of Economic Analysis; for federal debt, Federal Reserve Board, Statistical Release Z.1, “Financial Accounts of the United States.”

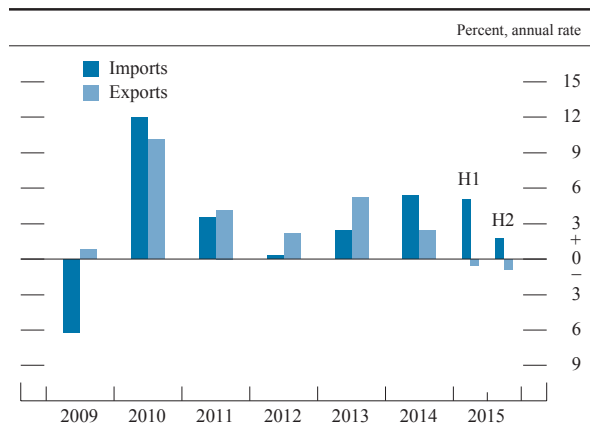
27. State and local employment and structures investment



NOTE: The employment data are monthly, and the structures data are quarterly.

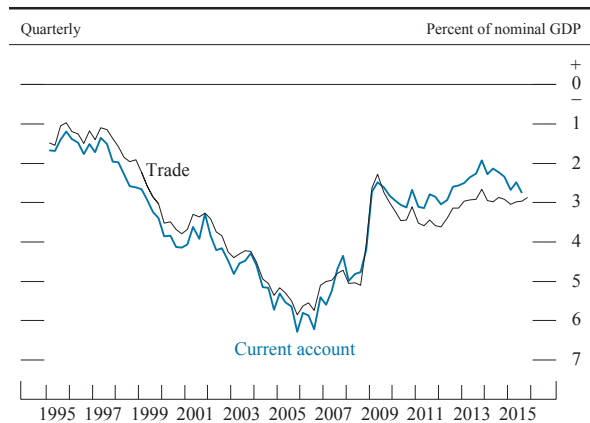
SOURCE: For employment data, Department of Labor, Bureau of Labor Statistics; for structures data, Department of Commerce, Bureau of Economic Analysis.

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



SOURCE: Department of Commerce, Bureau of Economic Analysis.

29. U.S. trade and current account balances



NOTE: The current account data extend through 2015:Q3. GDP is gross domestic product.

SOURCE: Department of Commerce, Bureau of Economic Analysis.

were particularly weak, consistent with steep declines in that industry. In all, real net trade continued to be a drag on real GDP growth in the second half of 2015. Although the real trade balance deteriorated, the nominal trade balance was little changed in 2015 in part because the value of imports declined, largely because of the decline in oil prices. Still, the current account deficit widened a bit to near 3 percent of nominal GDP as U.S. net investment income declined (figure 29).

Financial Developments

The expected path for the federal funds rate over the next several years declined

Despite further strengthening in labor market conditions and a range of other indicators that market participants viewed as consistent with continued expansion in the U.S. economy, market-based measures of the expected path of the federal funds rate over the next several years have moved down, on balance, since the middle of last year. Contributing to this shift were concerns about the foreign economic outlook and global disinflationary pressures, as well as Federal Reserve communications anticipating that economic conditions will warrant only gradual increases in the federal funds rate. Survey-based measures of the expected path of policy also moved down. According to the results of the most recent Survey of Primary Dealers, conducted by the Federal Reserve Bank of New York just prior to the January FOMC meeting, respondents' expectations for the federal funds rate target at the end of this year and next year were lower than those reported last June. Market-based measures of uncertainty about the policy rate approximately one to two years ahead declined, on balance, from their mid-2015 levels.

Longer-term Treasury yields decreased

Yields on longer-term nominal Treasury securities have declined since the middle of last year on net (figure 30). The decreases in nominal yields largely reflected reductions

in inflation compensation; yields on long-term inflation-protected Treasury securities were little changed. Participants in the U.S. Treasury market reportedly were particularly attentive to developments abroad, especially turbulence in Chinese financial markets, and to fluctuations in oil prices. Consistent with the changes in yields on Treasury securities, yields on 30-year agency mortgage-backed securities (MBS)—an important determinant of mortgage interest rates—decreased, on balance, over the second half of 2015 and early 2016 (figure 31).

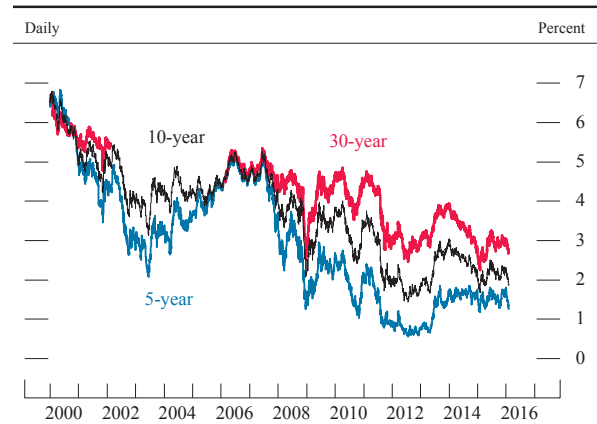
Broad equity price indexes decreased . . .

Since the middle of last year, amid considerable volatility, broad measures of U.S. equity prices have decreased notably, on net, as concerns about the foreign economic outlook appeared to weigh on risk sentiment and the outlook for corporate earnings growth (figure 32). Stock prices for companies in the energy and basic materials sectors dropped sharply, reflecting the continued fall in oil and other commodity prices. Implied volatility for the overall S&P 500 index, as calculated from options prices, increased, on balance, since the middle of last year; at times, its movement was notable.

. . . and risk spreads on speculative-grade corporate bonds moved up substantially, particularly for firms in the energy sector

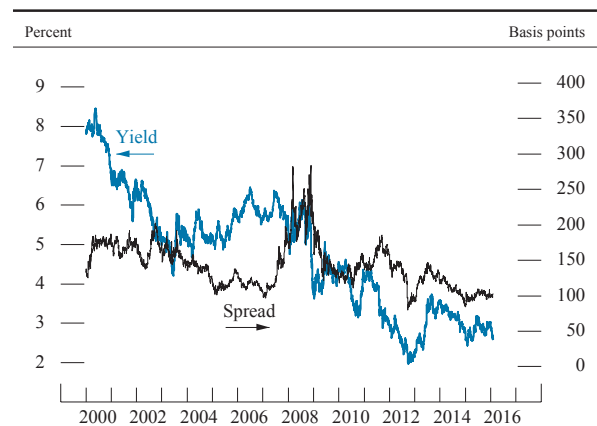
Credit spreads in the corporate sector have widened across the credit spectrum. The spread of yields on investment-grade corporate bonds to yields on Treasury securities of comparable maturity rose moderately, and credit spreads on speculative-grade bonds widened substantially. Spreads for firms in the energy sector increased particularly sharply, reflecting the further drops in the price of oil since late June. Mutual funds investing in speculative-grade bonds experienced significant outflows over the second half of 2015 and early 2016, and, in December, redemptions from one such fund were suspended. During the second half of last year, the respondents

30. Yields on nominal Treasury securities



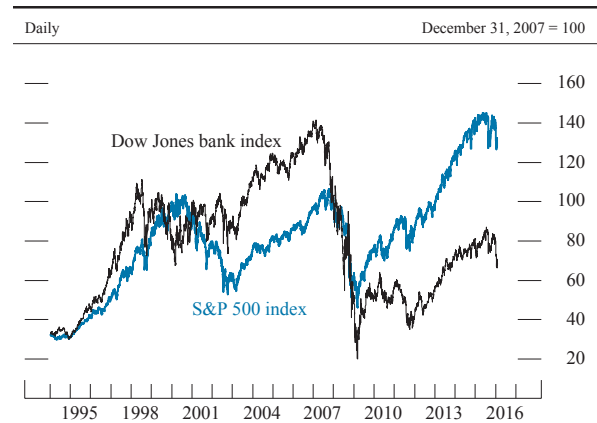
NOTE: The Treasury ceased publication of the 30-year constant maturity series on February 18, 2002, and resumed that series on February 9, 2006.
SOURCE: Department of the Treasury.

31. 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.
SOURCE: Department of the Treasury; Barclays.

32. Equity prices



NOTE: For Dow Jones Indices licensing information, see the note on the Contents page.
SOURCE: The Dow Jones Bank Index and the S&P 500 Index are a product of S&P Dow Jones Indices LLC and/or its affiliates.

to the Senior Credit Officer Opinion Survey on Dealer Financing Terms reported a moderate deterioration in liquidity and market functioning in speculative-grade corporate bonds and some tightening of the terms under which dealers were willing to provide financing to clients against such bonds.³ In addition, some metrics of corporate bond market liquidity suggest a slight deterioration over the second half of 2015 and early 2016, though most indicators remain at levels comparable with those seen prior to the crisis. For further discussion of corporate bond markets and other financial stability issues, see the box “Developments Related to Financial Stability.”

Short-term funding markets continued to function well

Short-term dollar funding markets have functioned smoothly during the second half of 2015 and early 2016. Markets for unsecured offshore dollar funding and repurchase agreements, or repos, generally did not exhibit signs of stress. Year-end funding pressures were modest.

Money market participants continued to focus on the Federal Reserve’s use of its monetary policy tools. These tools proved effective in raising the federal funds rate following the FOMC’s decision to increase the target range in December, while other money market rates also moved up broadly in line with the increase in the federal funds target range. For a detailed discussion, see the box “Monetary Policy Implementation following the December 2015 FOMC Meeting” in Part 2.

Treasury market functioning and liquidity conditions in the mortgage-backed securities market were generally stable

Indicators of Treasury market functioning have remained broadly stable over the second half of 2015 and early 2016. A variety of

3. More information on the Senior Credit Officer Opinion Survey on Dealer Financing Terms is available on the Board’s website at www.federalreserve.gov/econresdata/releases/scoos.htm.

liquidity metrics—including bid-asked spreads and bid sizes—have displayed no notable signs of liquidity pressures over the same period. In addition, Treasury auctions generally continued to be well received by investors.

Liquidity conditions in the agency MBS market were also generally stable. Dollar-roll-implied financing rates for production coupon MBS—an indicator of the scarcity of agency MBS for settlement—suggested limited settlement pressures over the second half of 2015 and early 2016.

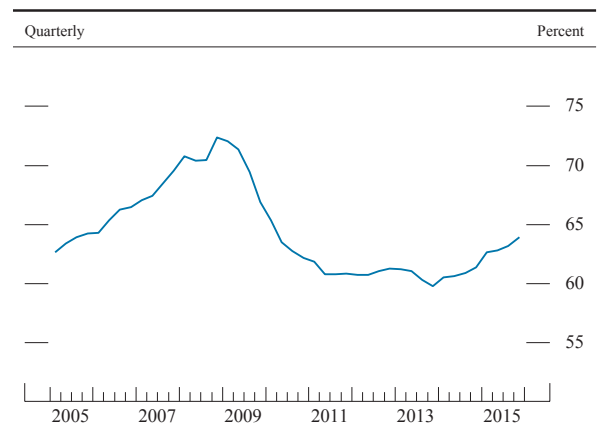
Bank credit has continued to expand and bank profitability rose further

Aggregate credit provided by commercial banks increased at a solid pace in the second half of 2015 (figure 33). The expansion in bank credit was mainly driven by strong growth in loans coupled with an increase in banks’ holdings of agency MBS. The growth of loans on banks’ books was generally consistent with the SLOOS reports of increased loan demand for many loan categories.

Measures of bank profitability remained below their historical averages but improved slightly during the third quarter of 2015 (the latest available data), supported by lower noninterest expenses (figure 34). Net interest margins were about unchanged, on average, during the third quarter. Delinquency and charge-off rates for most major loan types were generally stable, near or at their lowest levels since the financial crisis.

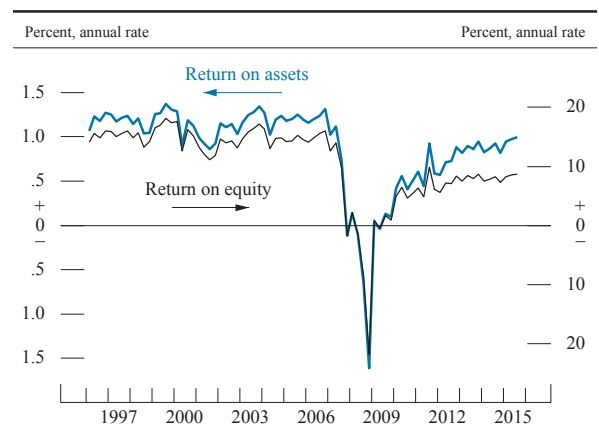
Among large bank holding companies (BHCs), despite generally positive third- and fourth-quarter earnings reports, equity prices have decreased markedly, on balance, since the middle of last year. The decline in bank equity prices likely reflected concerns about global growth, the effects of a flatter yield curve on the outlook for bank profitability, and potential losses due to the decrease in energy prices. Credit default swap (CDS) spreads for large BHCs increased on net.

33. 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”; Department of Commerce, Bureau of Economic Analysis.

34. Profitability of bank holding companies



NOTE: The data, which are seasonally adjusted, are quarterly and extend through 2015:Q3.

SOURCE: Federal Reserve Board, FR Y-9C, Consolidated Financial Statements for Bank Holding Companies.

Developments Related to Financial Stability

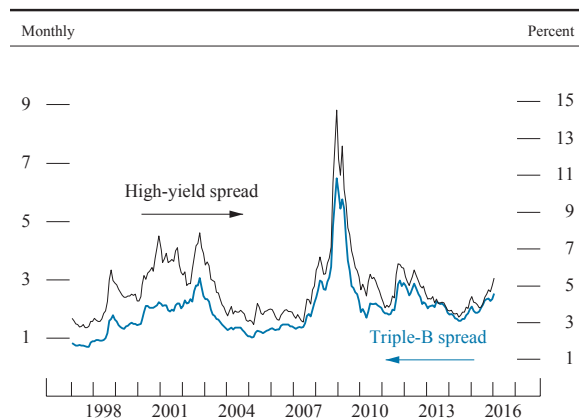
Financial vulnerabilities in the U.S. financial system overall have continued to be moderate since mid-2015. Regulatory capital and liquidity ratios at large banking firms are at historically high levels, and the use of short-term wholesale funding remains relatively low. Debt growth in the household sector continues to be modest and concentrated among borrowers with strong credit histories. Some areas where valuation pressures were a concern have cooled recently; in particular, risk premiums for below-investment-grade debt have widened. However, high leverage of nonfinancial corporations makes some firms highly vulnerable to adverse developments, such as lower oil prices or slowing global growth.

Vulnerabilities owing to leverage and maturity transformation in the financial sector remain low. Regulatory capital ratios at U.S. banking firms increased further in the third quarter of 2015, and holdings of high-quality liquid assets at banking firms also remain at very high levels. In addition, some of the largest domestic banks have reduced their reliance on potentially less stable types of short-term funding. The aggregate delinquency rate on bank loans declined to its lowest level since 2006, though delinquency rates on loans to the oil and gas industry, which account for a small share of most banks' portfolios, have increased. Bank underwriting practices in the leveraged loan market have improved, on balance, over the past year but occasionally still fall short of supervisory expectations. Moreover, domestic banking firms have only limited exposure to emerging market economies. However, developments in foreign economies and financial markets, particularly an escalation of recent volatility or a worsening of the outlook for China, could transmit risks through indirect financial linkages.

Net secured borrowing by dealers, primarily used to finance their own portfolios of securities, continued to decrease and is near historical lows, while securities financing activities aimed at facilitating clients' transactions also remain at low levels. The latter is consistent with reports that dealers have tightened price terms for securities financing and derivatives. The volume of margin loans outstanding—an important component of overall leverage used by hedge funds—appears to have moderated. Short-term funding levels remain relatively low, though reforms aimed at reducing structural vulnerabilities in those markets are still being implemented.

Overall asset valuation pressures have eased. Corporate bond spreads increased notably and are now above their historical norms (figure A). Those spreads appear to have risen by more than the compensation required for higher expected losses, suggesting risk premiums have also increased. Issuance

A. Corporate bond spreads to similar-maturity Treasury securities



NOTE: The spread is the 10-year yield for corporate bonds less the 10-year Treasury yield; bond yields are estimated from a smoothed curve fit to bond yields, and Treasury yields are estimated from a smoothed curve fit to off-the-run Treasury securities.

SOURCE: Department of the Treasury; BofA Merrill Lynch Global Research, used with permission.

of speculative-grade bonds and leveraged loans has slowed significantly, which also could reflect, in part, an increase in investors' risk aversion. Despite the volatility, most indicators of liquidity conditions in corporate bond markets, such as trading volumes and bid-asked spreads, deteriorated only slightly. Nonetheless, the suspension of redemptions in December by a high-yield bond mutual fund that had a high concentration of very low-rated debt and had experienced persistent outflows highlighted a vulnerability at open-end mutual funds that offer daily redemptions to investors while holding less-liquid assets.

Commercial real estate prices continued to rise, supported in part by improved fundamentals, and commercial real estate lending by banks accelerated in recent quarters. However, spreads on securities backed by commercial mortgages widened further and bank lending standards reportedly have tightened since July, suggesting that financing conditions have become a little less accommodative. In addition, late last year, federal banking regulators issued a joint statement reinforcing existing guidance for prudent risk management in that sector.¹ Residential home prices also continued to increase. However, price-to-rent ratios do not suggest that valuations are notably above

1. See Board of Governors of the Federal Reserve System, Federal Deposit Insurance Corporation, and Office of the Comptroller of the Currency (2015), "Agencies Issue Statement on Prudent Risk Management for Commercial Real Estate Lending," press release, December 18, www.federalreserve.gov/newsevents/press/bcreg/20151218a.htm.

historical norms, and residential mortgage debt growth remains minimal.

Broad equity indexes have declined significantly since July 2015, and forward price-to-earnings ratios have fallen to a level closer to their averages of the past three decades. Yields on longer-term Treasury securities decreased over that period, and estimates of term premiums remained low. Because many assets are priced based on Treasury yields, their low level continues to pose a risk to valuations of assets that have lower-than-average earnings yields. However, in December, the Federal Reserve's increase in the target range for the federal funds rate did not result in significant changes in longer-term interest rates or their volatility.

The ratio of private nonfinancial sector credit to gross domestic product remains below estimates of its long-term upward trend, reflecting subdued levels of household debt. Debt growth in the nonfinancial business sector has slowed in recent months, particularly among speculative-grade and unrated firms. However, leverage of such firms has risen to historical highs, especially among those in the oil industry, a development that points to somewhat elevated risks of distress for some business borrowers.

As part of its effort to improve the resilience of financial institutions and overall financial stability, the Federal Reserve Board has taken several further regulatory steps. First, the Board finalized a rule that increases risk-based capital requirements for U.S. global systemically important bank holding companies (G-SIBs).² The applicable surcharges are calibrated based on the systemic footprint of each U.S. G-SIB so that the amount of additional capital a firm must hold increases with the costs that its failure would impose in terms of U.S. financial stability. The G-SIB surcharge rule is designed to ensure that U.S. G-SIBs either hold substantially more capital, reducing the likelihood that they will fail, or choose to shrink their systemic footprint, reducing the harm that their failure would do to the financial system.

Second, the Board announced that it is seeking public comment on its proposed framework for setting the Countercyclical Capital Buffer (CCyB) and voted to affirm the CCyB amount at the current level of 0 percent—consistent with the continued moderate level of financial vulnerabilities.³ The

2. See Board of Governors of the Federal Reserve System (2015), "Federal Reserve Board Approves Final Rule Requiring the Largest, Most Systemically Important U.S. Bank Holding Companies to Further Strengthen Their Capital Positions," press release, July 20, www.federalreserve.gov/newsevents/press/bcreg/20150720a.htm.

3. See Board of Governors of the Federal Reserve System (2015), "Federal Reserve Board Seeks Public Comment on

buffer is a macroprudential tool that can be used to increase the resilience of the financial system by raising capital requirements on internationally active banking organizations when there is an elevated risk of above-normal losses in the future. The CCyB would then be available to help those banking organizations absorb shocks associated with worsening credit conditions, and it may also help moderate fluctuations in the supply of credit. In releasing the framework for comment, the Board consulted with the Federal Deposit Insurance Corporation and the Office of the Comptroller of the Currency. Should the Board decide to increase the CCyB amount in the future, banking organizations would have 12 months before the change became effective, unless the Board established an earlier effective date.

Third, the Board issued for public comment a proposed rule that would impose total loss-absorbing capacity and long-term debt requirements on U.S. G-SIBs and on the U.S. operations of certain foreign G-SIBs.⁴ The proposal would require each covered firm to maintain a minimum amount of unsecured long-term debt that could be converted into equity in a resolution of the firm, thereby recapitalizing the firm without putting public money at risk. The proposal would diminish the threat that a G-SIB's failure would pose to financial stability and is an important step in addressing the perception that certain institutions are "too big to fail."

Finally, the Board, acting in conjunction with other federal regulatory agencies, issued a final rule imposing minimum margin requirements on certain derivatives transactions that are not centrally cleared.⁵ The swap margin rule will reduce the risk that derivatives transactions would act as a channel for financial contagion and, by imposing higher margin requirements on uncleared swaps than apply to cleared swaps, will incentivize market participants to shift derivatives activity to central clearinghouses.

Proposed Policy Statement Detailing the Framework the Board Would Follow in Setting the Countercyclical Capital Buffer (CCyB)," press release, December 21, www.federalreserve.gov/newsevents/press/bcreg/20151221b.htm.

4. See Board of Governors of the Federal Reserve System (2015), "Federal Reserve Board Proposes New Rule to Strengthen the Ability of Largest Domestic and Foreign Banks Operating in the United States to Be Resolved without Extraordinary Government Support or Taxpayer Assistance," press release, October 30, www.federalreserve.gov/newsevents/press/bcreg/20151030a.htm.

5. See Board of Governors of the Federal Reserve System, Federal Deposit Insurance Corporation, Office of the Comptroller of the Currency, Farm Credit Administration, and Federal Housing Finance Agency (2015), "Agencies Finalize Swap Margin Rule," joint press release, October 30, www.federalreserve.gov/newsevents/press/bcreg/20151030b.htm.

The M2 measure of the money stock has increased at an average annualized rate of about 6 percent since last June, about the same pace registered in the first half of 2015 and faster than nominal GDP growth. Demand for liquid deposits has continued to boost M2 growth.

Municipal bond markets functioned smoothly, but some issuers remained strained

Credit conditions in municipal bond markets have generally remained stable since the middle of last year. Over that period, the MCDX—an index of CDS spreads for a broad portfolio of municipal bonds—and ratios of yields on 20-year general obligation municipal bonds to those on longer-term Treasury securities edged up on net.

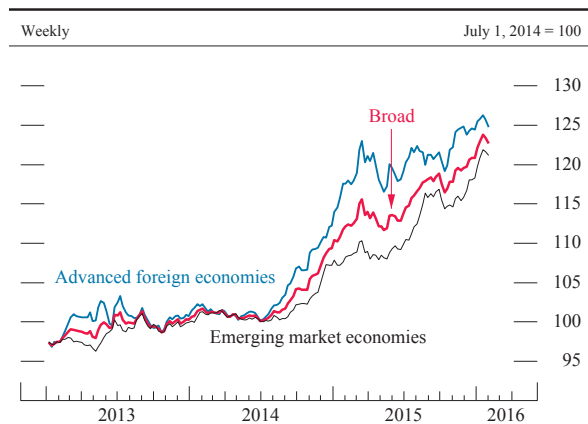
Nevertheless, significant financial strains were still evident for some issuers. In particular, Puerto Rico, which continued to face challenges from subdued economic performance, severe indebtedness, and other fiscal pressures, defaulted on some bond issues not backed by guarantees from the commonwealth and is seeking to restructure its debt.

International Developments

The dollar continued to strengthen . . .

The foreign exchange value of the dollar rose further, on net, since the middle of last year, bringing its increase since mid-2014, when the most recent run-up began, to over 20 percent by the beginning of 2016 (figure 35). Expectations that the Federal Reserve would soon start increasing its policy interest rates, even while most foreign central banks maintained or expanded monetary policy accommodation, boosted the value of the dollar. (For more discussion, see the box “Monetary Policy Divergence in the Advanced Economies.”) The dollar has also appreciated against the renminbi since last summer, when the People’s Bank of China

35. 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 February 4, 2016.
 SOURCE: Federal Reserve Board, Statistical Release H.10, “Foreign Exchange Rates.”

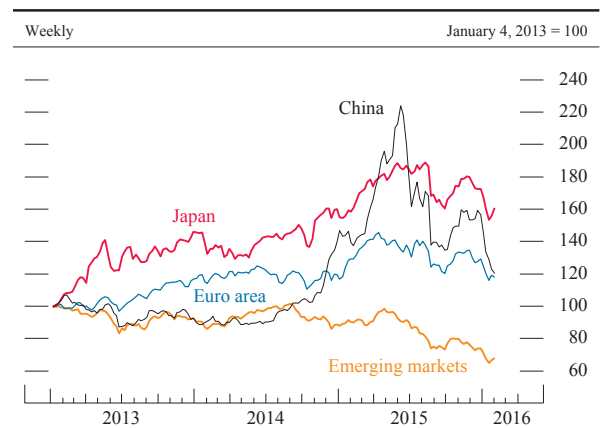
(PBOC) announced it was changing its policy to allow market forces to play a greater role in determining the renminbi's exchange rate. The PBOC allowed the renminbi to depreciate 3 percent against the dollar in August and another 1½ percent after the turn of the year. These developments, which contributed to intensified uncertainty about China's exchange rate policy and the prospects for its economy, fostered episodes of global market turbulence that further boosted the dollar. Investors became more focused on downside risks to prospects for growth in China and, by implication, global growth. These concerns about growth, along with still-strong oil production and high inventories, contributed to a sharp drop in commodity prices, which in turn weighed on the currencies of several commodity-exporting countries.

... while equity prices and foreign sovereign bond yields have declined

Triggered in part by the unexpected devaluation of the renminbi and an ensuing increase in concerns about global economic growth, equity indexes have dropped, on net, in most emerging market economies (EMEs) and advanced foreign economies (AFEs) since the beginning of the summer (figure 36). In particular, Chinese stock prices tumbled more than 40 percent despite official interventions, including circuit breakers and bans on stock sales, that were intended to mute some of the downward pressure. The fall in Brazilian stock prices was also very sharp, as global market turbulence as well as domestic developments, including a corruption scandal, declining output, and persistent high inflation, prompted stock prices to fall nearly 25 percent since last summer.

As in the United States, 10-year sovereign yields declined in most AFEs, likely in part because of increasing concerns about potential deflationary pressure amid falling commodity prices (figure 37). In the euro area, Greek sovereign yields, which had risen sharply in the first half of the year, declined substantially

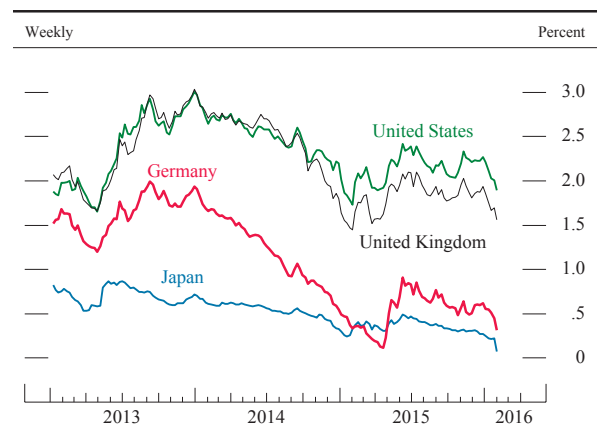
36. Equity indexes for selected foreign economies



NOTE: The data are weekly averages of daily data and extend through February 4, 2016. For Dow Jones Indices licensing information, see the note on the Contents page.

SOURCE: For Japan, Tokyo Stock Price Index (TOPIX); for the euro area, Dow Jones Euro STOXX Index; for China, Shanghai Composite Index; for emerging markets, Morgan Stanley Emerging Markets MXEF Capital Index; all via Bloomberg.

37. 10-year nominal benchmark yields in selected advanced economies



NOTE: The data are weekly averages of daily data and extend through February 4, 2016.

SOURCE: Bloomberg.

Monetary Policy Divergence in the Advanced Economies

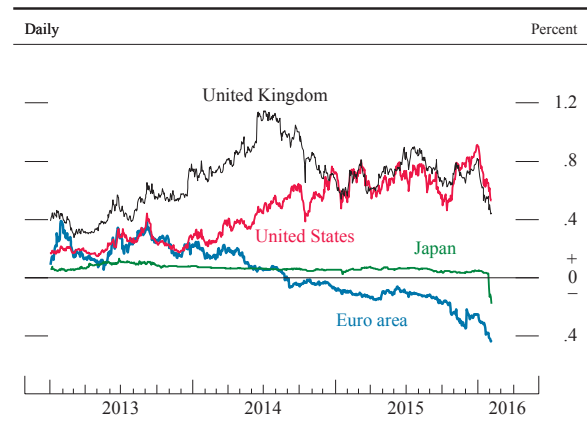
As recovery has gradually taken hold in the U.S. economy over the past few years, both activity and inflation in the advanced foreign economies (AFEs) have remained persistently weak. This divergence in the economic outlooks for the United States and the AFEs has led to expectations of divergence in their monetary policies. Although the Federal Reserve raised its target for the federal funds rate in December, policy rates in most AFEs are near zero (and negative for several economies) and are expected to remain low for several years. Furthermore, the European Central Bank (ECB) and Bank of Japan are providing further monetary accommodation through sizable asset purchase programs, and both of these central banks have indicated that asset purchases will continue, given that inflation remains well below target. Given this ongoing monetary easing, the average policy rate expected by market participants over the next 24 months has declined in the euro area and Japan since 2014, while that of the federal funds rate gradually increased over this period as “liftoff” approached (figure A).

Two effects of these policy divergences that operate through financial markets have important consequences for the economies involved.¹ First, and most obviously, monetary policy divergences have given rise to changes in exchange rates: Portfolio rebalancing by international investors toward economies and currencies with higher interest rates has put downward pressure on AFE currencies, and the dollar has appreciated significantly against these currencies since mid-2014 (text figure 35). This dollar appreciation has contributed to the drag that U.S. net exports have exerted on U.S. economic growth in recent quarters, but the stronger dollar also has contributed to cyclical stabilization abroad as expenditures have shifted toward weaker economies. This effect on international trade is also a consideration for U.S. and foreign monetary policies: All else being equal, a smaller contribution to the U.S. economy from the external sector likely points to a more gradual pace of policy normalization in the United States. By the same token, the economic stimulus from more-depreciated currencies abroad may allow AFE central banks to provide less monetary accommodation—or to start removing it earlier—than would otherwise be the case.

Second, the effect of monetary policy actions on financial conditions may spill over to interest rates in other countries. For example, on ECB policy announcement days, changes in U.S. and German long-term sovereign yields historically have been highly correlated (figure B); similarly large correlations

1. For more detail, see John Ammer, Michiel De Pooter, Christopher Erceg, and Steven Kamin (2016), “International Spillovers of Monetary Policy,” IFDP Notes (Washington: Board of Governors of the Federal Reserve System, February 8), www.federalreserve.gov/econresdata/notes/ifdp-notes/2016/international-spillovers-of-monetary-policy-20160208.html.

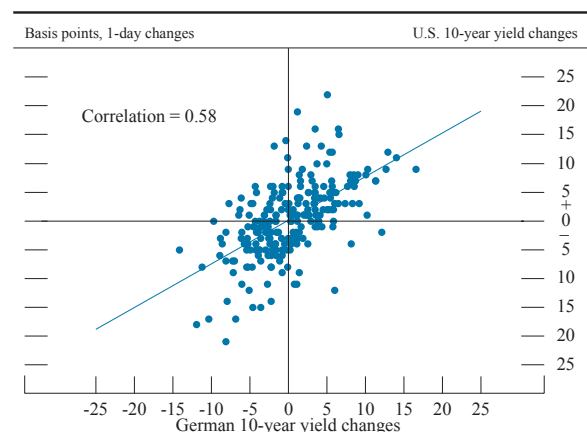
A. Two-year overnight index swap rates in selected advanced economies



SOURCE: Bloomberg.

are observed between U.S. and German yields on days when the Federal Reserve has made policy announcements. In the context of economic and policy divergences, these monetary policy spillovers may alter financial conditions in other countries in ways that are not necessarily consistent with their cyclical stabilization needs. For example, recent monetary easing abroad likely has had a tempering effect on longer-term U.S. interest rates that partially offsets the effect of our own policy normalization. Analogously, reduced monetary accommodation in the United States likely will partially offset the effect of greater monetary accommodation abroad. However, the implications of current policy divergences for monetary spillovers should not be exaggerated: U.S. policy remains accommodative and, on net, likely continues to contribute to accommodative conditions abroad.

B. One-day changes in U.S. and German 10-year yields on ECB policy announcement days, 1999–2015



NOTE: Each point represents the one-day change in U.S. and German 10-year yields on the day of an ECB policy announcement between March 1999 and April 2015. The line indicates the line of best fit.

SOURCE: For U.S. yields, Department of the Treasury; for German yields, Bloomberg; for announcement dates, European Central Bank.

as an agreement was reached last summer between the European Union and Greece. In contrast, bond spreads in a number of EMEs rose modestly, on net, in the second half of the year before moving up more steeply after the start of 2016 amid a widespread increase in risk aversion.

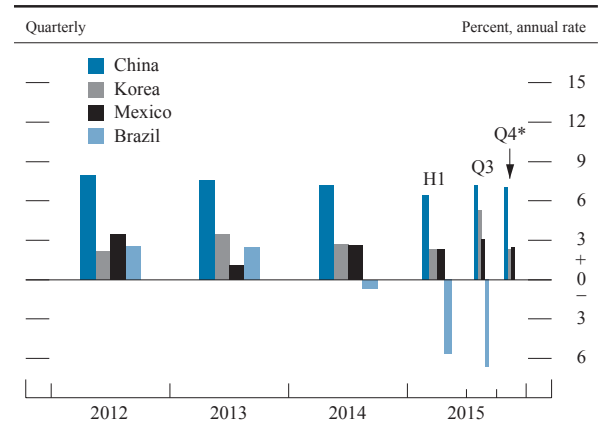
Growth in the emerging market economies moved back up from earlier in 2015 . . .

Following weak growth in the first half of 2015, economic activity in the EMEs improved in the second half, as the pace of growth picked up in Asia and Latin America (figure 38). However, growth has been held back in part by exports from EMEs, which declined appreciably early in 2015 and remain subdued on average.

Economic activity in most of emerging Asia, which had been restrained in the first half of the year by soft external demand and by the outbreak of MERS (Middle East Respiratory Syndrome) in South Korea, picked up in the second half, as the drag from these pressures subsided. In China, GDP growth is reported to have held steady around 7 percent in the second half of the year, boosted in part by relatively strong growth in services. However, weak manufacturing, as well as the financial market volatility noted previously, led to a pronounced heightening of concerns about the economy during the second half of the year.

In Latin America, the decline in commodity prices, along with other macroeconomic challenges, continued to weigh on the economic activity of several countries. In Mexico, the economy continued to grow at a moderate pace in the second half of 2015, supported by improving household demand. However, low oil prices have pressured public finances, and manufacturing exports faltered toward the end of the year. In Brazil, the economy is undergoing its most severe recession in decades. Tight monetary policy in response to high inflation, low commodity

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



* Gross domestic product of Brazil is not yet available for 2015:Q4.

NOTE: The data for Mexico incorporate the flash estimate for 2015:Q4. The data for China are seasonally adjusted by staff. The data for Mexico, Brazil, and Korea 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 Estadística Geografía e Informática; for Brazil, Instituto Brasileiro de Geografia e Estatística; all via Haver Analytics.

prices, and the fallout from a high-profile corruption scandal eroded business confidence and contributed to a collapse in investment.

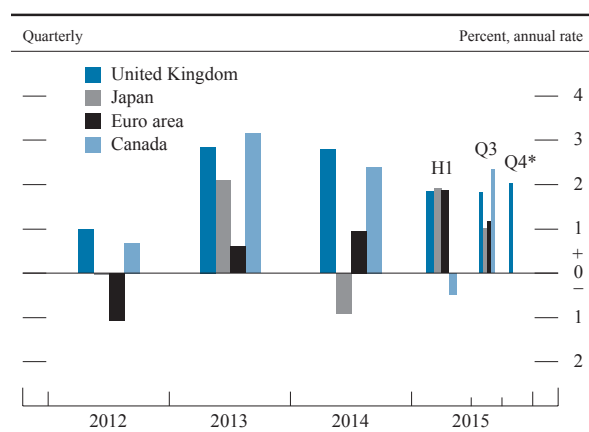
Inflation remained subdued in many EMEs, as the continuing decline in commodity prices contributed to a moderation of headline inflation. Consequently, some central banks, including those of Korea and India, loosened monetary policy to support growth. In China, the PBOC also lowered its benchmark rate and cut the reserve requirement ratio in August and October to address weakness in the economy. In contrast, faced with inflationary pressures stemming partly from their depreciating currencies, Brazil, Chile, and Colombia raised their policy rates in the second half of 2015.

... and in the advanced foreign economies, economic activity expanded at a moderate pace

In Canada, where low oil prices induced a mild contraction earlier in the year, economic activity rebounded in the third quarter as exports recovered and business-sector investment contracted at a slower pace. That said, more recent indicators of growth weakened markedly during the fourth quarter. In contrast, in the euro area, Japan, and the United Kingdom, economic activity grew moderately in the third quarter, and recent indicators for fourth-quarter growth, such as purchasing managers indexes, have largely held steady (figure 39).

As in the United States, inflation remained low in most advanced foreign economies. Further declines in commodity prices weighed on inflation in the AFEs; in the euro area, Japan, and the United Kingdom, consumer prices changed little in 2015. Over the same period, consumer prices rose about 1½ percent in Canada, reflecting the boost to import prices from the sharp depreciation of the Canadian dollar over the past year.

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



* Gross domestic products of the euro area, Japan, and Canada are not yet available for 2015:Q4.

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

With inflation low, AFE central banks maintained highly accommodative monetary policies, and some signaled their intention to maintain large balance sheets well into the future. The European Central Bank, in addition to lowering its deposit rate further into negative territory, announced an extension of the intended duration of its asset purchase program through at least March 2017 and that it would reinvest principal payments for as long

as necessary. The Bank of England announced that it will start shrinking its balance sheet only after its policy rate rises to about 2 percent from its current level of $\frac{1}{2}$ percent. Meanwhile, in response to weak economic performance earlier in 2015, the Bank of Canada cut its policy rate further. More recently, the Bank of Japan cut the interest rate that it pays on a portion of banks' current account deposits to negative 0.1 percent.

PART 2

MONETARY POLICY

In December, the Federal Open Market Committee (FOMC) raised the target range for the federal funds rate by $\frac{1}{4}$ percentage point after seven years in which that rate had been held near zero. The FOMC's decision reflected the considerable improvement in the labor market last year and the Committee's assessment that, even with the modest reduction in policy accommodation, the labor market would continue to strengthen and inflation would return over the medium term to the FOMC's 2 percent objective. Monetary policy remains accommodative, and the Committee expects that economic conditions will warrant only gradual increases in the federal funds rate. However, the actual path of the federal funds rate will depend on the economic outlook as informed by incoming data.

The FOMC raised the federal funds rate target range in December . . .

Since last March, the FOMC had anticipated that it would be appropriate to increase the federal funds rate when it had seen further improvement in the labor market and was reasonably confident that inflation would move back to 2 percent over the medium term. In December, the FOMC, judging that these criteria had been met, raised the target range for the federal funds rate to $\frac{1}{4}$ to $\frac{1}{2}$ percent (figure 40).⁴

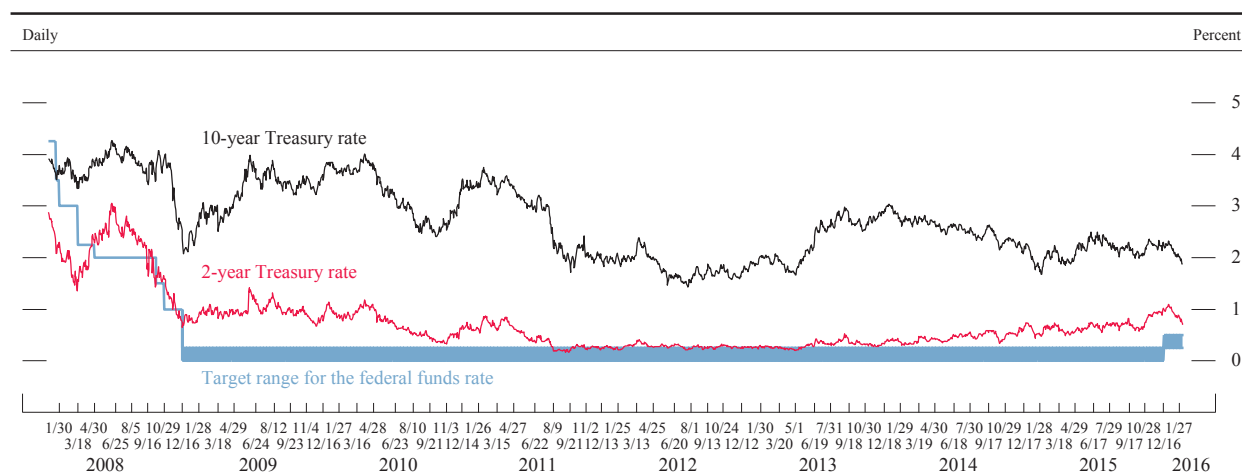
4. See Board of Governors of the Federal Reserve System (2015), "Federal Reserve Issues FOMC Statement," press release, December 16, www.federalreserve.gov/news_events/press/monetary/20151216a.htm.

The Committee's decision to raise the federal funds rate recognized the time it takes for policy actions to affect future economic outcomes; if the FOMC delayed the start of policy normalization for too long, a relatively abrupt tightening of policy might eventually be needed to keep the economy from overheating and inflation from significantly overshooting the Committee's 2 percent objective. Such an abrupt tightening could disrupt financial markets and perhaps even inadvertently push the economy into recession.

. . . but monetary policy remains accommodative

Even after the increase in the federal funds rate late last year, the stance of monetary

40. Selected interest rates



NOTE: The 2-year and 10-year Treasury rates are the constant-maturity yields based on the most actively traded securities. The dates on the horizontal axis are those of regularly scheduled Federal Open Market Committee meetings.

SOURCE: Department of the Treasury; Federal Reserve Board.

policy remains accommodative. The FOMC anticipates that economic conditions will evolve in a manner that will warrant only gradual increases in the federal funds rate, and that the federal funds rate is likely to remain, for some time, below the levels that are expected to prevail in the longer run.

This expectation is consistent with the view that the neutral nominal federal funds rate—defined as the value of the federal funds rate that would be neither expansionary nor contractionary if the economy was operating at its productive potential—is currently low by historical standards and is likely to rise only gradually over time. One indication that the neutral federal funds rate is low is that U.S. economic growth has been only moderate in recent years despite the very low level of the federal funds rate and the Federal Reserve’s very large holdings of longer-term securities. Had the neutral rate been running closer to the average level estimated to have prevailed in recent decades, these policy actions would have been expected to foster a much more rapid economic expansion.

An array of persistent economic headwinds have weighed on aggregate demand since the financial crisis; these headwinds included, at various times, limited access to credit for some borrowers, contractionary fiscal policy, and weak growth abroad coupled with a significant appreciation of the dollar. Although the overall restraint imposed by such headwinds has declined over the past few years, the effects of some headwinds have remained significant. As these effects abate further, the neutral federal funds rate should gradually move higher over time. (For a discussion of how the neutral federal funds rate is likely to evolve over time, see the box “The Neutral Federal Funds Rate in the Longer Run.”)

Another reason that the Committee expects only a gradual increase in the federal funds rate will be warranted is that, with the federal funds rate near zero, the FOMC can respond more readily to upside surprises to inflation,

economic growth, and employment than to downside shocks. This asymmetry suggests that it is appropriate to be more cautious in normalizing the stance of monetary policy than would be the case if short-term nominal interest rates were appreciably above zero.

In part reflecting this concern, the FOMC continued to reinvest principal payments from its securities portfolio, and the Committee expects that this reinvestment policy will be maintained until normalization of the level of the federal funds rate is well under way. Maintaining sizable holdings of longer-term securities should help support accommodative financial conditions and reduce the risk that the Committee would not be able to deliver sufficient accommodation by lowering the federal funds rate in the event of future adverse shocks.

The FOMC expects that, supported by an accommodative monetary policy, economic activity will continue to expand at a moderate pace and the labor market will continue to strengthen. Inflation is expected to remain low in the near term, in part because of recent further declines in energy prices, but to rise to 2 percent over the medium term as the transitory effects of declines in energy and import prices dissipate and the labor market strengthens further. In light of the current shortfall of inflation from 2 percent, the Committee is carefully monitoring actual and expected progress toward its inflation goal.

The FOMC’s policy decisions will continue to be data dependent

Although the Committee expects that economic conditions will warrant only gradual increases in the federal funds rate, the Committee has emphasized that the actual path of monetary policy will depend on how incoming data affect the economic outlook. In determining the timing and size of future adjustments to the target range, the Committee will assess realized and expected economic conditions relative

to its objectives of maximum employment and 2 percent inflation. Stronger growth or a more rapid increase in inflation than the Committee currently anticipates would likely call for faster increases in the federal funds rate; conversely, if conditions prove weaker, a lower path of the federal funds rate would likely be appropriate. Similarly, the timing of a change in the reinvestment policy will depend on economic developments and their implications for progress toward the FOMC’s goals of maximum employment and price stability. In assessing realized changes in economic conditions and forming its outlook, the Committee will take into account a wide range of measures, including measures of labor market conditions, indicators of inflation pressures and inflation expectations, and readings on financial and international developments.

The size of the Federal Reserve’s balance sheet has remained stable

With the continuation of the Committee’s reinvestment policy, the Federal Reserve’s total assets have held steady at around \$4.5 trillion (figure 41). Holdings of U.S. Treasury securities in the System Open Market Account (SOMA) have remained at \$2.5 trillion, and holdings of agency debt and agency

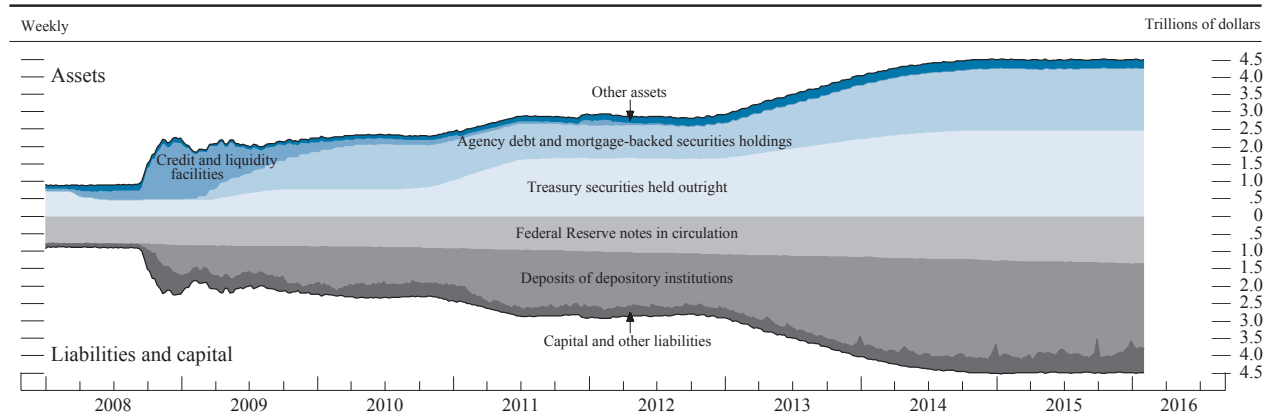
mortgage-backed securities at approximately \$1.8 trillion. Consequently, total liabilities on the Federal Reserve’s balance sheet were largely unchanged.

Given the Federal Reserve’s large securities holdings, interest income on the SOMA portfolio has continued to support substantial remittances to the U.S. Treasury Department. Preliminary results indicate that the Reserve Banks provided for payments of \$97.7 billion of their estimated 2015 net income to the Treasury. In addition, the Reserve Banks transferred to the Treasury \$19.3 billion from their capital surplus as required by an amendment to the Federal Reserve Act contained in the Fixing America’s Surface Transportation Act of 2015. Remittances from 2008 through 2015 total about \$600 billion on a cumulative basis—an average of about \$75 billion a year, compared with about \$25 billion a year, on average, over the decade prior to 2008.

The Committee continued to focus on the implementation of monetary policy

Consistent with the FOMC’s Policy Normalization Principles and Plans published on September 17, 2014, the Federal Reserve used interest paid on reserve balances

41. 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 February 3, 2016.

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

The Neutral Federal Funds Rate in the Longer Run

As discussed in the main text, economic growth has been only moderate in recent years despite the very low level of the federal funds rate and the Federal Reserve's large-scale purchases of longer-term securities. This observation suggests that headwinds have lowered the "neutral" federal funds rate—defined as the value of the federal funds rate that would be neither expansionary nor contractionary if the economy was operating at its productive potential—to historically low levels.

As economic disturbances dissipate, the neutral federal funds rate should rise to its expected longer-run level. This longer-run value of the neutral rate plays an important role in monetary policy analysis: It is a key determinant of the longer-run level of the federal funds rate and other nominal interest rates. When expressed on a real basis, it also corresponds to the intercept of simple policy rules such as those studied in Taylor (1993).¹ Like the current neutral rate, the longer-run value of the neutral rate is not directly observed and must be estimated using the available data and potentially imperfect models of the economy.

Since 2012, the median of the projections of the longer-run level of the federal funds rate in the Federal Open Market Committee's Summary of

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

Economic Projections has fallen from 4.25 percent to 3.50 percent.² In addition, several econometric studies have estimated a decline in the longer-run value of the neutral rate by statistically modeling the co-movements between variables like inflation, interest rates, output, and unemployment.³ Figure A shows estimates from

2. See the December 2015 Summary of Economic Projections, which appeared as an addendum to the minutes of the December 15–16, 2015, meeting of the Federal Open Market Committee and is included as Part 3 of this report.

3. See, for example, Benjamin K. Johannsen and Elmar Mertens (forthcoming), "The Expected Real Interest Rate in the Long Run: Time Series Evidence with the Effective Lower Bound," FEDS Notes (Washington: Board of Governors of the Federal Reserve System); Michael T. Kiley (2015), "What Can the Data Tell Us about the Equilibrium Real Interest Rate?" Finance and Economics Discussion Series 2015-077 (Washington: Board of Governors of the Federal Reserve System, August), www.federalreserve.gov/econresdata/feds/2015/files/2015077pap.pdf; Thomas Laubach and John Williams (2015), "Measuring the Natural Rate of Interest Redux," Hutchins Center Working Papers 15 (Washington: Brookings Institution, November), www.brookings.edu/~media/Research/Files/Papers/2015/10/30-laubach-williams/WP15-Laubach-Williams-natural-interest-rate-redux-2.pdf?la=en; and Thomas A. Lubik and Christian Matthes (2015), "Calculating the Natural Rate of Interest: A Comparison of Two Alternative Approaches," Economic Brief 15-10 (Richmond: Federal Reserve Bank of Richmond, October), https://www.richmondfed.org/~media/richmondfedorg/publications/research/economic_brief/2015/pdf/eb_15-10.pdf. In these

and also employed an overnight reverse repurchase agreement (ON RRP) facility to implement its decision in December to raise the target range for the federal funds rate.⁵ Specifically, the Board of Governors raised the interest rate paid on required and excess reserve balances to ½ percent, while the FOMC authorized ON RRP operations at an offering rate of ¼ percent. (For further information, see the box "Monetary Policy

5. See Board of Governors of the Federal Reserve System (2014), "Federal Reserve Issues FOMC Statement on Policy Normalization Principles and Plans," press release, September 17, www.federalreserve.gov/newsevents/press/monetary/20140917c.htm.

Implementation following the December 2015 FOMC Meeting.") In addition, the Board of Governors approved an increase in the discount rate (the primary credit rate) to 1 percent.

Along with the decision to increase the target range for the federal funds rate, the FOMC also temporarily suspended the aggregate cap on ON RRP transactions, indicating that ON RRP operations would be undertaken in amounts limited only by the value of Treasury securities held outright in the SOMA that are available for such operations and by a per-counterparty limit of \$30 billion per day. Nonetheless, total reverse repurchase

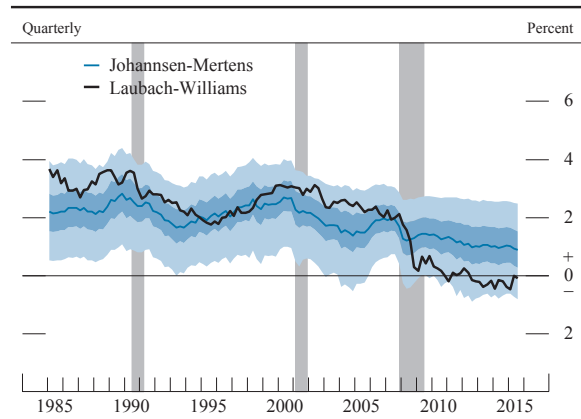
two time-series models of the longer-run value of the neutral rate, expressed on a real basis. One is from Johanssen and Mertens (forthcoming), and the other is from Laubach and Williams (2015).⁴ The figure includes the uncertainty bands for the Johanssen and Mertens estimates, which indicate that the uncertainty surrounding the longer-run value of the neutral rate is substantial (as it is in other model frameworks).

Uncertainty about the longer-run value of the neutral rate implies uncertainty about the expected cumulative rise in policy rates during the policy normalization process. The risk that the longer-run value of the neutral rate going forward could be lower than currently estimated is especially pertinent, because such a scenario would likely increase the probability that monetary policy will be constrained by the effective lower bound on nominal interest rates in the future, with adverse consequences for macroeconomic outcomes.

studies, the longer-run value of the neutral rate is sometimes referred to as the longer-run value of the “natural” rate or the longer-run “equilibrium” federal funds rate.

4. The estimates from the Johanssen-Mertens and Laubach-Williams models are not the same because the models use different data to infer slack in the economy and because the model restrictions and estimation methods are different.

A. Estimates of the neutral real rate in the longer run



NOTE: The data extend through 2015:Q3. For the Johanssen-Mertens model, at each date, the parameters of the model and the longer-run equilibrium real rate are jointly estimated using data up to that date. For the Laubach-Williams model, the parameters are estimated on the entire data sample, but estimates of the longer-run equilibrium real rate use data only up to the date of interest. Shaded regions are 50 and 90 percent uncertainty bands from the Johanssen-Mertens model. The shaded bars indicate periods of business recession as defined by the National Bureau of Economic Research.

SOURCE: Benjamin K. Johanssen and Elmar Mertens (forthcoming), “The Expected Real Interest Rate in the Long Run: Time Series Evidence with the Effective Lower Bound,” FEDS Notes (Washington: Board of Governors of the Federal Reserve System), and Thomas Laubach and John Williams (2015), “Measuring the Natural Rate of Interest Redux,” Hutchins Center Working Papers 15 (Washington: Brookings Institution, November), www.brookings.edu/~media/Research/Files/Papers/2015/10/30-laubach-williams/WP15-Laubach-Williams-natural-interest-rate-redux-2.pdf?la=en.

agreement transactions with the Federal Reserve have remained near levels observed prior to the increase in the target range for the federal funds rate and the suspension of the aggregate cap. The Committee intends to phase out this facility when it is no longer needed to help control the federal funds rate.

The Federal Reserve also continued to test the operational readiness of other policy

tools. Three Term Deposit Facility operations were conducted in the second half of 2015. The operations offered either 7- or 14-day deposits at a floating rate of 1 basis point over the interest rate on excess reserves. In these operations, deposit volumes declined slightly from previous tests with similar parameters.

Monetary Policy Implementation following the December 2015 FOMC Meeting

At its December 2015 meeting, the Federal Open Market Committee (FOMC) increased the target range for the federal funds rate from between 0 and $\frac{1}{4}$ percent to between $\frac{1}{4}$ and $\frac{1}{2}$ percent, effective December 17.¹ In order to implement the monetary policy stance announced in December, the Board of Governors also voted to raise the interest rate paid on required and excess reserve balances to 0.50 percent. Moreover, the FOMC authorized an increase in the overnight reverse repurchase agreement (ON RRP) facility offering rate to 0.25 percent and indicated that the aggregate amount of the ON RRP operations would be constrained only by the value of Treasury securities held outright in the System Open Market Account that are available for such operations.² Each of these monetary policy decisions is consistent with the guidance provided in the Policy Normalization Principles and Plans outlined in the July 2015 *Monetary Policy Report*.³

1. See Board of Governors of the Federal Reserve System (2015), “Federal Reserve Issues FOMC Statement,” press release, December 16, www.federalreserve.gov/newsevents/press/monetary/20151216a.htm.

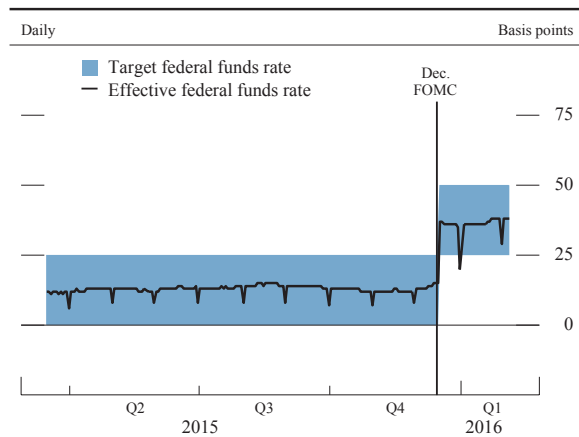
2. In a related action, the Board of Governors voted to approve a $\frac{1}{4}$ percentage point increase in the discount rate to 1 percent.

3. See the box “Policy Normalization Principles and Plans: Additional Details” in Board of Governors of the Federal Reserve System (2015), *Monetary Policy Report* (Washington: Board of Governors, July), p. 35, www.federalreserve.gov/monetarypolicy/files/20150715_mprfullreport.pdf.

The effective federal funds rate rose to 0.37 percent at the time of the change to the target range for the federal funds rate amid orderly trading conditions in money markets (figure A). Since the increase in the target range, the effective federal funds rate has traded in a relatively narrow range of 0.35 to 0.38 percent, with the exception of month-ends, when the rate fell temporarily in typical fashion. Increases in interest rates in other money markets were similar to the rise in the federal funds rate following the December meeting, with overnight Eurodollar rates closely tracking the effective federal funds rate and the general collateral repurchase agreement (or repo) rate maintaining spreads to unsecured rates similar to those observed before the December meeting.

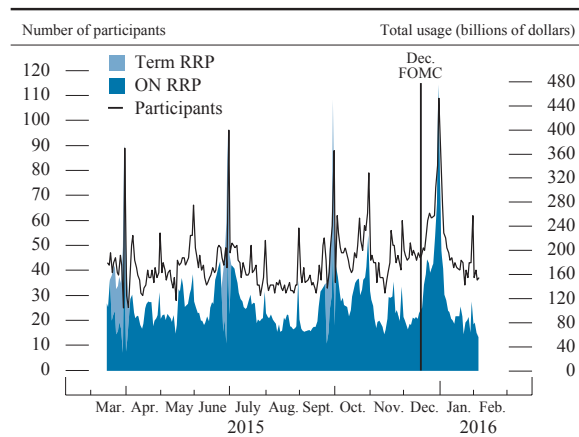
Total volume in the ON RRP facility was virtually unchanged on the day after the December meeting (figure B). In the weeks following the December meeting, the total amount of Federal Reserve reverse repurchase agreement (RRP) operations reflected typical calendar-related effects. On year-end, volume in the ON RRP facility was nearly \$475 billion, roughly in line with aggregate RRP operations seen on recent quarter-ends. Following year-end, usage of the ON RRP facility rapidly returned to—and has remained at—levels that prevailed before year-end, consistent with recent quarter-end patterns.

A. Effective federal funds rate



SOURCE: Federal Reserve Bank of New York.

B. Reverse repurchase agreement operations



NOTE: ON RRP is overnight reverse repurchase agreement; term RRP is term reverse repurchase agreement. Data are daily.
SOURCE: Federal Reserve Bank of New York.

PART 3

SUMMARY OF ECONOMIC PROJECTIONS

The following material appeared as an addendum to the minutes of the December 15–16, 2015, meeting of the Federal Open Market Committee.

In conjunction with the Federal Open Market Committee (FOMC) meeting held on December 15–16, 2015, meeting participants submitted their projections of the most likely outcomes for real output growth, the unemployment rate, inflation, and the federal funds rate for each year from 2015 to 2018 and over the longer run.⁶ 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 and assumptions about the 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. “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 Federal Reserve’s objectives of maximum employment and stable prices.

FOMC participants generally expected that, under appropriate monetary policy, real gross domestic product (GDP) growth in 2016 and 2017 would be at or somewhat above their individual estimates of the longer-run growth rate and would converge toward its longer-run rate in 2018 (table 1 and figure 1). All participants projected that the unemployment rate would decline further in 2016. Most participants expected that in

2018 the unemployment rate would remain somewhat below their individual judgments of its longer-run normal rate. Participants projected that inflation, as measured by the four-quarter change in the price index for personal consumption expenditures (PCE), would pick up in 2016 and 2017 from the very low rate seen in 2015. Almost all participants projected inflation in 2018 to be at or very near the Committee’s 2 percent objective.

As shown in figure 2, all but two participants thought that it would be appropriate to raise the target range for the federal funds rate before the end of 2015. Most participants expected that it would be appropriate to raise the target range for the federal funds rate gradually over the projection period as headwinds to economic growth dissipate slowly over time and as inflation rises toward the Committee’s goal of 2 percent. Consistent with this outlook, most participants projected that the appropriate level of the federal funds rate would be below its longer-run level through 2018.

Almost all participants viewed the levels of uncertainty associated with their outlooks for economic growth and the unemployment rate as broadly similar to the norms of the previous 20 years. Nearly all also viewed the levels of uncertainty associated with their inflation forecasts as broadly similar to historical norms. Most participants saw the risks to their outlooks for real GDP growth and the unemployment rate as broadly balanced. A majority viewed the risks attending their projections for both PCE and core PCE inflation as broadly balanced, but many saw these risks as weighted to the downside. Among those who saw the risks to their inflation outlook as tilted to the downside,

6. The president of the Federal Reserve Bank of Minneapolis did not participate in this FOMC meeting, and the incoming president is scheduled to assume office on January 1, 2016. James M. Lyon, First Vice President of the Federal Reserve Bank of Minneapolis, submitted economic projections.

Table 1. Economic projections of Federal Reserve Board members and Federal Reserve Bank presidents, under their individual assessments of projected appropriate monetary policy, December 2015
Percent

Variable	Median ¹					Central tendency ²					Range ³				
	2015	2016	2017	2018	Longer run	2015	2016	2017	2018	Longer run	2015	2016	2017	2018	Longer run
Change in real GDP.....	2.1	2.4	2.2	2.0	2.0	2.1	2.3–2.5	2.0–2.3	1.8–2.2	1.8–2.2	2.0–2.2	2.0–2.7	1.8–2.5	1.7–2.4	1.8–2.3
September projection	2.1	2.3	2.2	2.0	2.0	2.0–2.3	2.2–2.6	2.0–2.4	1.8–2.2	1.8–2.2	1.9–2.5	2.1–2.8	1.9–2.6	1.6–2.4	1.8–2.7
Unemployment rate	5.0	4.7	4.7	4.7	4.9	5.0	4.6–4.8	4.6–4.8	4.6–5.0	4.8–5.0	5.0	4.3–4.9	4.5–5.0	4.5–5.3	4.7–5.8
September projection	5.0	4.8	4.8	4.8	4.9	5.0–5.1	4.7–4.9	4.7–4.9	4.7–5.0	4.9–5.2	4.9–5.2	4.5–5.0	4.5–5.0	4.6–5.3	4.7–5.8
PCE inflation	0.4	1.6	1.9	2.0	2.0	0.4	1.2–1.7	1.8–2.0	1.9–2.0	2.0	0.3–0.5	1.2–2.1	1.7–2.0	1.7–2.1	2.0
September projection	0.4	1.7	1.9	2.0	2.0	0.3–0.5	1.5–1.8	1.8–2.0	2.0	2.0	0.3–1.0	1.5–2.4	1.7–2.2	1.8–2.1	2.0
Core PCE inflation ⁴	1.3	1.6	1.9	2.0		1.3	1.5–1.7	1.7–2.0	1.9–2.0		1.2–1.4	1.4–2.1	1.6–2.0	1.7–2.1	
September projection	1.4	1.7	1.9	2.0		1.3–1.4	1.5–1.8	1.8–2.0	1.9–2.0		1.2–1.7	1.5–2.4	1.7–2.2	1.8–2.1	
Memo: Projected appropriate policy path															
Federal funds rate	0.4	1.4	2.4	3.3	3.5	0.4	0.9–1.4	1.9–3.0	2.9–3.5	3.3–3.5	0.1–0.4	0.9–2.1	1.9–3.4	2.1–3.9	3.0–4.0
September projection	0.4	1.4	2.6	3.4	3.5	0.1–0.6	1.1–2.1	2.1–3.4	3.0–3.6	3.3–3.8	-0.1–0.9	-0.1–2.9	1.0–3.9	2.9–3.9	3.0–4.0

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 16–17, 2015.

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.

several highlighted the continued strength of the dollar and some recent indications that inflation expectations had declined as contributing to those risks.

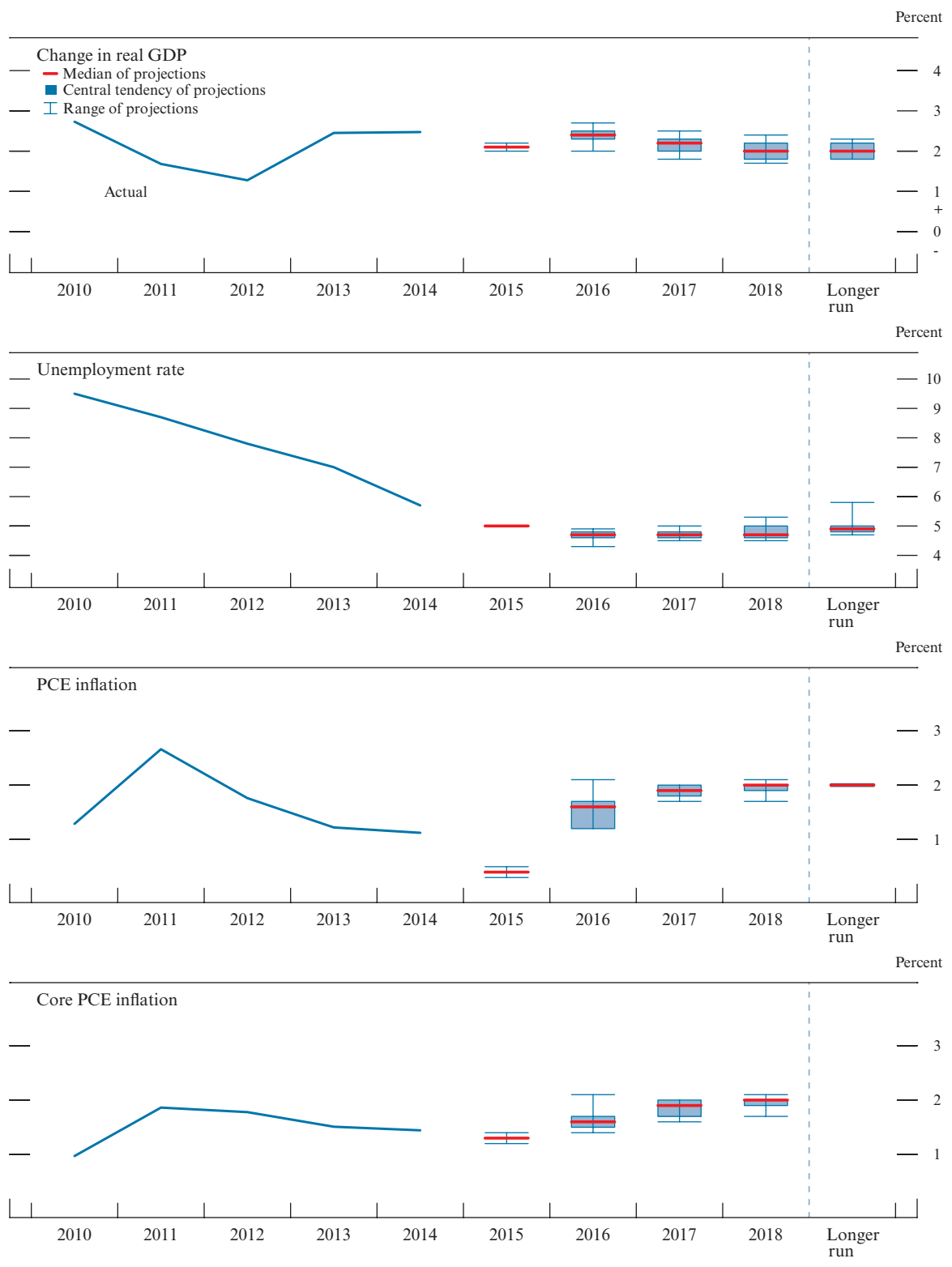
The Outlook for Economic Activity

Participants generally projected that, conditional on their individual assumptions about appropriate monetary policy, real GDP would increase in 2016 and 2017 at a pace somewhat above their estimates of its longer-run rate. Real GDP growth would then slow in 2018 to a rate at or near their individual estimates of the longer-run normal rate. Participants pointed to a number of factors that they expect will contribute to moderate output growth over the next few years, including labor market conditions that are supportive of economic expansion, household and business balance sheets that had improved significantly since the financial crisis, and a stance of monetary policy that was expected to remain accommodative.

Compared with their contributions to the Summary of Economic Projections (SEP) in September, participants' projections of real GDP growth from 2016 to 2018 were generally little changed. The median value of participants' projections for real GDP growth in 2016 was revised up slightly to 2.4 percent; some participants cited the Bipartisan Budget Act of 2015, which was passed in late October, as adding support to economic growth in the near term. Very few participants changed their forecasts for real GDP growth in the longer run, resulting in an unchanged median.

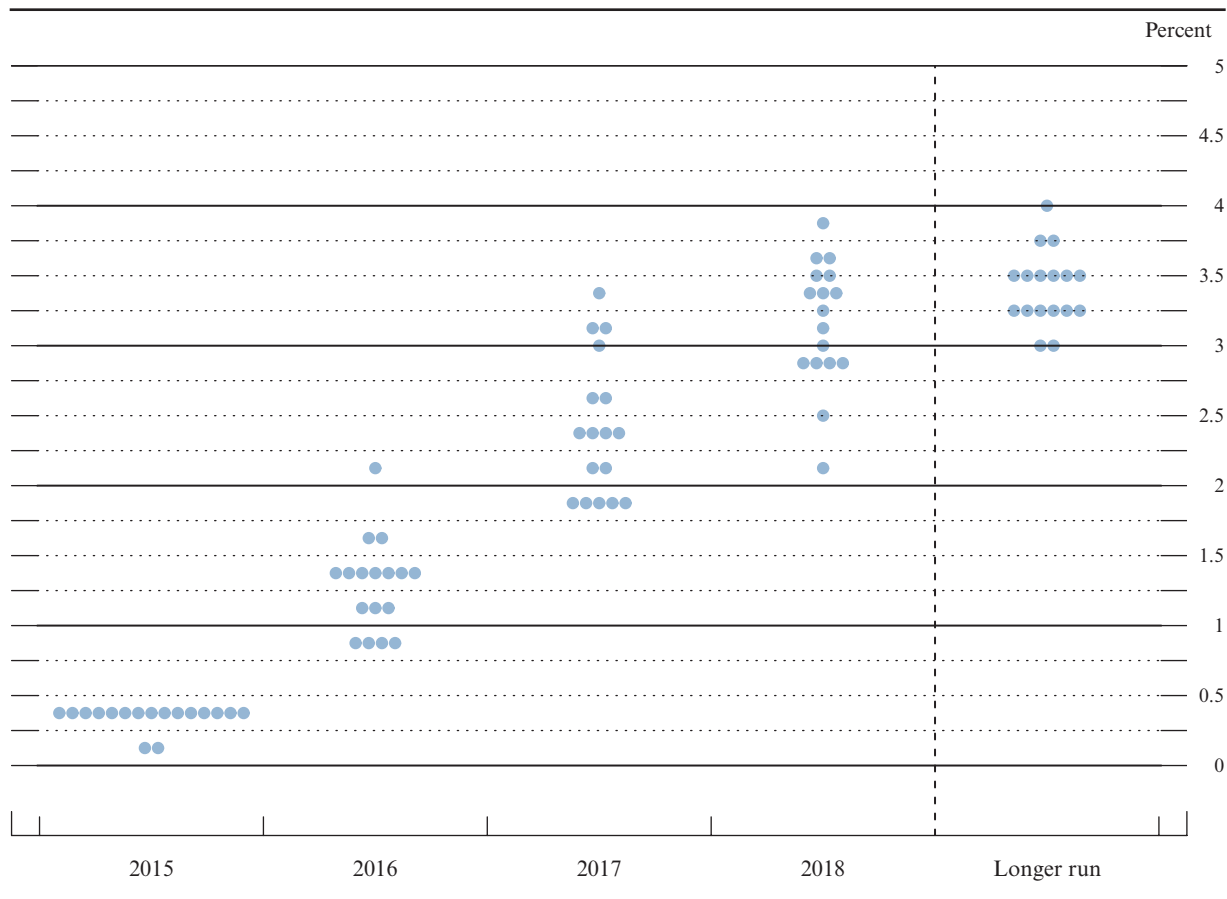
All participants projected that the unemployment rate would be at or below their individual judgments of its longer-run normal level from 2016 through 2018. Compared with the September SEP, most participants' projected paths for the unemployment rate were revised down a little over those three years, with the median of the projections in the fourth quarter of each year at 4.7 percent. Many also revised down slightly their

Figure 1. Medians, central tendencies, and ranges of economic projections, 2015–18 and over the longer run



NOTE: Definitions of variables are in the general note 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 $\frac{1}{8}$ 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.

estimates of the longer-run normal rate of unemployment, although the median forecast of 4.9 percent was unchanged since September. Participants generally cited stronger-than-expected labor market data in recent months as a factor explaining the downward revisions to their unemployment rate forecasts.

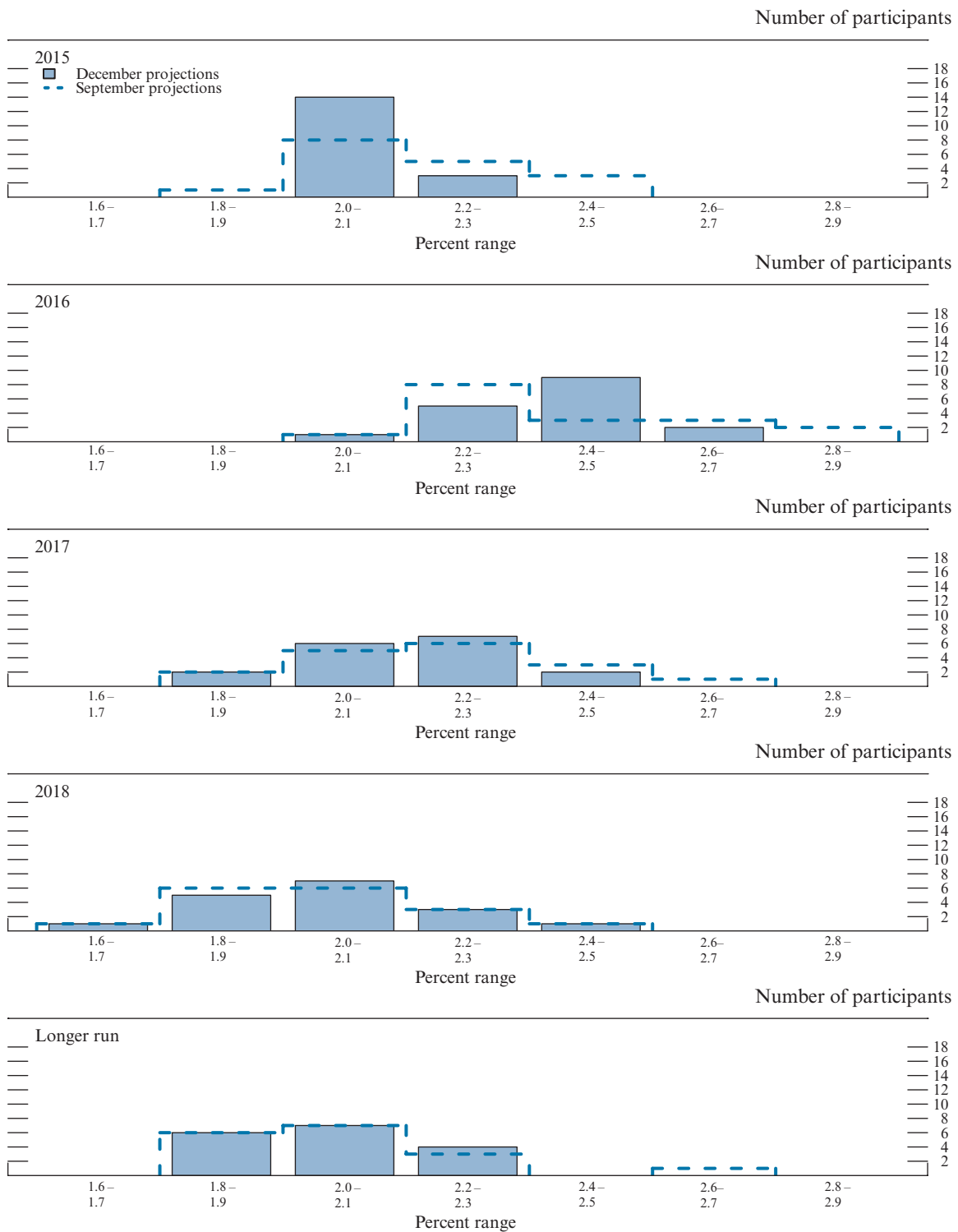
Figures 3.A and 3.B show the distribution of participants' views regarding the likely outcomes for real GDP growth and the unemployment rate through 2018 and in the longer run. The distributions of the projections for real GDP growth over the next several years and in the longer run narrowed some since the September SEP. The diversity of views across participants on the outlook for GDP growth reflected, in part, differences

in their individual assessments of the size and persistence of the effects of lower energy prices and a stronger dollar on real activity; the time it would take for the headwinds that have been restraining the pace of the economic expansion, such as financial and economic conditions abroad, to dissipate; and the appropriate path of monetary policy. With regard to the unemployment rate, the distributions of projections over the next three years shifted modestly to lower values since September.

The Outlook for Inflation

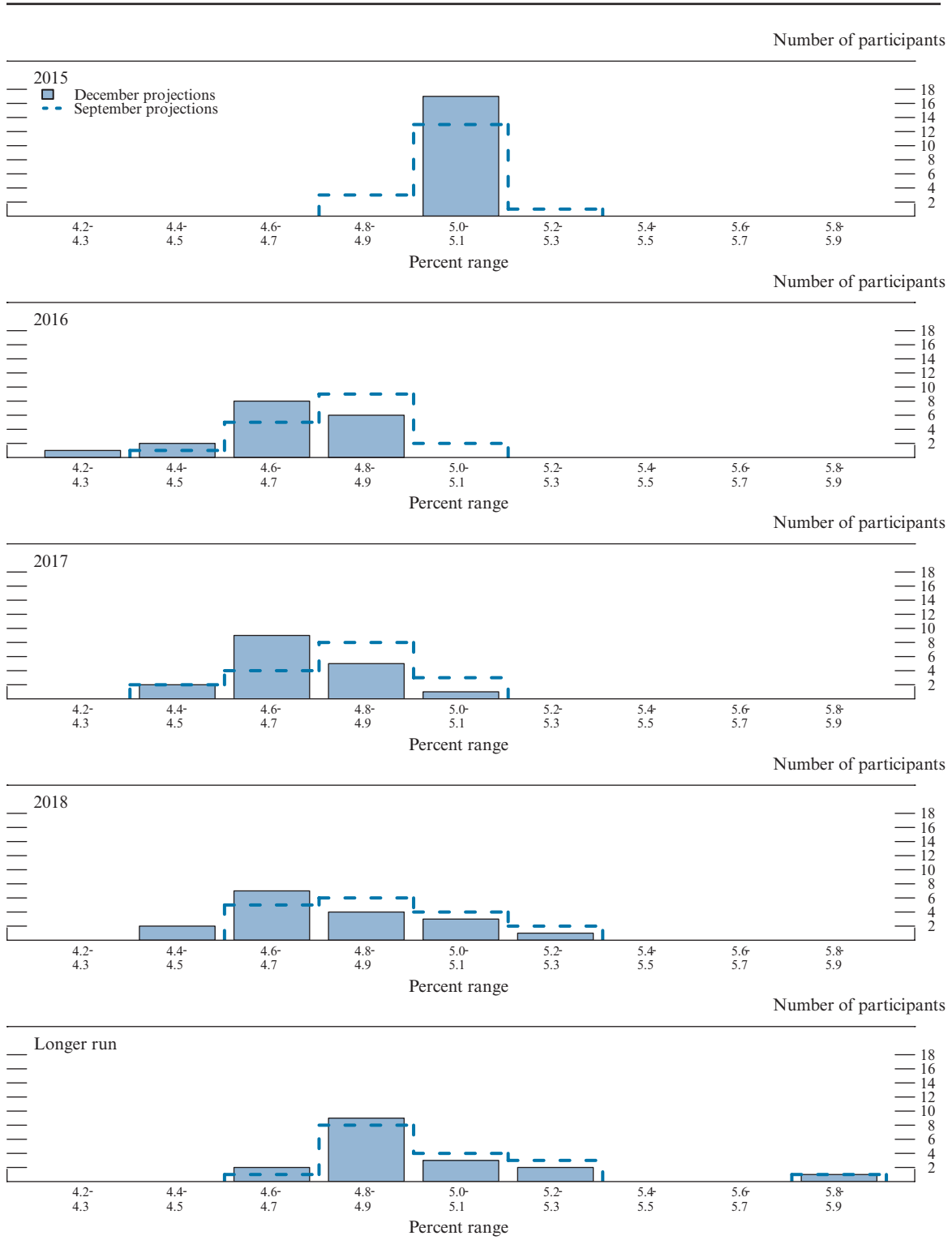
Nearly all participants saw PCE price inflation picking up in 2016, rising further in 2017, and then reaching a rate in 2018 at or very

Figure 3.A. Distribution of participants' projections for the change in real GDP, 2015–18 and over the longer run



NOTE: Definitions of variables are in the general note to table 1.

Figure 3.B. Distribution of participants' projections for the unemployment rate, 2015–18 and over the longer run



NOTE: Definitions of variables are in the general note to table 1.

close to the Committee's 2 percent longer-run objective. However, relative to the September SEP, almost all participants marked down their projections for PCE price inflation in 2016, observing that recent declines in energy prices and the continued strength in the dollar could exert additional downward pressure on inflation in the near term. Revisions to participants' inflation forecasts in 2017 were more mixed, while the projections for inflation in 2018 were little changed. Most participants also marked down their projections for core PCE price inflation in 2016, although almost all still expected core inflation to rise gradually over the projection period and to be at or very close to 2 percent by 2018. Factors cited by participants as contributing to their outlook that inflation will rise over the medium term included recent signs of a pickup in wage growth, their expectation of tighter resource utilization, their expectation that the effects of recent appreciation in the dollar and declines in oil prices on inflation will fade, their anticipation that inflation expectations will remain at levels consistent with the FOMC's longer-run objective, and still-accommodative monetary policy.

Figures 3.C and 3.D provide information on the distribution of participants' views about the outlook for inflation. The distribution of participants' projections for PCE price inflation in 2016 and 2017 shifted to the left compared with the September SEP, while the distributions of projections for 2018 and in the longer run were little changed. The distributions of projections for core PCE price inflation moved lower for 2016 and 2017 compared with September but did not change for 2018.

Appropriate Monetary Policy

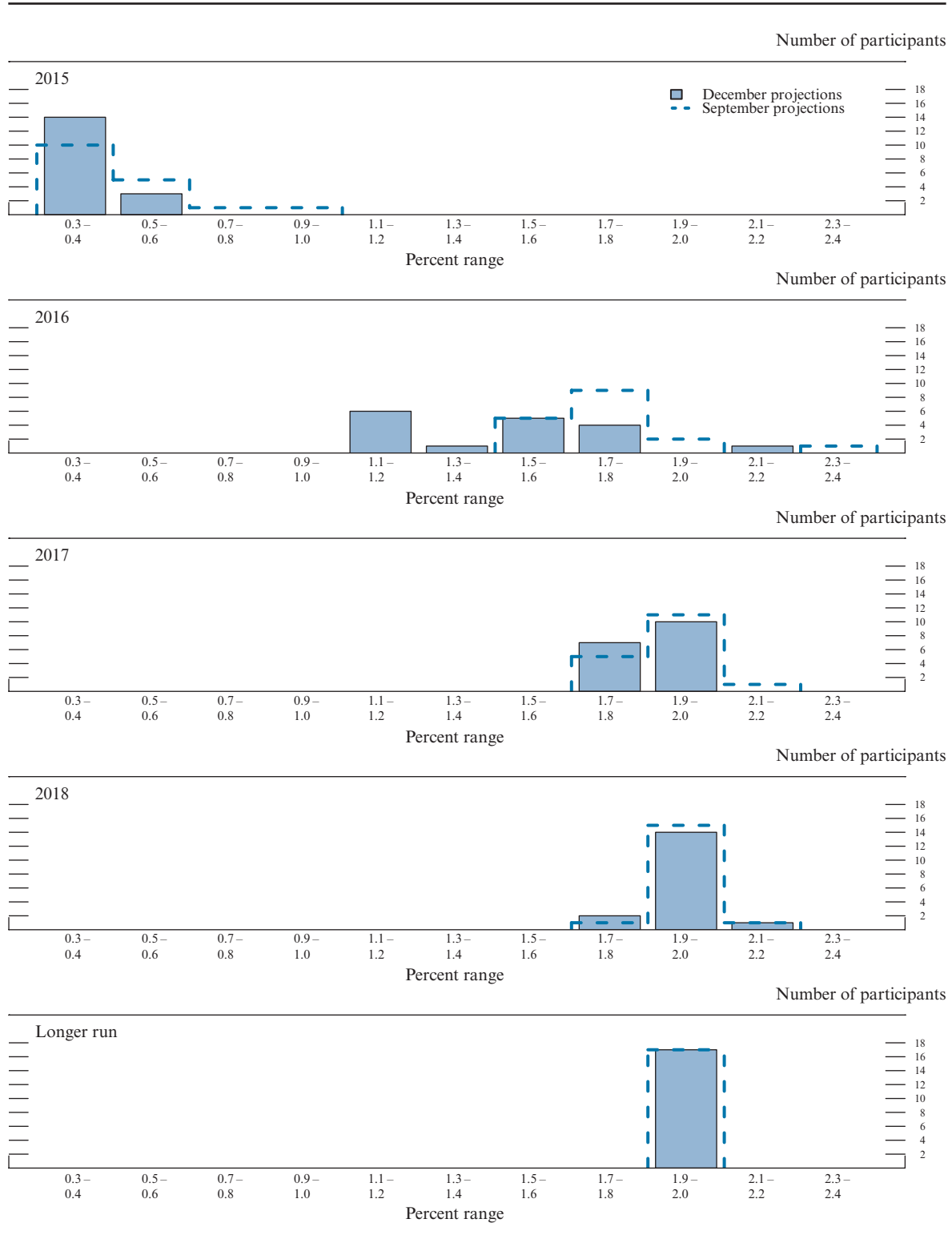
Figure 3.E provides the distribution of participants' judgments regarding the appropriate level of the target federal funds rate at the end of each calendar year from 2015 to 2018 and over the longer run. Relative to September, the projections of the appropriate

levels of the federal funds rate over the next three years generally shifted to lower values. The median projection for next year was unchanged, but the medians for 2017 and 2018 declined slightly. The median projection now stands at 1.4 percent at the end of 2016, 2.4 percent at the end of 2017, and 3.3 percent at the end of 2018. Given their expectations that economic headwinds will persist and that inflation will rise gradually to 2 percent over the next three years, most participants judged that it would be appropriate for the federal funds rate to remain below its longer-run normal level from 2016 to 2018. Participants projected that a gradual rise in the federal funds rate over that period would be appropriate as some of those headwinds, such as sluggish foreign economic growth, diminish and the temporary factors holding down inflation dissipate. Some participants noted that a gradual increase in the federal funds rate would be consistent with their expectation that the neutral short-term real interest rate will rise slowly over the next few years.

Both the median and the range of participants' projections of the federal funds rate in the longer run, at 3.5 percent and 3 to 4 percent, respectively, were unchanged since September. However, several participants revised their projections for the longer-run federal funds rate slightly lower. All participants judged that inflation in the longer run would be equal to the Committee's objective of 2 percent, implying that their individual judgments regarding the appropriate longer-run level of the real federal funds rate, in the absence of further shocks to the economy, ranged from 1 to 2 percent, the same as in September.

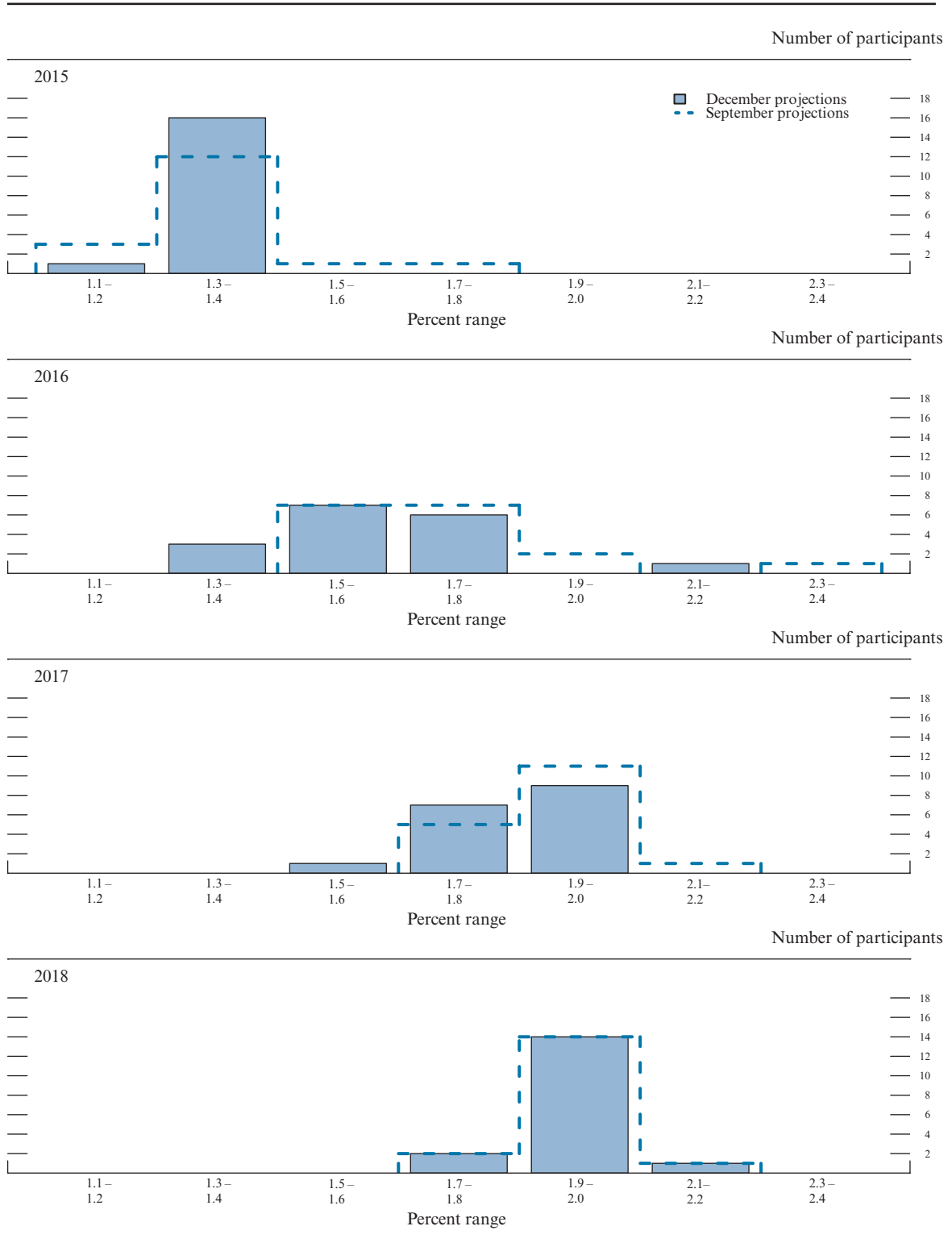
Participants' views of the appropriate path for monetary policy were informed by their judgments about the state of the economy and the outlook for labor markets and inflation. One important consideration for many participants was their estimate of the extent of slack remaining in the labor market, as informed by the incoming data on various labor market indicators. Another

Figure 3.C. Distribution of participants' projections for PCE inflation, 2015–18 and over the longer run



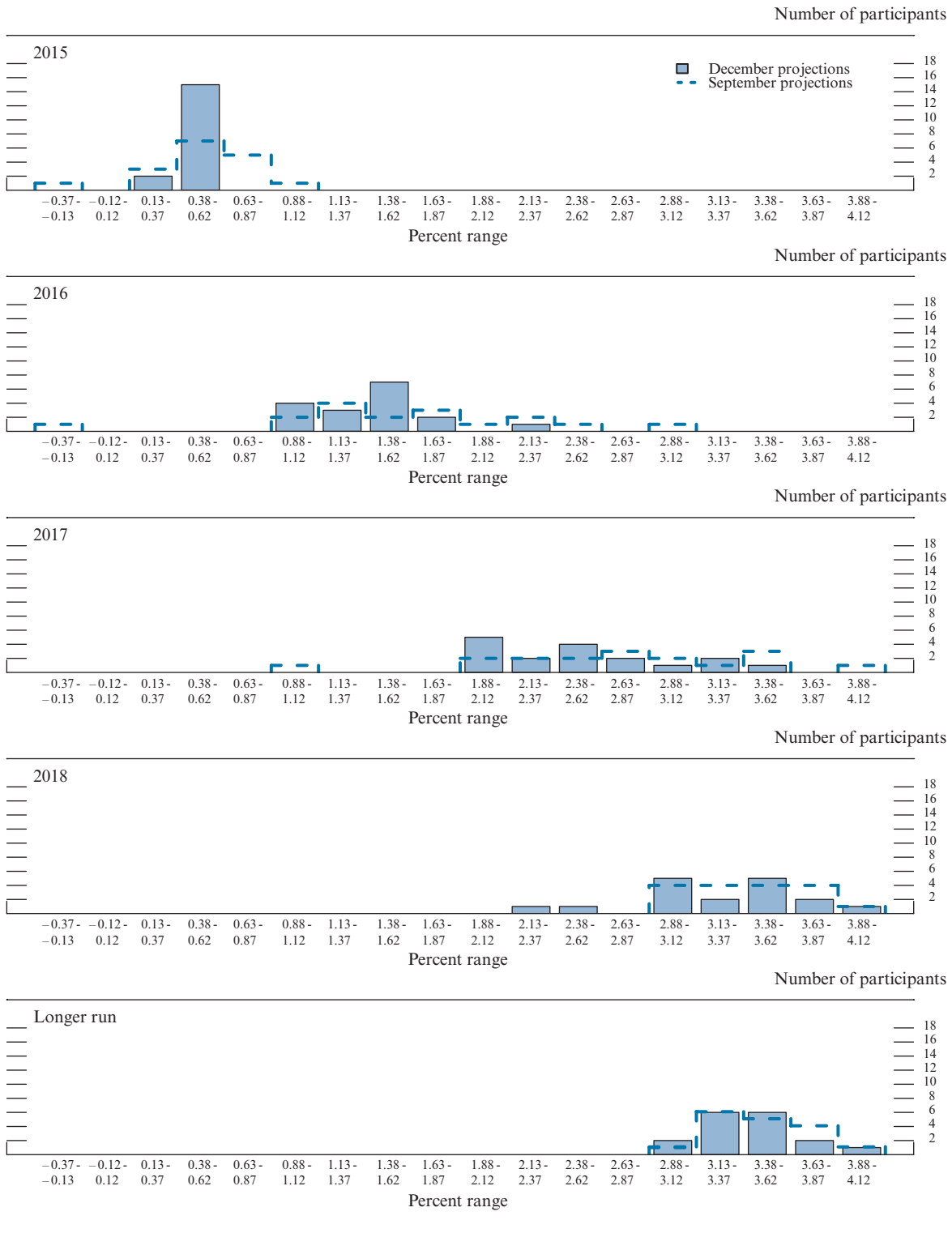
NOTE: Definitions of variables are in the general note to table 1.

Figure 3.D. Distribution of participants' projections for core PCE inflation, 2015–18



NOTE: Definitions of variables are in the general note 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, 2015–18 and over the longer run



NOTE: The midpoints of the target ranges for the federal funds rate and the target levels for the federal funds rate are measured at the end of the specified calendar year or over the longer run.

was prospects for inflation to return to the Committee's objective of 2 percent; in making such assessments, participants considered a range of factors, including measures of inflation compensation and longer-run inflation expectations as well as the likely persistence and size of the effects from low energy prices and the strong dollar. Participants also emphasized the potential for international developments to continue to have important implications for domestic economic activity and inflation and thus for appropriate monetary policy. Several participants discussed potential interactions between policy normalization and risks to financial stability. In addition, given the continued proximity of short-term interest rates to their effective lower bound, asymmetric risks around the outlook for employment and inflation were noted as one reason why a gradual approach to raising the federal funds rate may be appropriate.

Uncertainty and Risks

As in the September SEP, nearly all participants continued to judge the levels of uncertainty around their projections for real GDP growth and the unemployment rate as broadly similar to the average level of the past 20 years (figure 4).⁷ Most participants saw the risks to their outlooks for real GDP growth and unemployment as broadly balanced, as the number of participants who viewed the

7. Table 2 provides estimates of the forecast uncertainty for the change in real GDP, the unemployment rate, and total consumer price inflation over the period from 1995 through 2014. 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.

Table 2. Average historical projection error ranges

Percentage points				
Variable	2015	2016	2017	2018
Change in real GDP ¹	±0.9	±1.8	±2.1	±2.1
Unemployment rate ¹	±0.1	±0.8	±1.4	±1.8
Total consumer prices ²	±0.2	±1.0	±1.0	±1.0

NOTE: Error ranges shown are measured as plus or minus the root mean squared error of projections for 1995 through 2014 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, and consumer prices 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 (2007), "Gauging the Uncertainty of the Economic Outlook from Historical Forecasting Errors," Finance and Economics Discussion Series 2007-60 (Washington: Board of Governors of the Federal Reserve System, November), available at www.federalreserve.gov/pubs/feds/2007/200760/200760abs.html; and Board of Governors of the Federal Reserve System, Division of Research and Statistics (2014), "Updated Historical Forecast Errors," memorandum, April 9, www.federalreserve.gov/foia/files/20140409-historical-forecast-errors.pdf.

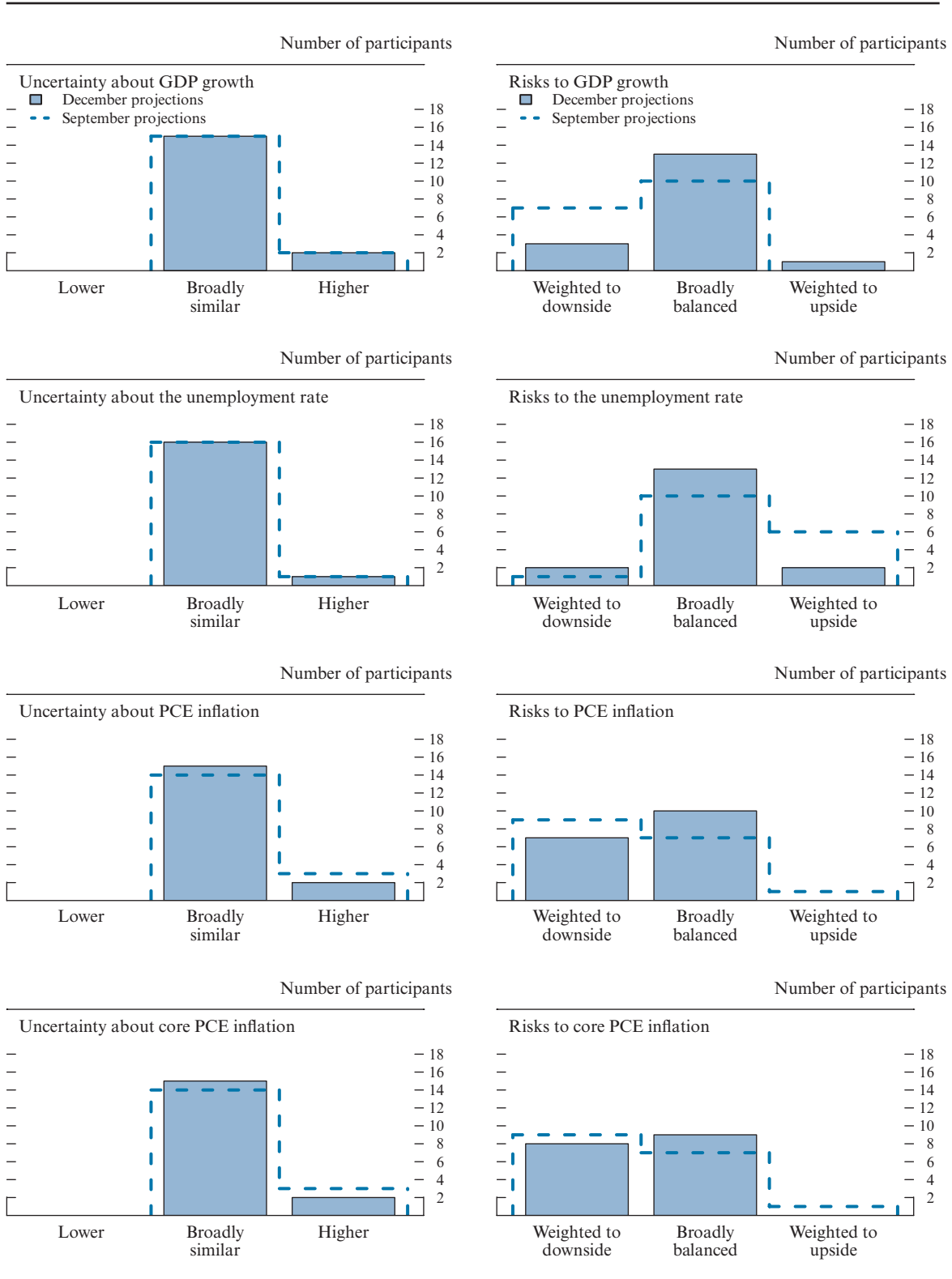
1. Definitions of variables are in the general note to table 1.

2. Measure is the overall consumer price index, the price measure that has been most widely used in government and private economic forecasts. Projection is percent change, fourth quarter of the previous year to the fourth quarter of the year indicated.

risks to economic growth as weighted to the downside and the risks to the unemployment rate as weighted to the upside fell appreciably since September. Diminished risks to domestic economic activity from developments abroad and the strength of recent labor market data were among the reasons noted for the more upbeat assessment of risks.

As in the September SEP, participants generally agreed that the levels of uncertainty associated with their inflation forecasts were broadly similar to the average level over the past 20 years. The number of participants who viewed the risks to their inflation forecasts as weighted to the downside declined slightly since September, and a majority now viewed the risks to both PCE and core PCE inflation as broadly balanced. Among those who saw risks to inflation as tilted to the downside, several highlighted the continued strength of the dollar and some recent indications that inflation expectations had declined as contributing to their perception of those risks.

Figure 4. Uncertainty and risks in economic projections



NOTE: For definitions of uncertainty and risks in economic projections, see the box “Forecast Uncertainty.” Definitions of variables are in the general note to table 1.

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. 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 2.1 to 3.9 percent in the current year, 1.2 to

4.8 percent in the second year, and 0.9 to 5.1 percent in the third and fourth years. The corresponding 70 percent confidence intervals for overall inflation would be 1.8 to 2.2 percent in the current year, and 1.0 to 3.0 percent in the second, third, and fourth years.

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 variable is greater than, smaller than, or broadly similar to typical levels of forecast uncertainty in the past, as shown in table 2. 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, participants judge whether each variable is more likely to be above or below their projections of the most likely outcome. These judgments about the uncertainty and the risks attending each participant's projections are distinct from the diversity of participants' views about the most likely outcomes. Forecast uncertainty is concerned with the risks associated with a particular projection rather than with divergences across a number of different projections.

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.

ABBREVIATIONS

AFE	advanced foreign economy
BHC	bank holding company
CDS	credit default swap
CMBS	commercial mortgage-backed securities
CRE	commercial real estate
EME	emerging market economy
FOMC	Federal Open Market Committee; also, the Committee
GDP	gross domestic product
MBS	mortgage-backed securities
ON RRP	overnight reverse repurchase agreement
OPEC	Organization of the Petroleum Exporting Countries
PBOC	People's Bank of China
PCE	personal consumption expenditures
SEP	Summary of Economic Projections
SLOOS	Senior Loan Officer Opinion Survey on Bank Lending Practices
SOMA	System Open Market Account

