

Have Long-Term Inflation Expectations Declined?

BY FERNANDA NECHIO

Based on surveys of professional forecasters, expectations for price inflation 5 to 10 years ahead have edged down over the past few years. This decline seems to be primarily driven by revised expectations from forecasters who overestimated inflation in the aftermath of the Great Recession. Currently, the median survey-based expectation for long-term inflation is close to its pre-recession level and appears well anchored at the Fed's 2% longer-run inflation objective.

Inflation has fallen very low recently to well below the 2% objective set by the Federal Open Market Committee (FOMC). Accompanying this decline in actual inflation, forecasts of long-term inflation have also fallen. This coincidence has raised concerns that low current inflation may be pulling down forecasters' views of distant inflation, which could suggest that long-term U.S. inflation expectations are no longer well anchored.

In this *Economic Letter*, I use survey-based inflation forecasts to evaluate the extent to which inflation expectations have been affected by the recent low levels of current inflation. I show that the latest long-term inflation forecasts in the Survey of Professional Forecasters (SPF) have decreased somewhat relative to their peak levels after the financial crisis and have essentially returned to their 2007 levels, near the FOMC's 2% objective.

Moreover, the range of estimates among professional forecasters, which also jumped after the crisis, has declined considerably. This is primarily because those forecasters who had predicted the highest future inflation have lowered their long-term projections.

Examining the forecast variation across the respondents of the SPF sample can shed some light on these changes. In particular, some forecasters increased their estimates after the crisis because of concerns that inflation would rise as a result of the Federal Reserve's large-scale asset purchases. Many of these forecasters appear to have reversed this assessment and returned their forecasts to pre-crisis levels. Accordingly, the distribution of forecasts has also narrowed.

Monetary policy and inflation expectations

In its "Statement on Longer-Run Goals and Monetary Policy Strategy," the FOMC noted its view that, "inflation at the rate of 2%, as measured by the annual change in the price index for personal consumption expenditures (PCE), is most consistent over the longer run with the Federal Reserve's statutory mandate" (FOMC 2015).

In general, to reach their inflation goals, central bankers often emphasize the benefits of having "well-anchored" inflation expectations (see, for example, Bernanke 2007, Draghi 2014, and Williams 2014). As

the argument goes, when expectations are aligned with the monetary authority's objective, households and businesses set wages and prices accordingly, making it easier for the central bank to hit its inflation target. Under these conditions, short-run deviations of inflation from the central bank's longer-run objective are widely considered to be transitory and so should have little impact on agents' price-setting behavior. Central banks therefore continuously monitor measures of long-term inflation expectations to help ensure that they are well anchored.

Recent price inflation—measured using the PCE price index and other price series—have been well below the Fed's longer-run objective. While some temporary factors—such as falling energy prices—may help explain these declines, policymakers are set to remain vigilant in case current conditions begin to adversely affect longer-term expectations (Federal Reserve Board 2014).

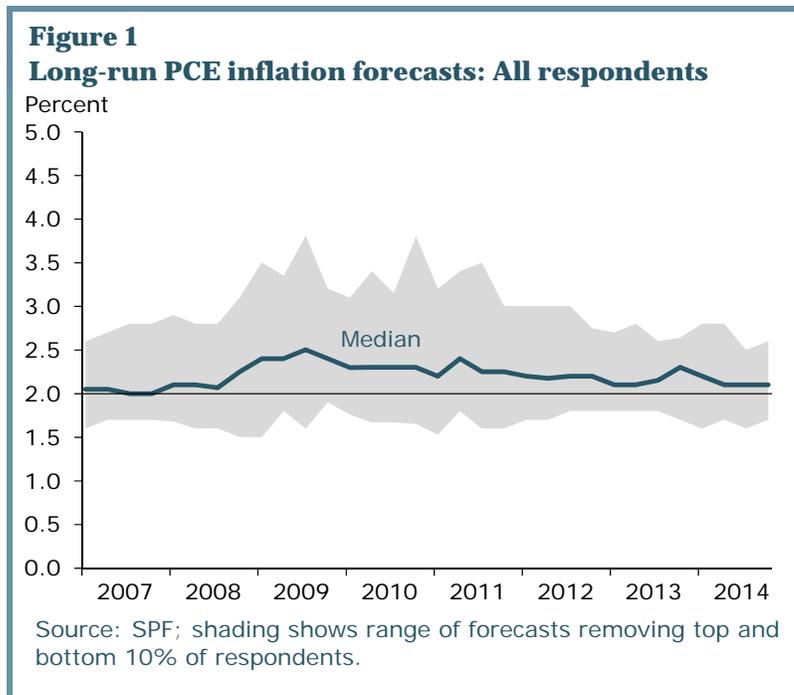
Among other metrics, policymakers often rely on survey data to gauge inflation expectations. Surveys provide a direct measure of inflation expectations over different forecast horizons. If inflation expectations are well anchored, long-term inflation forecasts should be near the monetary authority's inflation objective and respondents' forecast disagreements should be limited. These conditions would signal that survey respondents are interpreting short-term deviations from the inflation objective as transitory.

Alternative measures of inflation expectations are based on financial instruments with payoffs tied to inflation that can extract the market's assessment of the inflation outlook. Bauer and Christensen (2014), for example, discuss the risks to the inflation outlook using such measures, while Bauer and Rudebusch (2015), Lucca and Schaumburg (2011), and Feldman et al. (2015) highlight some of the difficulties of interpretation with these methods.

Long-term inflation expectations and the SPF

The SPF is a popular source of inflation expectations for the U.S. economy. Each quarter, the Federal Reserve Bank of Philadelphia collects expectations for about 32 economic variables from approximately 45 professional forecasters in the United States. The survey covers expectations about such variables as inflation, economic activity, and unemployment over various forecast horizons. Since 2007, the SPF has asked respondents to report their forecasts for average PCE inflation during the 5 to 10 years ahead of the survey date. This is the longest horizon in the survey and should be unaffected by temporary fluctuations in inflation that would affect short- and medium-term inflation forecasts. Therefore, changes to forecasts at this horizon should mainly reflect variations in long-term inflation expectations.

Figure 1 reports the median and range of forecasts for PCE inflation 5 to 10 years ahead. Median forecasts rose



from 2.1% in the first quarter of 2007 to 2.5% by mid-2009, then fell back to 2.1% at the end of 2014, completely offsetting the increase in the aftermath of the crisis. The gray shading shows that the range of forecasts, removing the lowest and highest 10% of respondents, also increased between 2009 and 2011, but has recently completely reversed from those peak levels. The top of the range fluctuated more than the bottom, showing that the increase and subsequent decline in forecast dispersion were mostly driven by the top percentiles of the distribution. Overall the figure shows that, right after the crisis, some forecasters increased their estimates for long-term inflation, which raised the median forecast and widened its dispersion. Since 2012, inflation forecasts have come down noticeably, pushing down the median and narrowing the dispersion.

Leduc et al. (2009) noted that the range of short-term inflation forecasts also widened in the wake of the crisis. This increased dispersion, however, primarily reflected much lower short-term inflation estimates. Cross-sectional short-term forecast dispersion has also returned to 2007 levels recently. Bundick and Hakkio (2015) also use the SPF to discuss changes in dispersion in short and long-term inflation forecasts.

SPF respondents and compositional effects

The SPF surveys a diverse group of business forecasters with varying levels of expertise, stages of experience, and forecast methodologies. To investigate whether specific types of forecasters are driving the movement in median forecasts, I break the sample into two subgroups based on their forecast accuracy.

Performance can be measured based on different economic variables and forecast horizons. For simplicity, I calculate forecast errors to compare how well forecasters' one-year-ahead inflation projections from 2007 to 2014 align with the actual inflation rate a year later. To summarize these forecast errors, I use a common statistic: the square root of the mean of the squared errors (RMSE) of each respondent. I then divide the sample into "accurate" forecasters, with RMSE values less than or equal to the average, and "inaccurate" forecasters, with RMSE values above the average.

For the accurate group, Figure 2 shows median PCE forecasts over the next 5 to 10 years, along with the forecast distribution removing the top and bottom 10%; Figure 3 reports the same for the inaccurate group. A comparison between Figures 2 and 3 shows that accurate forecasters generally reported lower forecasts for long-term PCE inflation than the inaccurate group. Accurate respondents reported long-term forecasts closer to 2% throughout the sample period. On the other hand, the inaccurate group's forecasts for long-term median inflation were always above 2%.

The inaccurate group's median forecasts increased nearly half a percentage point after the crisis and remained elevated until mid-2013. Since then, they have lowered somewhat, back to their 2007 levels. Median forecasts from the accurate subgroup also increased between 2008 and 2011, but not as much. The most recent data show both groups with estimates near 2.1%.

A comparison of the range of forecasts for the two groups shows that dispersion was also much larger among inaccurate forecasters, with some respondents reporting estimates for long-term inflation near 4.5%. However, dispersions for both groups have completely reversed from the peaks during the financial crisis. Note that for both groups, the increase in the range of responses was driven by forecasters at the top of the distribution, who reported inflation forecasts way above the 2% threshold.

Figures 2 and 3 suggest that the increase and later decline in the overall median long-term inflation forecasts were mainly driven by forecasters with worse forecasting records, who seem to have increased their estimates more than those with better records. More recently, the less accurate group adjusted their forecasts to levels of long-term inflation that are more in line with the Fed's objective.

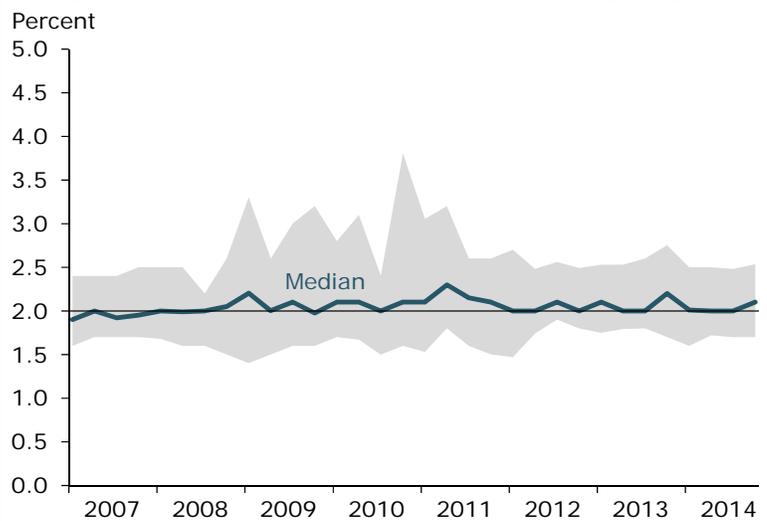
The uniqueness of the financial crisis may help explain the surge in long-term estimates and forecast dispersion. In the aftermath of the crisis, sizable revisions to policymakers' forecasts as well as revisions to data releases reveal substantial uncertainty about the duration and the depth of the recession (Alessi et al. 2014).

In addition, during the crisis the Federal Reserve and other central banks lowered short-term interest rates close to zero and pursued unconventional policies, such as large-scale asset purchases, to boost the economy. The novelty of some of these policies may have contributed to uncertainty about their effects and therefore affected some forecasters' estimates. In fact, a special question added to the SPF in mid-2012 asked whether participants viewed their long-term forecasts for PCE inflation as significantly different from the 2% inflation objective. Forecasters who deviated from 2% by 0.1 or 0.2 percentage point said they did not view their deviation as economically meaningful. Those with larger deviations projected 5- to 10-year-ahead median PCE inflation around 2.6% and revealed concerns about the size of the Fed's balance sheet, food and energy costs, and elevated public debt and fiscal deficits.

Conclusion

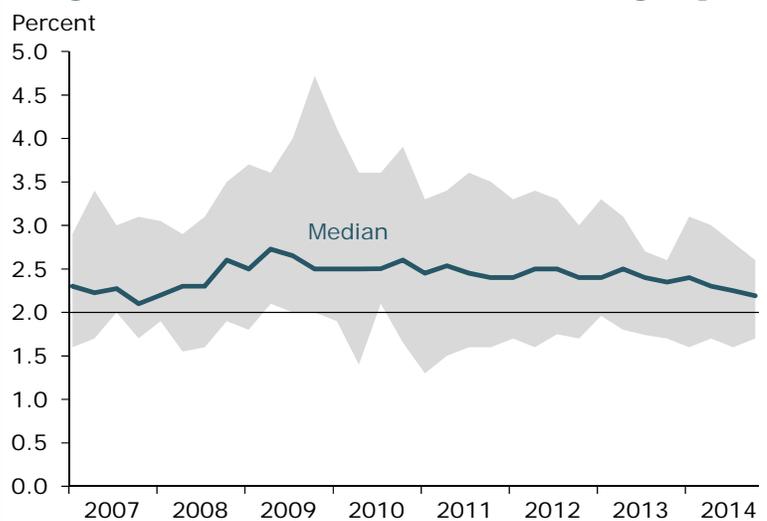
Median long-term inflation expectations from the Survey of Professional Forecasters have come down a bit since the Great Recession and are now close to their levels from the first quarter of 2007, near the Fed's 2% objective. This decline appears to be primarily driven by revised expectations from specific forecasters who had overestimated long-term inflation in the aftermath of the crisis.

Figure 2
Long-run PCE inflation forecasts: Accurate group



Source: SPF; shading shows range of forecasts removing top and bottom 10% of respondents.

Figure 3
Long-run PCE inflation forecasts: Inaccurate group



Source: SPF; shading shows range of forecasts removing top and bottom 10% of respondents.

The range of projections across forecasters in the survey has also declined sharply, primarily driven by lower inflation estimates among those who were in the upper end of the cross-sectional distribution during the crisis.

The decline in both median forecasts and cross-sectional forecast dispersion back to 2007 levels and closer to the Fed's objective suggests that inflation uncertainty has receded and that expectations, at least among professional forecasters, remain well anchored.

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References

- Alessi, Lucia, Eric Ghysels, Luca Onorante, Richard Peach, and Simon Potter. 2014. "Central Bank Macroeconomic Forecasting during the Global Financial Crisis: The European Central Bank and Federal Reserve Bank of New York Experiences." FRB New York Staff Report 680. http://www.newyorkfed.org/research/staff_reports/sr680.html
- Bauer, Michael, and Jens Christensen. 2014. "Financial Market Outlook for Inflation." *FRBSF Economic Letter* 2014-14 (May 12). <http://www.frbsf.org/economic-research/publications/economic-letter/2014/may/financial-market-outlook-inflation-derivatives/>
- Bauer, Michael, and Glenn Rudebusch. 2015. "Optimal Policy and Market-Based Expectations." *FRBSF Economic Letter* 2015-12 (forthcoming).
- Bernanke, Ben. 2007. "Inflation Expectations and Inflation Forecasting." Speech at the NBER Summer Institute, Monetary Economics Workshop, Cambridge, MA (July 10). <http://www.federalreserve.gov/newsevents/speech/bernanke20070710a.htm>
- Bundick, Brent, and Craig Hakkio. 2015. "Are Longer-Term Inflation Expectations Stable?" *The Macro Bulletin*, FRB Kansas City (March 9). <http://kansascityfed.org/publicat/research/macrobulletins/mb15Bundick-Hakkio0309.pdf>
- Draghi, Mario. 2014. "Monetary Policy in the Euro Area." Speech at the Frankfurt European Banking Congress (November 21). <http://www.ecb.europa.eu/press/key/date/2014/html/sp141121.en.html>
- Federal Reserve Board. 2015. "Statement on Longer-Run Goals and Monetary Policy Strategy." January 27. http://www.federalreserve.gov/monetarypolicy/files/FOMC_LongerRunGoals.pdf
- Federal Reserve Board. 2014. "Press Release." December 17. <http://www.federalreserve.gov/newsevents/press/monetary/20141217a.htm>
- Feldman, Ron, Ken Heinecke, Narayana Kocherlakota, Sam Schulhofer-Wohl, and Tom Tallarini. 2015. "Market-Based Probabilities: A Tool for Policymakers." Manuscript, FRB Minneapolis. https://www.minneapolisfed.org/~media/files/banking/mpd/optimal_outlooks_dec22.pdf
- Leduc, Sylvain, Glenn Rudebusch, and Justin Weidner. 2009. "Disagreement about the Inflation Outlook." *FRBSF Economic Letter* 2009-31 (October 5). <http://www.frbsf.org/economic-research/publications/economic-letter/2009/october/inflation-outlook-forecast/>
- Lucca, David, and Ernst Schaumburg. 2011. "What to Make of Market Measures of Inflation Expectations?" FRB New York, Liberty Street Economics blog, August 15. <http://libertystreeteconomics.newyorkfed.org/2011/08/what-to-make-of-market-measures-of-inflation-expectations.html>
- Williams, John. 2014. "Inflation Targeting and the Global Financial Crisis: Successes and Challenges." Essay presentation to the South African Reserve Bank Conference on Fourteen Years of Inflation Targeting in South Africa and the Challenge of a Changing Mandate, October 31. <http://www.frbsf.org/our-district/press/presidents-speeches/williams-speeches/2014/october/inflation-targeting-global-financial-crisis/>

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Computing long-term inflation expectations: PPP-UIP-CIP approach. Computing 5y/5y forward inflation expectations. Caveats. Slide Number 12. We discuss how these long-term inflation expectations might be used in economic analysis: anchoring of inflation expectations (response to macro data and news), computation of implied long-term real interest rates, etc. 5 6 June 2018 | Computing inflation expectations | P. Gerlach, R. Moessner, R. Rosenblatt | © Swiss National Bank. Literature. Computation of market-based long-term inflation expectations: Mandel and Barnes (2013) based on a report by Goldman Sachs Economics Research (2013), Krugman (2013). Applications This decline seems to be primarily driven by revised expectations from forecasters who overestimated inflation in the aftermath of the Great Recession. Currently, the median survey-based expectation for long-term inflation is close to its pre-recession level and appears well anchored at the Fed's 2% longer-run inflation objective. Date: 2015 References: View references in EconPapers View complete reference list from CitEc Citations: View citations in EconPapers (5) Track citations by RSS feed. After that, the longer-term trajectory of inflation is in large part a function of inflationary expectations. Here, too, we see some increase, but from historically low to more normal levels. We explain our reasoning below. Base Effects. Twelve months later, due to the suddenness and scale of this earlier decline, we expect year-over-year inflation growth rates for the next few months to be temporarily distorted by these sorts of base effects. While we do not yet have price data for March or April, if we assume monthly inflation going forward stays at a rate of just under 0.2 percent—the equivalent of a 2 percent annual rate, in line with the Federal Reserve's target—inflation in April and May 2021, measured as the percentage change in core PCE prices over the previous. long-term expectations don't seem to have changed much; and, short-term expectations do vary, but their variations are ultimately eliminated and the average difference seems to be small. Finance theory actually has interesting things to say about this kind of comparison. The long-term expectations come from a survey question that asks about the expected rate of inflation over the next five-to-ten years. The short-term expectations comes from a question about the next year. This can be viewed as a "spot rate" of inflation and an expected, or "forward," rate. Such language is often used in futures markets, where there are three conditions of interest