



Long-run inflation expectations in the shrinking upper tail

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ABSTRACT

Consumer inflation expectations are highly disperse, with some households reporting very high inflation forecasts. In recent years, disagreement in longer-run inflation expectations has fallen, reflecting compression in the upper part of the distribution. The 75th percentile of the distribution of longer-run inflation forecast has fallen 0.21 percentage points per year since 2012 and is at an all-time low. I show that the decline in long-run inflation expectations at the upper end of the distribution seems to reflect improvement in consumers' general economic sentiment, rather than stronger anchoring of inflation expectations.

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In January 2012, the Federal Open Market Committee (FOMC) announced that an inflation rate of 2% inflation is most consistent over the longer run with the Federal Reserve's statutory mandate. This announcement was intended to help anchor longer-run inflation expectations and facilitate the conduct of monetary policy. The FOMC carefully monitors various measures of longer-run inflation expectations, including measures from consumer survey data. The Michigan Survey of Consumers (MSC) has asked consumers about their expectations of 5- to 10-year-ahead inflation monthly since 1990.¹ The median of these longer-run expectations fell from 4.5% in 1990 to just under 3% in 2000, where it remained for nearly two decades. It has since declined to around 2.7%.

This decline has been highly salient to policymakers. It may be a positive sign that expectations are closer to the Fed's target and better-anchored. But it may also signal what Governor Lael Brainard has called "erosion in inflation expectations to the downside". She warns that "More frequent or extended episodes when inflation is below target and policy is at the effective lower bound risk pulling down private-sector inflation expectations in a self-reinforcing downward spiral, which could further compress the monetary policy buffer to cushion downside shocks".²

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¹ The survey question does not use the word "inflation", but instead asks, "by about what percent per year do you expect prices to go up or down, on average, during the next 5 to 10 years?" Longer-run inflation expectations were solicited only sporadically before 1990.

² Lael Brainard, March 07, 2019, "Navigating Cautiously", speech at the Julis-Rabinowitz Center for Public Policy and Finance and the Bendheim Center for

Consumer inflation expectations are very disperse, and some consumers report surprisingly high forecasts (Mankiw et al., 2004; Binder, 2015, 2017b). In evaluating the expectations formation process and monitoring expectations for policymaking, it is important to examine not only the median but also other features of the distribution of inflation expectations, as households may vary in their receptivity to central bank communication (Binder, 2017a; Binder and Verbrugge, 2016). In this letter, I show that the 75th percentile of the distribution of longer-run inflation expectations has fallen far more than the median. In fact, disagreement about long-run inflation has declined notably since 2014, and that the decline is entirely attributable to compression in the upper part of the distribution. Using the properties of forecast revisions, I argue that this does not reflect stronger anchoring of inflation expectations. Rather, respondents who report relatively high inflation expectations seem to associate bad times with high inflation, so as general economic sentiment has improved, their inflation forecasts have fallen.

1. The shrinking upper tail

Panel A of Fig. 1 plots the 25th, 50th, and 75th percentiles of the distribution of longer-run inflation expectations over time. The 75th percentile shows the largest decline in the past few years, having decreased by an average of 0.21 percentage points

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per year since the inflation targeting announcement in 2012. The median and 25th percentile have fallen by an average of 0.07 and 0.05 percentage points per year, respectively, since 2012.³ Higher portions of the distribution have also fallen—e.g. the 90th percentile by an average of 6 percentage points per year since 2012, from above 60% to around 15%. Another way to see the movement away from extreme high forecasts is in Panel B, which shows the falling shares of forecasts above various thresholds.

Panel C shows that the interquartile range (a proxy for disagreement) has declined to an all-time low of 2 percentage points.⁴ This decline is attributable to the shrinking difference between the 50th and 75th percentiles ($\pi(75, 50)$), as the difference between the 25th and 50th percentiles ($\pi(50, 25)$) has remained constant. Now $\pi(75, 50)$ is smaller than $\pi(50, 25)$, and the difference between mean and median expectations has fallen.

As the upper tail of the distribution of inflation expectations is shrinking, so are the disparities in forecasts of various groups of consumers. Most notably, the forecasts of consumers with a college degree were nearly a percentage point lower than those of consumers with only a high school education in 2014, and only 0.15 percentage points lower in 2019.

1.1. Better anchored or better feeling?

Why has there been a reduction in very high inflation expectations? Does the change in the distribution of long-run inflation expectations indicate that more consumers have anchored expectations? One definition of anchored is that longer-run expectations are minimally responsive to shocks, including changes to shorter-run inflation expectations (Bernanke, 2007). Davis (2012), for example, shows that market participants' expectations have become more anchored by regressing the change in longer-run inflation expectations derived from asset prices on a measure of shorter-run inflation surprise from one-year-ahead inflation expectations and showing that the coefficient has fallen to zero.

To implement a similar test for consumers, I use the rotating panel of respondents that take the MSC twice with a six-month gap. In the first three columns of Table 1, I regress the change in respondent i 's longer-run inflation expectations from month $t - 6$ to t ($\Delta\pi_{i,t}^l$) on the change in her shorter-run (year-ahead) inflation expectations ($\Delta\pi_{i,t}^s$). From 1990 to 2019, the coefficient estimate is 0.37. From 2000 through December 2011, the coefficient is 0.30, compared to 0.41 after. If expectations had become more firmly anchored, the coefficient should have decreased, but instead it is higher.⁵

Instead, the compression in the upper part of the distribution may reflect differences in the expectations formation process of the consumers who report higher versus lower expectations. Drager et al. (2015) show that many consumers form expectations that are inconsistent with the Fisher equation, Taylor rule, or Phillips curve, and may lack an understanding of key economic concepts like inflation. Consumers who provide especially high long-run inflation forecasts may be unfamiliar with inflation dynamics, and simply equate inflation with "bad times". If this is the case, the reported inflation expectations of

³ Note that for professional forecasters, the 75th percentile of the distribution of long-run inflation expectations has fallen only 0.02 percentage points per year since 2012, using 10-year-ahead or 5-year-ahead CPI inflation forecasts from the Federal Reserve Bank of Philadelphia Survey of Professional Forecasters. Median and 25th percentile long-run inflation expectations have no statistically significant time trend since 2012 for professional forecasters.

⁴ The figure begins in 2000 for visual clarity, but disagreement was even higher, averaging 3.2 percentage points, in the 1990s.

⁵ The difference in the coefficient estimate between columns 2 and 3 is statistically significant with $p < 0.01$.

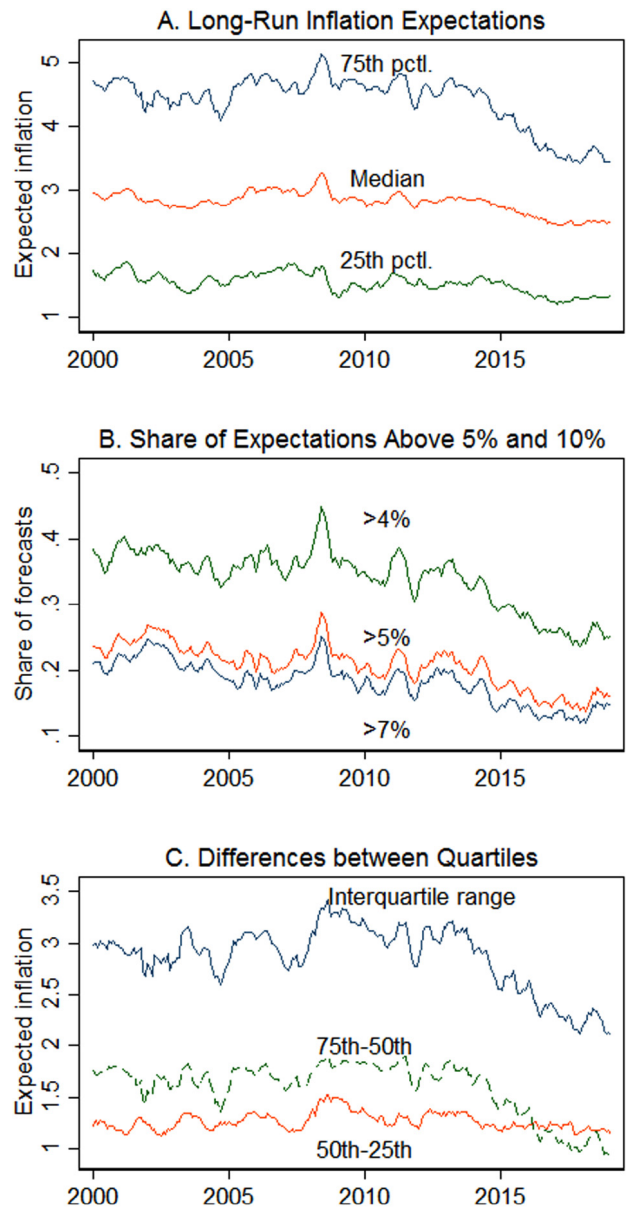


Fig. 1. Distribution of long-run inflation expectations over time. Notes: Centered 5-month moving average. Data from MSC.

these consumers may have fallen as the recovery has solidified and unemployment has continued to fall.

To investigate this possibility, I use responses to the MSC question, "Would you say that you (and your family living there) are better or worse off financially than you were a year ago?" This question and similar questions have been used in a variety of studies of consumer sentiment, which typically find that consumer sentiment forecasts household spending (Carroll et al., 1994; Souleles, 2004). An individual i 's response in month t ($P_{i,t}$) is coded as 1 for "better off", 0 for "same" and -1 for "worse off". The fourth and fifth columns of Table 1 include $\Delta P_{i,t} = P_{i,t} - P_{i,t-6}$ as a regressor. Both before and after 2012, the coefficient on ΔP is negative and statistically significant.⁶ That is, when respondents

⁶ Results are very similar if I use a panel regression with respondent fixed effects and all variables in levels instead of first differences, or if I code personal financial situation responses as a dummy variable indicating that the respondent is better off.

Table 1
Revisions to longer-run inflation expectations.

	(1) $\Delta\pi^l$	(2) $\Delta\pi^l$	(3) $\Delta\pi^l$	(4) $\Delta\pi^l$	(5) $\Delta\pi^l$	(6) $\Delta\pi^l$
$\Delta\pi^s$	0.37*** (0.00)	0.30*** (0.00)	0.41*** (0.01)	0.30*** (0.00)	0.41*** (0.01)	0.12*** (0.01)
ΔP				-0.09*** (0.02)	-0.11*** (0.02)	0.00 (0.01)
$\Delta\pi^s * H$						0.43*** (0.01)
$\Delta P * H$						-0.28*** (0.04)
N	115 124	47 162	31 077	47 043	30 580	30 580
R ²	0.21	0.18	0.26	0.18	0.26	0.33
Sample	1990–2019	2000–2011	2012–2019	2000–2012	2012–2019	2012–2019

Notes: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Dependent variable is the change in a respondent's longer-run inflation forecast from month $t - 6$ to t . Regressions include a constant term, and column (6) includes H .

perceive their personal financial situation more favorably, their longer-run inflation expectations tend to be lower.

Let the dummy variable H denote that a respondent provided a long-run inflation forecast of at least 5% in either or both of the times she took the survey. In the sixth column of Table 1, I include H and interactions of H with $\Delta\pi^s$ and ΔP as regressors. The coefficient on $\Delta\pi^s * H$ is statistically significant and positive, while that on $\Delta P * H$ is statistically significant and negative, and the coefficient on ΔP is no longer statistically significant. Respondents who make high forecasts have a much stronger association between their long-run inflation expectations and their short-run expectations and perceptions of their personal financial situation.

This can be seen visually in Fig. 2, which plots the 75th percentile of long-run inflation expectations and the balance score (S) of responses to the “better or worse off financially” question. S is the percent of “better” responses minus “worse” responses plus 100. A score above 100 indicates that more consumers thought that they were better off than thought they were worse off. The two series are significantly negatively correlated (coefficient -0.51). The median and 25th percentile long-run inflation expectations are weakly and not at all correlated, respectively, with S .⁷ Moreover, S Granger-causes $\pi(75, 50)$ (with $p = 0.019$), but not $\pi(50, 25)$.⁸

The decline in long-run inflation expectations at the upper end of the distribution seems to be a positive sign of consumers' general economic sentiment, but is perhaps less informative about the degree to which expectations are anchored. Indeed, Lamla and Vinogradov (2019) show that FOMC press conferences from December 2015 to June 2018 had no detectable effect on consumer perceptions or expectations of inflation, so the decline in inflation expectations in the upper tail that I have documented is unlikely to be attributable to central bank communication.

Federal Reserve policymakers should be aware that consumers who report very high inflation forecasts may not fully understand the survey question, and/or may not behave according to these reported expectations. In particular, for some consumers, especially in the higher end of the distribution of inflation expectations, reported long-run inflation expectations seem to be a proxy for sentiment about personal financial situation, rising when their situation seems less favorable. It thus seems plausible that their reported inflation expectations could rise again

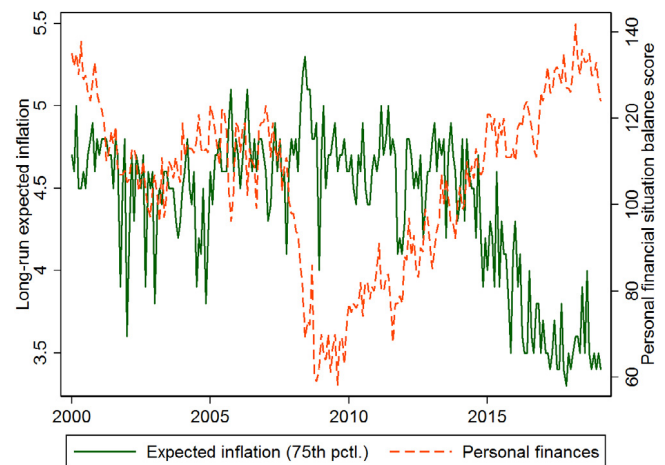


Fig. 2. Perception of personal financial situation and 75th percentile long-run inflation expectations. **Notes:** Data from MSC. Correlation coefficient = -0.51 .

if the economy weakens, even if inflation is muted. This should not be interpreted as evidence of weaker inflation expectations anchoring unless accompanied by rising inflation expectations at the lower end of the distribution. Future research should aim to understand the financial and economic decision making of consumers who may not have a clear understanding of inflation or well-formed inflation expectations.

References

- Bernanke, Ben, 2007. Inflation expectations and inflation forecasting. In: Monetary Economics Workshop of the National Bureau of Economic Research Summer Institute.
- Binder, Carola, 2015. Whose expectations augment the Phillips curve? *Econom. Lett.* 136, 35–38.
- Binder, Carola, 2017a. Fed speak on main street: Central bank communication and household expectations. *J. Macroecon.* 52, 238–251.
- Binder, Carola, 2017b. Measuring uncertainty based on rounding: New method and application to inflation expectations. *J. Monetary Econ.* 90, 1–12.
- Binder, Carola, 2018. Inflation expectations and the price at the pump. *J. Macroecon.* 58, 1–18.
- Binder, Carola, Verbrugge, Randall, 2016. Digging into the downward trend in consumer inflation expectations. In: Federal Reserve Bank of Cleveland Economic Commentary, Vol. 11.
- Carroll, Christopher D., Fuhrer, Jeffrey, Wilcox, David, 1994. Does consumer sentiment forecast household spending? If so, why? *Amer. Econ. Rev.* 84 (5), 1397–1408.
- Davis, J. Scott, 2012. Inflation expectations have become more anchored over time. *Dallas Fed Econ. Lett.* 7 (13), 1–4.

⁷ The temporary rise in expected inflation in 2018 coincides with a temporary rise in gas prices. See Binder (2018) and references therein for a discussion of inflation expectations and gas prices.

⁸ The Granger causality test follows a monthly VAR using 3 lags of $\pi(75, 50)$, $\pi(50, 25)$, S , CPI inflation and real gas prices, with lag length selected using the Akaike information criterion. Dickey–Fuller tests reject the null hypothesis that the variables contain a unit root. If a time trend is included, S still Granger-causes $\pi(75, 50)$.

- Drager, Lena, Lamla, Michael, Pfajfar, Damjan, 2015. Are Survey Expectations Theory-Consistent? The Role of Central Bank Communication and News. In: Finance and Economics Discussion Series, Board of Governors of the Federal Reserve System.
- Lamla, Michael, Vinogradov, Dmitri, 2019. Central bank announcements: Big news for little people? *J. Monetary Econ.*
- Mankiw, N. Gregory, Reis, Ricardo, Wolfers, Justin, 2004. Disagreement about inflation expectations. In: Gertler, Mark, Rogoff, Kenneth (Eds.), *NBER Macroeconomics Annual*, Vol. 18. MIT Press.
- Souleles, Nicholas, 2004. Expectations, heterogeneous forecast errors, and consumption: Micro evidence from the michigan consumer sentiment surveys. *J. Money Credit Bank.* 36 (1), 39–72.