STAFF
REPORTS

NO. 1200
AUGUST 2026

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FEDERAL RESERVE BANK *of* NEW YORK

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Federal Reserve Bank of New York Staff Reports, no. 1200
August 2026
https://doi.org/10.59576/sr.1200

Abstract

We document three stylized facts about household inflation expectations that stood out during the 2021–23 inflation surge: i) a temporary dislocation in the term structure of expectations, ii) an earlier peak at longer horizons, and iii) a sharp increase in the share of households expecting deflation at medium and long horizons. We show that these stylized facts are consistent with households' narratives attributing the inflation surge to temporary labor and supply disruptions. We also argue that they pose an empirical challenge to existing models of expectation formation. Implications for theory and expectations surveys are discussed.

JEL classification: E31, D84
Key words: household expectations, inflation expectations, inflation, narratives

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1 Introduction

Inflation expectations (IE hereafter) are of central importance to economists and policymakers (Reis 2021a, Mester 2022). Over the past two decades, the literature on how IE are updated and can be modeled has expanded considerably (e.g., Orphanides and Williams 2004, Coibion et al. 2018, Weber et al. 2022). Most empirical studies, however, have been conducted during periods of relatively stable inflation. Yet, a broad understanding of IE is especially valuable when an inflation shock occurs, as concerns about de-anchoring intensify and policymakers must assess how and when inflation will return to target. The 2021–23 high-inflation episode therefore provides a rare opportunity to study IE updating during a major inflation shock. In this paper, we use data from the New York Fed's Survey of Consumer Expectations (SCE) to document and investigate three stylized facts about household IE that stood out during the 2021–23 inflation surge.

We consider monthly IE between 2019 and 2024 at the one-, three-, and five-year horizons, which we refer to hereafter as short-, medium-, and long-term IE, respectively. The analysis reveals three unusual stylized facts. *Stylized Fact 1*: the term structure of IE experienced a temporary dislocation. After remaining almost identical at around 2.8% between 2014 and 2021, median short-term IE increased by more than 4 percentage points (pp) by June 2022. In contrast, medium-term IE increased by no more than 1.7 pp and long-term IE remained mostly stable throughout the high-inflation episode. The dislocation ended by mid-2023, as IE across forecast horizons were again broadly aligned near their pre-episode levels. *Stylized Fact 2*: Longer-term IE peaked earlier. Short-term IE closely tracked the timing of realized inflation, rising sharply in the spring of 2021 and declining after mid-2022. In contrast, medium- and long-term IE started turning downward almost a year earlier, even as realized inflation continued to rise sharply to levels not recorded in four decades. *Stylized Fact 3*: Longer-term deflation expectations rose. Unlike short-term deflation expectations, which declined slightly during the high-inflation episode, medium- and long-term deflation expectations rose substantially. The share of households expecting deflation at the medium-term horizon increased from 9.5% in April 2021 to 26% in August 2022, while the corresponding long-term share peaked at 30%. More generally, movements in the tails of the IE distributions during the high-inflation episode were asymmetric both within and across forecast horizons.

To shed light on these stylized facts, we fielded two special surveys. They reveal that respondents broadly attributed the 2021–23 inflation surge to temporary, pandemic-specific supply and labor disruptions. Respondents also generally believed that sharp increases in the prices of specific goods tend to reverse over time. In addition, the special surveys show that respondents with medium-term

deflation expectations, whose share increased unexpectedly during the inflation surge (Stylized Fact 3), held the most (not the least) optimistic outlook for the economy. Finally, we find that differences in respondents' interpretations of the inflation surge help explain some of the cross-sectional heterogeneity in IE. Taken together, we argue that this evidence provides a coherent narrative that can rationalize all three stylized facts. In short, pandemic-specific supply and labor disruptions weaken economic conditions only temporarily under this narrative (see Section 4 for a fuller discussion). In particular, prices rise mainly in the short term (thereby explaining the dislocation in the term structure of IE and the earlier peak in longer-term IE), before falling back toward pre-pandemic levels (thereby explaining the rise in longer-term deflation expectations).

These findings have implications for models of expectation formation. Despite an extensive literature, no single model has emerged as dominant. The three stylized facts documented here constitute a new empirical challenge that any successful model should be able to address jointly. We argue that such a model may need to incorporate two features. First, when an economic shock occurs, agents should form beliefs about the specific nature of that shock—its magnitude, persistence (e.g., temporary or permanent), and direction across horizons (e.g., inflationary in the short term but deflationary in the long term). Second, agents should be heterogeneous in these beliefs. Although we discuss which classes of models appear best suited to accommodate these features, integrating them formally into existing models may not be straightforward.

Our paper contributes to the growing literature on subjective expectations in macroeconomics (Bachmann et al. 2023). More specifically, it complements Armantier et al. (2023), Andrade and Wicklein (2025), and Coibion and Gorodnichenko (2026), who study broader movements in household IE during the 2021–23 inflation surge. Our study is also related to the literature on economic narratives, which emphasizes how people's macroeconomic beliefs are shaped by the stories they construct to make sense of economic developments (Shiller 2017, André et al. 2026). We contribute to these literatures in four ways.

First, the literature has documented several empirical regularities in household IE during periods of relatively stable inflation, including an upward bias, substantial cross-sectional disagreement, and systematic differences by age and gender (D'Acunto et al. 2024). We complement this evidence by identifying three unusual stylized facts about IE during a major inflation surge. These facts shed new light on how households form and revise their beliefs in response to an inflation shock.

Second, the literature often treats IE as a single object, without a specific time horizon, with one-year-ahead implicitly serving as the default (Reis 2021b). This relative lack of attention to the term

structure may reflect the fact that, in normal times, households' IE tend to be nearly identical across horizons. By contrast, we find that during an inflation surge, households can form rich, horizon-specific beliefs with markedly different dynamics. These results suggest that the term structure of IE should not be ignored and they underscore the need to better understand IE across horizons.

Third, we provide further evidence that IE elicited in surveys reflect meaningful and structured beliefs rather than noise or simple extrapolations. The rich dynamics of IE we observed during the inflation surge suggest that households formed reasoned beliefs about future inflation. This is further supported by our finding that households' narratives about the 2021–23 inflation surge are consistent with the stylized facts we document and some of the cross-sectional heterogeneity in IE. These findings suggest that a more complete understanding of IE may require attention to the narratives households form to rationalize sudden changes in economic conditions.

Fourth, we contribute to the theoretical literature on expectation formation by identifying a new set of empirical challenges that can be used to discriminate among models. We also suggest ways in which models could be enriched to account for the stylized facts. Doing so would improve our ability to predict IE during episodes of high inflation, when such predictions are arguably most valuable.

The remainder of the paper is organized as follows. Section 2 describes the data. Section 3 documents the three stylized facts. Section 4 sheds light on the stylized facts using additional survey evidence. Section 5 explores how our results inform models of IE formation. Section 6 concludes.

2 The Survey of Consumer Expectations

The core SCE is a monthly, internet-based survey conducted by the Federal Reserve Bank of New York since June 2013 (Armantier et al. 2017). It uses a rotating panel design, consisting of a nationally representative sample of around 1,300 U.S. household heads, who participate in the survey for up to 12 months. Data from the SCE have been used extensively over the past decade both for policy and research.[1] In addition to the monthly SCE, special SCE surveys are occasionally fielded on an ad hoc basis to address timely questions.

Since its inception, the SCE has elicited consumers' IE monthly at the short- and medium-term horizons. The short-term horizon corresponds to the year ahead ("*Over the next 12 months*"), while the medium-term horizon corresponds to the one-year rate of inflation three years ahead ("*Over the 12-month period between M+24 and M+36*," where M is the month in which the respondent takes

[1] See e.g., Armona et al. (2019), Mueller et al. (2021), Armantier et al. (2023), Aidala et al. (2024), or Koşar and van der Klaauw (2025).

the survey). So for instance, a respondent taking the survey in April 2022 is asked about inflation "*Over the 12-month period between April 2024 and April 2025.*" Starting in January 2022, long-term IE have also been elicited monthly by asking respondents to report their expected one-year rate of inflation five years ahead ("*Over the 12-month period between M+48 and M+60*").

The SCE elicits both a point and a density forecast from each respondent at each horizon. The former is an expectation expressed as a single number. The latter is obtained by asking respondents to state the percent chance that the rate of inflation will fall within pre-specified bins. We use a respondent's density forecast to calculate an individual measure of IE, defined as the mean of the respondent's density forecast. Although we report corresponding results based on point forecasts in the appendix, we use the density mean as our main measure of individual IE.

For the main analysis, we combine data from the core SCE collected monthly from January 2019 to July 2024,[2] with data from two special SCE surveys fielded in May 2022 and June 2023. The core SCE includes around 1,200 respondents monthly. The 2022 and 2023 special surveys included 2,218 and 2,155 respondents, respectively, with 1,350 respondents participating in both. As discussed in Section 4, the special surveys included questions designed primarily to elicit respondents' interpretations of the 2021–2023 inflation surge.[3]

3 Three Stylized Facts

3.1 Stylized fact 1: The dislocation in the term structure of inflation expectations

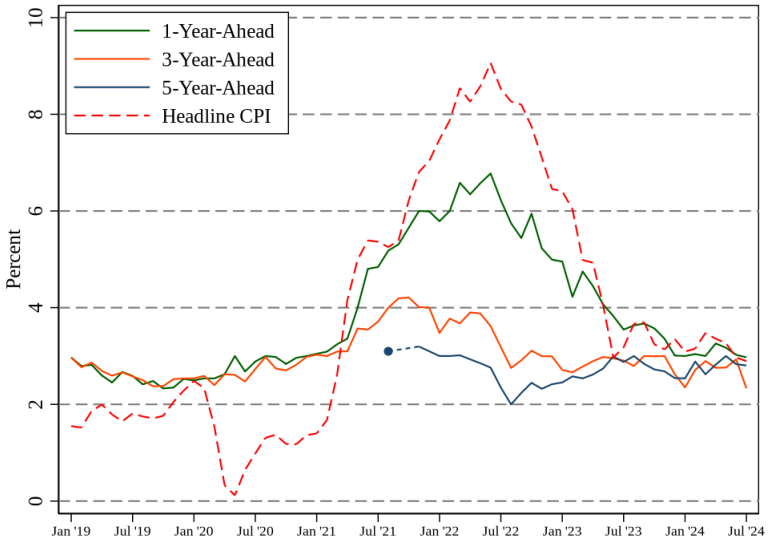
Figure 1 plots the median short-, medium-, and long-term individual IE between January 2019 and July 2024, as well as the contemporaneous inflation rate measured by the twelve-month percent change in the consumer price index (referred to as *realized inflation* hereafter). Between January 2019 and the onset of the inflation surge in the first quarter of 2021, median short- and medium-term IE were nearly identical, averaging about 2.8 percent. As shown in Appendix Figure A.1, this close alignment extends back to the inception of the SCE in 2014. Following the onset of the COVID-19 pandemic, as realized inflation started to rise to levels not seen in decades, the term structure of IE began to dislocate. Between January 2020 and June 2022, short-term IE rose by 4.3 pp. By contrast, medium-term IE rose at a much slower pace during the high-inflation episode, increasing

[2] Although we also consider data from 2014 to 2026, we end the sample in July 2024 for the main analysis to avoid confounding effects from subsequent events, including changes in U.S. trade policy and Middle East conflicts.

[3] The relevant questions asked in the 2022 and 2023 special surveys are reported in Appendix D and E, respectively. We also use IE data from a few additional special surveys in which long-term IE were elicited using a density forecast format (August 2021) and a point forecast format (July 2019, April 2021, and August 2021).

by at most 1.7 pp between January 2020 and September 2021. Although a pre-2021 comparison is impossible due to the lack of data, Figure 1 shows that longer-term IE remained broadly stable and relatively low throughout the high-inflation episode, never exceeding 3.2%.[4] Incidentally, this result provides little support for concerns expressed at the time that IE were becoming de-anchored (e.g., Reis 2021a). Finally, observe in Figure 1 that the dislocation in the term structure of IE was largely confined to the high-inflation episode. By mid-2023, short-, medium-, and long-term IE had returned close to their pre-2021 levels and were once again relatively well aligned.

Figure 1: Median Individual Inflation Expectations



Note: The figure shows the realized 12-month percent change in the headline CPI and median IE (measured as density means) at different horizons in the monthly SCE. The dot represents data from the August 2021 special survey.

3.2 Stylized fact 2: Longer-horizon expectations peaked earlier

As shown in Figure 1, short-term IE closely tracked the timing of realized inflation. Both rose sharply in the spring of 2021, peaked in June 2022, and declined thereafter. Medium-term IE initially followed a similar pattern, rising alongside realized inflation and short-term IE in the spring of 2021, albeit at a slower pace. The timing of the subsequent turn, however, differed markedly: medium-term IE peaked at 4.2% in September 2021 (nearly a year before short-term IE and realized inflation) and declined steadily thereafter. Thus, remarkably, medium-term IE began declining as realized inflation was still rising considerably, from 5.4% in September 2021 to 9.1% in June 2022, its highest level since November 1981. The median medium-term IE returned to its 2014–2020 average of 2.8% by August 2022, only two months after realized inflation peaked. By contrast, the median short-term IE remained above 2.9% until October 2024. Although the lack of pre-2021 data prevents a complete

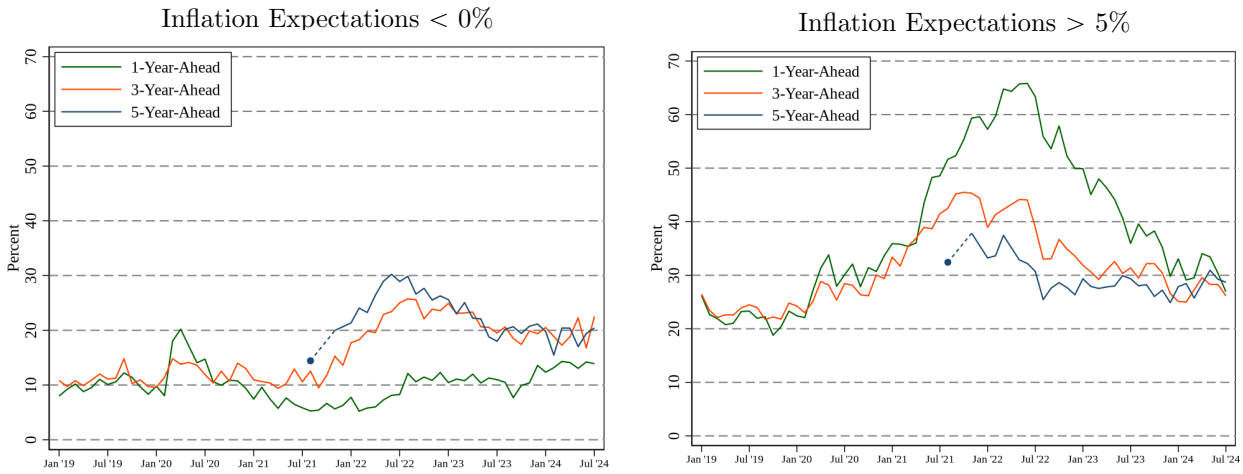
[4]The statistical significance of these results is established in Appendix B using regression analysis.

analysis of long-term IE, Figure 1 suggests that, if anything, their slight decline also began in the fall of 2021, consistent with medium-term IE and in contrast to short-term IE.

3.3 Stylized fact 3: Longer-term deflation expectations rose

Deflation expectations. The left panel of Figure 2 shows the share of respondents with deflation expectations (strictly negative IE), while the right panel shows the share with *high* IE (i.e., strictly above 5%).[5] From January 2019 until the onset of the COVID-19 pandemic, short-term deflation expectations were stable at around 10%. Appendix Figure A.2 shows that this stability extends back to 2014. The pandemic and the high-inflation episode that followed produced two departures from this historical pattern. First, deflation expectations spiked briefly at the onset of the pandemic. Second, short-term deflation expectations remained below 10% from November 2020 through August 2022, reaching a low of 5.2% in February 2022 before returning to near their historical level.

Figure 2: Share of Respondents with Low and High Inflation Expectations



Note: The left panel shows the share of respondents with deflation expectations (i.e., with density means strictly < 0%) in the monthly SCE. The right panel shows the share of respondents with *high* IE (i.e., with density means > 5%) in the monthly SCE.

Short- and medium-term deflation expectations followed a similar pattern between 2014 and the onset of the pandemic (see Appendix Figure A.2), but diverged sharply thereafter. Between September 2021 and August 2022, the share of respondents with medium-term deflation expectations nearly tripled, from 9.5% to 25.7%. This share subsequently declined slightly, but remained around 20% until the end of the sample period—roughly twice its historical level. The limited data on long-term deflation expectations suggest a similar pattern: a sharp rise followed by a partial decline. Between July 2021 and August 2022, however, long-term deflation expectations were consistently 5

[5] Using cutoffs other than 0% and 5% for low and high IE does not change the nature of the patterns shown in Figure 2.

to 7 pp higher than medium-term deflation expectations, reaching 30% in June and August 2022.[6] Thus, during the summer of 2022, as realized inflation reached 9.1%, a level not recorded in decades, nearly one in three respondents nevertheless expected deflation five years ahead. Unlike the term-structure dislocation in IE documented in Stylized Fact 1, the divergence in deflation expectations across horizons was not confined to the 2021–2023 inflation surge. As shown in Figures 2 and A.2, medium- and long-term deflation expectations have remained around 20%, while short-term deflation expectations started rising substantially above their historical average around late 2023.[7]

High inflation expectations. The right panel of Figure 2 is consistent with the temporary dislocation in IE documented earlier. The shares expecting *high* inflation (above 5%) were initially similar at the short- and medium-term horizons, rose at both horizons during the 2021–2023 inflation surge (albeit less and more briefly at the medium-term horizon) and subsequently converged again. Comparing the two panels reveals important asymmetries between the two tails of the IE distributions. At the short-term horizon, the increase in the share expecting high inflation during 2021–2023 was much larger than the decrease in the share expecting deflation (roughly 40 pp from trough to peak versus 5 pp from peak to trough). By contrast, at the medium- and especially the long-term horizons, both shares increased, but the rise in the share expecting deflation was larger than the rise in the share expecting high inflation (roughly 18 pp versus 10 pp at the long-term horizon). Moreover, the share expecting high inflation at the long-term (respectively, medium-term) horizon returned close to its pre-pandemic level by the end of 2022 (respectively, 2023), whereas the share expecting deflation remained elevated. Thus, the two tails of the IE distributions evolved asymmetrically within horizons and differently across horizons.

3.4 Changes in the cross-sectional distribution of individual expectations

The three stylized facts can be summarized by comparing changes in the cross-sectional distribution of IE across horizons in Figure 3. First, observe that before the pandemic, the distributions of short- and medium-term IE were remarkably similar (green and tan lines). During the inflation surge, the distribution of short-term IE shifted markedly to the right (blue and red lines) before moving back toward its pre-pandemic position (orange and black lines). By contrast, the distribution of medium-term IE did not shift substantially, but its tails thickened, reflecting an increase in IE *disagreement* across respondents. The limited long-term data reveal a pattern similar to that of medium-term IE.

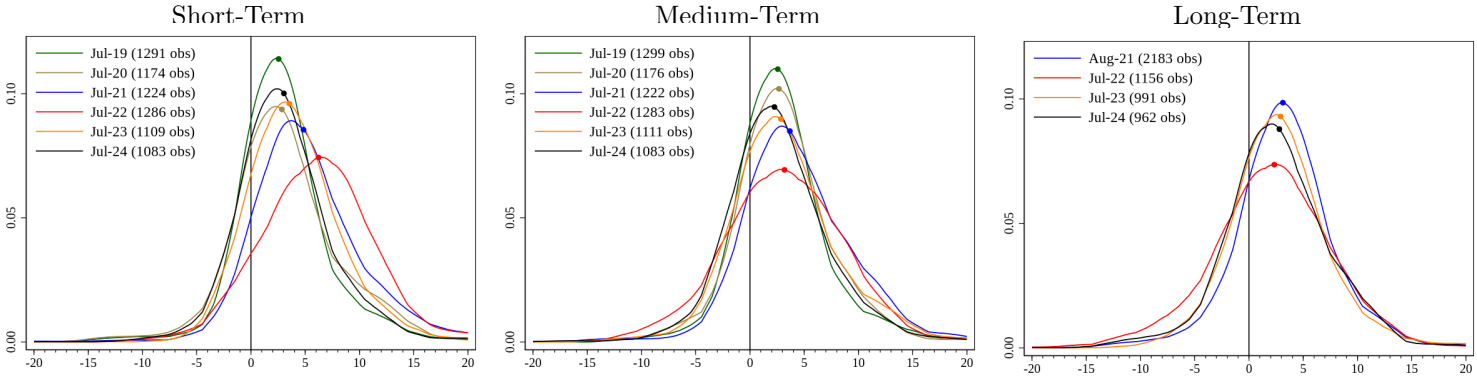
[6] The statistical significance of these results is established in Appendix B using regression analysis.

[7] As discussed in Armantier et al. (2023), the post-2021 rise in longer-term deflation expectations was broad-based across demographic groups and not unique to the SCE or the U.S. A similar pattern is visible (e.g.) in the Michigan Surveys of Consumers, the Canadian Survey of Consumer Expectations, and the Bank of England's Inflation Attitudes Survey.

Thus, Figure 3 illustrates the dislocation in the term structure of IE (Stylized Fact 1).

Second, the distribution of short-term IE shifted progressively to the right between July 2019 and July 2022, only moving back to the left in 2023, while the median (illustrated by a dot in Figure 3) did not return close to its July 2019 level until 2024. In contrast, the medium-term distribution shifted only modestly to the right in 2021 and began moving back in 2022, while the median medium-term IE returned to its July 2019 level by 2023. Consistent with this pattern, the long-term distribution shifted slightly to the left after 2021. Thus, medium- and long-term IE turned back earlier and returned to their pre-surge levels sooner than short-term expectations (Stylized Fact 2).

Figure 3: Distribution of Individual Inflation Expectations



Note: The figure shows kernel densities fitted to individual inflation density means. We use an Epanechnikov kernel with a bandwidth of 2. The x-axis in the figure is truncated at -20 and 20 percent. Dots represent median inflation expectations.

Third, the movements in the distribution of short-term IE between July 2019 and July 2022 reveal a gradual thinning of the left tail (in particular below 0%) and a more than proportional thickening of the right tail. This asymmetric trend partially reversed thereafter. In contrast, changes in the tails of the medium-term IE distribution over the same period were more symmetric and shorter-lived—by 2023, both tails had returned close to their July 2019 levels. Changes in the long-term distribution display yet another pattern: while the right tail remained essentially unchanged between 2021 and 2024 (providing no evidence of the deterioration in anchoring feared at the time), the left tail thickened markedly and had not returned to its 2021 level by July 2024. Taken together, these results confirm that movements in the tails of IE distributions were asymmetric within forecast horizons and different across horizons (Stylized Fact 3).[8]

[8] As shown in appendix Figures A.3, A.4 and A.5, patterns similar to those observed in Figures 1, 2, and 3 emerge when individuals' IE are measured using respondents' point forecasts rather than the means of their density forecasts.

4 Interpreting the Stylized Facts: Additional Survey Evidence

4.1 Perceptions about Inflation Dynamics

Contributors to the inflation surge. Building on the recent literature on economic narratives (Shiller 2017, André et al. 2026), we asked respondents in the June 2023 special survey to assess the importance of 16 potential contributors to the inflation surge between June 2021 and June 2022.[9] The top panel of Figure 4 shows that the three factors considered most important were pandemic-specific supply and labor disruptions: supply-chain issues, worker shortages, and shutdowns. This interpretation was shared broadly: 34% of respondents ranked these three factors as the most important contributors, and nearly half included all three factors in their top five. Nevertheless, the bottom panel of Figure 4 reveals meaningful differences across respondents. Those who reported low or moderate medium-term IE in the special survey ranked the three pandemic-related supply-side disruptions highest (left and central panels). By contrast, respondents with high medium-term IE ranked government spending, an inflationary demand-side factor, first (right panel).[10] Hence, respondents formed coherent narratives about the inflation surge that were consistent with their expectations, thereby accounting for some of the cross-sectional heterogeneity in IE.

Perceived price reversals. The pandemic and its aftermath were marked by unusually sharp and temporary price increases. For instance, gasoline and used cars prices rose by roughly 50% year over year in 2022 before subsequently declining. Accordingly, respondents to the 2022 and 2023 special surveys tended to agree that sharp price increases for specific goods (gasoline, food, durable goods, and homes) are followed by declines over the next two to three years. As shown in Figure 5 however, the average level of agreement was moderate (3.6 on a seven-point scale) and declined significantly with respondents' IE across horizons.[11] Thus, beliefs about whether sharp price increases ultimately reverse help account for some of the cross-sectional heterogeneity in IE.

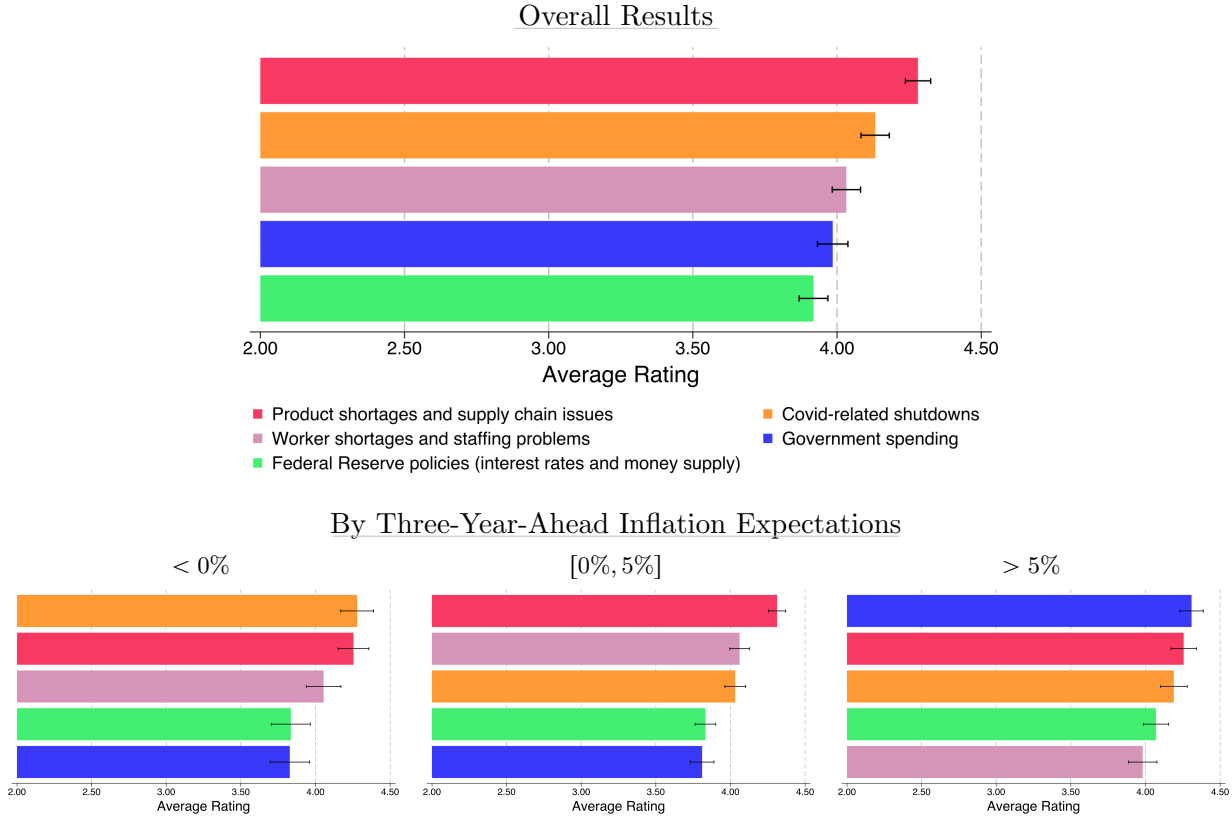
Together, these results may help rationalize the three stylized facts. To illustrate, consider an agent who believes the inflation surge reflects temporary inflationary disruptions that will peak in two years and dissipate in four. Initially, the agent expects a sharp rise in short-term IE, but a more moderate rise in medium-term IE and little change in long-term IE because the disruptions are expected to have passed their peak in three years and dissipated in four (Stylized Fact 1). Nine months later, realized inflation and the agent's short-term IE are still rising. However, because the

[9] See Appendix E for the exact wording of the questions and the complete list of factors. The list was informed by responses to open-ended questions fielded in a pilot survey.

[10] Similar patterns emerge when respondents are grouped using short- or long-term IE in the bottom panel of Figure 4.

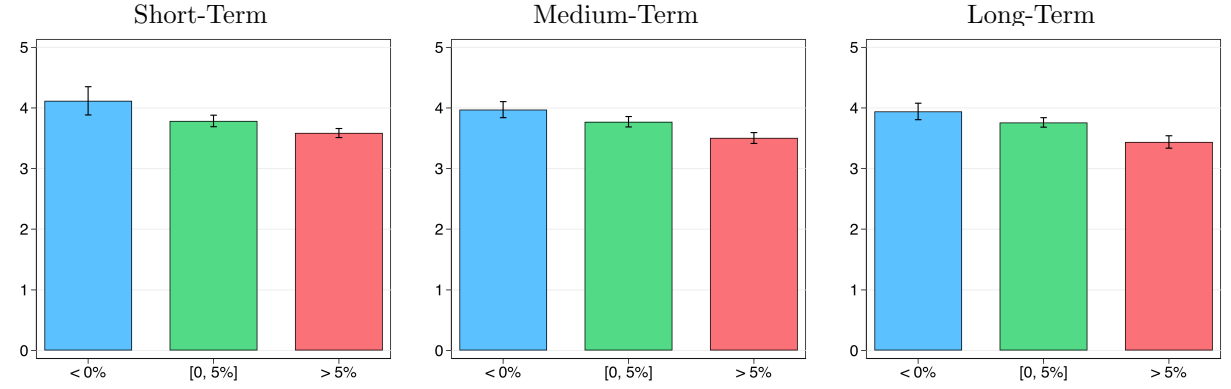
[11] As shown in appendix Figure A.6, this pattern emerges for each of the four goods (gasoline, food, durables, and homes).

Figure 4: Subjective Contributors to Inflation Surge between June 2021 and June 2022



Note: The top panel shows the average importance ratings that respondents assigned to the five highest-ranked contributors to the inflation surge between June 2021 and June 2022. The bottom panels report the corresponding results separately for respondents who, in the same survey, reported three-year-ahead IE $< 0\%$, in $[0\%, 5\%]$, and $> 5\%$. The figure is based on the 88.3% of respondents who correctly reported perceiving inflation between June 2021 and June 2022 to be higher than in 2019.

Figure 5: Commodity Price Reversion and Inflation Expectations



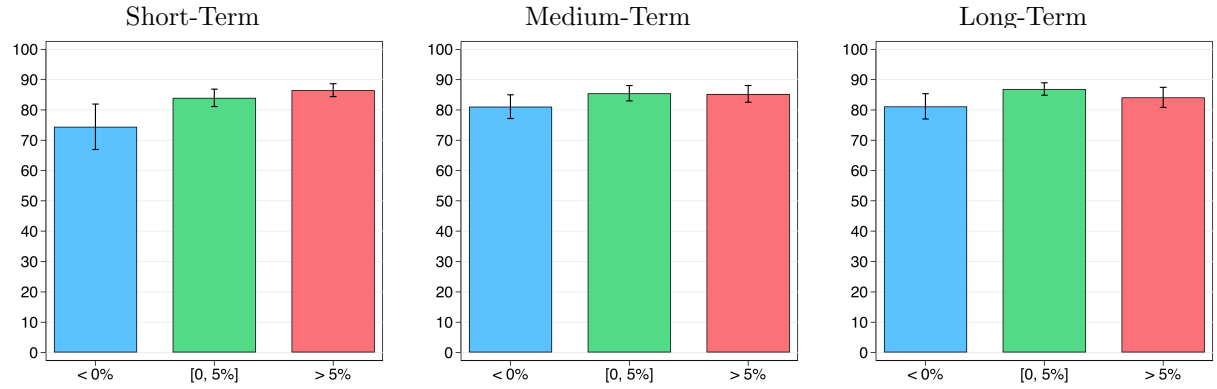
Note: The blue, green, and red bars denote the average responses of respondents who, in the same survey, reported IE at the one-year-ahead (left panel), three-year-ahead (middle panel), and five-year-ahead (right panel) horizons $< 0\%$, in $[0\%, 5\%]$, and $> 5\%$, respectively. For each commodity X, where X refers to gasoline, food, durable goods, and homes, respondents were asked how much they agreed with the statement: "*In general, when the price of X rises sharply over a short period of time, it usually comes back down over the next 2 to 3 years.*" Responses range from 1 (totally disagree) to 7 (totally agree). Each bar shows the average response across respondents and commodities. The figure combines data from the 2022 and 2023 special surveys. Error bars denote 95% confidence intervals around the averages, clustered at the respondent level to account for repeat respondents.

agent believes the disruptions will now end shortly beyond the three-year horizon, medium-term IE could begin to decline (Stylized Fact 2). Finally, if the agent believes that sharp price increases ultimately reverse over time, then he could report medium- and long-term deflation expectations even while realized inflation remains elevated (Stylized Fact 3).

4.2 A closer look at deflation expectations

Deflation confusion. The rise in medium- and long-term deflation expectations during the 2021–23 inflation surge is perhaps our most surprising stylized fact. A possible concern with this result is that respondents confused deflation with disinflation. To test this hypothesis, respondents in the two special surveys were asked whether there was inflation or deflation this year in a scenario in which all prices increased by $X\%$ last year and by around $X/2\%$ this year.[12] Overall, 85% of respondents correctly identified the scenario as inflation. Figure 6 further shows that, across forecast horizons, respondents expecting deflation were only marginally and not always statistically significantly less likely to answer correctly. Thus, we find little support for the hypothesis that confusion about the meaning of deflation explains the substantial rise in medium- and long-term deflation expectations.[13]

Figure 6: Deflation Confusion and Inflation Expectations



Note: The blue, green, and red bars denote the shares of correct responses among respondents who, in the same survey, reported IE at the one-year-ahead (left panel), three-year-ahead (middle panel), and five-year-ahead (right panel) horizons $< 0\%$, in $[0\%, 5\%]$, and $> 5\%$, respectively. Respondents in the 2023 survey were asked: "*Imagine that all prices increased by 4% last year, and imagine that all prices increase by 2% this year. In that case, would you say that there is inflation or deflation this year?*" Respondents in the 2022 survey were asked the same question but with price increases of 9% and 5%, respectively. The figure combines data from the 2022 and 2023 special surveys. Error bars denote 95% confidence intervals around the averages, clustered at the respondent level to account for repeat respondents.

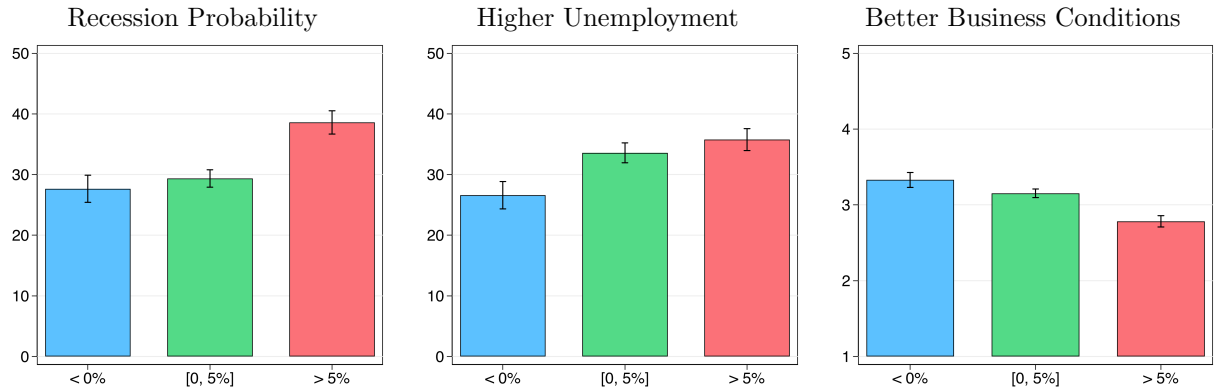
Economic outlook. Respondents in the special surveys were asked about three indicators of economic conditions three years ahead: the probability that the economy would be in a recession, the

[12] The hypothetical price increases were 9% last year and 5% this year in the 2022 special survey, versus 4% and 2%, respectively, in the 2023 special survey, reflecting prevailing inflation rates at the time of each survey.

[13] A regression analysis indicates that confusion about the meaning of deflation can account for at most 1 pp of the 26% of respondents reporting medium-term deflation expectations in the summer of 2022.

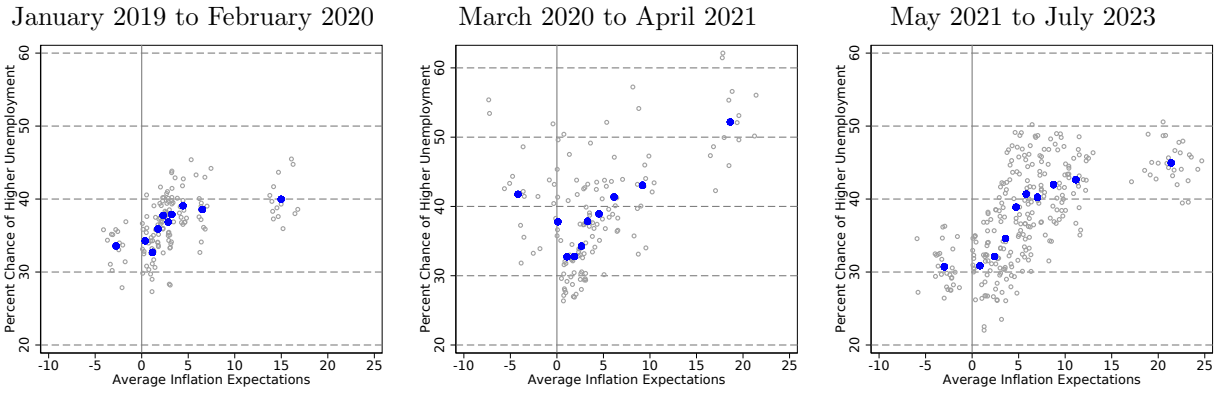
probability that unemployment would be higher than at present, and whether business conditions would be better or worse than at present (see Appendix D for question wording). Figure 7 shows that, compared with respondents with high medium-term IE (above 5%), those expecting medium-term deflation reported significantly lower probabilities of both a recession and higher unemployment, as well as significantly more favorable expectations about business conditions.[14] Thus, medium-term deflation expectations were associated with a more, not less, favorable economic outlook.

Figure 7: Expected Inflation and Economic Conditions at the Three-Year Horizon



Note: The blue, green, and red bars denote the average responses of respondents who, in the same survey, reported three-year-ahead IE $< 0\%$, in $[0\%, 5\%]$, and $> 5\%$, respectively. Respondents were asked to assess the chance that the U.S. economy would be in a recession in three years (left panel), the chance that the unemployment rate would be higher in three years than at the time of the survey (middle panel), and how business conditions in three years would compare with current conditions (right panel), with responses to the latter question ranging from 1 (much worse) to 5 (much better). The figure combines data from the 2022 and 2023 special surveys. Error bars denote 95% confidence intervals around the averages, clustered at the respondent level to account for repeat respondents.

Figure 8: One-Year-Ahead IE and Probability of Higher Unemployment



Note: Each gray dot represents a decile of one-year-ahead IE in a given month. For each dot, the x-axis shows average IE and the y-axis shows the average reported probability that the unemployment rate will be higher one year ahead. The blue dots show averages for each decile over the period indicated in the panel heading. The data are from the core SCE.

Figure 8, however, suggests that the relationship between IE and expected economic conditions is not systematic. Before the pandemic, short-term IE were positively, albeit modestly, associated

[14] As indicated in appendix Figure A.7, identical patterns emerge at the short- and long-term horizons.

with the likelihood respondents assigned to higher unemployment in the year ahead (left panel). The relationship became approximately V-shaped at the onset of the pandemic (with respondents in both tails assigning higher probabilities to rising unemployment) and turned strongly positive during the subsequent inflation surge (central and right panels, respectively). The persistent pessimism among respondents with high IE is consistent with previous studies (Ehrmann et al. 2017, Kamdar et al. 2019, Coibion and Gorodnichenko 2026). By contrast, our finding that the economic outlook of respondents with the lowest IE, including those with deflation expectations, varies with the prevailing economic environment is new and qualifies the existing literature.

Taken together, the three stylized facts and the evidence presented in this section point to a coherent narrative shared by many respondents. They attributed the inflation surge to pandemic-specific supply and labor disruptions that would temporarily raise prices and weaken the economy. They also anticipated that, as these disruptions dissipated, prices would move back toward their pre-pandemic levels and economic conditions would improve.

5 Models of Inflation Expectations Formation

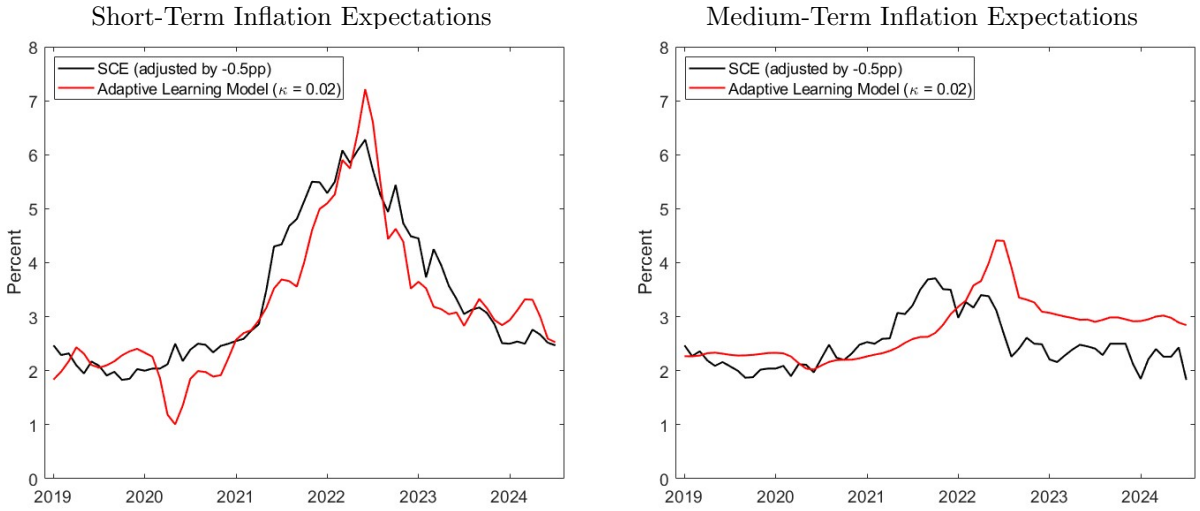
We now discuss the extent to which the three stylized facts we documented can inform models of IE formation. Full-information rational expectations (FIRE) has long been the standard for modeling expectation formation in macroeconomic theory (Muth 1961, Lucas 1972). In recent decades, as mounting empirical evidence challenged the FIRE paradigm, several alternatives have been proposed (Coibion and Gorodnichenko 2015, Coibion et al. 2018). Examples include information-friction models based on sticky information, noisy information, or rational inattention (Mankiw and Reis 2002, Woodford 2003, Maćkowiak and Wiederholt 2009); adaptive learning, in which agents recursively estimate a subjective law of motion as new data become available (Orphanides and Williams 2005); extrapolative expectations, in which recent inflation developments are projected forward (Pfajfar and Žakelj 2014); Bayesian learning, in which beliefs about latent states or unknown parameters are updated with Bayes' rule (Baley and Veldkamp 2023); experience-based expectations, in which memories of past inflation experiences shape beliefs (Malmendier and Nagel 2016, Gennaioli et al. 2025, Pedemonte et al. 2025); and diagnostic expectations, in which outcomes made more likely by new data are overweighted (Bordalo et al. 2020).

These models have been evaluated in part by their relative ability to organize empirical regularities in household IE, including an upward bias, substantial cross-sectional disagreement, and systematic differences by age and gender (Weber et al. 2022, D'Acunto et al. 2024). Although this evidence

has provided some support for adaptive-learning and experience-based models, the literature has not converged on a leading model of expectation formation. We complement this work by documenting three stylized facts about the dynamics of household IE during a high-inflation episode. Although these facts do not provide a direct test that discriminates among models, explaining them poses a new challenge that may help narrow the set of empirically relevant models.

Without modification, it does not appear that any existing model can explain all three stylized facts jointly. Consider for instance the standard adaptive-learning model of Orphanides and Williams (2005) in which agents recursively estimate an AR(3) process using current and past inflation to forecast inflation (see Appendix C for details). Figure 9 shows that the model tracks short-term IE fairly well (left panel) but fails to predict Stylized Fact 2, the early downturn in medium-term IE (right panel). Moreover, because the model assumes a representative agent, it cannot account for the rising share of respondents with deflation expectations (Stylized Fact 3) or, more generally, the distinct movements in the tails of IE distributions within and across forecast horizons.[15]

Figure 9: Predictions from an Adaptive Learning Model



Note: The left panel shows median short-term IE in the monthly SCE and model-generated IE at the same horizon. The right panel shows median medium-term IE in the monthly SCE and model-generated IE at the same horizon.

A model capable of jointly accounting for the three stylized facts would likely require two central features. First, when an economic shock occurs, agents should form beliefs about the specific nature of that shock, including its magnitude, persistence (e.g., temporary or permanent), and direction across horizons (e.g., inflationary in the short term but deflationary in the long term). A large temporary inflationary shock could then raise short-term IE sharply, leave long-term IE broadly stable, and

[15] As discussed in Armantier et al. (2023), the adaptive learning model can be enriched (e.g.) by imposing perfectly anchored long-run IE, or by limiting inflation experiences to the agent's lifetime (as in Malmendier and Nagel 2016), thereby introducing heterogeneity. These richer specifications, however, also fail to account for all three stylized facts.

cause medium-term IE to turn down earlier and eventually become deflationary, a pattern consistent with Figure 1. Agents could form these beliefs directly from signals about the source of the shock, such as the type of supply disruptions or policy actions, or infer them indirectly from the joint behavior of inflation and other macroeconomic outcomes.

Second, agents should hold heterogeneous beliefs about the nature of the shock—its magnitude, persistence, and direction across horizons. Such heterogeneity could generate asymmetric movements in the two tails of the cross-sectional IE distributions, both within and across forecast horizons. For example, some agents may view the inflation shock as large, short-lived, and followed by a period of deflation, while others may view the inflation shock as persisting only at short and medium horizons. Such disagreement could generate a thickening of the right tail at short horizons, of both tails at medium horizons, and of the left tail only at long horizons, consistent with the asymmetric pattern in Figure 3. Hence, at least in principle, combining these two central features could produce a dislocation in the term structure of IE (Stylized Fact 1), an earlier peak in IE at longer horizons (Stylized Fact 2), and an increase in longer-term deflation expectations (Stylized Fact 3).

Admittedly, accommodating these two features would require a highly flexible model with a rich state space. In that respect, Bayesian-learning models appear relatively well suited because they allow agents to infer latent shock characteristics from noisy private signals and jointly observed outcomes. In principle, noisy-information and rational-inattention models could also distinguish among shock types, provided that agents receive or acquire information about those shocks rather than only about current inflation. Models that rely primarily on realized inflation, such as canonical adaptive-learning, experience-based, and diagnostic-expectations models, appear less suited to accounting for the nature of shocks without additional structure, such as a richer multivariate or latent-state representation.

6 Conclusion

We documented three stylized facts that characterized household IE during the 2021–23 inflation surge. First, the term structure of IE became temporarily dislocated. Before 2021 and again after mid-2023, IE were broadly aligned across forecast horizons. By contrast, during the inflation surge, short-term IE increased sharply, medium-term IE rose more moderately, and long-term IE remained comparatively stable. Second, medium-term IE started declining in September 2021, about a year before both realized inflation and short-term IE. Third, the share of respondents expecting deflation increased markedly at medium- and long horizons. Our evidence suggests that these stylized facts can be rationalized in part by the narratives households formed about the 2021–23 inflation surge,

particularly the view that it was driven by temporary pandemic-specific supply and labor disruptions.

These results underscore the important role that IE surveys can play, especially during high-inflation episodes. First, our findings provide additional evidence that IE elicited in surveys are meaningful. Respondents reported rich beliefs that were generally consistent with their subjective narratives about the causes of the 2021-23 inflation surge. Accordingly, IE surveys are not only informative in normal times, but they may be even more valuable during high-inflation episodes as a complement to theory. Our findings suggest that for models of expectation formation to perform well during such episodes, they may need to account for households' subjective perceptions of the inflation shock's nature (e.g., its causes, magnitude, and persistence). Surveys can elicit such perceptions and thereby help calibrate these models during an inflation shock. Alternatively, IE surveys may temporarily serve as a substitute for models. Because high-inflation episodes occur infrequently, models have yet to be fully validated in such environments. In the meantime, surveys can provide timely evidence that helps policymakers monitor and interpret IE when uncertainty is elevated and policy decisions are especially consequential.

Our findings also have implications for theories of expectation formation. We show that rare high-inflation episodes can reveal new empirical patterns that may help narrow the set of viable models. Accommodating these patterns, however, may not be straightforward. To do so, models may need to allow heterogeneous agents to form rich beliefs about the nature of severe inflation shocks. In such models, different inflation shocks may generate different IE dynamics. Accordingly, none of the three stylized facts we documented should be expected to recur if future high-inflation episodes are caused by different shocks. More broadly, our results suggest that the term structure of IE, which has received relatively little attention in the literature, deserves greater emphasis in future research. In particular, models of expectation formation should be able to capture the patterns that characterized the term structure of IE during the 2021–23 inflation surge: its temporary dislocation and the asymmetric movements in the cross-sectional distribution across forecast horizons.

Finally, our findings point to the value of broadening the scope of IE surveys. Over the past two decades, the survey-design literature on IE has focused on improving the numerical measurement of respondents' forecasts through question wording and elicitation format (e.g., point vs. density forecasts; Armantier et al. 2013). Accordingly, established surveys conducted by central banks and major institutions currently measure households' IE through numerical forecasts only. Consistent with Shiller (2017), our results suggest that combining these numerical forecasts with information about the narratives households form to make sense of economic developments can provide a richer

understanding of IE. In particular, we find that such narratives can help explain some of the cross-sectional heterogeneity in IE. Relatedly, it may be worthwhile to examine whether specific forms of heterogeneity in IE, such as systematic differences by gender, age, and political affiliation (Weber et al. 2022, Binder et al. 2024), partly reflect differences in the narratives these groups form to interpret the economy. Incorporating measures of households' narratives into future surveys could therefore deepen our understanding of how IE are formed and updated. How best to elicit such narratives, however, remains an important question for the survey-design literature to address.

References

Aidala, F., O. Armantier, G. Koşar, J. Somerville, G. Topa, and W. van der Klaauw (2024). Gasoline price changes and consumer inflation expectations: Experimental evidence. *Journal of Economic Behavior & Organization 220*, 66–80.

Andrade, P. and M. Wicklein (2025). Why have inflation expectations surged recently? a historical perspective. Current Policy Perspectives 25-14, Federal Reserve Bank of Boston.

André, P., I. Haaland, C. Roth, and J. Wohlfart (2026). Narratives about the macroeconomy. *The Review of Economic Studies*.

Armantier, O., W. Bruine de Bruin, S. Potter, G. Topa, W. van der Klaauw, and B. Zafar (2013). Measuring inflation expectations. *Annual Review of Economics 5*, 273–301.

Armantier, O., J. Foncel, and N. Treich (2023). Insurance and portfolio decisions: Two sides of the same coin? *Journal of Financial Economics 148*(3), 201–219.

Armantier, O., G. Koşar, J. Somerville, G. Topa, W. van der Klaauw, and J. C. Williams (2023). The curious case of the rise in deflation expectations. Staff Reports 1037, Federal Reserve Bank of New York.

Armantier, O., G. Topa, W. van der Klaauw, and B. Zafar (2017). An overview of the survey of consumer expectations. *Economic Policy Review* (23-2), 51–72.

Armona, L., A. Fuster, and B. Zafar (2019). Home price expectations and behaviour: Evidence from a randomized information experiment. *Review of Economic Studies 86*(4), 1371–1410.

Bachmann, R., G. Topa, and W. van der Klaauw (Eds.) (2023). *Handbook of Economic Expectations*. Amsterdam: Elsevier.

Baley, I. and L. Veldkamp (2023). Bayesian learning. In R. Bachmann, G. Topa, and W. van der Klaauw (Eds.), *Handbook of Economic Expectations*, Chapter 23, pp. 717–748. Amsterdam: Elsevier.

Binder, C. C., R. Kamdar, and J. M. Ryngaert (2024). Partisan expectations and COVID-era inflation. *Journal of Monetary Economics 148*, 103649.

Bordalo, P., N. Gennaioli, Y. Ma, and A. Shleifer (2020). Overreaction in macroeconomic expectations. *American Economic Review 110*(9), 2748–2782.

Coibion, O. and Y. Gorodnichenko (2015). Information rigidity and the expectations formation process: A simple framework and new facts. *American Economic Review 105*(8), 2644–2678.

Coibion, O. and Y. Gorodnichenko (2026). Inflation expectations and monetary policy: What have we learned and to what end? *The Econometrics Journal*.

Coibion, O., Y. Gorodnichenko, and R. Kamdar (2018). The formation of expectations, inflation, and the phillips curve. *Journal of Economic Literature 56*(4), 1447–91.

D'Acunto, F., U. Malmendier, and M. Weber (2024). Household inflation expectations: An overview of recent insights for monetary policy. NBER Working Paper 32488, National Bureau of Economic Research.

Ehrmann, M., D. Pfajfar, and E. Santoro (2017). Consumers' attitudes and their inflation expectations. *International Journal of Central Banking 13*(1), 225–259.

Gennaioli, N., M. Leva, R. Schoenle, and A. Shleifer (2025). How inflation expectations de-anchor: The role of selective memory cues. NBER Working Paper 32633.

Kamdar, R. et al. (2019). The inattentive consumer: Sentiment and expectations. *Mimeo*.

Koşar, G. and W. van der Klaauw (2025). Workers' perceptions of earnings growth and employment risk. *Journal of Labor Economics 43*(S1), S83–S121.

Lucas, Robert E., J. (1972). Expectations and the neutrality of money. *Journal of Economic Theory 4*(2), 103–124.

Maćkowiak, B. and M. Wiederholt (2009). Optimal sticky prices under rational inattention. *American Economic Review 99*(3), 769–803.

Malmendier, U. and S. Nagel (2016). Learning from inflation experiences. *The Quarterly Journal of Economics 131*(1), 53–87.

Mankiw, N. G. and R. Reis (2002). Sticky information versus sticky prices: A proposal to replace the new keynesian phillips curve. *The Quarterly Journal of Economics 117*(4), 1295–1328.

Mester, L. J. (2022). The role of inflation expectations in monetary policymaking: A practitioner's perspective. In *presented at the European Central Bank Forum on Central Banking: Challenges for Monetary Policy in a Rapidly Changing World, June*.

Mueller, A. I., J. Spinnewijn, and G. Topa (2021). Job seekers' perceptions and employment prospects: Heterogeneity, duration dependence, and bias. *American Economic Review 111*(1), 324–363.

Muth, J. F. (1961). Rational expectations and the theory of price movements. *Econometrica 29*(3), 315–335.

Orphanides, A. and J. C. Williams (2004). Imperfect knowledge, inflation expectations, and monetary policy. In B. Bernanke and M. Woodford (Eds.), *The inflation-targeting debate*, pp. 201–246. University of Chicago Press.

Orphanides, A. and J. C. Williams (2005). The decline of activist stabilization policy: Natural rate misperceptions, learning, and expectations. *Journal of Economic Dynamics and Control 29*(11), 1927–1950.

Pedemonte, M., H. Toma, and E. Verdugo (2025). Aggregate implications of heterogeneous inflation expectations: The role of individual experience. *The Economic Journal*.

Pfajfar, D. and B. Žakelj (2014). Experimental evidence on inflation expectation formation. *Journal of Economic Dynamics and Control 44*, 147–168.

Reis, R. (2021a). Losing the inflation anchor. *Brookings Papers on Economic Activity*, 307–361.

Reis, R. (2021b). The people versus the markets: A parsimonious model of inflation expectations. CEPR Discussion Paper 15624, Centre for Economic Policy Research.

Shiller, R. J. (2017). Narrative economics. *American Economic Review 107*(4), 967–1004.

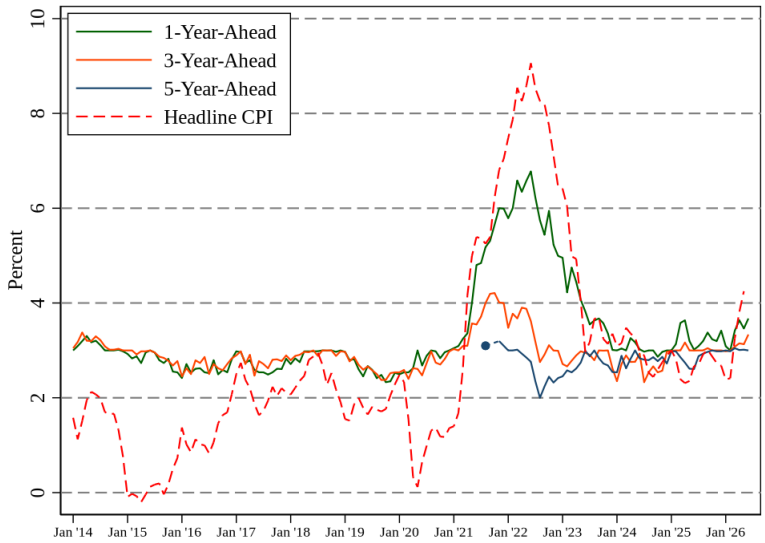
Weber, M., F. D'Acunto, Y. Gorodnichenko, and O. Coibion (2022). The subjective inflation expectations of households and firms: Measurement, determinants, and implications. *Journal of Economic Perspectives 36*(3), 157–184.

Woodford, M. (2003). Imperfect common knowledge and the effects of monetary policy. In P. Aghion, R. Frydman, J. Stiglitz, and M. Woodford (Eds.), *Knowledge, Information, and Expectations in Modern Macroeconomics: In Honor of Edmund S. Phelps*, pp. 25–58. Princeton, NJ: Princeton University Press.

Online Appendix

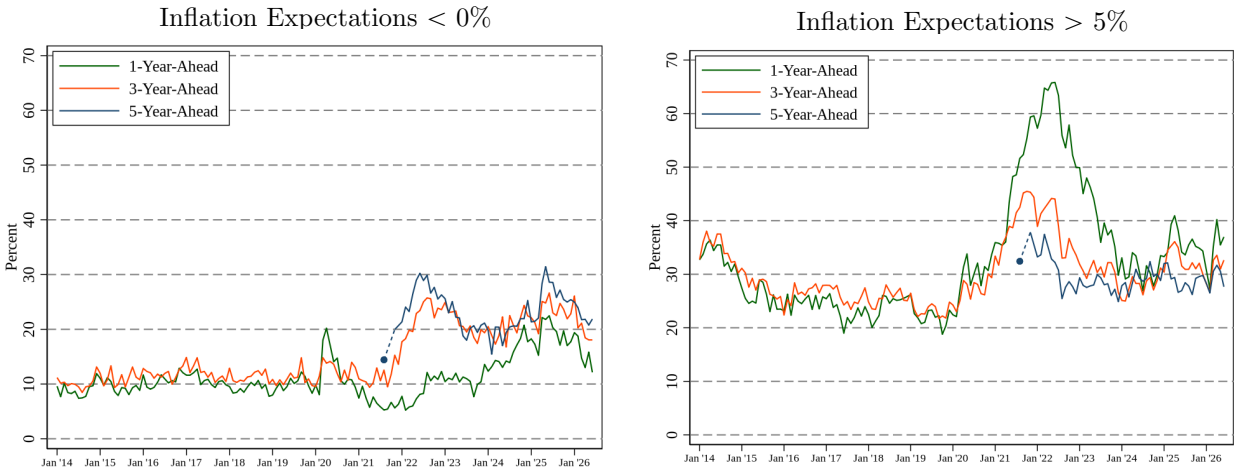
A Additional Figures

Figure A.1: Median Individual Inflation Expectations 2014–2026



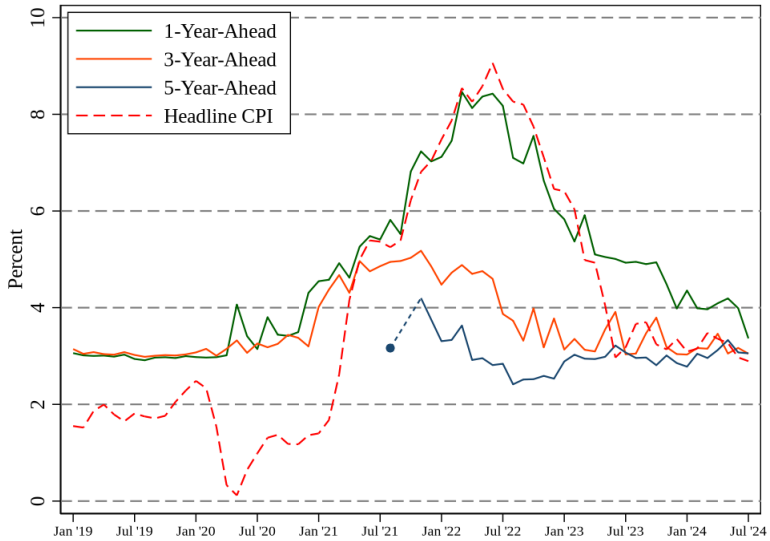
Note: The figure shows the realized 12-month percent change in the headline CPI and median IE (measured as density means) at different horizons in the monthly SCE. The dot represents data from the August 2021 special survey. The sample period goes from January 2014 to June 2026.

Figure A.2: Share of Respondents with Low and High Inflation Expectations 2014-2026



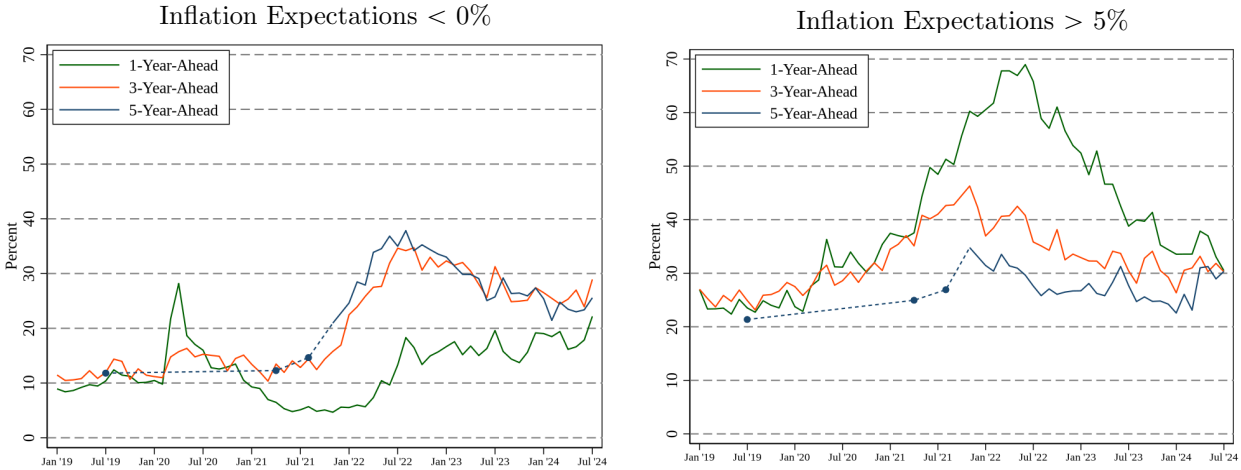
Note: The left panel shows the share of respondents with deflation expectations (i.e., with density means strictly $< 0\%$) in the monthly SCE. The right panel shows the share of respondents with *high* IE (i.e., with density means $> 5\%$) in the monthly SCE. The sample period goes from January 2014 to June 2026.

Figure A.3: Median Individual Inflation Expectations (Point Forecasts)



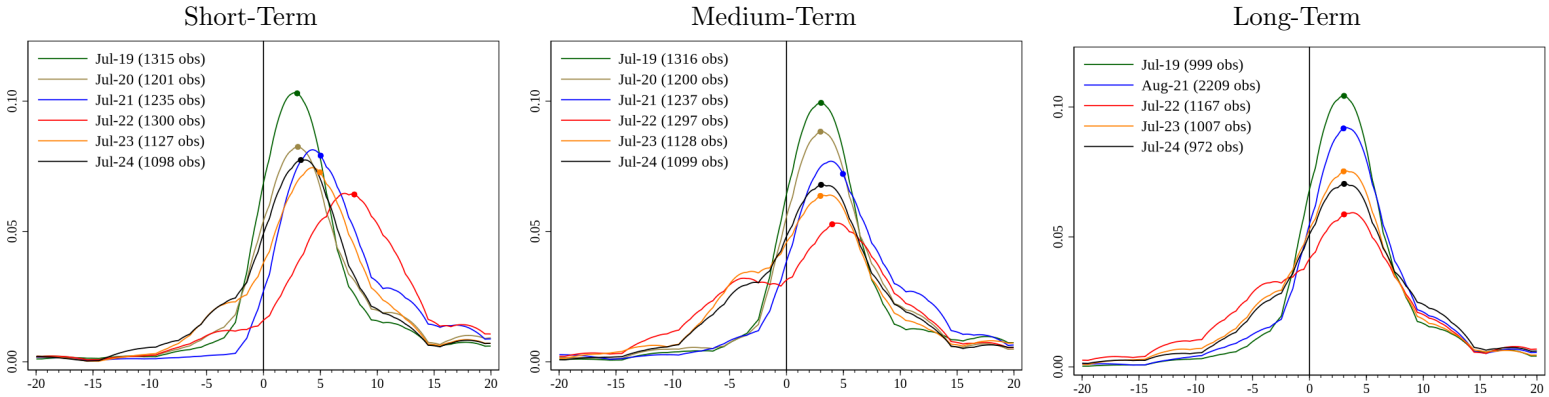
Note: The figure shows the realized 12-month percent change in the headline CPI and median IE (measured as point forecasts) at different horizons in the monthly SCE. The dot represents data from the August 2021 special survey.

Figure A.4: Share of Respondents with Low and High Inflation Expectations (Point Forecasts)



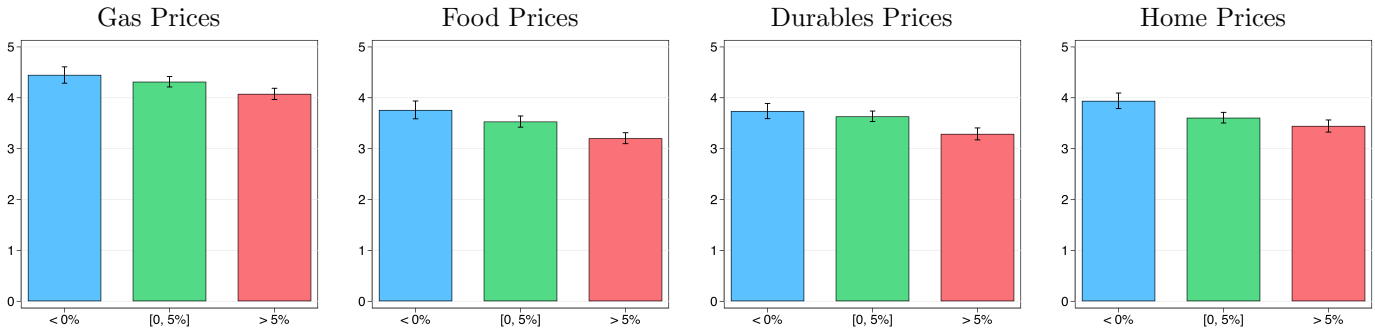
Note: The left panel shows the share of respondents with deflation expectations (i.e., with point forecasts strictly $< 0\%$) in the monthly SCE. The right panel shows the share of respondents with *high* IE (i.e., with point forecasts $> 5\%$) in the monthly SCE.

Figure A.5: Distribution of Individual Inflation Expectations (Point Forecasts)



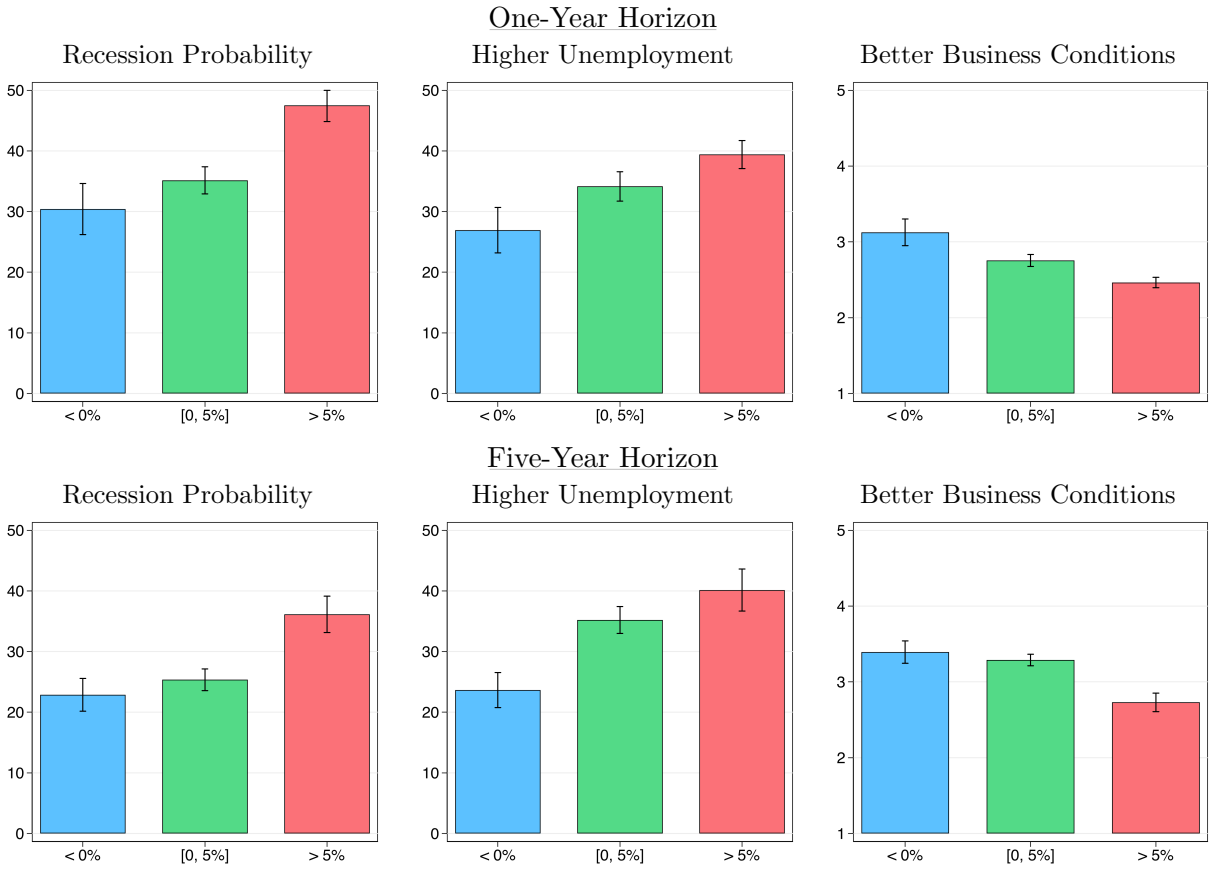
Note: The figure shows kernel densities fitted to individual inflation point forecasts. We use an Epanechnikov kernel with a bandwidth of 2. The x-axis in the figure is truncated at -20 and 20 percent. Dots represent median inflation expectations.

Figure A.6: Three-year-ahead IE and Reversion in Commodity Prices



Note: The blue, green, and red bars denote the average responses of respondents who, in the same survey, reported three-year-ahead IE $<$ 0%, in [0%,5%], and $>$ 5%, respectively. For each commodity X, respondents are asked how much they agree with the statement: "*In general, when the price of X rises sharply over a short period of time, it usually comes back down over the next 2 to 3 years.*" Responses were coded between 1 (totally disagree) and 7 (totally agree). The figure combines data from the 2022 and 2023 special surveys. Error bars denote 95% confidence intervals around the averages, clustered at the respondent level to account for repeat respondents.

Figure A.7: Expected Inflation and Economic Conditions



Note: The blue, green, and red bars denote the average responses of respondents who, in the same survey, reported one- and five-year-ahead IE $< 0\%$, in $[0\%, 5\%]$, and $> 5\%$, respectively. Respondents were asked to assess the chance that the U.S. economy would be in a recession in one and five years (left panels), the chance that the unemployment rate would be higher in one and five years than at the time of the survey (middle panels), and how business conditions in one and five years would compare with current conditions (right panels), with responses to the latter question ranging from 1 (much worse) to 5 (much better). The figure relies on data from the 2023 special survey. Error bars denote 95% confidence intervals around the averages.

B Additional Tables

The Term Structure of Inflation Expectations. To test whether the level and evolution of IE differed across forecast horizons between June 2020 and June 2022, we estimate the following model:

$$IE_{iht} = \mu_i + \alpha_1(M_h + L_h) + \alpha_2 L_h + [\beta + \beta_1(M_h + L_h) + \beta_2 L_h]\, t + \varepsilon_{iht}, \tag{B.1}$$

where IE_{iht} is respondent i's density-mean IE at horizon h (either short-, medium or long-term) in month t; M_h and L_h are indicators equal to one for medium- and long-term expectations, respectively; and μ_i denotes respondent fixed effects.

Under this parameterization, α_1 is the difference between the intercepts for short- and medium-term IE, while α_2 is the difference between the intercepts for medium- and long-term IE. Similarly, β is the monthly trend in short-term IE, β_1 is the difference between the trends for short- and medium-term IE, and β_2 is the difference between the trends for medium- and long-term IE.

Table B.1: Horizon Differences in Inflation-Expectation Levels and Trends

	June 2020 to June 2022	Common five-year sample
Three-year minus one-year intercept α_1	0.135	-1.805***
	(0.195)	(0.115)
Five-year minus three-year intercept α_2	–	-0.662**
		(0.251)
One-year monthly trend β	0.203***	0.205***
	(0.021)	(0.043)
Three-year minus one-year trend β_1	-0.122***	-0.208***
	(0.014)	(0.017)
Five-year minus three-year trend β_2	–	-0.110*
		(0.053)
Observations	60,786	22,701
Respondents	4,858	1,997

Note: The table reports the results of the estimation of model B.1. The model is estimated with data from June 2020 to June 2022 in the first column and from November 2021 to June 2022 (the period over which we have monthly data for long-term IE) in the second column. Standard errors, in parentheses, are two-way clustered by respondent and survey month. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The results in the first column of Table B.1 show that medium-term IE increased at a significantly slower pace than short-term IE between June 2020 and June 2022. The results in the second column confirm this result and also show that long-term IE increased at an even slower pace than medium-term IE between November 2021 and June 2022 (the period over which we have monthly data for long-term IE). These results therefore confirm statistically the dislocation in the term structure of IE, thereby supporting Stylized Fact 1.

Deflation expectations. To estimate whether the share of respondents with deflation expectations increased differently across forecast horizons between September 2021 and August 2022, we estimate the same model as in Equation B.1 except that the dependent variable is now defined as $D_{iht} = 100 \times \mathbf{1}\{IE_{iht} < 0\}$, where IE_{iht} is respondent i's density-mean IE at horizon h in month t.

Table B.2: Horizon Differences in Deflation-Expectation Levels and Trends

	September 2021 to August 2022	Common five-year sample
Three-year minus one-year intercept α_1	5.809***	9.563***
	(1.171)	(0.981)
Five-year minus three-year intercept α_2	–	5.787***
		(0.953)
One-year monthly trend β	-0.014	0.269
	(0.232)	(0.320)
Three-year minus one-year trend β_1	1.042***	0.707**
	(0.209)	(0.224)
Five-year minus three-year trend β_2	–	-0.042
		(0.158)
Observations	29,712	29,511
Respondents	2,870	2,237

Note: The table reports the results of the estimation of model B.1 where the dependent variable is defined as $D_{iht} = 100 \times \mathbf{1}\{IE_{iht} < 0\}$. The model is estimated with data from September 2021 to August 2022 in the first column and from November 2021 to August 2022 (the period over which we have monthly data for long-term IE) in the second column. Standard errors, in parentheses, are two-way clustered by respondent and survey month. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The first column in Table B.2 shows that the share of respondents with short-term deflation expectations remained stable between September 2021 and August 2022, while the share with medium-term deflation expectations was initially significantly higher, and then increased significantly. The results in the second column confirm this result and also show that the share of respondents with long-term deflation expectations was initially 5.8 pp higher than the corresponding medium-term share, with no significant subsequent change in this difference. These results therefore confirm statistically the increase in deflation expectations at the medium- and long-term horizons, thereby supporting Stylized Fact 3.

C A Model of Adaptive Learning

We consider a standard adaptive-learning model in which a representative agent estimates an $AR(3)$ process for inflation and updates its coefficients by least squares as new data become available. The model has been widely used to study IE formation under imperfect information and nests rational expectations as a limiting case (Orphanides and Williams (2004, 2005)).

The model operates at a monthly frequency. When forming expectations in month t, the agent observes inflation through t and forecasts inflation over successive three-month periods. These forecasts are then used to construct one-, three-, and five-year-ahead IE. For example, the one-year-ahead forecast is the average of the forecasts for the four successive three-month periods covering the next 12 months.

Each month, the agent estimates the following equation using the observations available at that date:

$$\pi_{s+3} = c_{0,t} + c_{1,t}\pi_s + c_{2,t}\pi_{s-3} + c_{3,t}\pi_{s-6} + \nu_{s+3}, \tag{C.2}$$

where s indexes the historical observations used to estimate the model and π_s denotes the annualized percentage change in headline CPI over the three-month period ending in month s. The coefficients are indexed by t because they are re-estimated each month as new observations become available.

Define the 4×1 regressor vector $X_s = (1, \pi_s, \pi_{s-3}, \pi_{s-6})'$ and the coefficient vector $c_t = (c_{0,t}, c_{1,t}, c_{2,t}, c_{3,t})'$. Using data available through month t, the coefficient estimates can be updated recursively as follows:

$$c_t = c_{t-1} + \kappa_t R_t^{-1} X_{t-3} \left(\pi_t - X_{t-3}' c_{t-1}\right), \tag{C.3}$$

$$R_t = R_{t-1} + \kappa_t \left(X_{t-3} X_{t-3}' - R_{t-1}\right). \tag{C.4}$$

where κ_t is the gain parameter. Under decreasing-gain least-squares learning with infinite memory, $\kappa_t = 1/t$, so the gain converges to zero as the sample expands. To allow for perpetual learning, we instead use a constant gain, $\kappa > 0$, which gives greater weight to recent observations. We set $\kappa = 0.02$ to match the magnitude of the observed movements in short-term IE.[16]

[16] See also Orphanides and Williams (2005, p. 1939).

D Questions from the May 2022 SCE Special Survey

D.1 Introduction to Probabilistic Questions

In some of the following questions, we will ask you to think about the percent chance of something happening in the future. Your answers can range from 0 to 100, where 0 means there is absolutely no chance, and 100 means that it is absolutely certain.

For example, numbers like:

- 2 and 5 percent may indicate "almost no chance"
- 18 percent or so may mean "not much chance"
- 47 or 52 percent chance may be a "pretty even chance"
- 83 percent or so may mean a "very good chance"
- 95 or 98 percent chance may be "almost certain"

Question For example, what do you think is the percent chance that over the next 12 months you will move to a different primary residence (that is, the place where you usually live)?

[ruler and slider to select a probability, or box to input a number]

D.2 Inflation Expectations

One-Year-Ahead, Point Forecast
Part 1
Over the next 12 months, do you think that there will be inflation or deflation? (Note: deflation is the opposite of inflation)

- ○ Inflation
- ○ Deflation (the opposite of inflation)

Part 2
What do you expect the rate of ["inflation" (if Part 1==inflation) / "deflation" (if Part 1==deflation)] to be **over the next 12 months**? Please give your best guess.

Over the next 12 months, I expect the rate of [inflation/deflation] to be _____%

One-Year-Ahead, Density Forecast
Now, we would like you to think about the different things that may happen to inflation **over the next 12 months**. In your view, what would you say is the percent chance that, over the next 12 months...

the rate of inflation will be 12% or higher	_____	percent chance
the rate of inflation will be between 8% and 11.99%	_____	percent chance
the rate of inflation will be between 4% and 7.99%	_____	percent chance
the rate of inflation will be between 2% and 3.99%	_____	percent chance
the rate of inflation will be between 0.01% and 1.99%	_____	percent chance
the rate of deflation (opposite of inflation) will be between 0% and 1.99%	_____	percent chance
the rate of deflation (opposite of inflation) will be between 2% and 3.99%	_____	percent chance
the rate of deflation (opposite of inflation) will be between 4% and 7.99%	_____	percent chance
the rate of deflation (opposite of inflation) will be between 8% and 11.99%	_____	percent chance
the rate of deflation (opposite of inflation) will be 12% or higher	_____	percent chance

Three-Year-Ahead, Point Forecast

Part 1

Now we would like you to think about inflation further into the future. **Over the next 12-month period between May 2024 and May 2025**, do you think that there will be inflation or deflation?

- ○ Inflation
- ○ Deflation (the opposite of inflation)

Part 2

What do you expect the rate of ["inflation" (if Part 1==inflation) / "deflation" (if Part 1==deflation)] to be over that period? Please give your best guess.

Over the 12-month period between May 2024 and May 2025, I expect the rate of [inflation/deflation] to be _____%

Three-Year-Ahead, Density Forecast

And in your view, what would you say is the percent chance that **over the 12-month period between May 2024 and May 2025**...

the rate of inflation will be 12% or higher	_____	percent chance
the rate of inflation will be between 8% and 11.99%	_____	percent chance
the rate of inflation will be between 4% and 7.99%	_____	percent chance
the rate of inflation will be between 2% and 3.99%	_____	percent chance
the rate of inflation will be between 0.01% and 1.99%	_____	percent chance
the rate of deflation (opposite of inflation) will be between 0% and 1.99%	_____	percent chance
the rate of deflation (opposite of inflation) will be between 2% and 3.99%	_____	percent chance
the rate of deflation (opposite of inflation) will be between 4% and 7.99%	_____	percent chance
the rate of deflation (opposite of inflation) will be between 8% and 11.99%	_____	percent chance
the rate of deflation (opposite of inflation) will be 12% or higher	_____	percent chance

Five-Year-Ahead, Point Forecast

Now we would like you to think about inflation even further into the future.

Part 1

Over the 12-month period between May 2026 and May 2027, do you think that there will be inflation or deflation?

- ○ Inflation
- ○ Deflation (the opposite of inflation)

Part 2

What do you expect the rate of ["inflation" (if Part 1==inflation) / "deflation" (if Part 1==deflation)] to be over that period? Please give your best guess.

Over the 12-month period between May 2026 and May 2027, I expect the rate of [inflation/deflation] to be _____%

Five-Year-Ahead, Density Forecast

And in your view, what would you say is the percent chance that **over the 12-month period between May 2026 and May 2027**...

the rate of inflation will be 12% or higher	_____	percent chance
the rate of inflation will be between 8% and 11.99%	_____	percent chance
the rate of inflation will be between 4% and 7.99%	_____	percent chance
the rate of inflation will be between 2% and 3.99%	_____	percent chance
the rate of inflation will be between 0.01% and 1.99%	_____	percent chance
the rate of deflation (opposite of inflation) will be between 0% and 1.99%	_____	percent chance
the rate of deflation (opposite of inflation) will be between 2% and 3.99%	_____	percent chance
the rate of deflation (opposite of inflation) will be between 4% and 7.99%	_____	percent chance
the rate of deflation (opposite of inflation) will be between 8% and 11.99%	_____	percent chance
the rate of deflation (opposite of inflation) will be 12% or higher	_____	percent chance

D.3 Confusion About Deflation

Imagine that all prices increased by 9% **last year**, and imagine that all prices increase by 5% **this year**. In that case, would you say that there is inflation or deflation **this year**?

- ○ Inflation
- ○ Deflation (the opposite of inflation)

D.4 Price Reversion

To what extent do you agree with the following statements:

Gasoline
In general, when **the price of a gallon of gas** rises sharply over a short period of time, it usually comes back down...

over the **next 12 months**...

Totally Disagree						Totally Agree
1	2	3	4	5	6	7

over the **next 2 to 3 years**...

Totally Disagree						Totally Agree
1	2	3	4	5	6	7

Food
In general, when **food prices** rise sharply over a short period of time, it usually comes back down...

over the **next 12 months**...

Totally Disagree						Totally Agree
1	2	3	4	5	6	7

over the **next 2 to 3 years**...

Totally Disagree						Totally Agree
1	2	3	4	5	6	7

Durable Goods
In general, when **durable goods prices** rise sharply over a short period of time, it usually comes back down...

over the **next 12 months**...

Totally Disagree						Totally Agree
1	2	3	4	5	6	7

over the **next 2 to 3 years**...

Totally Disagree						Totally Agree
1	2	3	4	5	6	7

Home Prices
In general, when **home prices** rise sharply over a short period of time, it usually comes back down...

over the **next 12 months**...

Totally Disagree						Totally Agree
1	2	3	4	5	6	7

over the **next 2 to 3 years**...

Totally Disagree						Totally Agree
1	2	3	4	5	6	7

D.5 Economic Expectations

Recession Probability
What do you think is the percent chance that **12 months from now**, the U.S. economy will be in a **recession**?
[ruler and slider to select a probability, or box to input a number]

And what about three years from now, what do you think is the percent chance that **three years from now**, the U.S. economy will be in a **recession**?
[ruler and slider to select a probability, or box to input a number]

Now think even further into future, what do you think is the percent chance that **five years from now**, the U.S. economy will be in a **recession**?

[ruler and slider to select a probability, or box to input a number]

Unemployment

What do you think is the percent chance that **12 months from now** the unemployment rate in the U.S. will be higher than it is now?
[ruler and slider to select a probability, or box to input a number]

And what about three years from now, What do you think is the percent chance that **3 years from now**, that is in **May 2025**, the unemployment rate in the U.S. will be higher than it is now?
[ruler and slider to select a probability, or box to input a number]

Now think even further into future, what do you think is the percent chance that **five years from now**, that is in **May 2028**, the unemployment rate in the U.S. will be higher than it is now? (*this question was asked only in the 2023 special survey*)
[ruler and slider to select a probability, or box to input a number]

Business Conditions

Now turning to **business conditions** in the country as a whole, do you expect that **12 months from now**, business conditions will be better, or worse than they are at present, or just about the same? (*this question was asked only in the 2023 special survey*)

Much Worse	Somewhat Worse	About the Same	Somewhat Better	Much Better
O	O	O	O	O

And what about three years from now, do you expect that **three years from now**, business conditions will be better, or worse than they are at present, or just about the same?

Much Worse	Somewhat Worse	About the Same	Somewhat Better	Much Better
O	O	O	O	O

Now think even further into future, do you expect **five years from now**, that is in **May 2028**, business conditions will be better, or worse than they are at present, or just about the same? (*this question was asked only in the 2023 special survey*)

Much Worse	Somewhat Worse	About the Same	Somewhat Better	Much Better
O	O	O	O	O

E Additional questions in the June 2023 SCE Special Survey

E.1 Drivers of Changes in Inflation Perceptions/Expectations

Earlier you said that you think the rate of [inflation/deflation] was [Y]% this year **(between June 2022 and June 2023)** and that you expect the rate of [inflation/deflation] to be [Z]% next year **(between June 2023 and June 2024)**.

Which factors do you think will contribute to [this increase in the rate of inflation / inflation remaining unchanged / this decrease in the rate of inflation]?[17]

The order of the factors was randomized across respondents. The factors were listed in a table, with a 1-5 Likert scale next to each factor.

Not at all important				Very important
1	2	3	4	5

1. Government spending
2. Bad government policies
3. Fiscal stimulus during Covid
4. Federal Reserve policies (interest rates and money supply)
5. Product shortages and supply chain issues
6. Improvement in supply chain issues
7. The war in Ukraine
8. Covid-related shutdowns
9. What goes up must come down
10. Worker shortages and staffing problems
11. Improved labor market conditions
12. Workers demanding higher wages
13. Strong demand for goods and services
14. Weaker demand for goods and services
15. Companies making record profits or price gouging
16. International geopolitical tensions

[17] Depending on whether $Z > Y$, $Z = Y$ or $Z < Y$. The other questions in the June 2023 special survey are the same as in the May 2022 special survey, but with dates shifted accordingly for questions involving three- or five-year-ahead horizons.