

DSSR

Discussion Paper No. 155

**Affective Sensitivity and Inflation Expectations
across the Income Distribution**

Shahdah Hanif and Wali Ullah

October, 2026

**Data Science and Service Research
Discussion Paper**

Center for Data Science and Service Research
Graduate School of Economic and Management
Tohoku University
27-1 Kawauchi, Aobaku
Sendai 980-8576, JAPAN

Affective Sensitivity and Inflation Expectations across the Income Distribution

Shahdah Hanif Wali Ullah

Working Paper · October 2026

Preliminary draft. Comments are welcome.

SHAHDAH HANIF is a PhD candidate in the Department of Economics, Institute of Business Administration (IBA), Karachi, Pakistan (E-mail: shanif@iba.edu.pk). WALI ULLAH is a faculty member in the Department of Economics, Institute of Business Administration (IBA), Karachi, Pakistan.

Corresponding author: Shahdah Hanif, shanif@iba.edu.pk.

Acknowledgments: We thank the University of Michigan Survey Research Center for making the Surveys of Consumers microdata publicly available (<https://data.sca.isr.umich.edu/>).

Affective Sensitivity and Inflation Expectations across the Income Distribution

Preliminary draft. Comments are welcome.

Abstract

Households do not form inflation expectations with information alone; emotions matter too. This paper introduces an affective channel into the limited-attention model of expectation formation. A household’s economic mood—the emotional component of consumer sentiment that macroeconomic fundamentals cannot explain—shapes how firmly it holds on to its past inflation beliefs. Attention to new information works as in the benchmark. We estimate the model on Michigan Survey microdata from 1978 to 2025. A more positive mood weakens belief persistence in both income groups. Low-income households, however, are about two and a half times as sensitive as high-income households. The affective channel substantially improves the fit of the model and lowers long-run expected inflation below the limited-attention benchmark. The results are robust across estimators, measures of mood and demographic groups, and in an extension where mood also shapes how current inflation is read. For monetary policy, the households most exposed to inflation are also those whose expectations are most sensitive to their emotional state.

Keywords: inflation expectations; affect; non-fundamental sentiment; consumer sentiment; limited attention; belief persistence

JEL Classification: D84, D91, E31

1 Introduction

Household inflation expectations occupy a central place in modern monetary economics. In particular, they govern intertemporal consumption and saving decisions, enter wage negotiations and price setting, and through these channels shape the inflation that central banks seek to stabilize (Woodford 2003; Coibion et al. 2018). The effectiveness of monetary policy therefore depends on how these expectations are formed, since a central bank can anchor them only to the extent that it understands the process that generates them. For this reason, the formation of expectations, rather than their assumed rationality, has become an active field of applied macroeconomics (D’Acunto et al. 2024).

Survey evidence is difficult to reconcile with the rational-expectations benchmark. Under rational expectations, forecast errors are unpredictable given the information available when

the forecast is made (Muth 1961). Household survey expectations, however, violate this condition: they adjust gradually to news, extrapolate recent inflation, and differ systematically and persistently across households (Mankiw et al. 2004; Pfajfar and Santoro 2008; Coibion and Gorodnichenko 2015). Among these differences, moreover, the income gradient is one of the most consistently documented. Specifically, lower-income households report higher expected inflation, make larger forecast errors, and revise their expectations less after disinflationary news (Bruine de Bruin et al. 2010; Malmendier and Nagel 2016; Angelico and Di Giacomo 2026).

The gradient is consequential because the costs of inflation are unevenly distributed. In particular, frequently purchased necessities consume a larger share of the budgets of lower-income households, and these households have fewer means of protecting their real income when prices rise (Cavallo et al. 2017). Beyond these material differences, they are less informed about inflation, more concerned about it and more inclined to extrapolate it, and they experience it not only as a loss of purchasing power but also as a source of stress, anxiety and financial uncertainty (Pfajfar and Santoro 2008; Stantcheva 2024). Taken together, this evidence points to two distinct channels through which expectations differ between low- and high-income households: a *cognitive* channel, which determines what households know about inflation (Sims 2003; Mankiw and Reis 2002; Carroll 2003; Coibion and Gorodnichenko 2015), and an *affective* channel, which determines how households evaluate economic conditions emotionally. The cognitive channel has been studied extensively, whereas the affective channel has received comparatively little attention. In this regard, recent studies show that sentiment and inflation expectations co-move within individuals over time (Li and Sinha 2025) and that emotional states influence which personal experiences are retrieved when beliefs are formed (Bordalo et al. 2026). To the best of our knowledge, however, no study assigns affect a structural role in the updating rule through which households form their forecasts. This gap constitutes the point of departure of the present paper.

Formalizing the affective channel requires a distinction between emotions, feelings and moods. Emotions are short-lived reactions to specific events, such as the anxiety that accompanies a sharp increase in food or fuel prices. Feelings, in turn, are the conscious experience of these reactions and shape how individuals evaluate their circumstances (Damasio 1994; Loewenstein et al. 2001). Moods, by contrast, differ from emotions in that they are diffuse, lack a specific object and persist over longer periods (Frijda 1993). Building on this distinction, Parkinson et al. (1996) show that a sequence of minor emotional experiences, none of which is significant in isolation, can accumulate into a relatively persistent mood that conditions the evaluation of subsequent events.¹ Following this literature, we refer to this

¹Affective states of this kind systematically influence judgment and information processing (Schwarz and

persistent mood as the household’s *accumulated affective state*. In the economic domain, it corresponds to what Katona (1951, 1975) described as the general economic mood of consumers, which survey measures of consumer sentiment were designed to capture (Curtin 2022). Consumer sentiment, however, measures this state only partially. This is because assessments of business conditions and personal finances reflect both households’ knowledge of the economy and their affective evaluation of it, and only the latter constitutes the affective state. This study therefore decomposes the Index of Consumer Sentiment into a component explained by macroeconomic fundamentals and a non-fundamental component, and uses the latter, households’ economic mood, as the measure of the affective state.

The central argument of the paper is that affect enters the updating process at a specific point. Because inflation expectations are formed dynamically, with each forecast building on the previous one, households must recall their previous belief before combining it with new information. Importantly, the affective state in which stored information is recalled shapes how that information is evaluated (Bower 1981), whereas directly observed data are less susceptible to affective influence (Schwarz and Clore 1983; Forgas 1995). We therefore model affect as conditioning the recall of the previous belief, while current inflation enters the update as in the limited-attention benchmark. As a result, expectations differ across income groups for two reasons: households receive signals about inflation of different precision, and they carry forward their previous beliefs to different degrees depending on their affective state and their sensitivity to it.

These considerations motivate two research questions. First, *does the accumulated affective state of households influence the formation of their inflation expectations?* Second, *does this influence differ between low- and high-income households?*

Addressing these questions, in turn, requires two elements: a measure of affect that is separated from economic information, and a structural model of expectation formation in which affect has a well-defined role. The analysis proceeds in three steps.

First, the paper develops a theoretical framework that extends the limited-attention model of Pfäuti (2023) and Shabalina and Tzaawa-Krenzler (2025), in which households combine a prior belief with a noisy signal about inflation, by allowing the household’s accumulated affective state to condition the recall of the previous belief.² In this framework, the strength of this effect is governed by an income-group-specific affective-sensitivity pa-

Clore 1983; Forgas 1995), and emotions play a central role in decision-making (Damasio 1994; Loewenstein 2000).

²In Pfäuti (2023), households share a common rational prior, and heterogeneity arises only through attention to the inflation signal; Shabalina and Tzaawa-Krenzler (2025) allow attention to differ across income groups. In both frameworks, the prior itself is unaffected by household characteristics. The present framework relaxes this assumption.

parameter. At the same time, the weight on new information remains unchanged, so that the affective channel complements rather than replaces the cognitive channel. Furthermore, because the model reduces to the benchmark when affective sensitivity is zero, the estimate of this parameter provides a direct test of the channel.

Second, the study measures the affective state and estimates the model on monthly Michigan microdata, comparing households at the bottom and top of the income distribution. Specifically, the affective state is measured by non-fundamental sentiment, defined as the part of consumer sentiment not explained by current macroeconomic fundamentals and, in a stricter measure, by their values over the following twelve months (Baker and Wurgler 2006; Lemmon and Portniaguina 2006; Barsky and Sims 2012). The maximum likelihood estimates show that affective sensitivity is negative in both groups and considerably larger in absolute value for low-income households. Moreover, the difference in belief persistence widens when both groups are evaluated at the same level of affect, which indicates that it reflects sensitivity to mood rather than the level of mood. In addition, excluding the affective channel significantly worsens the fit of the model, and the income gradient persists in an extension in which the same sensitivity also scales the weight on current inflation.

Third, the paper examines the robustness of these findings. Notably, the estimates are nearly identical under nonlinear GLS and Bayesian estimation, and they remain significant under autocorrelation-robust inference, a bootstrap that accounts for the estimated decomposition, year fixed effects and lagged sentiment. Similarly, they hold within demographic subgroups. Finally, when the unadjusted sentiment index replaces non-fundamental sentiment, the sensitivities are slightly larger and the ranking of the two groups is unchanged.

This research contributes to three strands of literature. First, it adds to the literature on heterogeneous household expectations an affective mechanism that operates alongside limited attention and helps explain why low-income households update their expectations differently. Second, it extends the literature on sentiment and expectations in two respects. The affective state is measured by the component of consumer sentiment that is not explained by current or future economic conditions, rather than by the sentiment index itself. In addition, affect is treated as a structural parameter of the updating rule, estimated jointly with the attention parameter, rather than as a correlate of expectations. Third, the study contributes to the behavioral literature on belief formation by showing that affect governs a specific margin of updating, namely the persistence of previously formed beliefs, which is distinct from attention to new information.

The remainder of the paper is organized as follows. Section 2 reviews the cognitive and affective channels and the debate on the content of consumer sentiment. Section 3 develops the theoretical framework and derives the propositions. Section 4 describes the data and the

measurement of the affective state, and Section 5 the estimation strategy. Section 6 presents the results and robustness checks. Section 7 extends the model to a special case in which affect acts on both the previous belief and current inflation. Section 8 concludes.

2 Related Literature

Heterogeneity in household inflation expectations across demographic and socioeconomic groups is well documented and is not accounted for by rational-expectations models (Bryan and Venkatu 2001; Mankiw et al. 2004; Souleles 2004; Pfajfar and Santoro 2008; Coibion and Gorodnichenko 2015; Binder 2018; D’Acunto et al. 2022). Lower-income households in particular report higher and less accurate expectations (Bruine de Bruin et al. 2010; Doh et al. 2024; Angelico and Di Giacomo 2026). Explanations fall into a cognitive channel, which attributes the heterogeneity to differences in information, attention, experience and memory, and an affective channel, which attributes it to differences in households’ economic mood. This section reviews both, together with the debate on what consumer sentiment measures, which determines how the affective channel can be identified.

2.1 The cognitive channel

The cognitive channel has dominated the literature. In the epidemiological model of Carroll (2003), information about inflation diffuses slowly from experts to households. Coibion and Gorodnichenko (2015) provide evidence consistent with sticky information (Mankiw and Reis 2002) and rational inattention (Sims 2003). More recent work shows that attention is both heterogeneous and state-dependent: it rises during inflationary episodes (Pfäuti 2023) and differs across individuals and income groups (Link et al. 2023; Shabalina and Tzaawa-Krenzler 2025).

A second strand emphasizes experience, memory and bias. Households place greater weight on the inflation they have personally experienced (Malmendier and Nagel 2011, 2016), rely heavily on the prices they observe in their regular purchases (Cavallo et al. 2017; D’Acunto et al. 2021), and draw on their own consumption experience (Kuchler and Zafar 2019; Angelico and Di Giacomo 2026). Beliefs also reflect bounded rationality, heuristics, salience and selective recall (Simon 1955; Mullainathan 2002; Enke and Zimmermann 2019; Bordalo et al. 2020, 2022; Andre et al. 2022; Afrouzi et al. 2023). This channel is retained in full; in the present framework it is captured by the weight that households place on new information.

2.2 Affect, sentiment and expectation formation

A growing literature argues that household expectations are also shaped by affective evaluations of the economy. Consumer sentiment, the most widely used, although partial, measure of such evaluations, carries information about expectation formation beyond conventional fundamentals (Ehrmann et al. 2017; Kamdar 2019; Curtin 2022; Li and Sinha 2023, 2025). Inflation itself produces heterogeneous affective responses: it is associated with perceived losses of purchasing power, financial stress, anxiety and concerns about fairness, and these responses vary across income groups (Stantcheva 2024). Shifts in sentiment during periods of high uncertainty are also closely associated with heterogeneity in expectations (Binder 2020).

This literature generally treats sentiment as an empirical correlate of expectations, or as a determinant of what households recall, rather than as part of the mechanism through which beliefs are updated. It also uses the sentiment index as a whole, without separating the affective component from the economic information that the index contains. No study has yet examined how a persistent affective state shapes the previous belief a household carries into the updating process; this is the margin the present framework captures, jointly with the cognitive channel.

2.3 Consumer sentiment: information or affect?

The economic content of consumer sentiment has long been debated. In its ordinary meaning, sentiment is a judgment prompted by feeling, an idea colored by emotion; applied to the economy, it describes households' views of future economic developments, which may reflect facts and reasoned arguments but also a mood of optimism or pessimism (Nowzohour and Stracca 2020). The animal-spirits tradition, from Keynes (1936) to Akerlof and Shiller (2009), treats these moods as psychological waves that may or may not become self-fulfilling, whereas the news view treats sentiment as imperfect information about future conditions (Barsky and Sims 2012; Blanchard et al. 2013). The *informational* view holds that sentiment mainly summarizes news about current and future economic conditions. Ludvigson (2004) shows that much of its predictive power for household spending is absorbed by other economic indicators, and Barsky and Sims (2012) conclude from a structural model that innovations in confidence predominantly reflect news about future fundamentals rather than animal spirits.

The *behavioral* or affective view originates with Katona (1951, 1975), who designed the Michigan index on the premise that consumers' attitudes affect behavior independently of income and information. Consistent with this view, sentiment predicts household spending and output beyond what fundamentals predict (Carroll et al. 1994; Matsusaka and Sbordone

1995), and in the Michigan microdata household forecast errors are systematic while sentiment continues to predict consumption (Souleles 2004). Exogenous declines in confidence that carry no economic news also reduce consumption and output (Lagerborg et al. 2023). Sentiment is, moreover, closely related to inflation expectations: pessimistic households report higher and more biased expectations (Ehrmann et al. 2017), and optimistic households expect lower inflation (Kamdar 2019).

A third strand concludes that sentiment contains both components. Curtin (2019, 2022) describes the Michigan index as combining information about economic conditions with affective evaluations formed through experience, Nowzohour and Stracca (2020) conclude that confidence affects economic activity beyond the information it contains, and even Barsky and Sims (2012) find a non-zero role for animal spirits. Nowzohour and Stracca (2020) also caution that survey sentiment may reflect news about future fundamentals rather than mood, so the two must be separated before sentiment is read as affect. The present paper adopts this view and implements it empirically: the component of sentiment explained by fundamentals is removed before estimation rather than controlled for afterwards, so that the estimated sensitivity refers to affect alone.

3 Theoretical Framework

3.1 Motivation: affect and the recall of beliefs

Research in neuroscience, psychology and behavioral economics treats affect and cognition as interacting components of a single information-processing system (Zajonc 1980; Damasio 1994; LeDoux 1996; Pessoa 2008, 2013, 2017).³ Affective states influence probability assessments, risk perception, memory retrieval and judgment (Bower 1981; Loewenstein et al. 2001; Slovic et al. 2007; Kahneman 2011), so that the same information may be evaluated differently depending on the affective state in which it is processed.

Because each forecast builds on the previous one, the point at which affect enters the updating cycle matters. Curtin (2022) argues that automatic evaluations derived from past experience provide the priors through which individuals update their expectations, and mood-congruent recall implies that the same stored belief is evaluated differently in different affective states (Bower 1981). This study therefore introduces the accumulated affective state at the point where the previous belief is recalled, and leaves the processing of the new signal to the cognitive channel.

³Pessoa (2008) shows that emotionally relevant information is evaluated through interacting subcortical and cortical networks, often before deliberate reasoning is complete.

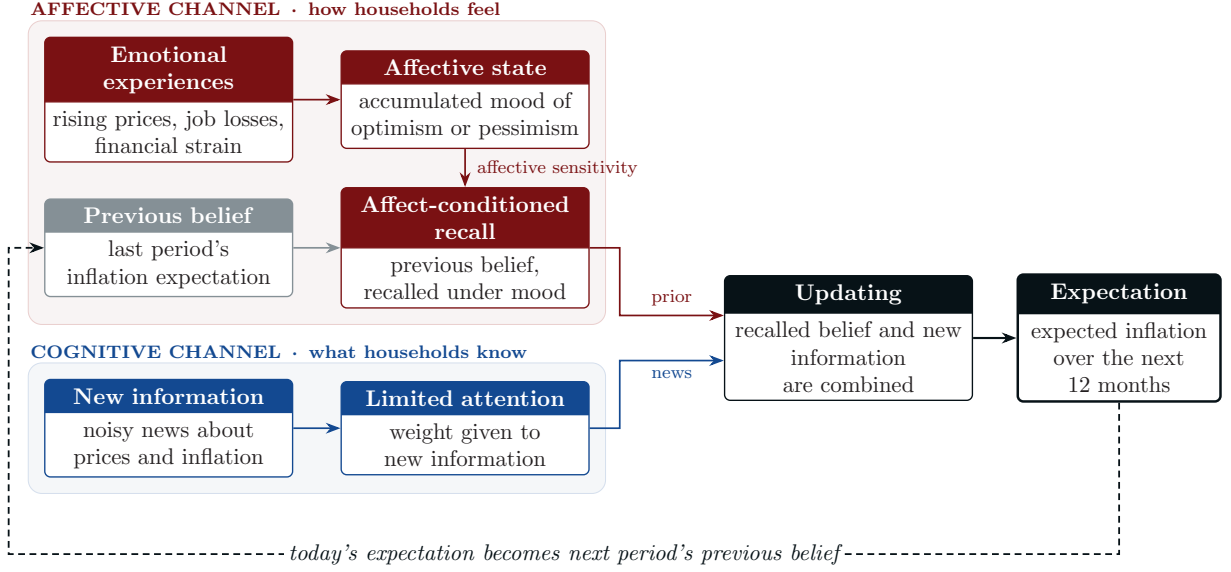


Figure 1: Two channels of expectation formation

Notes: Inflation expectations are formed through two channels that meet when beliefs are updated. In the affective channel (top), repeated emotional experiences accumulate into an affective state, a persistent mood of optimism or pessimism, which conditions how the previous belief is recalled and therefore how much of it is carried forward. In the cognitive channel (bottom), households observe noisy information about inflation and, because attention is limited, give it only partial weight. The updated expectation becomes the previous belief of the next period (dashed line). The corresponding equations are derived in Sections 3.2–3.4.

Three considerations favor this placement. First, the previous belief is an internal, reconstructed quantity, whereas the current price signal is an external observation; memory for such reconstructed beliefs is precisely where mood-congruent processing operates (Bower 1981; Forgas 1995), while directly observed information leaves less room for feelings to shape the judgment (Schwarz and Clore 1983). Second, the placement keeps the two channels separate: attention, γ_j , alone governs how much new information is absorbed, and affect, ψ_j , alone governs how much of the past is carried forward, so that the model distinguishes what households know from how they feel and nests the limited-attention benchmark through a single parameter. Third, it targets the empirical regularity the benchmark cannot explain: given the high persistence of inflation, household beliefs are considerably less persistent than limited attention alone implies, and an affective channel that operates on the persistence of beliefs addresses this regularity directly. Section 7 shows that the central findings do not depend on this placement.

Expectations are therefore the joint outcome of two channels (Figure 1): a previous belief recalled under the influence of the affective state through ψ_j , and a new signal weighted by the attention parameter γ_j as in the benchmark model.

3.2 The benchmark: limited attention

The benchmark limited-attention model treats expectation formation as a signal-extraction problem in which households combine a prior belief with a noisy signal about inflation, weighting the signal by the Kalman gain γ_j (Sims 2003; Coibion and Gorodnichenko 2015; Pfäuti 2023; Shabalina and Tzaawa-Krenzler 2025). This structure is retained, and the recall of the previous belief is conditioned on the household’s accumulated affective state.

Assumption 1 (Perceived law of motion). Households perceive inflation as an AR(1) process,

$$\pi_t = \rho \pi_{t-1} + \xi_t, \quad \rho \in (-1, 1), \quad \xi_t \sim \text{i.i.d. } N(0, \sigma_\xi^2). \quad (1)$$

The parameter ρ measures inflation persistence and ξ_t is an unpredictable shock.⁴

Assumption 2 (Noisy signals). Each household i in income group j observes a noisy signal of current inflation,

$$s_{i,t} = \pi_t + \varepsilon_{i,t}, \quad \varepsilon_{i,t} \sim \text{i.i.d. } N(0, \sigma_{\varepsilon,j}^2), \quad (2)$$

where the noise variance may differ across income groups.

The signal represents information obtained from observed prices, media coverage and social interaction. Differences in its precision across groups generate differences in the Kalman gain, the source of heterogeneity in the benchmark model.⁵

3.3 The affective state and the affect-conditioned recall

Definition 1 (Affective state). The affective state $\phi_{i,t}$ of household i at time t is its economic mood: a latent and persistent emotional state of optimism or pessimism about economic conditions, built up from repeated emotional experiences of inflation and the broader economy, and distinct from the household’s information about those conditions. Higher values of $\phi_{i,t}$ indicate greater optimism.

At the end of period $t - 1$ the household holds a forecast of current inflation, $\mathbb{E}_{i,t-1}(\pi_t) = \rho \mathbb{E}_{i,t-1}(\pi_{t-1})$, obtained by projecting its updated belief with the perceived law of motion. This is the belief it reports in the survey of period $t - 1$.

⁴A perceived autoregressive law of motion is the usual starting point in models of learning and expectation formation (Evans and Honkapohja 2001; Pfäuti 2023; Shabalina and Tzaawa-Krenzler 2025). Households need not know ρ exactly; in estimation, ρ is set equal to the persistence of realized inflation (Section 5.1).

⁵In the steady state of the Kalman filter, $\gamma_j = \Sigma_j / (\Sigma_j + \sigma_{\varepsilon,j}^2)$, where Σ_j is the variance of the prior; a less precise signal implies a smaller gain (Sims 2003; Coibion and Gorodnichenko 2015).

Assumption 3 (Affect-conditioned recall). At date t , before observing the new signal, household i in group j recalls its previous forecast under its current affective state,

$$\tilde{\mathbb{E}}_{i,t-1}(\pi_t) = (1 + \psi_j \phi_{i,t}) \mathbb{E}_{i,t-1}(\pi_t), \quad (3)$$

where ψ_j is the affective-sensitivity parameter of group j .

The *affective multiplier* $1 + \psi_j \phi_{i,t}$ scales the share of the previous belief that enters the update, and the recalled belief reduces to the stored forecast when $\psi_j = 0$. Because this modification occurs before the signal is observed and leaves the signal itself untouched, it is distinct from a change in attention, which remains governed by γ_j .⁶ The timing follows from the cycle of the Kalman filter: the recall takes place at date t , so the relevant affective state is the one prevailing at t , whereas the affective state of earlier periods is already embedded in the previous forecast $\mathbb{E}_{i,t-1}(\pi_t)$.

3.4 Updating and the structural equation

After recalling its previous belief, the household observes $s_{i,t}$ and updates in the usual Kalman way,

$$\mathbb{E}_{i,t}(\pi_t) = \tilde{\mathbb{E}}_{i,t-1}(\pi_t) + \gamma_j [s_{i,t} - \tilde{\mathbb{E}}_{i,t-1}(\pi_t)], \quad (4)$$

where $s_{i,t} - \tilde{\mathbb{E}}_{i,t-1}(\pi_t)$ is the forecast surprise and $\gamma_j \in (0, 1)$ is the weight assigned to it (the derivation is given in Appendix A).⁷ Substituting (2) and (3),

$$\mathbb{E}_{i,t}(\pi_t) = (1 - \gamma_j)(1 + \psi_j \phi_{i,t}) \mathbb{E}_{i,t-1}(\pi_t) + \gamma_j \pi_t + \gamma_j \varepsilon_{i,t}. \quad (5)$$

Forecasting one period ahead with the perceived law of motion, $\mathbb{E}_{i,t}(\pi_{t+1}) = \rho \mathbb{E}_{i,t}(\pi_t)$, yields

$$\mathbb{E}_{i,t}(\pi_{t+1}) = \rho(1 - \gamma_j)(1 + \psi_j \phi_{i,t}) \mathbb{E}_{i,t-1}(\pi_t) + \rho \gamma_j \pi_t + u_{i,t+1}, \quad (6)$$

where $u_{i,t+1}$ collects the signal noise and the remaining forecast error. The affective multiplier scales only the *persistence channel* (the previous expectation); the *information channel* (current inflation) is governed by attention alone.

⁶Affect enters multiplicatively so that it acts on the persistence rather than the level of beliefs, consistent with evidence that affective states shape how existing information is evaluated rather than supplying new information (Loewenstein et al. 2001; Slovic et al. 2007).

⁷This is the standard Kalman updating rule (Kalman 1960), which combines a prior belief and a noisy signal optimally when both are normally distributed. It underlies the noisy-information models of expectation formation tested by Coibion and Gorodnichenko (2015).

3.5 Effective weights

Definition 2 (Effective weights). At an affective state ϕ , the effective weight of group j on its previous belief (*effective belief persistence*) and on current inflation are

$$P_j(\phi) \equiv \rho(1 - \gamma_j)(1 + \psi_j\phi), \quad I_j \equiv \rho\gamma_j. \quad (7)$$

Affect therefore changes the relative weight of the two inputs. The share of current inflation in the total weight, $I_j/[P_j(\phi) + I_j]$, rises when the multiplier falls, so that a household whose affective state lowers the persistence of its previous belief relies relatively more on new information.

Lemma 1 (Three regimes of updating). *The total weight $P_j(\phi) + I_j = \rho[1 + (1 - \gamma_j)\psi_j\phi]$ is equal to, below, or above the benchmark weight ρ according as $\psi_j = 0$, $\psi_j < 0$, or $\psi_j > 0$ (for $\phi > 0$).*

Proof. Add the two expressions in (7): $\rho(1 - \gamma_j)(1 + \psi_j\phi) + \rho\gamma_j = \rho[1 + (1 - \gamma_j)\psi_j\phi]$. Since $\rho > 0$, $1 - \gamma_j > 0$ and $\phi > 0$, the sign of the deviation from ρ is the sign of ψ_j . $\square$

With $\psi_j < 0$, affect *attenuates* the persistence of beliefs; with $\psi_j > 0$, it *amplifies* it. The sign of ψ_j is not restricted and is determined empirically.

3.6 Propositions

Proposition 1 (Affective attenuation). *If $\rho > 0$, $0 < \gamma_j < 1$ and $\psi_j < 0$, a more favorable affective state lowers effective belief persistence, leaves the weight on current inflation unchanged, and raises the relative weight on current inflation.*

Proof. From (7), $\partial P_j/\partial \phi = \rho(1 - \gamma_j)\psi_j < 0$ and $\partial I_j/\partial \phi = 0$. The relative weight $I_j/(P_j + I_j)$ is decreasing in P_j , so it rises with ϕ . $\square$

The proposition concerns the responsiveness of the forecast, not its level. A negative sign is expected if a favorable affective state reduces the perceived salience of a previously held belief, so that it is discounted rather than reinforced when carried forward (Weinstein 1980; Sharot 2011). Three strands of research support this mechanism. Studies of mood and memory show that people recall information congruent with their current mood more readily, so that unfavorable information is less accessible in a positive mood (Bower 1981). Induced moods also alter perceived risks in domains unrelated to their source (Johnson and Tversky 1983). In addition, models of anticipatory feelings show that beliefs about future outcomes affect current well-being, which gives individuals an incentive to hold optimistic beliefs about

adverse events (Caplin and Leahy 2001; Brunnermeier and Parker 2005). Applying these findings to the accumulated affective state, we expect that a favorable state shades the recalled belief about inflation downward, whereas the new signal is read as observed.

Proposition 2 (Heterogeneous affective sensitivity). *For two income groups j and k with comparable benchmark parameters, if $|\psi_j| > |\psi_k|$ then the belief persistence of group j responds more strongly to a given change in affect:*

$$\left| \frac{\partial P_j}{\partial \phi} \right| = \rho(1 - \gamma_j)|\psi_j| > \rho(1 - \gamma_k)|\psi_k| = \left| \frac{\partial P_k}{\partial \phi} \right|. \quad (8)$$

Proof. Immediate from $\partial P_j / \partial \phi = \rho(1 - \gamma_j)\psi_j$ when $(1 - \gamma_j)$ and $(1 - \gamma_k)$ are comparable. $\square$

The proposition distinguishes the *sensitivity* to affect, measured by ψ_j , from its *level*. Lower-income households are expected to display a larger $|\psi_j|$ for two reasons. Inflation absorbs a larger share of their budgets, so that price increases weigh more heavily on their economic circumstances, and the cost of acquiring and processing information about inflation is relatively higher for this group, which leads low-income households to rely more on general evaluations of economic conditions in forming their beliefs (Kahneman 2003; D’Acunto et al. 2021; Cavallo et al. 2017). More generally, $|\psi_j|$ measures the extent to which households substitute their feelings for information when forming expectations. Research on feelings as information shows that people use their current feelings as a signal about the object being judged, and rely on them more when information is costly or the judgment is complex (Schwarz and Clore 1983; Schwarz 2012); research on the affect heuristic shows that feelings can replace part of the deliberate processing of information (Finucane et al. 2000; Kahneman 2011). Financial pressure reduces the cognitive resources available for such processing (Mani et al. 2013), and lower financial literacy raises its cost (Lusardi and Mitchell 2014), so that feelings are a relatively cheaper input into the forecasts of low-income households.

Because the change in belief persistence depends on the product $\psi_j\phi$, a group with a less favorable average affective state can nevertheless display the larger change if its sensitivity is sufficiently larger. Remark 1 formalizes this interaction between the level of affect and the sensitivity to it.

Remark 1 (Multidimensional heterogeneity). The difference in effective belief persistence between groups j and k depends jointly on attention, sensitivity and the level of affect, as follows directly from (7):

$$P_j(\phi_{j,t}) - P_k(\phi_{k,t}) = \rho \left[(1 - \gamma_j)(1 + \psi_j\phi_{j,t}) - (1 - \gamma_k)(1 + \psi_k\phi_{k,t}) \right]. \quad (9)$$

Differences in average affective states alone therefore do not determine which group's expectations are more strongly influenced by affect.

Remark 2 (Benchmark recovery). Setting $\psi_j = 0$ in (6), the model reduces to the limited-attention benchmark, with $P_j = \rho(1 - \gamma_j)$, $I_j = \rho\gamma_j$ and

$$\mathbb{E}_{i,t}(\pi_{t+1}) = \rho[(1 - \gamma_j)\mathbb{E}_{i,t-1}(\pi_t) + \gamma_j\pi_t] + u_{i,t+1}. \quad (10)$$

Because the benchmark is nested, the null hypothesis $H_0 : \psi_j = 0$ provides a direct test of whether the affective channel contributes to expectation formation.

The final proposition describes the long-run behavior of expectations. Holding the affective state constant at ϕ and inflation at its mean $\bar{\pi}$, the estimating equation (15) is a first-order difference equation in $\mathbb{E}_{j,t}(\pi_{t+1})$ whose coefficients depend on ψ_j and ϕ only through the multiplier $m_j = 1 + \psi_j\phi$.

Proposition 3 (Long-run expectations). *Let $m_j = 1 + \psi_j\phi$.*

(i) *Stability and level. If $-1 < \psi_j\phi < 1/[\rho(1 - \gamma_j)] - 1$, expectations converge to*

$$\mathbb{E}_j^* = \frac{\alpha_{0j} + \rho\gamma_j\bar{\pi}}{1 - \rho(1 - \gamma_j)m_j}. \quad (11)$$

(ii) *Limits. As $\psi_j\phi \rightarrow 0$, $\mathbb{E}_j^*$ converges to its limited-attention value $(\alpha_{0j} + \rho\gamma_j\bar{\pi})/[1 - \rho(1 - \gamma_j)]$; as $\psi_j\phi \rightarrow -1$, the previous belief receives no weight and $\mathbb{E}_j^* \rightarrow \alpha_{0j} + \rho\gamma_j\bar{\pi}$; as $\psi_j\phi$ approaches the upper bound, which requires $\psi_j > 0$, $\mathbb{E}_j^* \rightarrow \infty$.*

(iii) *Monotonicity and convexity. Within the stable region,*

$$\frac{\partial \mathbb{E}_j^*}{\partial m_j} = \frac{\rho(1 - \gamma_j)(\alpha_{0j} + \rho\gamma_j\bar{\pi})}{[1 - \rho(1 - \gamma_j)m_j]^2} > 0, \quad \frac{\partial^2 \mathbb{E}_j^*}{\partial m_j^2} = \frac{2\rho(1 - \gamma_j)\partial \mathbb{E}_j^*/\partial m_j}{1 - \rho(1 - \gamma_j)m_j} > 0. \quad (12)$$

With $\psi_j < 0$, long-run expected inflation therefore falls as the affective state becomes more favorable and as $|\psi_j|$ rises, and a deterioration in the affective state raises it by more than an equal improvement lowers it.

Proof. (i) The lower bound keeps the weight on the previous belief positive and the upper bound ensures $P_j = \rho(1 - \gamma_j)m_j < 1$; setting $\mathbb{E}_{j,t}(\pi_{t+1}) = \mathbb{E}_{j,t-1}(\pi_t) = \mathbb{E}_j^*$ and $\pi_t = \bar{\pi}$ in (15) and solving gives (11). (ii) Substitute $m_j = 1$, $m_j \rightarrow 0$ and $\rho(1 - \gamma_j)m_j \rightarrow 1$ in (11). (iii) (11) has the form $A/(1 - cm_j)$ with $A = \alpha_{0j} + \rho\gamma_j\bar{\pi} > 0$ and $c = \rho(1 - \gamma_j) > 0$; since $\partial m_j/\partial \phi = \psi_j$ and $\partial m_j/\partial \psi_j = \phi$, the signs follow, and convexity in m_j implies the asymmetry. $\square$

3.7 From households to income groups

The model is estimated at the level of income groups. Define the group affective state as the within-group average, $\phi_{j,t} \equiv N_j^{-1} \sum_{i \in j} \phi_{i,t}$. Because ρ , γ_j and ψ_j are common within a group and the signal noise $\varepsilon_{i,t}$ is i.i.d. with mean zero, averaging (6) across households gives⁸

$$\mathbb{E}_{j,t}(\pi_{t+1}) = \rho(1 - \gamma_j)(1 + \psi_j \phi_{j,t})\mathbb{E}_{j,t-1}(\pi_t) + \rho\gamma_j \pi_t + u_{j,t}. \quad (13)$$

Expanding the affective multiplier separates the benchmark terms from the affective term:

$$\mathbb{E}_{j,t}(\pi_{t+1}) = \underbrace{\rho(1 - \gamma_j)}_{\alpha_{1j}} \mathbb{E}_{j,t-1}(\pi_t) + \underbrace{\rho\gamma_j}_{\alpha_{2j}} \pi_t + \underbrace{\rho\psi_j(1 - \gamma_j)}_{\beta_{1j}} \phi_{j,t} \mathbb{E}_{j,t-1}(\pi_t) + u_{j,t}. \quad (14)$$

3.8 The estimable equation and identification

Adding a group-specific intercept α_{0j} and an error $\varepsilon_{j,t}$, which absorbs measurement error in the affective state and sampling variation, gives the estimating equation⁹

$$\mathbb{E}_{j,t}(\pi_{t+1}) = \alpha_{0j} + \rho(1 - \gamma_j)(1 + \psi_j \phi_{j,t})\mathbb{E}_{j,t-1}(\pi_t) + \rho\gamma_j \pi_t + \varepsilon_{j,t}. \quad (15)$$

Its reduced form,

$$\mathbb{E}_{j,t}(\pi_{t+1}) = \alpha_{0j} + \alpha_{1j} \mathbb{E}_{j,t-1}(\pi_t) + \alpha_{2j} \pi_t + \beta_{1j} \phi_{j,t} \mathbb{E}_{j,t-1}(\pi_t) + \varepsilon_{j,t}, \quad (16)$$

maps one to one into the affective parameter: $\psi_j = \beta_{1j}/\alpha_{1j}$, so that the affective channel is exactly identified and no cross-coefficient restriction is imposed on it. With ρ fixed at the persistence of realized inflation, one restriction remains, $\alpha_{1j} + \alpha_{2j} = \rho$. It follows from the Kalman weighted average and is shared with the limited-attention benchmark; Section 6.6.4 examines it. The model is estimated in the structural form (15), so that γ_j and ψ_j are obtained directly together with their joint covariance.

⁸The aggregation treats the group averages of $\phi_{i,t}$ and $\mathbb{E}_{i,t-1}(\pi_t)$ as representative of the group, abstracting from the within-group covariance between the two. Any such covariance is absorbed in the group intercept and the error term of the estimating equation.

⁹The intercept α_{0j} captures a persistent level bias in a group's expectations that is not explained by past beliefs or current inflation, such as the well-documented tendency of lower-income households to report higher expected inflation on average (Bruine de Bruin et al. 2010). Allowing it to differ by group prevents this level difference from being attributed to affective sensitivity. The structural equation contains no constant; the intercept is an estimation device that also absorbs level differences arising from aggregation and survey measurement, and it is not given a structural interpretation.

3.9 Testable hypotheses

The propositions translate into five hypotheses about the estimates of (15), which organize the empirical analysis.

- H1** (*Existence; Remark 2.*) The affective channel exists: $\psi \neq 0$, tested on the pooled sample and jointly for the two income groups, $H_0 : \psi_{\text{Low}} = \psi_{\text{High}} = 0$.
- H2** (*Sign; Proposition 1.*) Affective sensitivity is negative in each group, $\psi_j < 0$: a more favorable affective state weakens belief persistence.
- H3** (*Heterogeneity; Proposition 2.*) Low-income households are more sensitive, $|\psi_{\text{Low}}| > |\psi_{\text{High}}|$.
- H4** (*Multidimensionality; Remark 1.*) The gap in belief persistence between the groups does not disappear when both are evaluated at the same level of affect.
- H5** (*Long-run behavior; Proposition 3.*) At the estimated parameters, expectations are stable, their long-run level lies below the limited-attention benchmark, $\mathbb{E}_j^*(\hat{\psi}_j) < \mathbb{E}_j^*(0)$, and a deterioration in the affective state raises it by more than an equal improvement lowers it.

4 Data and Measurement of the Affective State

4.1 Data

This study uses household-level microdata from the Michigan Survey of Consumers, a monthly repeated cross-section run by the University of Michigan’s Survey Research Center, from January 1978 to September 2025. It is one of the longest continuous records of household inflation expectations and consumer sentiment for the United States. Each wave records a household’s expected percentage change in prices over the next twelve months (variable PX1), its income, and its answers to the five questions underlying the Index of Consumer Sentiment. Realized inflation is the year-over-year percentage change in the seasonally adjusted Consumer Price Index for All Urban Consumers (CPIAUCSL), taken from the FRED database of the Federal Reserve Bank of St. Louis, which matches the twelve-month horizon of the survey question.

4.2 Sample construction

Variables are coded as in the survey codebook.¹⁰ Households are classified *within each survey year*, which avoids the look-ahead bias that a single sample-wide cut-off would create: households at or below the 25th percentile of the within-year income distribution form the *low-income* group, and those at or above the 75th percentile the *high-income* group. The percentiles are computed over all respondents who report income in that year. Comparing the tails of the distribution focuses the analysis on the households for which the mechanism of Proposition 2 is expected to be strongest. The dependent variable is one-year-ahead expected inflation (PX1). The pooled model of Section 6 uses all households with a valid inflation forecast and sentiment index, irrespective of income.

4.3 Variable construction

For each income group j and month t , group expected inflation is the average of individual answers weighted by the survey weight $w_{i,t}$ (WT), which corrects for the sampling design and non-response:¹¹

$$\mathbb{E}_{j,t}(\pi_{t+1}) = \frac{\sum_{i \in j} w_{i,t} \text{PX1}_{i,t}}{\sum_{i \in j} w_{i,t}}. \quad (17)$$

The subscript $t + 1$ denotes the twelve-month forecast horizon. Realized inflation π_t is the year-over-year change in the CPI ending in month t , and $\mathbb{E}_{j,t-1}(\pi_t)$ is the group expectation reported in the previous month. Months in which the group expectation, its lag or group sentiment is missing are dropped.

4.4 Measuring the affective state

The affective state is latent and is measured in two steps. The first step uses the household’s Index of Consumer Sentiment (ICS), which is built from broad evaluative judgments about personal and national economic conditions,¹² is recorded for the same respondents and in the same survey wave as the inflation expectation, and was designed to capture what Katona

¹⁰Surveys of Consumers SDA archive codebook, <https://sda.umsurvey.org/sca/Doc/>. Six income records carrying the placeholder values 999998 and 999999 are set to missing. For expected inflation (PX1), the codes for answers that give a direction but no amount (−97 and 96), for “don’t know whether up or down” (98) and for answers not ascertained (99) are set to missing, since they are not numerical forecasts; all numerical answers, including expected deflation, are kept unchanged.

¹¹The weight applies to household heads and their spouses or partners; other respondents carry a weight of zero (8,412 of the 156,040 responses in the two income groups, all before 2015). These responses are retained and receive no weight in the averages.

¹²The five questions cover current and expected personal finances, expected business conditions over the next year and the next five years, and current buying conditions for durable goods. See <https://www.sca.isr.umich.edu/>.

(1951, 1975) described as the economic mood of consumers (Curtin 2022). Because the index also reflects what households know about the economy (Section 2.3), the second step removes the component explained by macroeconomic fundamentals (Section 4.5). Estimates with the unadjusted index are reported in Appendix F.

Household-level values of the ICS range from 2.00 to 150.72. To give ψ_j the same interpretation in both groups, the index is rescaled over the pooled household sample,

$$\phi_{i,t} = \frac{\text{ICS}_{i,t} - \text{ICS}_{\min}}{\text{ICS}_{\max} - \text{ICS}_{\min}}, \quad \text{ICS}_{\min} = 2.00, \quad \text{ICS}_{\max} = 150.72, \quad (18)$$

so that $\phi = 0$ and $\phi = 1$ are the least and the most favorable states observed. The group series $\phi_{j,t}$ is constructed as in (17). Because ψ_j depends on this normalization, the economic magnitudes in Section 6 are reported as effects of a one-standard-deviation change in the affective state, which do not depend on the scale of ϕ .

4.5 Isolating the affective component: non-fundamental sentiment

To isolate the affective component, group sentiment is regressed on observable macroeconomic fundamentals, and the residual is used as the measure of the affective state, following Baker and Wurgler (2006) and Lemmon and Portniaguina (2006) and the distinction between news and animal spirits in Barsky and Sims (2012). In the baseline decomposition, current fundamentals have the same effect on both income groups,

$$\phi_{j,t} = a_j + b_1 u_t + b_2 \pi_t + b_3 \Delta y_t + b_4 r_t^{\text{stock}} + b_5 \pi_t^{\text{gas}} + \tilde{\phi}_{j,t}, \quad (19)$$

where u_t is the unemployment rate, π_t CPI inflation, Δy_t the growth of real disposable income, r_t^{stock} the return on the NASDAQ Composite and π_t^{gas} gasoline price inflation, all over twelve months and taken from FRED.¹³

The residual $\tilde{\phi}_{j,t}$ is *non-fundamental sentiment*: households' economic mood, the optimism or pessimism that observable economic conditions do not explain, or in the language of Barsky and Sims (2012) the "animal spirits" component of confidence. Because the residual has mean zero, each group's sample mean of sentiment is added back so that the measure

¹³FRED series UNRATE, CPIAUCSL, DSPIC96, NASDAQCOM and CUSR0000SETB01. The NASDAQ Composite is used because FRED's S&P 500 series begins only in 2016. As a robustness check, every slope is also allowed to differ by income group, $\phi_{j,t} = a_j + b_{1j} u_t + b_{2j} \pi_t + b_{3j} \Delta y_t + b_{4j} r_t^{\text{stock}} + b_{5j} \pi_t^{\text{gas}} + \tilde{\phi}_{j,t}$ (group slopes), which changes the results only marginally (Appendix F).

keeps the scale of (18):¹⁴

$$\phi_{j,t}^{NF} = \bar{\phi}_j + \tilde{\phi}_{j,t}. \quad (20)$$

Because sentiment may also contain news about future conditions (Barsky and Sims 2012; Blanchard et al. 2013), a second decomposition adds the realized values of the fundamentals over the following twelve months,

$$\phi_{j,t} = a_j + \sum_k b_k X_{k,t} + \sum_k d_k X_{k,t+12} + \tilde{\phi}_{j,t}^F, \quad (21)$$

where $X_{k,t}$ adds industrial production growth to the current fundamentals and $X_{k,t+12}$ contains inflation, the change in unemployment, industrial production, real income growth and stock returns over the next twelve months. This test is conservative, since affect may itself influence future activity (Lagerborg et al. 2023).

The paper therefore reports two measures throughout: *non-fundamental sentiment (current fundamentals excluded)*, the baseline, and *non-fundamental sentiment (current and future fundamentals excluded)*. The fitted values of the decomposition are not used in estimation.

Appendix Table A.1 shows that sentiment responds to fundamentals in the expected direction: higher unemployment and inflation reduce it, and income growth and stock returns raise it. Yet the fundamentals explain only 52 percent of its variation, and allowing group-specific slopes adds less than one percentage point. Appendix Figure A.1 shows that the non-fundamental component is large and persistent: sentiment exceeded the level implied by fundamentals in the mid-1980s and late 1990s, fell below it after the 2008 financial crisis, and declined furthest below it after 2021.¹⁵

4.6 Descriptive statistics

After merging and dropping missing values, the panel contains 1,144 group-month observations (572 months for each of the two groups). Table 1 reports descriptive statistics. Low-income households expect more inflation than high-income households (5.17 against 3.65 percent) and report lower sentiment (0.509 against 0.616 on the rescaled scale), against an average realized inflation rate of 3.58 percent. Removing the component explained by

¹⁴Because $\bar{\phi}_j$ is constant over time, adding it does not reintroduce information from the fundamentals. The level matters because affect enters through the multiplier $1 + \psi_j \phi_{j,t}$; a measure centered at zero would place every household at the least favorable point of the scale. When the pooled sample mean is added to both groups instead, the estimates are -0.545 (0.060) for low-income and -0.262 (0.040) for high-income households (Appendix Table A.12).

¹⁵The increase in the fundamental component in 2021 reflects the rise in real disposable income associated with pandemic stimulus payments.

current fundamentals lowers the standard deviation of sentiment from 0.082 to 0.065 for low-income and from 0.106 to 0.085 for high-income households; most of the variation in sentiment therefore remains after the fundamentals are removed. The same pattern holds within the finer subgroups defined by income, marital status and sex used in Section 6.6.6 (Table A.2 in Appendix D).

Table 1: Descriptive statistics

Variable	Pooled		Low income		High income	
	Mean	SD	Mean	SD	Mean	SD
Expected inflation, $\mathbb{E}_{j,t}(\pi_{t+1})$ (%)	4.41	2.03	5.17	1.93	3.65	1.82
Realized inflation, π_t (%)	3.58	2.74	3.58	2.74	3.58	2.74
Consumer sentiment, ϕ (rescaled, $[0, 1]$)	0.562	0.109	0.509	0.082	0.616	0.106
Non-fundamental sentiment						
Current fundamentals excluded	—	0.092	—	0.065	—	0.085
Current and future fundamentals excluded	—	0.084	—	0.059	—	0.071
Forecast error, $\pi_{t,t+12} - \mathbb{E}_{j,t}(\pi_{t+1})$ (pp)	−0.93	2.15	−1.68	2.23	−0.17	1.77
Observations	1,144		572		572	
Household responses	156,040		73,699		82,341	

Notes: Monthly observations, February 1978 to September 2025; the low- and high-income groups are the households at or below the 25th and at or above the 75th percentile of each year’s income distribution. Sentiment is rescaled by pooled min–max normalization of household-level ICS (minimum 2.00, maximum 150.72). Realized inflation π_t is year-over-year CPI inflation and is common to both groups. The forecast error and the measure purged of future fundamentals are available through August 2025 (570 months). Pooled columns include the variation between the two groups. Non-fundamental sentiment is defined in Section 4.5; its mean equals that of consumer sentiment by construction, so only its standard deviation is reported. Statistics that refer to both income groups jointly (tests, ratios, differences, log-likelihoods and observations) are reported in the low-income column.

Appendix Figure A.2 reports the implications of these differences for forecast accuracy. Comparing each month’s expectation with the inflation realized over the following twelve months, low-income households overpredict inflation by 1.68 percentage points on average ($t = -6.3$ with Newey–West standard errors), whereas the average forecast error of high-income households, 0.17 percentage points, is not significantly different from zero ($t = -0.8$). The mean squared forecast error of low-income households is approximately two and a half times as large (7.81 against 3.16). Figure 2 relates expected inflation to non-fundamental sentiment. In both groups, months in which non-fundamental sentiment is lower, that is, in which households are more pessimistic than observable economic conditions imply, are associated with higher expected inflation, and the relationship is considerably steeper for low-income households (slope -9.1 against -3.3). The same pattern holds with the unadjusted index, with steeper slopes (-13.4 and -7.3 ; Appendix Figure A.3), because the index also contains the information about inflation and unemployment that the decomposition removes.

These relationships are simple correlations; the model of Section 3 provides the framework for their interpretation.

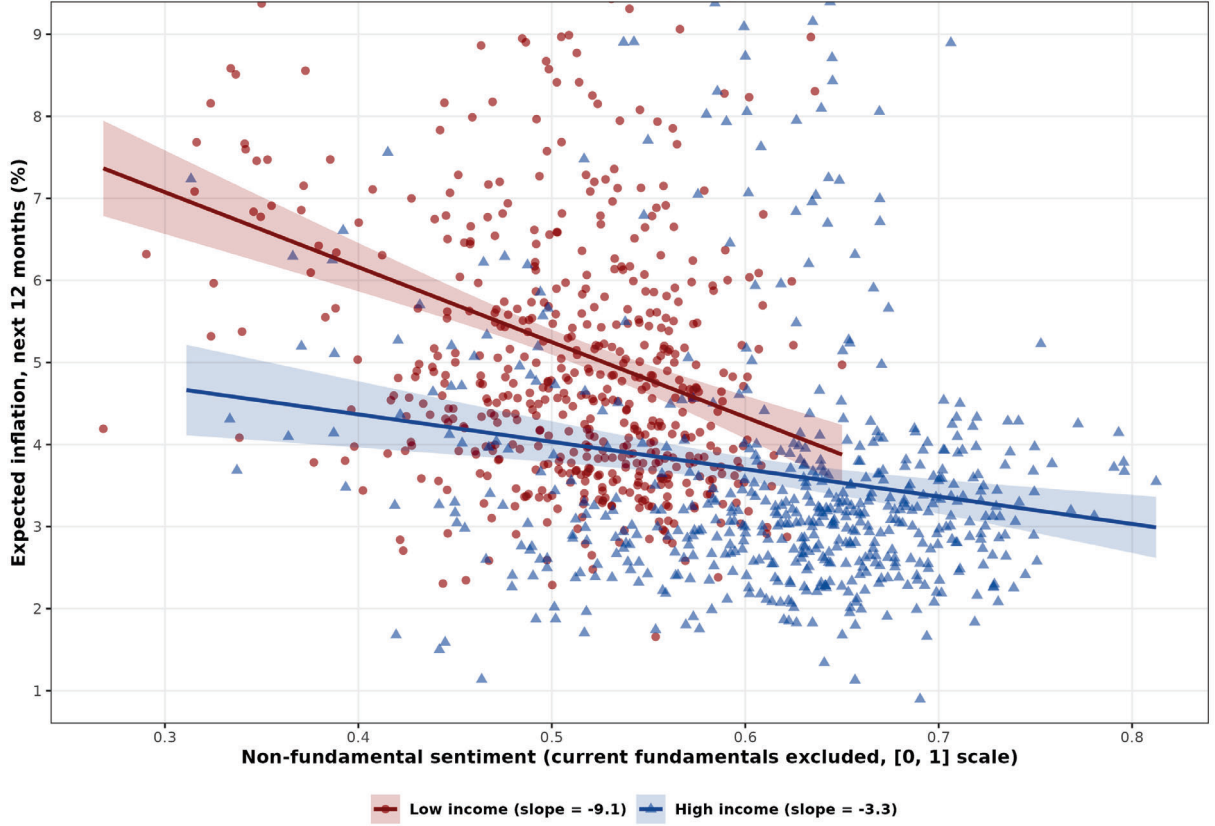


Figure 2: Expected inflation and non-fundamental sentiment, by income group

Notes: Michigan Survey of Consumers and FRED, monthly, February 1978 to September 2025. Each point is a monthly group average of expected inflation against the group’s non-fundamental sentiment (20). Lines are least-squares fits by income group with 95% confidence bands. The vertical axis is restricted to 1–9 percent; the 51 observations outside this range are included in the fits. Appendix Figure A.3 uses the unadjusted index.

5 Estimation Strategy

5.1 Maximum-likelihood estimation

The autoregressive coefficient ρ describes the aggregate inflation process (1), not household behavior. It is therefore estimated from realized inflation and held fixed in the structural equation. An AR(1) regression of year-over-year CPI inflation gives $\hat{\rho} = 0.9928$, and all structural estimates below use this value.¹⁶ Fixing ρ has a further advantage. Because ρ

¹⁶With the CPI vintage of October 2026 the same regression gives 0.9881. Fixing ρ at this value leaves the estimates and every conclusion unchanged (the sensitivities become -0.613 and -0.232).

multiplies the same regressors as ψ_j in (15), the two would be strongly correlated if estimated together, so that a joint estimate would partly substitute inflation persistence for affective sensitivity. Estimating ρ from the inflation process removes this source of weak identification and identifies ψ_j from household expectations alone.

Let $\mu_{j,t}(\theta)$ denote the conditional mean implied by (15) at the parameter vector $\theta = (\alpha_{0j}, \gamma_j, \psi_j, \sigma_j)_{j \in \{\text{Low}, \text{High}\}}$. With $\varepsilon_{j,t} \sim N(0, \sigma_j^2)$, so that each group has its own residual variance, the log-likelihood of the panel is

$$\ell(\theta) = -\frac{n}{2} \log(2\pi) - \sum_j n_j \log \sigma_j - \sum_j \frac{1}{2\sigma_j^2} \sum_t \left(\mathbb{E}_{j,t}(\pi_{t+1}) - \mu_{j,t}(\theta) \right)^2, \quad (22)$$

where n_j is the number of observations in group j . Because $\mu_{j,t}(\theta)$ is nonlinear in γ_j and ψ_j , (22) is maximized numerically from a grid of nine starting values (Appendix B.1). Under Gaussian errors, this is equivalent to weighted nonlinear least squares with weights $1/\sigma_j^2$, which is why nonlinear generalized least squares reproduces the same point estimates.

Both groups are estimated in a single optimization on the stacked panel. Joint estimation is required because it delivers the covariance matrix of both groups' parameters, on which the cross-group tests depend. Standard errors are obtained from the inverse of the negative Hessian at $\hat{\theta}$, and support Wald tests of $H_0 : \psi_{\text{Low}} = \psi_{\text{High}}$ (H3) and $H_0 : \psi_{\text{Low}} = \psi_{\text{High}} = 0$ (H1) (Appendix B.2).

Because the survey question refers to inflation over the next twelve months, consecutive monthly forecasts overlap, and the errors of (15) may be serially correlated. Every main estimate is therefore also reported with autocorrelation-robust (HAC) standard errors, a Newey and West (1987) sandwich with twelve lags in which the scores of both groups are summed within each month. In addition, because non-fundamental sentiment is itself estimated in a first step (Pagan 1984), standard errors are computed by a moving-block bootstrap that resamples twelve-month blocks of calendar months and repeats both the decomposition and the estimation in every draw (Künsch 1989).

5.2 Common time-varying shocks

Equation (15) attributes all variation in expectations to the household-level mechanism. In practice, shocks common to all households in a period, such as distinct inflation regimes or financial crises, may also affect expectations, independently of γ_j and ψ_j . As a robustness check, a year fixed effect δ_t , common to both groups, is added:

$$\mathbb{E}_{j,t}(\pi_{t+1}) = \alpha_{0j} + \delta_t + \rho(1 - \gamma_j)(1 + \psi_j \phi_{j,t}) \mathbb{E}_{j,t-1}(\pi_t) + \rho \gamma_j \pi_t + \varepsilon_{j,t}. \quad (23)$$

Year effects are not implied by the theory; they are a standard device for absorbing common shocks. Equation (15) therefore remains the baseline, and (23) tests whether the income gradient in affective sensitivity remains once common shocks are controlled for.

5.3 Further robustness checks

The maximum-likelihood estimates are complemented by nonlinear generalized least squares, Bayesian estimation, the moving-block bootstrap, year fixed effects and estimation within demographic and socioeconomic subgroups (Appendix B.3). Every specification is also re-estimated with the unadjusted sentiment index in place of non-fundamental sentiment (Appendix F), and the two-channel extension is estimated in Section 7.

6 Results

The hypotheses are examined in sequence. We first examine whether the affective channel exists (H1), then whether its sign and strength differ by income (H2, H3), then its economic magnitude and whether it reduces to differences in the level of affect (H4), and the long-run behavior of expectations (H5), and finally its robustness. Every table reports both measures of non-fundamental sentiment defined in Section 4.5. *Inflation persistence* (ρ) denotes the persistence of realized inflation, fixed at its AR(1) value of 0.9928, while *belief persistence* denotes the weight households place on their previous expectation, which the theory predicts affect will reduce.

6.1 Existence of the affective channel

The model is first estimated on the pooled sample, in which all households share the same parameters. This specification provides a test of the affective channel that does not depend on the definition of income groups. For the pooled sample, the decomposition is estimated on the sentiment of all households. If $\psi = 0$, the model reduces to the limited-attention benchmark (Remark 2). Columns (1) and (4) of Table 2 report the maximum-likelihood estimates; estimates by nonlinear GLS and Bayesian estimation are reported in Appendix Table A.6.

The estimates reject the limited-attention benchmark (H1). With the baseline measure, the affective-sensitivity parameter is -0.244 ($t = -6.42$), and the likelihood-ratio statistic for $H_0 : \psi = 0$ is 46.38. Nonlinear GLS yields the same estimate, and the Bayesian 95 percent credible interval, $[-0.324, -0.175]$, lies entirely below zero (Appendix Table A.6). The extended measure yields almost identical results: the estimate is -0.238 ($t = -6.46$),

Table 2: Structural maximum-likelihood estimates

	Non-fundamental sentiment					
	Current fundamentals excluded			Current and future fundamentals excluded		
	Pooled (1)	Low income (2)	High income (3)	Pooled (4)	Low income (5)	High income (6)
<i>Structural parameters</i>						
Affective sensitivity (ψ_j)	−0.244** (0.038) [0.068]	−0.621** (0.068) [0.130]	−0.240** (0.037) [0.071]	−0.238** (0.037) [0.069]	−0.585** (0.065) [0.136]	−0.235** (0.036) [0.068]
Weight on inflation (γ_j)	0.131** (0.019)	0.221** (0.023)	0.156** (0.021)	0.130** (0.019)	0.219** (0.023)	0.153** (0.021)
Intercept (α_{0j})	0.656** (0.086)	1.636** (0.142)	0.483** (0.069)	0.642** (0.084)	1.562** (0.139)	0.477** (0.068)
Residual SD (σ_j)	0.593	1.002	0.653	0.593	1.007	0.653
<i>Hypothesis tests</i>						
$H_0: \psi = 0$, t -statistic	−6.42**			−6.46**		
$H_0: \psi_j = 0$, LR statistic	46.38**	144.33**		46.77**	139.28**	
$H_0: \psi_j = 0$, Wald $\chi^2(2)$		127.31**			123.32**	
Ratio $ \psi_{\text{Low}} / \psi_{\text{High}} $		2.59** (0.49)			2.49** (0.47)	
$H_0: \psi_{\text{Low}} = \psi_{\text{High}}$, t -statistic		−4.96**			−4.70**	
HAC t -statistic		−3.17**			−2.86**	
Log-likelihood	−512.63	−1380.94		−510.46	−1378.39	
Observations	572	1,144		570	1,140	

Notes: * $p < 0.05$, ** $p < 0.01$. Standard errors from the inverse Hessian in parentheses; Newey and West (1987) HAC standard errors (twelve lags) in brackets. ρ is fixed at 0.9928 in all columns. Columns (1) and (4) estimate one common (α_0, γ, ψ) for all households with a valid forecast and sentiment index, with sentiment decomposed for all households together. Columns (2)–(3) and (5)–(6) estimate the two income groups jointly, which yields the cross-group covariance used for the tests; for these columns the LR and Wald statistics test the joint hypothesis $\psi_{\text{Low}} = \psi_{\text{High}} = 0$, i.e. no affective channel in either group. The standard error of the sensitivity ratio is computed by the delta method, and its stars test the ratio against one. Columns (4)–(6) use sentiment purged of current and twelve-month-ahead fundamentals, (21), whose sample ends in August 2025. A nine-point multi-start check confirms the global optimum in every specification. Estimates by nonlinear GLS and Bayesian estimation are reported in Appendix Table A.6. Statistics that refer to both income groups jointly (tests, ratios, differences, log-likelihoods and observations) are reported in the low-income column.

and the likelihood-ratio statistic is 46.77. The negative sign confirms Proposition 1 (H2): a more favorable affective state reduces the weight on the previous expectation.

The pooled estimate, however, imposes a common parameter on households whose updating behavior may differ by income. Remark 1 shows that income groups may differ in sensitivity, in attention and in the level of affect, and a single pooled coefficient cannot distinguish among these sources of heterogeneity. The next subsection therefore estimates the model separately for low- and high-income households.

6.2 Heterogeneity across income groups

Columns (2)–(3) and (5)–(6) of Table 2 report the estimates for the two income groups, estimated jointly. The affective channel is statistically significant in both income groups.

With the baseline measure, the joint hypothesis $H_0 : \psi_{\text{Low}} = \psi_{\text{High}} = 0$ is rejected at the 0.1 percent level (likelihood-ratio statistic 144.33; Wald statistic 127.31), and each coefficient is individually significant (H1), also with HAC standard errors. Both estimates are negative, as predicted (H2): -0.621 for low-income households and -0.240 for high-income households. Because the sign of ψ_j is not restricted in estimation, this result is determined by the data. The extended measure, which also removes the information in sentiment about the following twelve months, yields -0.585 and -0.235 .

The sensitivity of low-income households is approximately 2.6 times that of high-income households with the baseline measure (2.5 with the extended measure), and the hypothesis of equal sensitivity is rejected in both cases ($t = -4.96$ and -4.70), in line with H3. The rejection survives autocorrelation-robust inference ($t = -3.17$ and -2.86). This result concerns the *sensitivity* to affect rather than its *level*. Low-income households have a less favorable average affective state (0.509 against 0.616), so their larger response cannot be explained by a more favorable evaluation of the economy. The pooled estimate of -0.244 is close to the high-income estimate and less than half of the low-income estimate; pooling therefore understates the sensitivity of low-income households. The remaining parameters are almost identical across the two measures, which indicates that removing the information about future fundamentals changes the estimated sensitivities only marginally.

6.3 The model without and with the affective channel

Table 3 compares the affective model with the limited-attention benchmark, in which $\psi_{\text{Low}} = \psi_{\text{High}} = 0$. Imposing this restriction reduces the log-likelihood by 72.16 with the baseline measure (LR = 144.33) and by 69.65 with the extended measure (LR = 139.28), and both information criteria favor the affective model. The deterioration arises because, with ρ fixed at the persistence of realized inflation, the benchmark assigns a weight of $\rho(1 - \gamma_j)$, which is close to one, to the previous expectation and therefore implies more persistence in expectations than is observed. The affective model accommodates the lower persistence of expectations through the multiplier $1 + \psi_j \phi_{j,t}$. The remaining parameters change accordingly: in the benchmark, the weight on current inflation falls from 0.221 to 0.163 for low-income households and from 0.156 to 0.093 for high-income households, and the intercepts decline in absolute value.

The gain in fit is concentrated among low-income households. With the baseline measure, the affective multiplier raises the explained variation of their expectations from 0.682 to 0.731, compared with an increase from 0.860 to 0.871 for high-income households. Appendix Figure A.4 shows where this gain arises by plotting the affective contribution, defined as the

Table 3: The model without and with the affective channel

	Non-fundamental sentiment							
	Current fundamentals excluded				Current and future fundamentals excluded			
	No affect		With affect		No affect		With affect	
	Low income (1)	High income (2)	Low income (3)	High income (4)	Low income (5)	High income (6)	Low income (7)	High income (8)
<i>Structural parameters</i>								
Affective sensitivity (ψ_j)	—	—	−0.621** (0.068)	−0.240** (0.037)	—	—	−0.585** (0.065)	−0.235** (0.036)
Weight on inflation (γ_j)	0.163** (0.024)	0.093** (0.019)	0.221** (0.023)	0.156** (0.021)	0.165** (0.024)	0.090** (0.020)	0.219** (0.023)	0.153** (0.021)
Intercept (α_{0j})	0.301** (0.059)	0.032 (0.029)	1.636** (0.142)	0.483** (0.069)	0.301** (0.059)	0.033 (0.029)	1.562** (0.139)	0.477** (0.068)
<i>Model fit</i>								
R^2	0.682	0.860	0.731	0.871	0.678	0.860	0.725	0.872
RMSE	1.09	0.68	1.00	0.65	1.09	0.68	1.01	0.65
Log-likelihood	−1453.11		−1380.94		−1448.03		−1378.39	
LR statistic, LR(2)			144.33**				139.28**	
AIC	2918.2		2777.9		2908.1		2772.8	
BIC	2948.5		2818.2		2938.3		2813.1	
Observations	1,144		1,144		1,140		1,140	

Notes: * $p < 0.05$, ** $p < 0.01$. Standard errors in parentheses. The with-affect columns (3)–(4) and (7)–(8) reproduce the income-group estimates of Table 2. The no-affect columns (1)–(2) and (5)–(6) impose $\psi_{\text{Low}} = \psi_{\text{High}} = 0$, the limited-attention benchmark, on the same samples, with group-specific error variances. In all columns ρ is fixed at 0.9928. Both income groups are estimated jointly, so the log-likelihood, LR statistic, AIC, BIC and number of observations refer to the two groups together; R^2 and RMSE refer to the expectations equation of each group, computed from the fitted values. Statistics that refer to both income groups jointly (tests, ratios, differences, log-likelihoods and observations) are reported in the low-income column.

difference between the fitted expectations of the two models,

$$C_{j,t} = \hat{E}_{j,t}(\pi_{t+1})|_{\hat{\psi}_j} - \hat{E}_{j,t}(\pi_{t+1})|_{\psi_j=0}. \quad (24)$$

The contribution has a mean of zero in both groups by construction, but its standard deviation is 0.43 percentage points for low-income households and 0.19 for high-income households, a ratio of about 2.2. The contribution is also systematically related to the inflation environment. During the high inflation of 1978–1982 it averages −0.64 percentage points for low-income and −0.34 for high-income households, and during the inflation surge of 2021–2022 it averages −0.30 and −0.01. During the Great Recession it is positive, at 0.19 and 0.11. Because $\hat{\psi}_j < 0$, affect attenuates the transmission of the previous belief; the affective model therefore predicts lower expectations than the benchmark when inflation has been high and higher expectations when inflation falls abruptly. This attenuation is approximately twice as large for low-income households, and it is most pronounced in the episodes in which inflation expectations are of greatest concern for monetary policy.

6.4 Economic magnitude and the level of affect

The parameters in Table 2 are not directly interpretable as updating weights. Table 4 therefore reports the effective weights P_j and I_j of Definition 2 implied by these estimates.

Table 4: Effective updating weights and economic magnitudes

	Non-fundamental sentiment			
	Current fundamentals excluded		Current and future fundamentals excluded	
	Low income (1)	High income (2)	Low income (3)	High income (4)
<i>Panel A. At each group's own mean sentiment</i>				
Mean sentiment (ϕ)	0.509	0.616	0.509	0.616
Prior weight, baseline: $\rho(1 - \gamma_j)$	0.774 (0.023)	0.838 (0.020)	0.775 (0.023)	0.840 (0.021)
Prior weight, net of affect: P_j	0.529 (0.037)	0.714 (0.032)	0.544 (0.036)	0.719 (0.032)
Inflation weight: $I_j = \rho\gamma_j$	0.219 (0.023)	0.155 (0.020)	0.217 (0.023)	0.152 (0.021)
Net prior weight as share of baseline (%)	68.4 (3.4)	85.2 (2.3)	70.2 (3.3)	85.5 (2.2)
<i>Panel B. Pessimistic versus optimistic state (mean $\pm$ 1 SD)</i>				
Sentiment, pess. / opt.	0.444 / 0.574	0.531 / 0.700	0.451 / 0.568	0.545 / 0.688
Prior weight, pessimistic	0.560 (0.034)	0.731 (0.030)	0.571 (0.034)	0.733 (0.030)
Prior weight, optimistic	0.498 (0.039)	0.697 (0.034)	0.518 (0.038)	0.705 (0.034)
Change in prior weight, pess. to opt. (%)	-11.12 (1.67)	-4.65 (0.81)	-9.30 (1.41)	-3.85 (0.67)
<i>Panel C. At a common sentiment level (pooled mean)</i>				
Pooled mean sentiment	0.562		0.563	
Prior weight (P_j)	0.503 (0.039)	0.725 (0.031)	0.520 (0.038)	0.729 (0.031)
Gap (high – low income), own means	0.185** (0.049)		0.174** (0.048)	
Gap (high – low income), pooled mean	0.222** (0.050)		0.209** (0.049)	

Notes: * $p < 0.05$, ** $p < 0.01$. Standard errors in parentheses, computed by the delta method from the covariance matrix of Table 2, treating sentiment levels as given. Weights use $\rho = 0.9928$ and the estimates of Table 2. Net prior weights multiply baseline weights by $1 + \psi_j\phi$, where ϕ is non-fundamental sentiment; the weight on current inflation does not depend on ϕ (Definition 2). In Panel B the two sentiment levels are each group's mean minus and plus one standard deviation of non-fundamental sentiment, and the change is measured from the pessimistic to the optimistic state. Statistics that refer to both income groups jointly (tests, ratios, differences, log-likelihoods and observations) are reported in the low-income column.

Panel A evaluates the weights at each group's mean sentiment. At this level, the affective multiplier reduces the weight on the previous belief of low-income households to 68.4 percent of its benchmark value, compared with 85.2 percent for high-income households. Low-income households therefore carry forward approximately 32 percent less of their previous expectation than in the benchmark, while the corresponding reduction for high-income households is approximately 15 percent. The weight on current inflation is unaffected, so that the relative weight on new information is higher for both groups than in the benchmark. The extended

measure gives 70.2 and 85.5 percent.

Panel B reports the change in belief persistence associated with a change in sentiment, holding all parameters constant. Moving from a pessimistic state (one within-group standard deviation below the mean) to an optimistic state (one standard deviation above) reduces belief persistence by 11.1 percent for low-income households and by 4.7 percent for high-income households (9.3 and 3.9 percent with the extended measure). Because the change is measured relative to each group’s own standard deviation, the difference between the two groups reflects sensitivity rather than differences in the dispersion of sentiment, and it does not depend on the normalization of ϕ .

Panel C examines whether the difference in belief persistence between the groups arises only from their different levels of affect. If it did, the difference would disappear when both groups are evaluated at the same level of affect. At the pooled mean, however, the difference is 0.222, which is *larger* than the difference of 0.185 obtained at each group’s own mean (H4); with the extended measure, the corresponding values are 0.209 and 0.174. The difference in belief persistence therefore reflects differences in sensitivity and in baseline updating, and not only differences in the level of affect. This is the sense in which heterogeneity across income groups is multidimensional.

Table 5 compares these weights with those of the limited-attention benchmark, estimated with $\psi_j = 0$. In the benchmark, the weights on the previous expectation and on current inflation always sum to ρ . The benchmark therefore implies that households carry forward 83 percent (low income) and 90 percent (high income) of their previous belief. Once affect is allowed for, the total weight falls to 0.748 for low-income and 0.869 for high-income households at their mean sentiment, and the weight on current inflation rises, from 0.162 to 0.219 for low-income households and from 0.093 to 0.155 for high-income households. Part of what the benchmark interprets as inattention and belief persistence therefore reflects the affective state.

The intercept rises when affect is introduced, from 0.301 to 1.636 for low-income households and from 0.032 to 0.483 for high-income households. Because the intercept is an estimation device that absorbs the average level of expectations not explained by the weighted information, it is larger in the affective model: once affect lowers the weight on the previous belief, the constant accounts for a larger share of the average level of expectations. The difference in intercepts between the groups therefore accounts for much of the difference in the *level* of expectations, whereas affect accounts for the difference in their *persistence*.

Table 5: Updating weights with and without the affective channel

	Non-fundamental sentiment			
	Current fundamentals excluded		Current and future fundamentals excluded	
	Low income (1)	High income (2)	Low income (3)	High income (4)
<i>Panel A. Limited-attention benchmark ($\psi_j = 0$)</i>				
Prior weight: $\rho(1 - \gamma_j)$	0.831 (0.024)	0.900 (0.019)	0.829 (0.024)	0.903 (0.019)
Inflation weight: $\rho\gamma_j$	0.162 (0.024)	0.093 (0.019)	0.164 (0.024)	0.089 (0.019)
Total weight	0.993	0.993	0.993	0.993
Intercept (α_{0j})	0.301** (0.059)	0.032 (0.029)	0.301** (0.059)	0.033 (0.029)
<i>Panel B. Affective model, at each group's mean sentiment</i>				
Prior weight: P_j	0.529 (0.037)	0.714 (0.032)	0.544 (0.036)	0.719 (0.032)
Inflation weight: I_j	0.219 (0.022)	0.155 (0.020)	0.218 (0.023)	0.152 (0.021)
Total weight: $\rho[1 + (1 - \gamma_j)\psi_j\bar{\phi}_j]$	0.748 (0.024)	0.869 (0.017)	0.762 (0.023)	0.871 (0.017)
Intercept (α_{0j})	1.636** (0.142)	0.483** (0.069)	1.562** (0.139)	0.477** (0.068)
Log-likelihood, Panel A / Panel B	-1453.1 / -1380.9		-1448.0 / -1378.4	

Notes: * $p < 0.05$, ** $p < 0.01$. Standard errors in parentheses, from the inverse Hessian (Panel A) and by the delta method (Panel B), treating sentiment levels as given. $\rho = 0.9928$. Panel A reports the maximum-likelihood estimates of the model with $\psi_j = 0$, in which the weights sum to ρ by construction. Panel B evaluates the weights of the affective model at each group's mean non-fundamental sentiment. Statistics that refer to both income groups jointly (tests, ratios, differences, log-likelihoods and observations) are reported in the low-income column.

6.5 Long-run behavior of expectations

Table 6 evaluates Proposition 3 at the estimates of Table 2, with $\bar{\pi} = 3.58$ percent, the sample mean of inflation, and Figure 3 shows the long-run expectation as ϕ and ψ vary. The results support H5. First, expectations are stable for both groups: $\hat{\psi}_j\bar{\phi}_j$ lies well inside the stability region. Second, the affective channel lowers the long-run expectation significantly below the limited-attention benchmark, by 5.55 percentage points for low-income and 2.77 percentage points for high-income households; it roughly halves the pass-through of a permanent change in inflation and shortens the half-life of beliefs by more than half. Third, a one-standard-deviation deterioration in the affective state raises the long-run expectation by significantly more than an equal improvement lowers it, as the convexity in Proposition 3(iii) predicts. At the estimated values, the long-run expectation is 5.14 percent for low-income and 3.63 percent for high-income households, close to their sample means of 5.17 and 3.65 percent, so the model also reproduces the level of expectations of each group; because the group intercepts are estimated, this match is partly by construction, and the difference in levels between the groups is carried mainly by the intercepts.

Table 6: Long-run behavior of expectations

	Low income		High income	
	Benchmark ($\psi_j = 0$)	Affective model (estimates)	Benchmark ($\psi_j = 0$)	Affective model (estimates)
$\psi_j \bar{\phi}_j$	0	-0.316	0	-0.148
Long-run expectation, $\mathbb{E}_j^*$ (%)	10.69	5.14 (0.09)	6.40	3.63 (0.10)
Difference from benchmark (pp)		-5.55** (0.67)		-2.77** (0.40)
Sample mean of expectations (%)	5.17		3.65	
Long-run pass-through of inflation	0.97	0.47	0.96	0.54
Half-life of beliefs (months)	2.70	1.09	3.92	2.06
<i>Change in $\mathbb{E}_j^*$ (pp) after a one-SD change in the affective state</i>				
Deterioration		+0.36		+0.23
Improvement		-0.32		-0.20
Asymmetry (deterioration - improvement)		0.045** (0.005)		0.026** (0.004)
Limit as $\psi_j \phi \rightarrow -1$ ($= \alpha_{0j} + \rho \gamma_j \bar{\pi}$)	2.42		1.04	
Stability bound on $\psi_j \phi$	0.29		0.19	

Notes: Evaluated at the estimates of Table 2 (current fundamentals excluded), with $\rho = 0.9928$, inflation at its sample mean of 3.58 percent and the affective state at each group's mean. The benchmark sets $\psi_j = 0$ and keeps the other parameters unchanged. Pass-through is $\rho \gamma_j / [1 - \rho(1 - \gamma_j)m_j]$; the half-life is $\ln 0.5 / \ln[\rho(1 - \gamma_j)m_j]$. Standard errors in parentheses, by the delta method from the covariance matrix of Table 2, treating $\bar{\pi}$ and $\bar{\phi}_j$ as given. With current and future fundamentals excluded, the long-run expectations are 5.14 and 3.63 percent, the differences from the benchmark -5.28 and -2.77 percentage points, and the asymmetries 0.035 and 0.018. ** $p < 0.01$. Statistics that refer to both income groups jointly (tests, ratios, differences, log-likelihoods and observations) are reported in the low-income column.

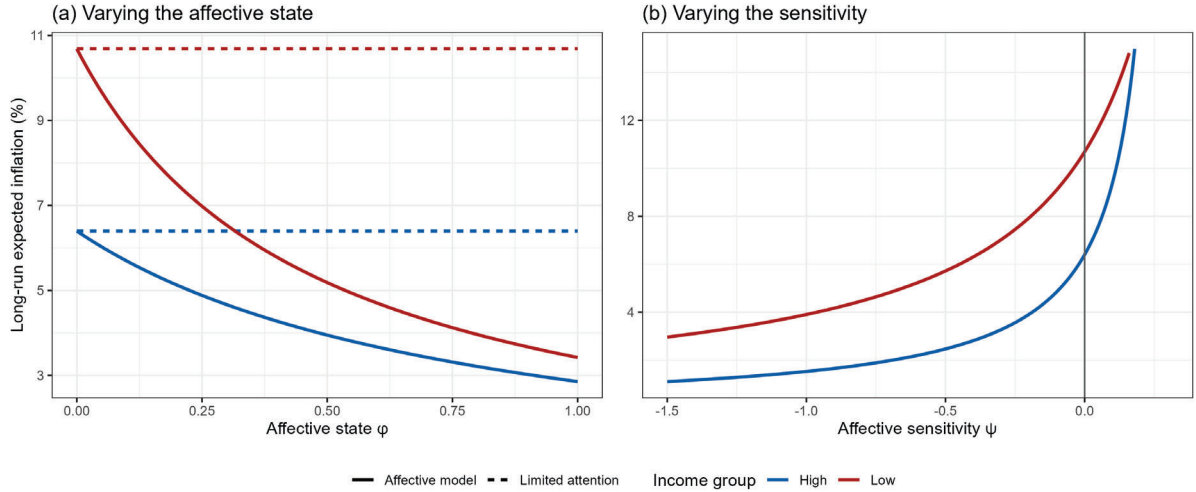


Figure 3: Long-run expected inflation, the affective state and affective sensitivity

Notes: Long-run expectation (11) for each income group, evaluated at its estimates of α_{0j} and γ_j (Table 2) with inflation at its sample mean of 3.58 percent. Panel (a) varies the affective state with ψ_j at its estimate; dashed lines are the limited-attention benchmark ($\psi_j = 0$). Panel (b) varies the affective sensitivity with ϕ at each group's mean; the vertical line is the benchmark. Values outside 0–15 percent are not plotted.

6.6 Robustness

Could the results be an artefact of the estimator, of common shocks, of the timing of sentiment, of the construction of the affective measure or of how the sample is cut? We examine each possibility in turn; the case in which affect also acts on current inflation is taken up in Section 7.

6.6.1 Estimation method and first-stage uncertainty

Appendix Table A.6 compares the maximum-likelihood estimates with those from nonlinear GLS and Bayesian estimation. Nonlinear GLS yields the same point estimates and standard errors. The Bayesian posterior means differ from the maximum-likelihood estimates by at most 0.005, so the support for H3 does not depend on asymptotic normality, and $\psi_{\text{Low}} < \psi_{\text{High}}$ in every posterior draw under both measures. The residual standard deviation of the low-income group is approximately 1.5 times that of the high-income group, and a likelihood-ratio test rejects a common residual variance ($\text{LR} = 101.9$), which supports the use of group-specific variances.

The moving-block bootstrap described in Section 5.1, which accounts for the estimation of non-fundamental sentiment, yields standard errors of 0.142 and 0.082 with the baseline measure (0.147 and 0.088 with the extended measure), somewhat larger than the HAC standard errors. The 95 percent intervals, $[-1.021, -0.480]$ and $[-0.437, -0.139]$, nevertheless remain below zero, and the low-income sensitivity exceeds the high-income sensitivity in absolute value in all 499 bootstrap replications under both measures.

6.6.2 Common time-varying shocks

Shocks common to both income groups, such as changes in the inflation regime or financial crises, may affect expectations independently of the affective channel and may be reflected in the estimated sensitivities. Appendix Table A.10 therefore adds a fixed effect for each calendar year. Both sensitivities remain negative and significant at the 0.1 percent level and increase in absolute value, to -1.146 for low-income and -0.822 for high-income households with the baseline measure, while the ratio between them declines from 2.59 to 1.39. The extended measure yields the same pattern (-1.078 and -0.788 , ratio 1.37). Because ρ remains fixed at the persistence of realized inflation, the year effects absorb common shocks without altering the perceived persistence of inflation. Two conclusions follow. First, the increase in both sensitivities after controlling for common shocks is inconsistent with the view that sentiment merely proxies for aggregate conditions: once low-frequency co-movement is removed, the sensitivities are identified from within-year variation in mood. Second,

although the ratio is smaller, indicating that common shocks account for part of the difference between the groups, the income gradient survives: equality of the two sensitivities is rejected ($t = -3.78$). Since year effects are not implied by the theory, the specification without them remains the baseline.

Appendix Table A.11 compares four specifications, with and without sentiment and with and without year effects. With the baseline measure, including sentiment reduces the sum of squared residuals by 13.4 percent without year effects and by 14.2 percent with them. Both information criteria favor the specifications with sentiment. The BIC, which penalizes the year parameters more heavily, favors the primary model, whereas the AIC favors the year-effects specification with sentiment. The primary model is retained because it corresponds directly to the theory and is preferred by the BIC.

6.6.3 Construction of non-fundamental sentiment

The measure of the affective state involves two choices: whether the effects of the fundamentals are common to both income groups, and which level the residual is centred on. Appendix Table A.12 varies both. Allowing every slope of the decomposition to differ by income group leaves the estimates virtually unchanged: with current fundamentals excluded, the sensitivities are -0.644 and -0.237 , against -0.621 and -0.240 in the baseline. Centring the residual on the pooled mean instead of each group's own mean assigns both groups the same average level of affect (0.562), so that only the variation of sentiment around this common level differs between them. The sensitivities remain negative and significant, at -0.545 and -0.262 with the baseline decomposition, and the ratio declines from 2.59 to 2.08 . Equality of the two sensitivities is still rejected in every specification (t between -3.91 and -5.22). The income gradient in affective sensitivity is therefore not a consequence of the lower average sentiment of low-income households or of the restriction that fundamentals affect both groups equally.

6.6.4 Timing of sentiment and the Kalman restriction

Because sentiment and expected inflation are reported in the same interview, part of their comovement could run from expected inflation to sentiment. Two checks address this concern. Replacing current sentiment by its value in the previous month, which is predetermined with respect to the current forecast, leaves the sensitivities almost unchanged (-0.575 and -0.231 , ratio 2.49). Instrumenting current sentiment with its own lags, in a control-function version of the maximum-likelihood estimator and by two-stage least squares on the structural equation, does not reject the exogeneity of sentiment (likelihood-ratio $p = 0.19$ for the control

function; Wu–Hausman p -values between 0.14 and 0.67), the instruments are strong (first-stage F above 250), and the instrumented sensitivities, -0.60 and -0.24 , are close to the baseline. The estimated affective channel is therefore not an artefact of reverse causality within the interview.

The structural equation imposes $\alpha_{1j} + \alpha_{2j} = \rho$, a restriction of the Kalman weighted average that the model shares with the limited-attention benchmark. In the unrestricted reduced form (16), estimated by OLS, the sum is 0.98 for high-income households ($t = -0.36$ against ρ) but 1.27 for low-income households ($t = 4.94$), so the weighted-average structure describes high-income households more closely. The restriction does not drive the income gradient. Because $\psi_j = \beta_{1j}/\alpha_{1j}$ is exactly identified, it can be computed without the restriction: the unrestricted estimates are -1.04 (0.12) for low-income and -0.21 (0.16) for high-income households, so the low-income sensitivity is larger, not smaller, when the restriction is relaxed.

6.6.5 Comparison with consumer sentiment

Appendix F reports all estimates with the unadjusted consumer sentiment index in place of non-fundamental sentiment. The comparison shows how much of the estimated affective effect could be attributed to the information contained in sentiment. With consumer sentiment, the sensitivities are -0.706 for low-income and -0.268 for high-income households (Table A.8). Removing the component explained by current fundamentals therefore retains approximately 88 percent of the low-income sensitivity and 90 percent of the high-income sensitivity, and removing the component explained by current and future fundamentals retains approximately 82 and 89 percent of the values estimated with consumer sentiment on the same sample. The ratio between the groups changes little, from 2.63 to 2.59 and 2.49, and the explanatory power of the expectation equation is unchanged (R^2 of 0.729 and 0.870 with consumer sentiment against 0.731 and 0.871 with non-fundamental sentiment).

These results are difficult to reconcile with a purely informational interpretation of the sensitivities. If sentiment mattered only because it summarized economic information, removing its fundamental component would have reduced the estimated sensitivities substantially and narrowed the difference between the groups. Neither outcome is observed. The estimated sensitivities therefore reflect the affective component of sentiment rather than its informational content, in line with evidence that sentiment contains a component unrelated to fundamentals that predicts household behavior (Souleles 2004; Ludvigson 2004).

6.6.6 Demographic and socioeconomic subgroups

The analysis next examines whether the income gradient holds within demographic groups. Subgroup sentiment is purged of fundamentals as in (19)–(21), and all subgroups of a specification are estimated jointly; the estimates are reported in Appendix E. Dividing each income group by marital status and sex (Table A.3), affective sensitivity is negative and significant in all eight subgroups (H2). The income gradient is clearest among married households, where low-income women and men are both considerably more sensitive than their high-income counterparts (H3); among single households and between women and men the differences are less systematic.

7 An Extension: Affect on Both Channels

The framework places affect on the recall of the previous belief. A natural extension lets affect also shape how current inflation is weighed.¹⁷ Evidence on feelings as information and on the affect heuristic suggests that a household’s affective state may color its overall judgment rather than one of its inputs (Schwarz and Clore 1983; Finucane et al. 2000; Slovic et al. 2007), and in the Kalman cycle the projection of the updated belief, like the recall of the previous one, is made under the affective state of date t . If affect conditions this projection, $\mathbb{E}_{i,t}(\pi_{t+1}) = \rho(1 + \psi_j \phi_{i,t})\mathbb{E}_{i,t}(\pi_t)$, the updating equation becomes the *two-channel model*

$$\mathbb{E}_{i,t}(\pi_{t+1}) = \rho(1 + \psi_j \phi_{i,t}) [(1 - \gamma_j)\mathbb{E}_{i,t-1}(\pi_t) + \gamma_j \pi_t] + u_{i,t+1}, \quad (25)$$

in which the affective multiplier scales both the previous belief and current inflation, with effective weights $P_j^{\text{TC}}(\phi) = \rho(1 - \gamma_j)(1 + \psi_j \phi)$ and $I_j^{\text{TC}}(\phi) = \rho\gamma_j(1 + \psi_j \phi)$.

Proposition 4 (Affect on both channels). *In the two-channel model (25), with $\rho > 0$, $0 < \gamma_j < 1$ and $\psi_j < 0$, a more favorable affective state lowers both effective weights while the relative weight on current inflation remains equal to γ_j ; Proposition 2 and Remarks 1–2 hold unchanged; and, within the stable region, expectations converge to*

$$\mathbb{E}_j^{*,\text{TC}} = \frac{\alpha_{0j} + \rho\gamma_j m_j \bar{\pi}}{1 - \rho(1 - \gamma_j)m_j}, \quad m_j = 1 + \psi_j \phi, \quad (26)$$

which is increasing and convex in m_j .

Proof. Direct from (25), following the steps of Propositions 1 and 3. □

¹⁷The two-channel model is the subject of ongoing work by the authors; this section presents its main structure and estimates.

Table 7 reports maximum-likelihood estimates of (25), with a group intercept, obtained with the same data and methods as in Section 6. Affective sensitivity is negative and significant in both income groups, the limited-attention benchmark is rejected ($LR = 136.03$), and low-income households remain the more sensitive group: the sensitivities are -0.451 and -0.198 , a ratio of 2.27, and their equality is rejected ($t = -4.73$; HAC $t = -3.81$). The affective channel again lowers long-run expectations well below the benchmark, to 5.15 and 3.63 percent. The income gradient in affective sensitivity therefore does not depend on where affect enters the updating cycle.

Table 7: The two-channel model: maximum-likelihood estimates

	Current fundamentals excluded		Current and future fundamentals excluded	
	Low income	High income	Low income	High income
Affective sensitivity (ψ_j)	-0.451^{**} (0.046) [0.081]	-0.198^{**} (0.028) [0.055]	-0.429^{**} (0.044) [0.083]	-0.195^{**} (0.028) [0.054]
Weight on inflation (γ_j)	0.263^{**} (0.030)	0.173^{**} (0.025)	0.263^{**} (0.031)	0.171^{**} (0.025)
Ratio $ \psi_{\text{Low}} / \psi_{\text{High}} $	2.27 (0.40)		2.20 (0.38)	
Equality t (HAC t)	-4.73^{**} (-3.81)		-4.49^{**} (-3.48)	
LR statistic against $\psi_j = 0$	136.03 ^{**}		132.67 ^{**}	
$\mathbb{E}_j^{*,\text{TC}}$ (benchmark)	5.15 (9.18)	3.63 (6.08)	5.15 (8.97)	3.64 (6.08)

Notes: * $p < 0.05$, ** $p < 0.01$. Estimates of (25) with a group intercept; both income groups are estimated jointly. Standard errors from the inverse Hessian in parentheses, Newey–West HAC standard errors (12 lags) in brackets. $\rho = 0.9928$. Long-run expectations follow (26), with benchmark ($\psi_j = 0$) values in parentheses. Statistics that refer to both income groups jointly (tests, ratios, differences, log-likelihoods and observations) are reported in the low-income column.

8 Conclusion

Low-income households report higher inflation expectations than high-income households and bear a larger share of the costs of inflation. This paper has examined whether the way these households update their expectations reflects their affective evaluations of the economy, in addition to differences in their information. Because consumer sentiment combines both, the affective state was measured by its non-fundamental component, which captures households’ economic mood, the optimism or pessimism that observable economic conditions do not explain. This study extended the limited-attention model so that a household’s affective

tive state conditions the recall of its previous belief, while new information enters as in the benchmark. Because the extension nests the standard model, the relevance of the affective channel is determined empirically rather than assumed.

The evidence supports the affective channel. A more favorable affective state reduces the persistence of previously formed beliefs in both income groups, and low-income households are about two and a half times as sensitive as high-income households. The difference increases rather than disappears when both groups are evaluated at the same level of affect, indicating a difference in the responsiveness of beliefs to affect rather than merely a difference in the level of affect. Excluding the affective channel worsens model fit substantially, because, given the high persistence of inflation, the benchmark model cannot account for the comparatively weak persistence of beliefs. An extension in which affect scales the whole updated belief, the previous belief and current inflation alike, yields the same income gradient. These findings hold whether sentiment is purged of current fundamentals only or of current and future fundamentals, and they are robust across estimators, to autocorrelation-robust inference and first-stage estimation uncertainty, to year fixed effects and within demographic groups. With the unadjusted sentiment index, the sensitivities are approximately one-seventh larger and the ranking of the groups is the same.

Two implications follow. For the study of expectations, affect is not merely a correlate of beliefs but part of the process through which they are updated, operating on a margin, the persistence of previously formed beliefs, that is distinct from attention to new information. Models that allow only for limited attention will therefore attribute to informational differences part of an income gradient that reflects differences in affect. For monetary policy, the expectations of low-income households are the most responsive to fluctuations in sentiment. Communication that addresses households' evaluations of the economy, and not only their information about inflation, is therefore likely to be most effective for the households whose expectations are least anchored.

The analysis is subject to several limitations. Non-fundamental sentiment is an indirect measure of the affective state. It removes the information contained in observable current and future macroeconomic conditions, but private information about households' own circumstances cannot be removed in the same way, and a direct survey measure of affect would provide a sharper test. The model is estimated on income-group averages of a repeated cross-section and abstracts from heterogeneity within groups; the rotating panel component of the survey would allow the mechanism to be examined at the household level.

References

- Afrouzi, H., S. Y. Kwon, A. Landier, Y. Ma, and D. Thesmar. (2023) “Overreaction in expectations: Evidence and theory.” *Quarterly Journal of Economics*, 138, 1713–1764.
- Akerlof, G. A., and R. J. Shiller. (2009) *Animal Spirits: How Human Psychology Drives the Economy, and Why It Matters for Global Capitalism*. Princeton, NJ: Princeton University Press.
- Andre, P., C. Pizzinelli, C. Roth, and J. Wohlfart. (2022) “Subjective models of the macroeconomy: Evidence from experts and representative samples.” *Review of Economic Studies*, 89, 2958–2991.
- Angelico, C., and F. Di Giacomo. (2026) “Heterogeneous inflation expectations and forecast errors across the income distribution: The role of memory.” *Journal of Economic Behavior & Organization*, 246, 107552.
- Baker, M., and J. Wurgler. (2006) “Investor sentiment and the cross-section of stock returns.” *Journal of Finance*, 61, 1645–1680.
- Barsky, R. B., and E. R. Sims. (2012) “Information, animal spirits, and the meaning of innovations in consumer confidence.” *American Economic Review*, 102, 1343–1377.
- Binder, C. (2018) “Estimation of expected inflation with a stochastic volatility model.” *Journal of Money, Credit and Banking*, 50, 1121–1144.
- Binder, C. (2020) “Coronavirus fears and macroeconomic expectations.” *Review of Economics and Statistics*, 102, 721–730.
- Blanchard, O. J., J.-P. L’Huillier, and G. Lorenzoni. (2013) “News, noise, and fluctuations: An empirical exploration.” *American Economic Review*, 103, 3045–3070.
- Bordalo, P., N. Gennaioli, and A. Shleifer. (2020) “Memory, attention, and choice.” *Quarterly Journal of Economics*, 135, 1399–1442.
- Bordalo, P., N. Gennaioli, and A. Shleifer. (2022) “Overreaction and diagnostic expectations in macroeconomics.” *Journal of Economic Perspectives*, 36, 223–244.
- Bordalo, P., N. Gennaioli, F. Lopez-de-Silanes, S. G. Schröder, A. Shleifer, and M. van Rooij. (2026) “The psychology of macroeconomic expectations.” NBER Working Paper No. 35214, National Bureau of Economic Research.
- Bower, G. H. (1981) “Mood and memory.” *American Psychologist*, 36, 129–148.
- Brunnermeier, M. K., and J. A. Parker. (2005) “Optimal expectations.” *American Economic Review*, 95, 1092–1118.
- Bruine de Bruin, W., W. van der Klaauw, J. S. Downs, B. Fischhoff, G. Topa, and O. Armantier. (2010) “Expectations of inflation: The role of demographic variables, expectation formation, and financial literacy.” *Journal of Consumer Affairs*, 44, 381–402.

- Bryan, M. F., and G. Venkatu. (2001) “The curiously different inflation perspectives of men and women.” *Federal Reserve Bank of Cleveland Economic Commentary*, November.
- Caplin, A., and J. Leahy. (2001) “Psychological expected utility theory and anticipatory feelings.” *Quarterly Journal of Economics*, 116, 55–79.
- Carroll, C. D., J. C. Fuhrer, and D. W. Wilcox. (1994) “Does consumer sentiment forecast household spending? If so, why?” *American Economic Review*, 84, 1397–1408.
- Carroll, C. D. (2003) “Macroeconomic expectations of households and professional forecasters.” *Quarterly Journal of Economics*, 118, 269–298.
- Cavallo, A., G. Cruces, and R. Perez-Truglia. (2017) “Inflation expectations, learning, and supermarket prices: Evidence from survey experiments.” *American Economic Journal: Macroeconomics*, 9, 1–35.
- Coibion, O., and Y. Gorodnichenko. (2015) “Information rigidity and the expectations formation process: A simple framework and new facts.” *American Economic Review*, 105, 2644–2678.
- Coibion, O., Y. Gorodnichenko, and R. Kamdar. (2018) “The formation of expectations, inflation, and the Phillips curve.” *Journal of Economic Literature*, 56, 1447–1491.
- Curtin, R. T. (2019) *Consumer expectations: Micro foundations and macro impact*. Cambridge University Press.
- Curtin, R. T. (2022) “A new theory of expectations.” *Journal of Business Cycle Research*, 18, 239–259.
- D’Acunto, F., E. Charalambakis, D. Georgarakos, G. Kenny, J. Meyer, and M. Weber. (2024) “Household inflation expectations: An overview of recent insights for monetary policy.” NBER Working Paper No. 32488, National Bureau of Economic Research.
- D’Acunto, F., U. Malmendier, J. Ospina, and M. Weber. (2021) “Exposure to grocery prices and inflation expectations.” *Journal of Political Economy*, 129, 1615–1639.
- D’Acunto, F., U. Malmendier, and M. Weber. (2022) “What do the data tell us about inflation expectations?” NBER Working Paper No. 29825, National Bureau of Economic Research.
- Damasio, A. R. (1994) *Descartes’ error: Emotion, reason, and the human brain*. Putnam.
- Doh, T., J. Lee, and W. Y. Park. (2024) “Heterogeneity in household inflation expectations and monetary policy.” Research Working Paper No. RWP 24-06, Federal Reserve Bank of Kansas City.
- Ehrmann, M., D. Pfajfar, and E. Santoro. (2017) “Consumers’ attitudes and their inflation expectations.” *International Journal of Central Banking*, 13, 225–259.
- Enke, B., and F. Zimmermann. (2019) “Correlation neglect in belief formation.” *Review of Economic Studies*, 86, 313–332.

- Evans, G. W., and S. Honkapohja. (2001) *Learning and expectations in macroeconomics*. Princeton University Press.
- Finucane, M. L., A. Alhakami, P. Slovic, and S. M. Johnson. (2000) “The affect heuristic in judgments of risks and benefits.” *Journal of Behavioral Decision Making*, 13, 1–17.
- Forgas, J. P. (1995) “Mood and judgment: The affect infusion model (AIM).” *Psychological Bulletin*, 117, 39–66.
- Frijda, N. H. (1993) “Moods, emotion episodes, and emotions.” In *Handbook of Emotions*, edited by M. Lewis and J. M. Haviland, pp. 381–403. New York: Guilford Press.
- Johnson, E. J., and A. Tversky. (1983) “Affect, generalization, and the perception of risk.” *Journal of Personality and Social Psychology*, 45, 20–31.
- Kahneman, D. (2003) “Maps of bounded rationality: Psychology for behavioral economics.” *American Economic Review*, 93, 1449–1475.
- Kahneman, D. (2011) *Thinking, fast and slow*. Farrar, Straus and Giroux.
- Kalman, R. E. (1960) “A new approach to linear filtering and prediction problems.” *Journal of Basic Engineering*, 82, 35–45.
- Kamdar, R. (2019) “The inattentive consumer: Sentiment and expectations.” Working paper, Indiana University.
- Katona, G. (1951) *Psychological analysis of economic behavior*. McGraw-Hill.
- Katona, G. (1975) *Psychological economics*. Elsevier.
- Keynes, J. M. (1936) *The General Theory of Employment, Interest and Money*. London: Macmillan.
- Kuchler, T., and B. Zafar. (2019) “Personal experiences and expectations about aggregate outcomes.” *Journal of Finance*, 74, 2491–2542.
- Künsch, H. R. (1989) “The jackknife and the bootstrap for general stationary observations.” *Annals of Statistics*, 17, 1217–1241.
- Lagerborg, A., E. Pappa, and M. O. Ravn. (2023) “Sentimental business cycles.” *Review of Economic Studies*, 90, 1358–1393.
- LeDoux, J. (1996) *The emotional brain: The mysterious underpinnings of emotional life*. Simon & Schuster.
- Lemmon, M., and E. Portniaguina. (2006) “Consumer confidence and asset prices: Some empirical evidence.” *Review of Financial Studies*, 19, 1499–1529.
- Li, G., and N. R. Sinha. (2023) “Are real assets owners less averse to inflation? Evidence from consumer sentiments and inflation expectations.” FEDS Working Paper No. 2023-058, Board of Governors of the Federal Reserve System.
- Li, G., and N. R. Sinha. (2025) “Gauging inflation aversion through the lens of consumer sentiment.” *Economics Letters*, 256, 112640.

- Link, S., A. Peichl, C. Roth, and J. Wohlfart. (2023) “Information frictions among firms and households.” *Journal of Monetary Economics*, 135, 99–115.
- Loewenstein, G. (2000) “Emotions in economic theory and economic behavior.” *American Economic Review*, 90, 426–432.
- Loewenstein, G. F., E. U. Weber, C. K. Hsee, and N. Welch. (2001) “Risk as feelings.” *Psychological Bulletin*, 127, 267–286.
- Ludvigson, S. C. (2004) “Consumer confidence and consumer spending.” *Journal of Economic Perspectives*, 18, 29–50.
- Lusardi, A., and O. S. Mitchell. (2014) “The economic importance of financial literacy: Theory and evidence.” *Journal of Economic Literature*, 52, 5–44.
- Malmendier, U., and S. Nagel. (2011) “Depression babies: Do macroeconomic experiences affect risk taking?” *Quarterly Journal of Economics*, 126, 373–416.
- Malmendier, U., and S. Nagel. (2016) “Learning from inflation experiences.” *Quarterly Journal of Economics*, 131, 53–87.
- Mani, A., S. Mullainathan, E. Shafir, and J. Zhao. (2013) “Poverty impedes cognitive function.” *Science*, 341, 976–980.
- Mankiw, N. G., and R. Reis. (2002) “Sticky information versus sticky prices: A proposal to replace the New Keynesian Phillips curve.” *Quarterly Journal of Economics*, 117, 1295–1328.
- Mankiw, N. G., R. Reis, and J. Wolfers. (2004) “Disagreement about inflation expectations.” *NBER Macroeconomics Annual*, 18, 209–248.
- Matsusaka, J. G., and A. M. Sbordone. (1995) “Consumer confidence and economic fluctuations.” *Economic Inquiry*, 33, 296–318.
- Mullainathan, S. (2002) “A memory-based model of bounded rationality.” *Quarterly Journal of Economics*, 117, 735–774.
- Muth, J. F. (1961) “Rational expectations and the theory of price movements.” *Econometrica*, 29, 315–335.
- Newey, W. K., and K. D. West. (1987) “A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix.” *Econometrica*, 55, 703–708.
- Nowzohour, L., and L. Stracca. (2020) “More than a feeling: Confidence, uncertainty, and macroeconomic fluctuations.” *Journal of Economic Surveys*, 34, 691–726.
- Pagan, A. (1984) “Econometric issues in the analysis of regressions with generated regressors.” *International Economic Review*, 25, 221–247.
- Parkinson, B., P. Totterdell, R. B. Briner, and S. Reynolds. (1996) *Changing moods: The psychology of mood and mood regulation*. Longman.

- Pessoa, L. (2008) “On the relationship between emotion and cognition.” *Nature Reviews Neuroscience*, 9, 148–158.
- Pessoa, L. (2013) *The cognitive-emotional brain: From interactions to integration*. MIT Press.
- Pessoa, L. (2017) “A network model of the emotional brain.” *Trends in Cognitive Sciences*, 21, 357–371.
- Pfajfar, D., and E. Santoro. (2008) “Asymmetries in inflation expectation formation across demographic groups.” *Journal of Money, Credit and Banking*, 42, 197–215.
- Pfäuti, O. (2023) “The inflation attention threshold and inflation surges.” arXiv preprint 2308.09480.
- Schwarz, N., and G. L. Clore. (1983) “Mood, misattribution, and judgments of well-being: Informative and directive functions of affective states.” *Journal of Personality and Social Psychology*, 45, 513–523.
- Schwarz, N. (2012) “Feelings-as-information theory.” In *Handbook of Theories of Social Psychology*, Vol. 1, edited by P. A. M. Van Lange, A. W. Kruglanski and E. T. Higgins, pp. 289–308. London: Sage.
- Shabalina, E., and M. Tzaawa-Krenzler. (2025) “Heterogeneous attention to inflation and monetary policy.” Working paper, Reserve Bank of Australia and Goethe University Frankfurt.
- Sharot, T. (2011) “The optimism bias.” *Current Biology*, 21, R941–R945.
- Simon, H. A. (1955) “A behavioral model of rational choice.” *Quarterly Journal of Economics*, 69, 99–118.
- Sims, C. A. (2003) “Implications of rational inattention.” *Journal of Monetary Economics*, 50, 665–690.
- Slovic, P., M. L. Finucane, E. Peters, and D. G. MacGregor. (2007) “The affect heuristic.” *European Journal of Operational Research*, 177, 1333–1352.
- Souleles, N. S. (2004) “Expectations, heterogeneous forecast errors, and consumption: Micro evidence from the Michigan Consumer Sentiment Surveys.” *Journal of Money, Credit and Banking*, 36, 39–72.
- Stantcheva, S. (2024) “Why do we dislike inflation?” *Brookings Papers on Economic Activity*, 2024, 1–46.
- Weinstein, N. D. (1980) “Unrealistic optimism about future life events.” *Journal of Personality and Social Psychology*, 39, 806–820.
- Woodford, M. (2003) *Interest and prices: Foundations of a theory of monetary policy*. Princeton University Press.

Zajonc, R. B. (1980) "Feeling and thinking: Preferences need no inferences." *American Psychologist*, 35, 151–175.

Appendix

A Derivation of the Posterior Belief

This appendix derives the updating rule (4) and the structural equation (6) from the four building blocks of the framework: the perceived law of motion (1), the noisy signal (2), the stored forecast and the affect-conditioned recall (3).

Step 1: the stored forecast. At the end of period $t - 1$ the household holds a posterior belief about π_{t-1} with mean $\mathbb{E}_{i,t-1}(\pi_{t-1})$ and variance σ_j^2 . Projecting it with the law of motion gives its forecast of current inflation,

$$\mathbb{E}_{i,t-1}(\pi_t) = \rho \mathbb{E}_{i,t-1}(\pi_{t-1}), \quad \sigma_{\text{prior},j}^2 = \rho^2 \sigma_j^2 + \sigma_\xi^2. \quad (\text{A.1})$$

This is the forecast reported in the survey of period $t - 1$.

Step 2: the recalled prior. At date t the household recalls its stored forecast under its current affective state (Assumption 3),

$$\mu_{i,t}^{\text{prior}} \equiv \tilde{\mathbb{E}}_{i,t-1}(\pi_t) = (1 + \psi_j \phi_{i,t}) \mathbb{E}_{i,t-1}(\pi_t). \quad (\text{A.2})$$

The affective state shifts the mean of the prior but not its variance: it conditions how much of the previous belief is carried forward, not how uncertain the household is about it. The prior distribution is therefore

$$\pi_t \mid \mathcal{I}_{i,t-1}, \phi_{i,t} \sim N(\mu_{i,t}^{\text{prior}}, \sigma_{\text{prior},j}^2). \quad (\text{A.3})$$

Step 3: the likelihood of the signal. Given π_t , the signal (2) is Gaussian,

$$s_{i,t} \mid \pi_t \sim N(\pi_t, \sigma_{\varepsilon,j}^2). \quad (\text{A.4})$$

The affective state does not enter the likelihood, so the signal is read as observed.

Step 4: Bayes' rule and the Kalman gain. Because the prior (A.3) and the likelihood (A.4) are both Gaussian, the posterior is Gaussian with precision equal to the sum of the prior and signal precisions and mean equal to the precision-weighted average of the prior

mean and the signal,

$$\mu_{i,t}^{\text{post}} = (1 - \gamma_j) \mu_{i,t}^{\text{prior}} + \gamma_j s_{i,t}, \quad \gamma_j \equiv \frac{\sigma_{\text{prior},j}^2}{\sigma_{\text{prior},j}^2 + \sigma_{\varepsilon,j}^2}. \quad (\text{A.5})$$

The gain lies in the unit interval and depends only on the relative precision of the signal. As $\sigma_{\varepsilon,j}^2 \rightarrow 0$ the signal is perfectly informative and $\gamma_j \rightarrow 1$; as $\sigma_{\varepsilon,j}^2 \rightarrow \infty$ the signal is uninformative and $\gamma_j \rightarrow 0$. The belief variance evolves as $\sigma_j^2 = \gamma_j \sigma_{\varepsilon,j}^2$; iterating this recursion converges to a unique steady state, and the gain evaluated at the steady-state variance is constant over time and specific to each income group. This steady-state gain is the parameter γ_j estimated in the paper. Writing $\mathbb{E}_{i,t}(\pi_t) \equiv \mu_{i,t}^{\text{post}}$ and adding and subtracting the prior mean yields the innovation form (4).

Step 5: the posterior belief and the forecast. Substituting the signal (2) and the recalled prior (A.2),

$$\mathbb{E}_{i,t}(\pi_t) = \underbrace{(1 - \gamma_j)(1 + \psi_j \phi_{i,t}) \mathbb{E}_{i,t-1}(\pi_t)}_{\text{weight on the previous belief}} + \underbrace{\gamma_j \pi_t}_{\text{weight on inflation}} + \underbrace{\gamma_j \varepsilon_{i,t}}_{\text{signal noise}}, \quad (\text{A.6})$$

which is (5). Projecting with the law of motion, $\mathbb{E}_{i,t}(\pi_{t+1}) = \rho \mathbb{E}_{i,t}(\pi_t)$, gives the structural equation (6). Affect enters only through the first component, so that it governs the persistence of beliefs, while the gain γ_j , which governs attention to new information, is determined by the precision of the signal alone. The signal noise has mean zero and averages out when beliefs are aggregated within an income group (Section 3.7).

B Estimation Details

B.1 Starting values and numerical optimization

The likelihood need not be globally concave, so the optimizer could stop at a local maximum. The parameters are initialized at economically plausible values on the rescaled sentiment scale: $\gamma_j = 0.3$, inside the required interval $(0, 1)$; $\psi_j = -1$, consistent with the sign of Proposition 1; and $\alpha_{0j} = 2$. Inflation persistence is fixed at $\rho = 0.9928$, the coefficient of an AR(1) regression of year-over-year CPI inflation. To check that the reported estimates are a global maximum, the optimization is repeated from a nine-point grid with $\gamma_j \in \{0.15, 0.30, 0.45\}$ and $\psi_j \in \{-0.3, -1, -2\}$. For the pooled model the grid is $\gamma \in \{0.1, 0.2, 0.3\}$ and $\psi \in \{-0.5, -1, -1.5\}$. Convergence to the same log-likelihood from every start is taken as evidence of a global maximum.

B.2 Standard errors and hypothesis tests

Standard errors are obtained from the inverse of the negative Hessian of the log-likelihood at $\hat{\theta}$,

$$\hat{V}(\hat{\theta}) = [-\nabla^2 \ell(\hat{\theta})]^{-1}. \quad (\text{A.7})$$

Because estimation is joint across the two groups, this matrix covers all parameters of both groups. Autocorrelation-robust standard errors use the sandwich

$$\hat{V}_{\text{HAC}} = \hat{V} \left[\sum_{l=-L}^L \left(1 - \frac{|l|}{L+1}\right) \sum_t g_t g'_{t-l} \right] \hat{V}, \quad L = 12, \quad (\text{A.8})$$

where g_t is the sum over both groups of the scores of month t (Newey and West 1987). For a linear restriction $R\theta = r$, the Wald statistic

$$W = (R\hat{\theta} - r)' [R\hat{V}R']^{-1} (R\hat{\theta} - r) \quad (\text{A.9})$$

is asymptotically χ^2 with degrees of freedom equal to the number of restrictions. It is used for $H_0 : \psi_{\text{Low}} = \psi_{\text{High}}$ (Proposition 2) and for $H_0 : \psi_{\text{Low}} = \psi_{\text{High}} = 0$ (Remark 2). Functions of the parameters, such as the sensitivity ratio, the effective weights and the long-run expectation, are tested by the delta method.

B.3 Robustness estimators

Nonlinear GLS and the residual variance. The baseline likelihood (22) allows a separate residual variance for each group. Nonlinear generalized least squares minimizes the weighted sum of squares $\sum_j \sigma_j^{-2} \sum_t (\mathbb{E}_{j,t}(\pi_{t+1}) - \mu_{j,t}(\theta))^2$ and updates the group variances from the residuals until they converge, and therefore reproduces the point estimates; its covariance matrix is $(J'WJ)^{-1}$, where J is the Jacobian of the conditional mean and W the diagonal matrix of inverse variances. For the eight-subgroup specifications the variances are held at their maximum-likelihood values (two-step feasible GLS). Imposing a common variance $\sigma_{\text{Low}} = \sigma_{\text{High}}$ is tested against the baseline by a likelihood-ratio test with one degree of freedom.

Bayesian estimation. The posterior combines the Gaussian likelihood with weakly informative priors,

$$p(\theta \mid \text{data}) \propto \exp\{\ell(\theta)\} \times \prod_j \text{Beta}(\gamma_j; 2, 2) \times \prod_j N(\psi_j; 0, 2^2) \times \prod_j N(\alpha_{0j}; 0, 5^2). \quad (\text{A.10})$$

The Beta(2,2) prior keeps γ_j inside $(0, 1)$ without favoring either boundary. The prior on ψ_j is centered at the null of Remark 2, not at the sign predicted by Proposition 1, so that the posterior reflects the data rather than the hypothesis under test. The group-specific error standard deviations are fixed at their maximum-likelihood values, and ρ is fixed at 0.9928. Draws are generated by a random-walk Metropolis–Hastings sampler with proposal covariance $2.38^2/d$ times the inverse Hessian of the maximum-likelihood fit, where d is the number of sampled parameters (three per group). The sampler runs 40,000 iterations and discards the first 8,000; convergence is assessed from effective sample sizes.

Moving-block bootstrap. Calendar months are resampled in blocks of twelve consecutive months (499 draws). In every draw the decomposition regression (19) (or (21)) is re-estimated on the resampled months, non-fundamental sentiment is rebuilt, and the model is re-estimated, so that the bootstrap distribution accounts for the first-step estimation of the affective measure.

Year fixed effects. Let $D_{t,\tau} = \mathbf{1}[t \in \tau]$ indicate that month t falls in calendar year τ . The year effect in (23) is $\delta_t = \sum_{\tau=2}^T \delta_\tau D_{t,\tau}$, with the first year normalized to zero. This adds 47 parameters for the 48 years in the sample. For given $(\gamma_j, \psi_j, \sigma_j)$, the intercepts and year effects are obtained by weighted least squares, and the likelihood is maximized over the remaining parameters (profile likelihood).

Model fit. Four nested specifications, with and without sentiment and with and without year effects, are compared by the sum of squared residuals and by $\text{AIC} = n \log(\text{SSR}/n) + 2k$ and $\text{BIC} = n \log(\text{SSR}/n) + k \log n$, where k is the number of mean parameters.

B.4 Software

All estimation was carried out in R. Maximum likelihood uses direct numerical optimization of the Gaussian log-likelihood (`optim`, `BFGS`), with Hessians and score matrices from `numDeriv`; nonlinear GLS uses iterated feasible weighted least squares, and Bayesian estimation a custom Metropolis–Hastings sampler with Hessian-scaled proposals. A single script reproduces every table.

C Decomposition of Consumer Sentiment and Forecast Accuracy

This appendix reports the decomposition regressions of Section 4.5 (Table A.1), the resulting fundamental and non-fundamental components (Figure A.1) and the accuracy of inflation expectations by income group discussed in Section 4.6 (Figure A.2). These results do not depend on the model of expectation formation.

Table A.1: What explains consumer sentiment? The decomposition regression

	Current fundamentals (1)	Current and future fundamentals (2)
High-income group ($a_{\text{High}} - a_{\text{Low}}$)	0.1070** (0.0135)	0.1069** (0.0109)
<i>Current fundamentals</i>		
Unemployment rate (u_t)	-0.0168** (0.0044)	-0.0138** (0.0050)
CPI inflation (π_t)	-0.0134** (0.0022)	-0.0121** (0.0042)
Real disposable income growth (Δy_t)	0.0087** (0.0028)	0.0103** (0.0019)
Stock return (r_t^{stock})	0.0007** (0.0002)	0.0003 (0.0002)
Gasoline inflation (π_t^{gas})	0.0004 (0.0004)	0.0001 (0.0004)
Industrial production growth		0.0062** (0.0011)
<i>Future fundamentals (next twelve months)</i>		
CPI inflation (π_{t+12})		0.0010 (0.0027)
Change in unemployment ($u_{t+12} - u_t$)		0.0085 (0.0050)
Industrial production growth		0.0051** (0.0014)
Real disposable income growth		0.0068** (0.0019)
Stock return		-0.0006** (0.0002)
R^2	0.521	0.638
R^2 , group-specific slopes	0.524	
Observations	1,144	1,140

Notes: * $p < 0.05$, ** $p < 0.01$. Newey and West (1987) standard errors with 12 lags in parentheses. Constants are not reported. Coefficients are reported to four decimals because the regressors are in percent while sentiment is on the $[0, 1]$ scale. Growth rates and returns are twelve-month percentage changes. Column (1) corresponds to (19); column (2) corresponds to (21), whose sample ends in August 2025 because twelve-month-ahead values are required. The second R^2 allows every slope to differ by income group.

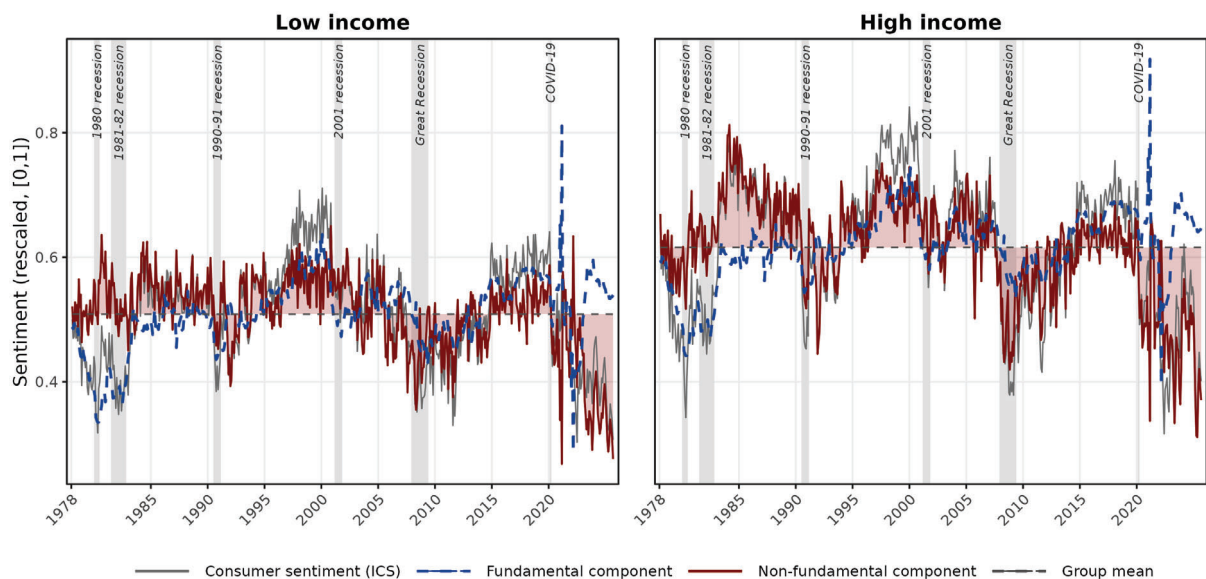


Figure A.1: Decomposition of consumer sentiment into fundamental and non-fundamental components

Notes: Michigan Survey of Consumers and FRED, monthly, February 1978 to September 2025. Each panel plots group consumer sentiment (ICS, rescaled to $[0, 1]$, grey line), its fundamental component (fitted value from regression (19); dashed line), and its non-fundamental component (residual plus the group mean, (20); red line). The red shading shows the deviation of non-fundamental sentiment from the group mean (dashed grey line; 0.51 for low-income and 0.62 for high-income households). Fundamentals explain 52 percent of the variation in sentiment (Table A.1). Grey bands are NBER recessions.

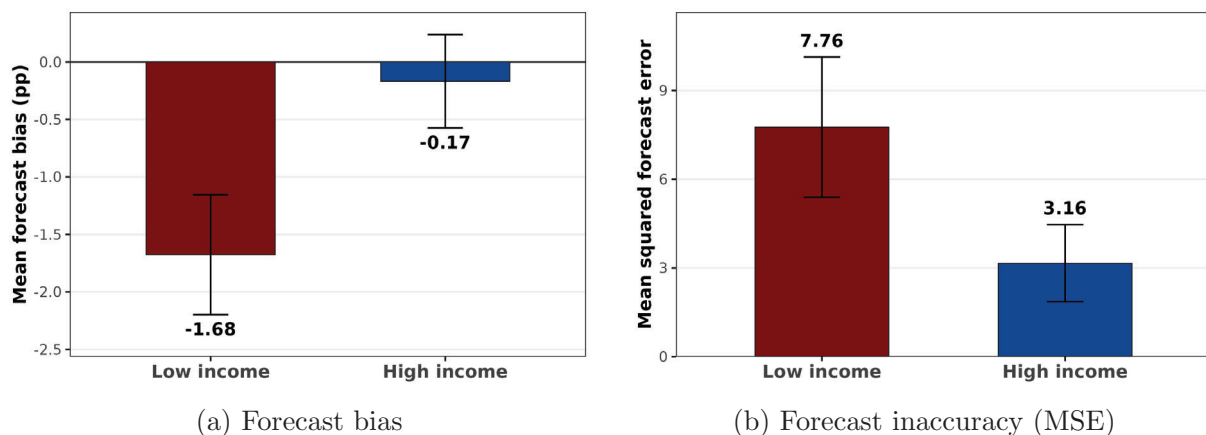


Figure A.2: Income and the accuracy of inflation expectations

Notes: Michigan Survey of Consumers and FRED, monthly, February 1978 to August 2025 (570 months per group). The forecast error is realized CPI inflation over the following twelve months minus expected inflation; negative values indicate that households expected more inflation than materialized. (a) Mean forecast bias. (b) Mean squared forecast error. Error bars are 95% confidence intervals based on Newey–West standard errors with 12 lags.

D Descriptive Statistics by Demographic Group

Table A.2 reports descriptive statistics for the eight subgroups used in Section 6.6.6. The pattern in Table 1 holds within each subgroup. Every low-income subgroup reports higher expected inflation (4.37 to 5.94 percent) than every high-income subgroup (3.43 to 3.89 percent), together with lower sentiment (0.484 to 0.561, against 0.580 to 0.642). Married low-income women report the highest expected inflation (5.94 percent) and the lowest sentiment (0.484). The number of responses ranges from 5,960 (high-income single women) to 38,656 (high-income married men), corresponding to approximately 10 to 68 respondents per subgroup and month, so that the averages for the smaller subgroups are less precise. Purging current fundamentals lowers the standard deviation of sentiment by 9 to 18 percent, and adding future fundamentals lowers it further, while the mean is unchanged by construction.

Table A.2: Descriptive statistics by income, marital status and sex

	Low income				High income			
	Married		Single		Married		Single	
	Female (1)	Male (2)	Female (3)	Male (4)	Female (5)	Male (6)	Female (7)	Male (8)
Responses	12,831	12,767	30,116	16,788	27,286	38,656	5,960	9,599
Months	570	570	570	570	570	570	566	570
<i>Expected inflation (%)</i>								
Mean	5.94	4.55	5.47	4.37	3.89	3.43	3.84	3.53
SD	2.76	2.16	2.22	2.13	1.99	1.82	2.61	2.13
<i>Sentiment (ϕ)</i>								
Mean	0.484	0.516	0.490	0.561	0.589	0.636	0.580	0.642
SD	0.097	0.103	0.086	0.098	0.114	0.109	0.151	0.129
<i>Non-fundamental sentiment, SD</i>								
Current fundamentals excluded	0.082	0.091	0.072	0.087	0.093	0.090	0.137	0.116
Current and future fundamentals excluded	0.077	0.086	0.064	0.080	0.080	0.076	0.129	0.106

Notes: Responses are the individual survey responses in each subgroup; months are the subgroup-month averages used in estimation. Means and standard deviations are computed over the monthly subgroup averages. Sentiment is the rescaled ICS of Table 1. The last two rows report the standard deviation of non-fundamental sentiment, purged of current fundamentals and of current and future fundamentals with slopes common to all subgroups; its mean equals that of sentiment by construction.

E Additional Robustness Tables

Table A.3: Affective sensitivity $\hat{\psi}_j$ by income, marital status and sex

	Non-fundamental sentiment			
	Current fundamentals excluded		Current and future fundamentals excluded	
	Low income (1)	High income (2)	Low income (3)	High income (4)
<i>Married</i>				
Females	-1.222** (0.121)	-0.672** (0.072)	-1.182** (0.119)	-0.661** (0.070)
Males	-1.474** (0.114)	-0.293** (0.041)	-1.407** (0.111)	-0.287** (0.040)
Difference	0.252 (0.166)	-0.379** (0.082)	0.225 (0.163)	-0.374** (0.081)
Low – high income, females	-0.550** (0.141)		-0.520** (0.138)	
Low – high income, males	-1.181** (0.121)		-1.120** (0.118)	
<i>Single</i>				
Females	-0.890** (0.088)	-1.813** (0.178)	-0.862** (0.087)	-1.796** (0.181)
Males	-1.162** (0.096)	-0.937** (0.089)	-1.083** (0.093)	-0.922** (0.088)
Difference	0.272* (0.130)	-0.876** (0.199)	0.221 (0.127)	-0.875** (0.201)
Low – high income, females	0.923** (0.199)		0.934** (0.201)	
Low – high income, males	-0.225 (0.131)		-0.161 (0.128)	

Notes: * $p < 0.05$, ** $p < 0.01$. Maximum-likelihood estimates of ψ_j from (15); standard errors in parentheses. Subgroup sentiment is purged of current fundamentals (columns 1–2) or of current and twelve-month-ahead fundamentals (columns 3–4), with slopes common to all subgroups, and each subgroup’s mean is added back, as in (19)–(21). All eight subgroups are estimated jointly, each with its own α_{0j} , γ_j and residual variance, and with ρ fixed at 0.9928; nine starting values converged to the same negative log-likelihood (8075 in columns 1–2). Difference is females minus males, with standard errors from the joint covariance matrix. Married households are those coded married or living with a partner (MARRY = 1); single households are those divorced or separated, widowed or never married (MARRY = 3–5). High-income single women have a median of 9 respondents per month; their estimate implies an affective multiplier below zero at the subgroup’s mean sentiment and should be interpreted with caution. Statistics that refer to both income groups jointly (tests, ratios, differences, log-likelihoods and observations) are reported in the low-income column.

Table A.4: Affective sensitivity $\hat{\psi}_j$ by income and education

	Non-fundamental sentiment					
	Current fundamentals excluded			Current and future fundamentals excluded		
	Low income (1)	High income (2)	Low – high income (3)	Low income (4)	High income (5)	Low – high income (6)
Low education	−0.890** (0.091)	−2.332** (0.295)	1.442** (0.309)	−0.828** (0.087)	−2.894** (0.445)	2.066** (0.453)
Higher education	−0.765** (0.076)	−0.224** (0.035)	−0.541** (0.083)	−0.713** (0.073)	−0.222** (0.034)	−0.491** (0.081)

Notes: * $p < 0.05$, ** $p < 0.01$. Maximum-likelihood estimates of ψ_j from (15); standard errors in parentheses. Education follows the survey codebook: low education is a high-school diploma or less (EDUC = 1–3) and higher education is some college or more (EDUC = 4–6). The four subgroups are estimated jointly with ρ fixed at 0.9928 and subgroup-specific residual variances; differences use the joint covariance matrix. All estimated gains lie in the unit interval ($\hat{\gamma}_j$ between 0.15 and 0.68). High-income households with low education have a median of 17 respondents per month; their estimate implies an affective multiplier below zero at the subgroup’s mean sentiment and should be interpreted with caution.

Table A.5: Affective sensitivity $\hat{\psi}_j$ by income, education and sex

	Non-fundamental sentiment			
	Current fundamentals excluded		Current and future fundamentals excluded	
	Low income (1)	High income (2)	Low income (3)	High income (4)
<i>Low education</i>				
Females	−0.925** (0.101)	−1.710** (0.217)	−0.839** (0.096)	−1.680** (0.202)
Males	−1.346** (0.108)	−1.464** (0.141)	−1.288** (0.104)	−1.429** (0.183)
Difference	0.421** (0.148)	−0.246 (0.259)	0.449** (0.141)	−0.251 (0.273)
<i>Higher education</i>				
Females	−1.151** (0.103)	−0.655** (0.069)	−1.100** (0.102)	−0.631** (0.067)
Males	−1.017** (0.093)	−0.253** (0.036)	−0.953** (0.090)	−0.251** (0.036)
Difference	−0.134 (0.139)	−0.402** (0.078)	−0.147 (0.137)	−0.380** (0.076)

Notes: * $p < 0.05$, ** $p < 0.01$. Maximum-likelihood estimates of ψ_j from (15); standard errors in parentheses. The eight subgroups are estimated jointly with ρ fixed at 0.9928 and subgroup-specific residual variances. Difference is females minus males, with standard errors from the joint covariance matrix. Education is defined as in Table A.4. Nine starting values converged to the same negative log-likelihood (8573 in columns 1–2). All estimated gains lie in the unit interval. The two high-income, low-education subgroups have medians of 8 and 11 respondents per month.

Table A.6: Structural estimates by nonlinear GLS and Bayesian estimation

	Non-fundamental sentiment					
	Current fundamentals excluded			Current and future fundamentals excluded		
	Pooled sample (1)	Low income (2)	High income (3)	Pooled sample (4)	Low income (5)	High income (6)
<i>Affective sensitivity (ψ_j)</i>						
Maximum likelihood	-0.244** (0.038)	-0.621** (0.068)	-0.240** (0.037)	-0.238** (0.037)	-0.585** (0.065)	-0.235** (0.036)
NLGLS	-0.244** (0.038)	-0.621** (0.068)	-0.240** (0.037)	-0.238** (0.037)	-0.585** (0.065)	-0.235** (0.036)
Bayesian	-0.248** (0.038)	-0.624** (0.068)	-0.244** (0.037)	-0.242** (0.037)	-0.590** (0.065)	-0.238** (0.036)
ML, block bootstrap		-0.621** (0.142)	-0.240** (0.082)		-0.585** (0.147)	-0.235** (0.088)
<i>Ratio ψ_{Low} / ψ_{High}</i>						
Maximum likelihood		2.59 (0.49)			2.49 (0.47)	
NLGLS		2.59 (0.49)			2.49 (0.47)	
Bayesian		2.62 (0.51)			2.53 (0.49)	
$\Pr(\psi_{Low} < \psi_{High})$, Bayesian		1.00			1.00	
$\psi_{Low} < \psi_{High}$, share of bootstrap draws		1.00			1.00	

Notes: * $p < 0.05$, ** $p < 0.01$. Standard errors in parentheses; Bayesian rows report posterior means and posterior standard deviations, and the bootstrap row reports the standard deviation of the bootstrap distribution. ρ is fixed at 0.9928 in all columns. With a single group, NLGLS has no cross-group variance structure and reproduces the maximum-likelihood estimates. The standard error of the ratio is computed by the delta method for ML and NLGLS and from the posterior draws for the Bayesian rows. The samplers ran 40,000 iterations (8,000 discarded) and hold the residual standard deviations at their maximum-likelihood values; acceptance rates are 27.5–27.6 percent for the income groups and 31.6–32.1 percent for the pooled sample. The block bootstrap resamples twelve-month blocks of calendar months (499 draws) and repeats both the decomposition regression and the estimation in every draw; its 95 percent intervals are $[-1.021, -0.480]$ and $[-0.437, -0.139]$ for ψ_{Low} and ψ_{High} ($[-0.985, -0.441]$ and $[-0.462, -0.132]$ with current and future fundamentals excluded). A likelihood-ratio test rejects a common residual variance for the two groups ($LR = 101.9$, $p < 0.001$). Statistics that refer to both income groups jointly (tests, ratios, differences, log-likelihoods and observations) are reported in the low-income column.

Table A.7: Subgroup estimates of $\hat{\psi}_j$ across estimators

Subgroup	Non-fundamental sentiment							
	Low income				High income			
	Current fundamentals excluded		Current and future fundamentals excluded		Current fundamentals excluded		Current and future fundamentals excluded	
	ML (1)	FGLS (2)	Bayesian (3)	ML (4)	ML (5)	FGLS (6)	Bayesian (7)	ML (8)
<i>Marital status $\times$ sex</i>								
Married, female	-1.222** (0.121)	-1.222** (0.121)	-1.224** (0.119)	-1.182** (0.119)	-0.672** (0.072)	-0.672** (0.072)	-0.682** (0.074)	-0.661** (0.070)
Married, male	-1.474** (0.114)	-1.474** (0.114)	-1.474** (0.109)	-1.407** (0.111)	-0.293** (0.041)	-0.293** (0.041)	-0.295** (0.040)	-0.287** (0.040)
Single, female	-0.890** (0.088)	-0.890** (0.088)	-0.894** (0.088)	-0.862** (0.087)	-1.813** (0.178)	-1.813** (0.178)	-1.813** (0.180)	-1.796** (0.181)
Single, male	-1.162** (0.096)	-1.162** (0.096)	-1.166** (0.094)	-1.083** (0.093)	-0.937** (0.089)	-0.937** (0.089)	-0.933** (0.087)	-0.922** (0.088)
<i>Education</i>								
Low education	-0.890** (0.091)	-0.890** (0.091)	-0.891** (0.092)	-0.828** (0.087)	-2.332** (0.295)	-2.332** (0.295)	-2.323** (0.313)	-2.894** (0.445)
Higher education	-0.765** (0.076)	-0.765** (0.076)	-0.769** (0.075)	-0.713** (0.073)	-0.224** (0.035)	-0.224** (0.035)	-0.226** (0.035)	-0.222** (0.034)
<i>Education $\times$ sex</i>								
Low educ., female	-0.925** (0.101)	-0.925** (0.101)	-0.923** (0.104)	-0.839** (0.096)	-1.710** (0.217)	-1.710** (0.217)	-1.710** (0.221)	-1.680** (0.202)
Low educ., male	-1.346** (0.108)	-1.346** (0.108)	-1.346** (0.110)	-1.288** (0.104)	-1.464** (0.141)	-1.464** (0.141)	-1.467** (0.132)	-1.429** (0.183)
Higher educ., female	-1.151** (0.103)	-1.151** (0.103)	-1.157** (0.103)	-1.100** (0.102)	-0.655** (0.069)	-0.655** (0.069)	-0.660** (0.069)	-0.631** (0.067)
Higher educ., male	-1.017** (0.093)	-1.017** (0.093)	-1.023** (0.092)	-0.953** (0.090)	-0.253** (0.036)	-0.253** (0.036)	-0.253** (0.037)	-0.251** (0.036)

Notes: * $p < 0.05$, ** $p < 0.01$. Standard errors in parentheses; the Bayesian columns report posterior means and posterior standard deviations (40,000 draws, 8,000 discarded). The subgroups within each specification are estimated jointly with ρ fixed at 0.9928. The FGLS columns report two-step feasible GLS with group-specific variances from the maximum-likelihood fit. Columns (4) and (8) use sentiment purged of current and twelve-month-ahead fundamentals, with the sample ending in August 2025.

F Results with Consumer Sentiment

This appendix reports the estimates obtained when the unadjusted Index of Consumer Sentiment, rescaled as in (18), is used as the measure of the affective state in place of non-fundamental sentiment. With consumer sentiment, the pooled sensitivity is -0.266 , and the sensitivities are -0.706 for low-income and -0.268 for high-income households, a ratio of 2.63 (Table A.8). All conclusions of Section 6 hold with this measure. The sensitivities are approximately one-seventh larger than with non-fundamental sentiment, which is consistent with a small informational component in consumer sentiment. Table A.9 compares the estimates across all sentiment measures, including the decomposition with group-specific slopes (footnote 13).

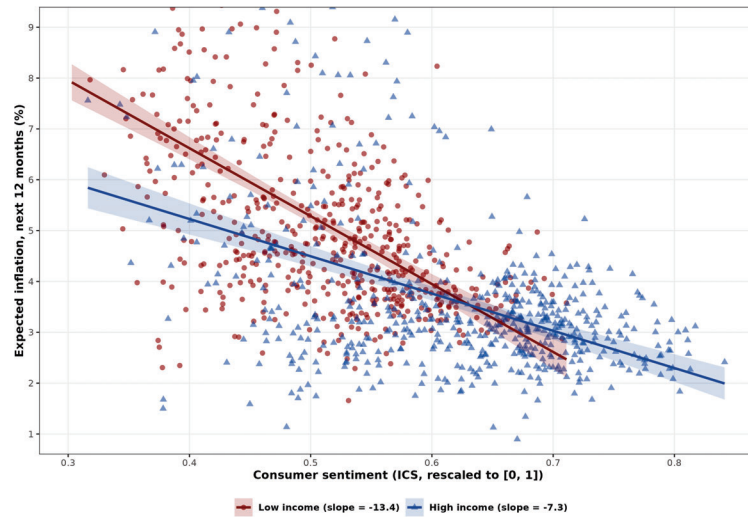


Figure A.3: Expected inflation and consumer sentiment (ICS), by income group

Notes: Michigan Survey of Consumers, monthly, February 1978 to September 2025. Each point is a monthly group average of one-year-ahead expected inflation plotted against the group's rescaled Index of Consumer Sentiment, before the fundamental component is removed. Lines are least-squares fits by income group, with 95% confidence bands. The vertical axis is restricted to 1–9 percent, as in Figure 2.

Table A.8: Structural maximum-likelihood estimates (consumer sentiment)

	Consumer sentiment (ICS)		
	Pooled (1)	Low income (2)	High income (3)
<i>Structural parameters</i>			
Affective sensitivity (ψ_j)	-0.266** (0.045)	-0.706** (0.074)	-0.268** (0.042)
Weight on current inflation (γ_j)	0.104	0.166	0.134
<i>Hypothesis tests</i>			
$H_0: \psi_j = 0$, LR statistic	37.84**	135.14**	
Ratio $ \psi_{\text{Low}} / \psi_{\text{High}} $		2.63** (0.50)	
$H_0: \psi_{\text{Low}} = \psi_{\text{High}}$, t -statistic		-5.17**	
R^2	0.887	0.729	0.870
Observations	572	1,144	

Notes: * $p < 0.05$, ** $p < 0.01$. Standard errors in parentheses. Column (1) estimates one common (α_0, γ, ψ) for all households; columns (2)–(3) estimate the two income groups jointly ($n = 1,144$), which yields the cross-group covariance used for the hypothesis tests. ρ is fixed at 0.9928. The standard error of the sensitivity ratio is computed by the delta method, and its stars test the ratio against one. A nine-point multi-start check confirms the global optimum. The ratio and equality test use the delta method; the two groups have separate parameters and variances, so their estimates are independent. Statistics that refer to both income groups jointly (tests, ratios, differences, log-likelihoods and observations) are reported in the low-income column.

Table A.9: Affective sensitivity with consumer sentiment (ICS) and non-fundamental sentiment

	Non-fundamental sentiment							
	Consumer sentiment (ICS)		Current fundamentals excluded				Current and future fundamentals excluded	
			Common slopes		Group slopes		Common slopes	
	Low income	High income	Low income	High income	Low income	High income	Low income	High income
ML	-0.706** (0.074)	-0.268** (0.042)	-0.621** (0.068)	-0.240** (0.037)	-0.644** (0.069)	-0.237** (0.036)	-0.585** (0.065)	-0.235** (0.036)
Share retained (%)			88	90			82	89
R^2	0.729	0.870	0.731	0.871	—	—	0.725	0.872
Observations	1,144		1,144		1,144		1,140	

Notes: * $p < 0.05$, ** $p < 0.01$. Standard errors in parentheses. ρ is fixed at 0.9928 in all columns. The share retained is the non-fundamental estimate as a percentage of the ICS estimate on the same sample. The last two columns purge sentiment of current and twelve-month-ahead fundamentals, (21); because future values are required, the sample ends in August 2025 ($n = 1,140$). R^2 is that of the structural expectation equation (15), computed from the maximum-likelihood fitted values for each group; it is not computed for the group-slopes construction. Statistics that refer to both income groups jointly (tests, ratios, differences, log-likelihoods and observations) are reported in the low-income column.

G Model Fit

Figure A.4 plots the affective contribution $C_{j,t}$ defined in (24), the difference between the fitted expectations of the affective model and the benchmark.

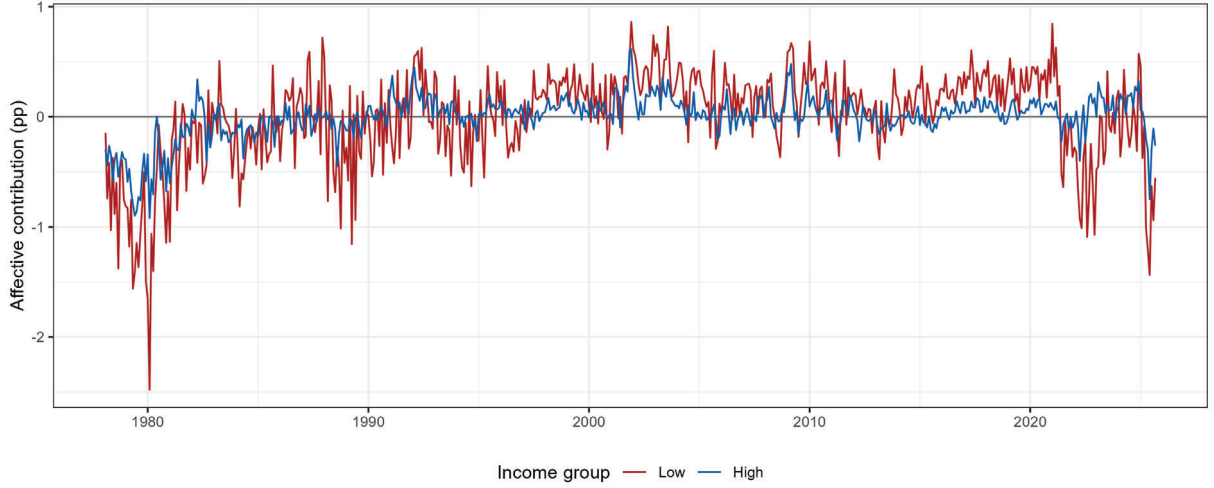


Figure A.4: Affective contribution to fitted inflation expectations

Notes: Michigan Survey of Consumers, monthly, February 1978 to September 2025. The affective contribution $C_{j,t}$ in (24) is the fitted expectation of the affective model with non-fundamental sentiment (current fundamentals excluded; Table 3, columns 3–4) minus the fitted expectation of the limited-attention benchmark with $\psi_j = 0$ (columns 1–2), in percentage points. Both models are estimated by maximum likelihood with $\rho = 0.9928$. The standard deviations are 0.43 (low income) and 0.19 (high income).

H Additional Robustness Results

This section reports the tables discussed in the robustness section of the main text.

Table A.10: Structural estimates with and without year fixed effects

	Non-fundamental sentiment							
	Current fundamentals excluded				Current and future fundamentals excluded			
	No year FE		Year FE		No year FE		Year FE	
	Low income (1)	High income (2)	Low income (3)	High income (4)	Low income (5)	High income (6)	Low income (7)	High income (8)
<i>Structural parameters</i>								
Affective sensitivity (ψ_j)	-0.621** (0.068)	-0.240** (0.037)	-1.146** (0.082)	-0.822** (0.069)	-0.585** (0.065)	-0.235** (0.036)	-1.078** (0.080)	-0.788** (0.067)
Weight on inflation (γ_j)	0.221**	0.156**	0.221	0.233	0.219**	0.153**	0.228	0.242
<i>Hypothesis tests</i>								
Ratio $ \psi_{\text{Low}} / \psi_{\text{High}} $	2.59 (0.49)		1.39 (0.12)		2.49 (0.47)		1.37 (0.12)	
$H_0: \psi_{\text{Low}} = \psi_{\text{High}}$, t -statistic	-4.96**		-3.78**		-4.70**		-3.46**	
<i>Model fit</i>								
Log-likelihood	-1380.94		-1258.46		-1378.39		-1252.20	
Observations	1,144		1,144		1,140		1,140	

Notes: * $p < 0.05$, ** $p < 0.01$. Standard errors in parentheses; the standard error of the ratio is computed by the delta method. ρ is fixed at 0.9928 in all columns. Year FE adds one fixed effect per calendar year, common to both groups, estimated by profile likelihood. Both income groups are estimated jointly, so the tests, log-likelihood and number of observations refer to the two groups together. Each specification was estimated from four starting values, which converged to the same log-likelihood. Statistics that refer to both income groups jointly (tests, ratios, differences, log-likelihoods and observations) are reported in the low-income column.

Table A.11: Model fit comparison

Model	k	Non-fundamental sentiment					
		Current fundamentals excluded			Current and future fundamentals excluded		
		SSR	AIC	BIC	SSR	AIC	BIC
No sentiment, no year FE	4	945.02	-210.60	-190.43	942.20	-209.24	-189.08
Sentiment, no year FE (primary)	6	818.71	-370.73	-340.48	820.96	-362.27	-332.04
No sentiment, year FE	51	760.00	-365.85	-108.70	751.09	-373.67	-116.69
Sentiment, year FE	53	652.30	-536.68	-269.44	650.77	-533.11	-266.05

Notes: ρ is fixed at 0.9928 in every row; k counts the mean parameters; models are estimated by nonlinear least squares; $n = 1,144$ for current fundamentals and $n = 1,140$ for current and future fundamentals; $\text{AIC} = n \log(\text{SSR}/n) + 2k$ and $\text{BIC} = n \log(\text{SSR}/n) + k \log n$.

Table A.12: Affective sensitivity under alternative constructions of non-fundamental sentiment

	Non-fundamental sentiment			
	Group mean (baseline)		Pooled mean	
	(1)	(2)	(3)	(4)
<i>Panel A. Affective sensitivity (ψ_j)</i>				
	Low income	High income	Low income	High income
<i>Current fundamentals excluded</i>				
Common slopes	−0.621** (0.068)	−0.240** (0.037)	−0.545** (0.060)	−0.262** (0.040)
Group slopes	−0.644** (0.069)	−0.237** (0.036)	−0.563** (0.061)	−0.259** (0.039)
<i>Current and future fundamentals excluded</i>				
Common slopes	−0.585** (0.065)	−0.235** (0.036)	−0.517** (0.058)	−0.258** (0.039)
Group slopes	−0.627** (0.068)	−0.226** (0.035)	−0.550** (0.061)	−0.248** (0.038)
<i>Panel B. Hypothesis tests</i>				
	Ratio low/high	Equality <i>t</i> -statistic	Ratio low/high	Equality <i>t</i> -statistic
<i>Current fundamentals excluded</i>				
Common slopes	2.59** (0.49)	−4.96**	2.08** (0.39)	−3.91**
Group slopes	2.71** (0.50)	−5.22**	2.17** (0.41)	−4.16**
<i>Current and future fundamentals excluded</i>				
Common slopes	2.49** (0.47)	−4.70**	2.00** (0.38)	−3.68**
Group slopes	2.77** (0.52)	−5.25**	2.22** (0.42)	−4.23**

Notes: * $p < 0.05$, ** $p < 0.01$. Maximum-likelihood estimates; standard errors in parentheses. Ratio low/high is $|\psi_{\text{Low}}|/|\psi_{\text{High}}|$, with a delta-method standard error and stars testing the ratio against one; the equality *t*-statistic tests $H_0: \psi_{\text{Low}} = \psi_{\text{High}}$. Common slopes estimate one effect of each fundamental for both income groups, as in (19) and (21); group slopes let every effect differ by income group (footnote 13). The residual of the decomposition is re-centred either on the group's own mean sentiment (0.509 and 0.616) or on the mean sentiment of both groups together (0.562), which removes the difference in the average level of affect between the groups. The two groups are estimated jointly with ρ fixed at 0.9928. The common-slopes rows of columns (1)–(2) reproduce the income-group estimates of Table 2.