

TI 2026-080/II
Tinbergen Institute Discussion Paper

Heterogeneity in Expectations: Empirical and Experimental Evidence

Isabelle Salle ¹
Hung Truong ²

¹ University of Amsterdam

² University of Ottawa and Faculty of Political Economy, VNU University of Economics and Business, Vietnam National University, Hanoi, Vietnam

Heterogeneity in Expectations: Empirical and Experimental Evidence

Isabelle Salle^{1,2,3}

Hung Truong²

¹*University of Amsterdam*

²*University of Ottawa*

³*Tinbergen Institute*

2026-09-28

This chapter surveys the empirical literature in macroeconomics on heterogeneous expectations both from surveys and laboratory experiments.¹ For a comprehensive treatment of expectations beyond heterogeneity, we refer to the recent Handbook of Economic Expectations [Bachmann et al., 2023]. Section 1 defines the main concepts, Section 2 provides a historical perspective, Section 3 focuses on inflation expectations, Section 4 broadens up to other variables, and Section 5 concludes with avenues for future work.

1 Heterogeneity in expectations: a road map

1.1 Heterogeneous expectations and the FIRE benchmark

Expectations refer to agents' beliefs about future economic outcomes, whether aggregate, such as inflation or policy actions, or individual, such as household income growth or employment opportunities. They are forward-looking objects formed from memory, attention, information, experience, or interpretation. The benchmark full-information rational-expectations (FIRE) framework – covered in Chapter 2 – leaves out these dimensions since FIRE agents share the same model-consistent forecast conditional on the same information set. This assumption is analytically powerful but leaves little room for empirical regularities in expectations formation that have proven economically consequential.

¹We do not cover heterogeneous expectations models; see Chapter 7, which covers heuristics-switching and evolutionary models, and Chapters 8–10 on their policy implications. Other approaches include diverse rational beliefs [Kurz et al., 2013], two-type models [Branch and Gasteiger, 2019; Andrade et al., 2019; Goy et al., 2022; Ozden, 2025], epidemiological expectations [Carroll and Wang, 2023], and hybrid approaches [Evans et al., 2025]. See Bullard et al. [2026] and Armenta and Milani [2026] on matching the survey expectations with models. Heterogeneous-expectations New Keynesian (HENK) models remain a much smaller literature compared to the heterogeneous-agent (HANK) literature. On the time-series literature on forecast disagreement as a measure of economic uncertainty, see, e.g., Lahiri and Sheng [2010].

1.2 What is ‘heterogeneity’ in expectations?

Heterogeneity in expectations is not a single empirical fact but a family of related objects that describe how beliefs are distributed across agents, forecasting horizons, or states of the economy. Distinguishing these dimensions is essential because they point to different interpretations, expectations models, or economic effects. We must therefore begin by separating the main dimensions of heterogeneity.

Differences in the level of expectations, i.e. disagreement Differences between the point forecasts reported by agents for a given variable and horizon are empirically large. Beyond simple mistakes, such disagreement may arise because agents observe different signals, attach different weights to information, or use different mental models. This form of heterogeneity is the most commonly studied and is usually measured by the standard deviation or the interquartile range of the cross-sectional distributions of beliefs at any point in time.

Subjective uncertainty Unlike disagreement, uncertainty is an individual-level object. It concerns how much probability mass a respondent assigns to different possible outcomes. Two consumers can report the same expected inflation while one is tightly confident in the number, and the other assigns substantial probability to other outcomes. This distinction reflects uncertainty, which matters for economic behaviors. For instance, [Coibion et al. \[2024\]](#) show that higher perceived macroeconomic uncertainty persistently reduces household spending. More subtly, [Gambetti et al. \[2025\]](#) distinguish between uncertainty accompanied by high disagreement, which has limited effects on aggregate activity, and uncertainty accompanied by low disagreement ("agreed uncertainty"), which can trigger substantial economic contractions.

Differences in the variable of interest Agents may differ in the interpretation of the variable to forecast. For instance, consumer inflation expectations may differ because households do not observe the consumer price index (CPI) directly but instead infer inflation from the prices most salient to them. What looks like disagreement may therefore partly reflect differences in the underlying economic variable respondents have in mind.

Across-group beliefs heterogeneity Relatedly, expectations vary not only within groups but also across them: households, firms, professional forecasters, policymakers, and even laboratory subjects routinely hold distinct views about future economic conditions.

These four dimensions imply that expectations heterogeneity cannot be reduced to a single deviation from FIRE because it reflects distinct mechanisms: various information sets or levels of attention, distinct lifetime experience and memory, different subjective models, or divergent survey interpretation. One empirical challenge is to distinguish economically meaningful beliefs heterogeneity from noise and measurement error. The recent

literature has made progress by combining repeated surveys, probabilistic elicitation, randomized information treatments, administrative or transaction-level data, and laboratory experiments. These methods make it possible to ask not only whether expectations differ, but why they differ, when they change, and whether they matter for economic decisions.

1.3 Expectations heterogeneity and policy transmission

Heterogeneity in inflation expectations itself matters for monetary policy transmission, and central bank (CB) communication in particular – see Chapter 10. If agents hold different beliefs, or update those beliefs at different times, a single policy announcement need not produce a common, expected response. It may be informative to households with limited prior knowledge, redundant to firms already tracking inflation closely, and irrelevant to agents who do not connect aggregate inflation with their own economic choices. Hence, beliefs heterogeneity helps explain why communication can be powerful or muted, why credibility is not uniform across groups, or why the anchoring of expectations should be assessed distributionally rather than through an average forecast [Coibion et al., 2022; Weber et al., 2025; D’Acunto et al., 2025]. Additionally, the evolution of inflation expectations heterogeneity can be informative regarding the risk of unanchoring expectations. Reis [2022] discusses how expectations drifting away amid inflationary pressures are characterized by an increased dispersion and a longer right tail.

The same logic extends to fiscal policy (see Chapter 8). A stimulus payment, for example, may be spent differently depending on whether a household expects higher inflation, higher taxes, weaker employment prospects, or improved income growth. Similarly, firms’ investment and hiring decisions also depend on managers’ expectations about costs, prices, credit conditions, and future sales. For this reason, expectations heterogeneity constitutes a policy transmission mechanism in itself.

2 Heterogeneous expectations: a historical perspective

Figure 1 traces the evolution of ideas and measurements that have shaped the contemporary empirical literature on heterogeneous expectations surveyed here. The idea that heterogeneous beliefs matter for economic outcomes long predates modern research. Smith [1776, Book IV, Chapter 5] already emphasizes differences in judgment across individuals as the core engine of market coordination. Knight [1921]; Pigou [1927] already discuss the role of subjective expectations in economic decision-making and aggregate activity, and Keynes [1936, Chapter 12], on “the state of long-term expectation,” develops several concepts remarkably close to today’s heterogeneous expectations literature. In parallel, Hayek [1937, 1945] argued that economic decisions rely on “dispersed bits of incomplete and frequently contradictory knowledge” (1945, p. 519). Yet, these conceptual foundations lacked both systematic measurements of expectations and analytical frameworks to study their aggregate effects.

The empirical study of heterogeneous expectations emerged with the development of survey methods. The psychologist and behavioral economist George Katona pioneered the Michigan Surveys in 1946 as the first large-scale effort to collect expectations data from households [Katona, 1951, 1960]. At the same time, the rational expectations (RE) revolution following Muth [1961]; Lucas [1972] placed expectations at the center of macroeconomic theory. This development culminated in the New Keynesian framework in which expectations are a key determinant of current outcomes [Woodford, 2003, p. 15]. Paradoxically, the increasing theoretical importance of expectations reduced the rationale to measure them since under RE, beliefs are inferred from the model and, hence, homogeneous, rather than observed in the real world. Consequently, expectations became central to macroeconomic theory while remaining largely absent from empirical research.

Survey expectations survived in forecasting research and the development of the ASA-NBER survey in 1968 — later the Survey of Professional Forecasters (SPF) — in which persistent disagreement and systematic errors were documented; see the evidence in Zarnowitz and Braun [1993].² In this context, a substantial literature emerged in foreign-exchange markets during the 1980s; see Takagi [1991] for a review. Frankel and Froot [1987b, 1990], Chinn and Frankel [1994], and Ito [1990] document systematic forecast errors and substantial disagreement among market participants. Frankel and Froot [1987a] and Ito [1988] identified extrapolative and mean-reverting forecasting rules in these data. Around that time, Shiller [1987] surveyed investors' expectations in the wake of the 1987 stock market crash and documented large differences in beliefs, narratives, and motivations. This line of research emphasizes direct elicitation of beliefs and argues for disentangling confidence from expected returns [Shiller et al., 1996; Shiller, 2000]. Dominitz and Manski [1997b, 2007] provide a key methodological contribution by eliciting subjective probability distributions, stressing that uncertainty and disagreement are distinct concepts, and arguing that subjective distributions contain information lost in point forecasts. The design of surveys such as the New York Fed Survey of Consumer Expectations is based on this contribution [Armantier et al., 2017]. Subsequent work in this vein discusses the pervasive heterogeneity of investors' expectations; see, *inter alia*, Vissing-Jorgensen [2004]; Dominitz and Manski [2007]; Greenwood and Shleifer [2014], and Adam and Nagel [2023] for a comprehensive survey of this literature.

²The oldest survey of economic expectations, at least in the United States, is the Livingston Survey, launched in 1946 by financial journalist Joseph Livingston but made available to researchers only in 1978, and administered by the Federal Reserve Bank of Philadelphia since 1990 [Carlson, 1977; Croushore, 1997]. Since the SPF is quarterly and has a larger and more formalized panel than the semiannual Livingston survey, research on forecast accuracy mostly switched to the SPF in the 1990s.

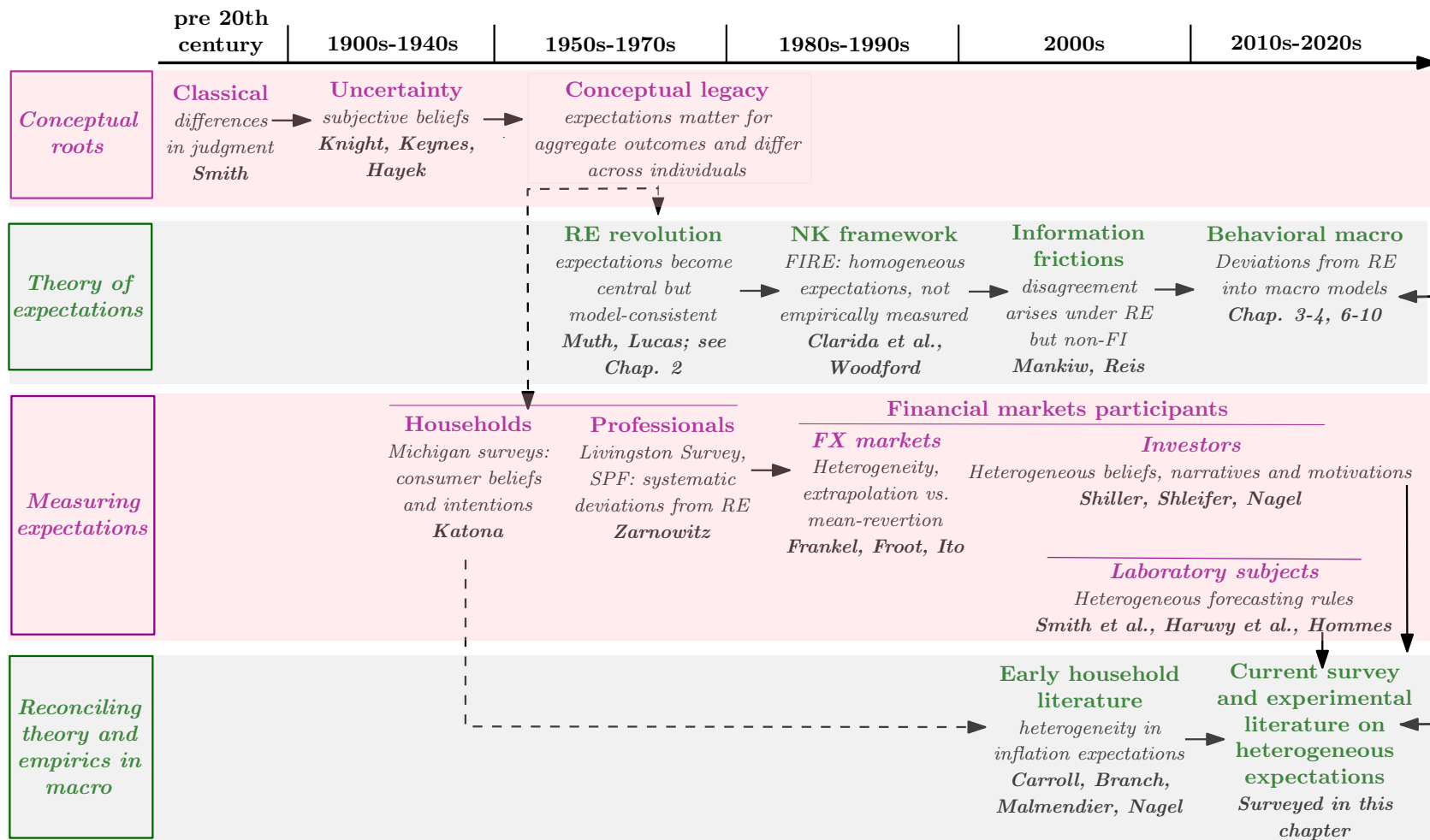


Figure 1: Genealogy of the heterogeneous expectations literature

A parallel research line emerges in experimental finance in the 1980s. While early laboratory asset markets were primarily designed to study information aggregation, market efficiency, and speculative bubbles, the seminal contribution of [Smith et al. \[1988\]](#) elicit price forecasts alongside trading decisions, and document substantial heterogeneity across subjects. Subsequent experiments focus on beliefs; see, e.g., [Haruvy et al. \[2007\]](#), and the learning-to-forecast (LtF) experimental branch; see, *inter alia*, [Hommes et al. \[2005\]](#); [Heemeijer et al. \[2009\]](#), and [Hommes \[2011\]](#) for an early survey. LtFEs also investigate macroeconomic expectations; see, e.g., [Pfajfar and Žakelj \[2014\]](#); [Assenza et al. \[2021\]](#); [Mokhtarzadeh and Petersen \[2021\]](#).

These developments have contributed to envision expectations as a measurable and economically relevant variable rather than a model outcome, and beliefs heterogeneity as an empirical object rather than idiosyncratic noise that cancels out at the aggregate. The emergence of macroeconomic models with information frictions and heterogeneous beliefs [[Mankiw and Reis, 2002](#)], followed by the rise of behavioral macroeconomics from the 2010s in the wake of the Global Financial Crisis (GFC) in 2007-08, renewed interest in measuring expectations directly. This rise in interest is illustrated in Figure 2 and has recently culminated in the publication of the first textbook in macroeconomics centered around expectations [[Coibion and Gorodnichenko, 2026a](#)].

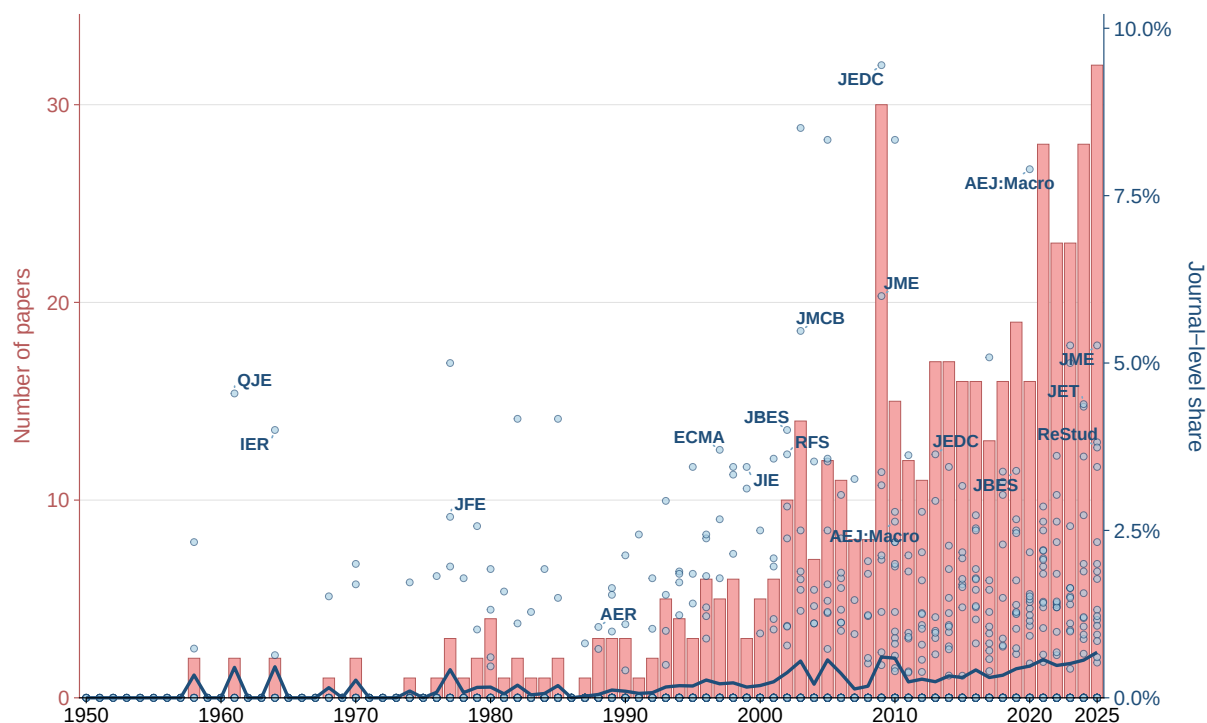
Initial explorations of heterogeneity in macroeconomic expectations include [Carroll \[2003\]](#); [Mankiw et al. \[2003\]](#); [Branch \[2004\]](#); [Pfajfar and Santoro \[2010\]](#); [Malmendier and Nagel \[2011\]](#). Modern research combines the Michigan tradition of measuring household beliefs with the SPF and financial-market traditions that treat expectations as observables. The post-pandemic inflation surge in 2021-22 reinforced this trend (e.g., [Meeks and Monti 2023](#); [Fofana et al. 2025](#)) and highlighted the macroeconomic costs of expectation dispersion [[Falck et al., 2021](#); [Bullard et al., 2026](#)].

3 Heterogeneity in inflation expectations

Inflation expectations occupy a central place in macroeconomics. Since they determine real interest rates and feed into price-setting behaviors and wage negotiations, they constitute a key channel of monetary policy transmission (see Chapter 9). Therefore, they are the most extensively studied and the best measured expectations, with extensive data coverage from household, firm, and professional surveys.

3.1 Who differs, and why?

We discuss heterogeneous inflation expectations for each group of agents.



Notes: total number in red bars (left-hand-side axis) and journal-level percentage shares in blue dots with the average in the blue solid line (right-hand-side axis). Publications are sampled from the Web of Science Core Collection in leading economics journals (2025 IDEAS/RePEc top 50 aggregate journal ranking), published between 1950 and 2025, and classified as studying expectations heterogeneity or non-FIRE expectations using a dictionary search over titles, abstracts, and keywords. Selected high-share journal-year observations are labeled using conventional journal abbreviations.

Figure 2: Prevalence of academic publications on heterogeneous and non-FIRE expectations, 1950–2025

3.1.1 Households

Households are the most-studied group in the empirical literature since institutional and national surveys have long provided repeated micro-level data to researchers. These datasets have established a set of robust facts:

- (i) Household inflation expectations tend to be higher, more dispersed, and more right-skewed than the forecasts of professionals.
- (ii) They vary systematically with socio-economic characteristics, in particular: gender, age, education, income, race or ethnicity, political affiliation, cognitive abilities, financial literacy, financial vulnerability, or housing tenure.
- (iii) They tend to co-move with salient personal price experiences beyond aggregate inflation statistics, and are shaped by local economic conditions and individual memories.
- (iv) Their cross-sectional dispersion rises during inflationary episodes along the right tail of the distribution.

Using a survey of Swedish households, [Jonung \[1981\]](#) is probably the first paper about heterogeneous inflation expectations. The author discusses differences in individually experienced inflation rates to explain higher perceptions among women, and higher expectations among younger people; see also [Bryan and Venkatu \[2001b\]](#) for an early discussion of demographic heterogeneity, [Mankiw et al. \[2003\]](#) for the first comprehensive treatment, [D’Acunto, Malmendier and Weber \[2023\]](#); [D’Acunto and Weber \[2025\]](#) for recent surveys, and [Fofana et al. \[2025\]](#) for a summary of the stylized facts on household disagreement and its drivers amid the recent inflation surge.

So, households disagree, but why? The literature points to several mechanisms.

Exposure to heterogeneous price signals Since nobody buys the CPI basket, people instead observe the prices of goods they buy frequently, notice the prices that changed recently, and the ones that are emotionally or financially salient. This makes food prices [[D’Acunto, Malmendier, Ospina and Weber, 2021](#)], gasoline prices [[Binder and Makridis, 2022](#)], rent, mortgage payments, or social security checks disproportionately important. Evidence from matched survey and transaction data shows that households’ inflation expectations respond to the price changes in their own shopping baskets, with high-frequency purchases receiving especially large weights and price increases receiving more attention than price decreases [[Cavallo et al., 2017](#); [Weber et al., 2022](#)].

Distinct inflation experience [Souleles \[2004\]](#) links demographic differences in inflation forecast errors in the Michigan survey to group-specific shocks. Age and cohort patterns in expectations further suggest that individuals overweight recent macroeconomic outcomes when forming beliefs about the future [[Malmendier and Nagel, 2016](#); [Malmendier et al., 2021](#)]. This experience-based learning produces systematic cohort differences because generations enter adulthood under different inflation regimes, labor-market conditions, and macroeconomic narratives. [Salle et al. \[2026\]](#) show that personal memories of inflation affect beliefs beyond the common cohort experiences.

Differences in cognitive and informational capacity Education, income, financial literacy, and numeracy predict both the level and precision of inflation expectations [[Bruine de Bruin et al., 2010](#); [D’Acunto et al., 2019](#); [Das et al., 2020](#); [D’Acunto, Hoang, Paloviita and Weber, 2023](#)]. Beyond proxies for cognitive sophistication, these variables also reflect differences in the incentives to acquire and in the costs to process macroeconomic information. Information provision experiments in surveys show that information treatments can move expectations, but the strength and persistence of belief updating vary across respondents [[Coibion and Gorodnichenko, 2012](#); [Coibion et al., 2022](#); [Dräger and Nghiem, 2025](#)].

Various narratives Households encounter macroeconomic statistics through media, social networks, CB communication, or political frames. Trust in public institutions affects

the extent to which households use official statistics [D’Acunto and Weber, 2024]. Political affiliation can color beliefs about aggregate conditions even when personal economic expectations are relatively unaffected [Koh et al., 2025]. Evidence on subjective models and narratives shows that households interpret macroeconomic information through heterogeneous causal frameworks and retrieve various propagation channels when reasoning about shocks [Andre et al., 2022]. During the recent inflation surge, Andre et al. [2026] show that household narratives were heterogeneous and more supply-side focused than those of experts, and often politically influenced, which shaped both their expectations and the interpretation of new information. Additionally, Kostyshyna et al. [2026] show that Canadian household inflation expectations can be described by different forecasting models, and this heterogeneity has sharpened since this episode.

These different mechanisms need not be mutually exclusive. The ‘gender gap’ in inflation expectations, namely women on average reporting higher inflation expectations than men, is probably the most developed example. It was already present in early work [Jonung, 1981; Bryan and Venkatu, 2001a], and it persists even within households, which suggests that it is not merely a reflection of income, wealth, or family-level characteristics [D’Acunto, Malmendier and Weber, 2021]. Ke [2025] reports extensive disagreement among spouses within households, including about inflation. A prominent explanation of this gender gap is the exposure channel: gendered household roles expose women, on average, more to grocery prices than men [D’Acunto, Malmendier and Weber, 2021]. Yet, the most recent literature has moved beyond this single-channel interpretation and even challenges it [Van Hove and Verbraecken, 2025]. The gender gap is weaker or absent among high-confidence respondents [Reiche, 2024], and can change when incentives alter survey effort [Drobot et al., 2024]. The gender gap in financial knowledge and greater inflation aversion and uncertainty among women also matter in expectation formation [McMahon and Reiche, 2024]. The useful lesson is therefore that demographic gaps often reflect inter-related differences in exposure, confidence, attention, preferences, and the mapping from personal experience to aggregate beliefs.

Finally, data availability has confined most research on household expectations to high-income countries, and in particular the United States. Recently, D’Acunto et al. [2025] use a sample of 47 countries representing 90% of global GDP to show that reliance on local information sources is a global phenomenon: across countries, consumers often use signals from shopping, bills, family, friends, and social media rather than representative aggregate indicators to forecast inflation.

3.1.2 Firms

Firms set prices, negotiate wages, choose employment, borrow, invest, and manage inventories, so their expectations directly determine inflation and real activity. Yet, systematic firm-level evidence are more recent and more sparse than household evidence because firm surveys often contain strategic and confidential information, which has limited researchers’ access to the existing data. Firm surveys are also harder to deploy: a firm is not a individual respondent like a household member. It is not always clear who

is answering the survey: the owner, the chief executive, the financial officer, the manager, or the survey administrator? It is also not clear what the relevant inflation expectation is for price setting [Candia et al., 2023]: aggregate CPI inflation, output-price growth, input costs, wages, competitors' prices, the industry price, and if so at which level of aggregation? This creates both a measurement challenge and an opportunity: firms' expectations are multidimensional because firms actually make multidimensional decisions.

The recent firm-survey literature establishes several stylized facts across various countries (among others, New Zealand, US, France, Italy, and the Euro-area):³

(i) Firms' inflation expectations are more dispersed than those of professionals but less than those of households.

(ii) They are often higher than those of professional forecasts but less upward-biased than those of households, yet with a similar level of anchoring as households.

Using a survey of New Zealand firms, the seminal contribution of Coibion et al. [2018] documents large heterogeneity in firms' macroeconomic expectations, in particular about inflation, which they relate to different incentives to gather the relevant information. The U.S. Survey of Firms' Inflation Expectations shows that managers' expectations display dynamics distinct from household and professional forecasts and that many managers have limited knowledge of monetary policy targets [Candia et al., 2024]. French evidence confirms that firms' reported expectations are sensitive to survey wording and information prompts, while also showing that firms display less bias and disagreement than households [Savignac et al., 2024]. Euro area evidence extends this comparison, with firm demographics, firm constraints, and country-level conditions each contributing to heterogeneity [Baumann et al., 2024, 2025].

The literature has uncovered three main mechanisms to explain firms' disagreement about inflation that partly mirrors those associated with household disagreement. However, compared to households, Link et al. [2023] find that demographic characteristics play a lesser role in shaping firms' expectations – of inflation but also interest rates and unemployment – than for households.

Exposure to distinct local and sectoral conditions Firms infer aggregate inflation partly from the prices they directly observe such as input costs, output prices, local wages growth, or regional inflation. This is the firm-side analogue to the household exposure channel, but the signals are different. A manufacturing firm facing energy and intermediate-input shocks receives a different signal from a service firm facing wage pressures. Andrade et al. [2022] show how French firms tend to treat industry-specific information as relevant for aggregate outlooks, including CPI inflation. Using the ECB's Survey on the Access to Finance of Enterprises (SAFE), Baumann et al. [2024] document a similar pass-through from regional, to national and Euro-area inflation expectations. This mechanism resembles an 'island economy' in which agents observe precise local signals from which they must infer the aggregate state.

³This list of countries is not accidental, it reflects the availability of data.

Heterogeneous level of attention Firms update their information set when it becomes relevant to their decisions, and this relevance changes over the inflation cycle. Using the Cleveland Fed’s Survey of Firms’ Inflation Expectations, [Candia et al. \[2024\]](#) emphasize that many CEOs “do not know” about recent inflation dynamics and monetary policy. High-frequency evidence from the UK shows that firms’ inflation perceptions and expectations respond within hours of CPI releases, but the response is stronger with larger media coverage [[Yotzov et al., 2026](#)]. [Candia et al. \[2023\]](#) report that when inflation is higher, firms’ forecasts in cross-country survey data are closer to those of professional forecasters.

In other words, attention is state-dependent [[Weber et al., 2025](#)]. During inflation surges, managers have stronger incentives to monitor aggregate data because inflation becomes relative more informative about costs, wages, margins, and competitors’ likely behaviors than when inflation is low and stable.

Various levels of macroeconomic knowledge Firm managers often have incomplete and heterogeneous knowledge of inflation targets, monetary-policy frameworks, or recent aggregate inflation statistics. Information experiments show that when firms receive such information, they revise their beliefs accordingly, which leads expectations to partially converge toward common signals and reduces cross-sectional dispersion [[Coibion et al., 2020](#); [Baumann et al., 2024](#)].

Finally, like for households, firms’ expectations have been found to matter for pricing, credit, and employment decisions; see, e.g., [Coibion et al. \[2020\]](#); [Bonomo et al. \[2026\]](#). [Ropele et al. \[2024\]](#) further show how disagreement in firms’ expectations result in resources misallocation and substantial TFP loss. Taken together, the evidence suggests that heterogeneity in firms’ inflation expectations can shape aggregate inflation dynamics.

3.1.3 Professionals

Professional forecasters provide a useful benchmark because they are informed, repeatedly evaluated, and usually closer to model-based forecasting than households or firms. Yet, even among professionals, expectations, and not just inflation expectations, are heterogeneous:

- (i) Disagreement among professionals and among policy makers is typically lower than among households, firms, and laboratory subjects [[Cornand and Hubert, 2022](#)].
- (ii) Disagreement among professionals varies across variables, horizons, countries, and macroeconomic regimes. In particular, it rises with macroeconomic volatility, inflation uncertainty, and changes in the information environment, and it often differs between nominal and real variables [[Dovern et al., 2012](#)].
- (iii) Professionals differ not only in point but also density forecasts, namely in perceived risks and in how they summarize subjective distributions [[Giordani and Söderlind, 2003](#); [Engelberg et al., 2009](#); [D’Amico and Orphanides, 2008](#)].

This evidence matters because it speaks against a simple interpretation in which heterogeneity is only the product of low literacy or survey confusion. Persistent disagreement among this highly informed crowd points to other mechanisms behind expectations heterogeneity.

Information frictions Even experts do not instantaneously and uniformly incorporate all relevant information to update their forecast each time new information becomes available [Coibion and Gorodnichenko, 2012]. Even when they do, Andrade and Le Bihan [2013] show that professionals also use different information sets, resulting in disagreement.

Distinct models Differences in priors and forecasting models also matter, particularly at longer horizons where signals are weaker and model structure becomes more important than when forecasting for the short run [Lahiri and Sheng, 2008]. For instance, Binder [2021] documents that professionals who do not use the natural rate of unemployment to forecast inflation have less anchored expectations than those who report doing so. Nonetheless, Patton and Timmermann [2010] find that short-run inflation expectations of professionals are more diverse than what can be explained by heterogeneous priors or signals.

Strategic incentives Reputational concerns can also induce discrepancies between reported forecasts and private beliefs, which can produce either herding or deliberate differentiation [Ottaviani and Sørensen, 2006].

Policy makers are less frequently studied because individual-level data are scarcer,⁴ but the available evidence suggests that they occupy a distinct position. Comparing households, firms, professional forecasters, policymakers, and laboratory participants, Cornand and Hubert [2022] show that policymakers revise forecasts most frequently and display lowest disagreement across groups. This is consistent with their incentives and information access: policymakers are professionally required to monitor macroeconomic data, internal forecasts, staff analysis, and policy-relevant risks.

3.1.4 Laboratory subjects

Laboratory experiments provide a complementary form of empirical evidence on expectations formation. Their strength lies in identification. In the lab, the researcher can elicit subjects' expectations while holding the information set fixed, varying feedback, changing the salience of signals, or manipulating the policy environment. By doing so, the resulting belief heterogeneity may no longer be attributed to information heterogeneity

⁴Two common data sources exist in the US: the FOMC forecasts or inflation and GDP growth since 1979 and the 'Greenbook.'

(i.e., the full-information component of the FIRE benchmark), but to behavioral factors (namely, the RE component).

The vast majority of lab evidence on heterogeneous expectations comes from the LtF literature. In this class of group experiments, individual expectations are repeatedly elicited and aggregated to feed back into the variable to forecast. This literature has extensively shown that subjects adopt heterogeneous forecasting rules, switch between them, and generate aggregate dynamics that need not coincide with the FIRE predictions. In New Keynesian experiments, heterogeneous expectations have been found to shape inflation and output dynamics, while communication and policy design have some effects on expectations coordination [Pfajfar and Žakelj, 2014; Hommes et al., 2019; Mokhtarzadeh and Petersen, 2021; Petersen and Rholes, 2022; Assenza et al., 2021; Arifovic et al., 2023]. Truong et al. [2026] show that richer macroeconomic information and target communication need not reduce disagreement when subjects face cognitive constraints or interpret policy targets through biased mental models. Overall, experiments show that expectations heterogeneity survives when institutional and informational confounds are removed.

3.1.5 Cross-group comparison of expectations heterogeneity

Cornand and Hubert [2022] systematically compare inflation expectations heterogeneity across households, firms, professional forecasters, policy makers, and laboratory subjects, which leads to a clear picture:

- (i) Expectations from policymakers, professionals, and lab subjects tend to be less dispersed than those of firms and households.
- (ii) Firms are themselves less dispersed and revise their forecasts more frequently than households, and with a similar frequency as professionals and lab subjects, while being strongly shaped by their own business environment.
- (iii) Households are more dispersed, more reliant on salient experience, and more uncertain than any other groups.
- (iv) Inflation shocks play a key role on disagreement about inflation within all categories of agents, except for policymakers.

This comparison does not reflect only a hierarchy of rationality but provides also a map of informational environments and incentives.

To sum up, households often rely on salient personal experiences and imperfect macroeconomic literacy. Firms combine aggregate signals with own-market information about costs, demand, prices, and competitors. Professional forecasters use more structured information sets than firms and households but still differ in priors, models, or incentives. Policymakers are typically the most attentive and least dispersed group, while laboratory subjects reveal how heterogeneous expectations can emerge even when the information set is controlled.

3.2 Time-varying heterogeneity in inflation expectations

Heterogeneity in inflation expectations varies over time, for instance with the inflation regime, macroeconomic volatility, relative-price shocks, news intensity, or the perceived credibility of monetary policy. This time variation became especially visible during the post-COVID-19 pandemic inflation surge: in many countries, short-run expectations rose but most notably, cross-sectional disagreement widened sharply. As inflation later declined, disagreement persisted, suggesting that high-inflation episodes can leave long-lasting effects on beliefs [Fofana et al., 2025; Coibion and Gorodnichenko, 2026b; D’Acunto et al., 2025].

A useful interpretation is that attention and updating are state-dependent. When inflation is low and stable, like during the Great Moderation period, many agents economize on attention because inflation is not central to daily decisions. When inflation becomes salient, agents reallocate attention toward price signals, news, and CB communication. Time variation in disagreement therefore reflects not only changing shocks, but also changing incentives to acquire, process, and interpret macroeconomic information [Yotzov et al., 2026; Kostyshyna et al., 2026]. For this reason, survey information experiments to manipulate inflation beliefs appear less effective during inflation surges than when inflation is stable [Weber et al., 2025].

Hence, disagreement, skewness in belief distribution, or sensitivity to news should be treated as time-varying model outcomes next to the mean inflation expectations. The empirical question is therefore not only which agents disagree, but when disagreement rises, whether it persists after the shocks fade away, how it affects monetary policy transmission, and how CB credibility affects the speed at which the distribution of beliefs recenters.

4 Heterogeneity in other macroeconomic expectations

4.1 Beyond inflation expectations

Beyond inflation, agents form beliefs about a wide range of future outcomes: income growth, wages, employment risk, job-finding probabilities, house prices, interest rates, credit conditions, demand, or asset returns. The empirical evidence on inflation expectations is therefore best read as the most developed window into a broader issue: agents differ in how they perceive, forecast, and mentally organize the macroeconomic environment. This broader perspective is important for two reasons. First, inflation expectations rarely enter decisions in isolation. A household that expects higher inflation may also expect lower real income, higher nominal wages, higher interest rates, or a greater risk of unemployment. Second, the mechanisms emphasized throughout this chapter may also shape beliefs beyond future inflation.

Hereafter, we review evidence of heterogeneity in expectations about other macroeco-

conomic variables beyond inflation, and then about agent-level variables but these beliefs need not be considered independently from each other. For instance, amid the recent inflation surge, [Kostyshyna et al. \[2026\]](#) find that households with higher short-run inflation expectations also have higher expectations of long-run inflation, interest rate and local house price growth at all horizons, and of nominal wage, spending, income, and tax growth over the next year, compared to households lower inflation expectations.

4.2 Expectations of other macroeconomic variables

Household surveys reveal substantial disagreement regarding the future state of the economy, with beliefs again varying systematically across demographic groups and personal experiences [[Dominitz and Manski, 1997b](#)]. For instance, individuals with higher exposure to macroeconomic risk tend to extrapolate beliefs about recession likelihood to their own unemployment risk [[Roth and Wohlfart, 2020](#)].

Most of the forecasting research on macroeconomic indicators concerns professionals. [Andrade et al. \[2016\]](#) show that, while they systematically disagree, for all macroeconomic variables and at all horizons, they disagree less about real output growth in the long run than in the short run. However, the opposite holds when it comes to federal fund rates, while the horizon does not matter for disagreement about inflation. The authors interpret disagreement about the long run as ‘fundamental’ since it reflects different views about the low-frequency components of the variables, such as potential output growth or the inflation target. By contrast, [Patton and Timmermann \[2010\]](#) report that disagreement about inflation and GDP tends to increase with the forecast horizon, which aligns rather with the use of different models and priors than with different information sets.

Professionals may also disagree about the interpretation of macroeconomic information. [Andrade et al. \[2019\]](#) show how disagreement about future inflation and consumption forecasts partly reflect polar interpretations of future monetary policy accommodation, in line with Odyssean versus Delphic interpretation of forward-guidance. Relatedly, [Clements \[2022\]](#) argues that forecasts made by professionals should be studied jointly since disagreement between them may also reflect diverging views about the relationships between the macroeconomic aggregates implicit to their forecasts. The author finds that most heterogeneity among professionals can be explained by an inefficient use of information, either as over- or under-reaction.

Additionally, [Dovern et al. \[2012\]](#) show that disagreement among professional forecasters behaves differently for real and nominal variables. Disagreement about real variables, such as GDP growth, consumption, investment, and unemployment, is largely driven by the state of the business cycle and rises sharply during recessions. By contrast, disagreement about nominal variables (inflation and interest rates) is closely tied to their level and has declined over time as a result of expectations anchoring in countries with credible and independent CBs.

This pattern echoes experimental findings: in the lab, [Assenza et al. \[2021\]](#) find that subjects’ inflation and output gap forecasts appear decoupled, with each forecast time se-

ries linked to their own respective histories and minimal cross-influence. As for policy makers, FOMC projections about several macroeconomic variables being conditional on appropriate monetary policy, substantial disagreement could also reflect divergence in assumptions about this appropriate policy [[Binder, 2021](#)].

Evidence on firms' disagreement beyond inflation is more limited, but points to a similar direction. [Coibion et al. \[2018\]](#) show that New Zealand firms disagree substantially not only about inflation but also about unemployment, interest rates, and real GDP growth: average forecasts are often close to the professionals, but cross-sectional dispersion is larger. [Link et al. \[2023\]](#) document similar findings for German firms, a key mechanism being that firms partly infer aggregate conditions from their own industry.

Finally, disagreement and uncertainty are conceptually distinct: uncertainty may coexist either with broad agreement or with sharply divergent beliefs, with potentially different implications for aggregate economic activity [[Gambetti et al., 2025](#)].

4.3 Expectations of market prices

Exchange rates Expectations of exchange rates, asset and house prices have also extensively been studied. As outlined in Section 2, the earlier literature on exchange-rate expectations provides an important macro-financial precedent. [Frankel and Froot \[1987a, 1990\]](#) show that short-run expectations display bandwagon or extrapolative patterns and longer-run expectations moving in a mean-reverting direction. Micro survey evidence further documents substantial heterogeneity across foreign-exchange market participants, including respondent-specific effects in yen/dollar forecasts [[Ito, 1988, 1990](#)].

Asset prices and returns A foundational behavioral-finance view emphasizes heterogeneity between rational or fundamental arbitrageurs and sentiment-driven or noise traders, whose mistaken or extrapolative beliefs can affect prices when arbitrage is limited [[Shleifer and Summers, 1990](#)]. [Giglio et al. \[2021\]](#) systematically examine expectations of wealthy retail investors and report large disagreement between them about expected cash flows and returns that demographics alone cannot explain. This literature shows that disagreement and heterogeneous financial beliefs can shape asset prices, return predictability, volatility, and trading volume; see [Hong and Stein \[2007\]](#) and [Adam and Nagel \[2023\]](#) for comprehensive reviews.

In parallel, lab experiments have extensively studied expectations of asset prices; see, e.g., [Hommes et al. \[2005\]](#). In general, this literature focuses on the effect of the feedback between expectations and realizations on expectations' dynamics, where this feedback is positive in demand-driven markets such as financial markets. A robust result is that subjects' expectations coordinate quickly on the 'wrong anchor,' namely price levels different (typically higher) than the fundamental value, with little disagreement until a crash occurs [[Heemeijer et al., 2009](#)].

House prices The housing literature provides another prominent example of heterogeneity in expectations. Households' expectations of house prices differ depending on past house-price growth [Armona et al., 2019], on personally and locally observed house-price movements, social-network experiences, homeownership status, and experienced volatility [Kuchler and Zafar, 2019]. Heterogeneity also arises from information acquisition itself, since individuals choose to incorporate distinct signals about national house prices into their beliefs [Fuster et al., 2022].

4.4 Expectations of individual variables

An early contribution of Guiso and Parigi [1999] report substantial heterogeneity among Italian firms' expectations of their own demand, and relate it to firmographic variables. They also show that there is considerable heterogeneity in how uncertainty reduces investment. Since then, much of the literature has looked into measuring business uncertainty; see, e.g., Altig et al. [2022]. Firms' expectations are also studied in light of topical policy-relevant issues. For instance, Andrade et al. [2025] find considerable variation in how small and medium-sized U.S. firms expect tariffs to affect future costs and prices.

Like for households' individual-level expectations [Caplin et al., 2026], firm-level growth expectations are highly predictive of realized growth rates, which suggests that a substantial share of the heterogeneity in beliefs about individual variables arises from heterogeneous idiosyncratic circumstances, about which private agents have superior information. Hereafter, in line with much of the literature, we focus on households' expectations of personal economic prospects.

An early assessment of subjective risks of financial hardship among US workers is presented in Dominitz and Manski [1997a]. The authors find substantial heterogeneity in risk perception along race and education attainment: males without postsecondary schooling and black males report higher risk perceptions than other groups, in line with their relatively greater labor market insecurity.

Dominitz and Manski [1997b] is the pioneered survey on subjective earnings risk, measured as the cross-sectional variation in a given respondent's income expectations. Respondents are found to have fairly heterogeneous perceptions of the one-year-ahead income uncertainty they face, depending on their realized income, age, and employment status. More recently, Wang [2026] show that such survey-elicited income risks are more heterogeneous than conventional, aggregate-based estimates, which may be explained by unobserved heterogeneity and overconfidence.

Recent evidence further studies the substantial heterogeneity in workers' expectations about earnings growth and voluntary or involuntary job exits over the life and the business cycles. Using a unique combination of survey and administrative data of the Danish population, Caplin et al. [2026] report a large heterogeneity in respondents' expectations about their earnings, their probabilities of job separation, their unemployment length, and their distribution over future wage growth. This heterogeneity cannot be explained by demographics and individual earnings histories, but expectations closely match re-

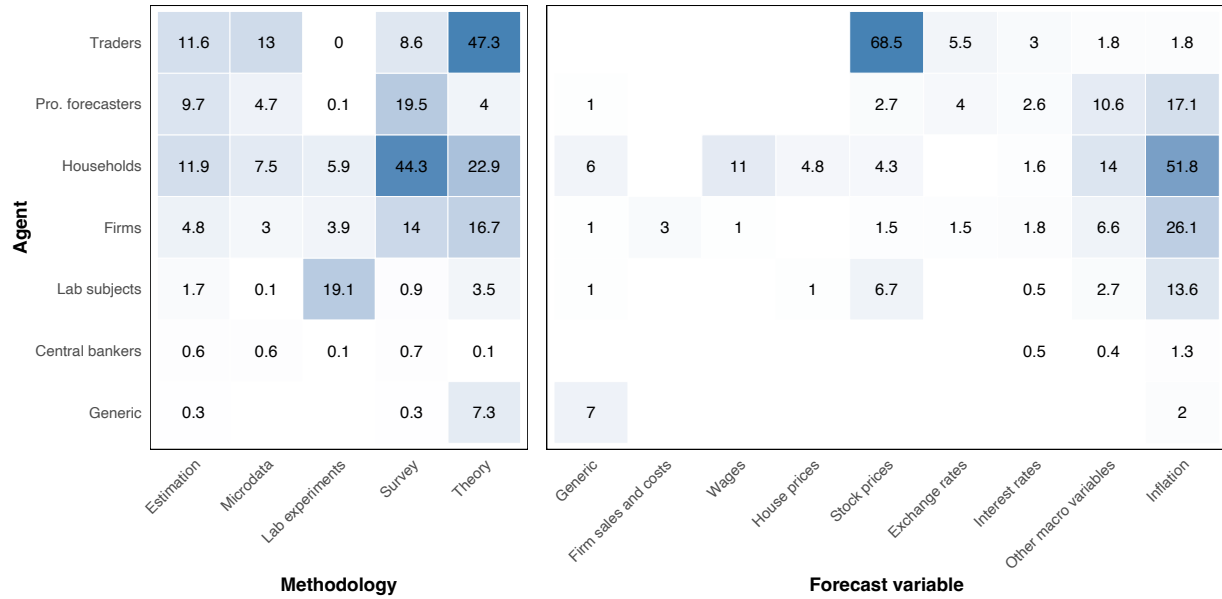
alizations, which speaks for superior private information underlying the distribution of individual expectations. [Koşar and Van der Klaauw \[2025\]](#) also look into heterogeneity in beliefs about labor market outcomes and earning growth. The authors document systematic demographic differences in both the average (the first moment) and the uncertainty (the second and the third moments) of future earnings growth. These demographic patterns also align with the determinants of the heterogeneity in the perception of job loss risk, whether from layoff or quitting. These expectations systematically correlate with other macroeconomic expectations: respondents who expect higher earnings also expect higher stock and home prices and a lower unemployment rate, while the association with inflation is weak, suggesting very modest real wage growth; see also [Mueller and Spinnewijn \[2023\]](#) on the positive association between perceptions about unemployment and expectations about individual labor market outlooks. This line of research suggests that the heterogeneity observed in personal income prospects also reflects differences in views about aggregate outlooks, beyond variations in idiosyncratic circumstances.

Relatedly, recent evidence on real wage expectations shows that households do not simply map inflation expectations one-for-one into wage-growth expectations. Instead, wage expectations appear to reflect labor-market conditions, bargaining power, and broader views about the economy. Using Canadian household survey data, [Jain et al. \[2024\]](#) show that wage-growth expectations are heterogeneous not only in levels and uncertainty but also in their connection to inflation expectations: this link is weak on average, yet stronger during high-inflation periods, in tighter labor markets, and among workers with stronger bargaining positions.

5 Implications and avenues for future research

The empirical literature has established that expectations are heterogeneous, structured, and economically relevant. Figure 3 summarizes the joint distribution of forecast variables, agent types, and methodologies in this literature. Inflation expectations dominate across virtually all agent groups, particularly households, and are studied primarily using surveys and theoretical models. In finance, a large share of models also look at traders' expectations of stock prices and returns. By contrast, expectations of firms and policy makers remain comparatively niche and are concentrated within inflation surveys. Beyond inflation, expectations about other macroeconomic variables remain relatively underexplored and are largely confined to household and professional forecaster surveys. For instance, fiscal variables represent less than 1% of the papers reviewed. This sparse coverage highlights opportunities for new data collection and study designs capable of filling these literature gaps.

One broad lesson is that heterogeneous expectations are not confined to inflation. It is the most developed empirical case because it is central to monetary policy and widely measured across institutional surveys but the modeling implications of disagreement extend beyond inflation. Importantly, heterogeneous expectations models should move beyond inflation expectations formation to focus on how agents *jointly* form beliefs about income,



Notes: See Appendix for the methodology of the LLM-assisted classification; 291 papers; numbers reported in each box represents percentage points, each row and each column sum up to 100. Papers using the New Keynesian framework are classified as firms/households and inflation/other macro variables.

Figure 3: Heatmap of the literature on heterogeneous expectations

employment, wages, asset prices, or any other economically-relevant variables. The recent work on households' versus experts' representations of the co-movement of economic variables through narratives is a first step in this direction [Andre et al., 2022]. To go further, we also need finer measurements. Surveys increasingly distinguish between expected inflation, and at various horizons, perceived inflation, household-specific inflation, and subjective uncertainty. The challenge is to apply the same measurement discipline to other economic variables – for example, (real) wages and income, employment risk, interest rates, firms' demand and costs, or credit conditions.

A second priority is to study heterogeneity in the mapping between expectations and realized decisions. While the literature has made important progress through matched survey-administrative data to show that expectations matter for behaviors, heterogeneous reactions to these expectations have been barely studied. An exception is McMahon and Reiche [2024]: they show that British men and women report comparable inflation expectations but differ in uncertainty, inflation aversion, and intended responses to inflation, with women more likely to save or shop around, and men more likely to seek wage increases during inflationary periods.

Relatedly, another challenge is to interpret the sources of heterogeneity and to identify which dimensions matter most for economic decisions. If disagreement reflects different signals, policy communication can reduce dispersion by improving information. If it reflects different subjective models, simply providing facts may have limited effects. If it reflects different decision margins, the relevant policy message may differ across house-

holds, firms, and professionals.

The heatmaps in Figure 3 reveal yet another research avenue: to extend methodologies to new populations – for example, combining survey or experimental approaches with central bankers, and integrate further survey, field, and laboratory experiments. Controlled experiments can isolate mechanisms, while field data help assess whether those mechanisms operate in naturally occurring environments. Survey experiments identify how agents update beliefs when given information, but they often cannot reveal implicit decision making. Laboratory experiments can isolate mechanisms such as learning, salience, memory, coordination, and feedback; see the discussion in Salle [2022]. List [2026] recently argues that laboratory and field designs provide complementary forms of evidence rather than a simple hierarchy of external validity.

Finally, the evidence surveyed in this chapter motivates the modeling agenda of the following chapters. FIRE models abstract from precisely the moments that appear central in the data: dispersed point forecasts, heterogeneous uncertainty, differential attention, experience-based learning, or state-dependent anchoring. The challenge is not to add heterogeneity for its own sake, but to discipline models with the empirical moments documented here when they matter economically. A useful model of heterogeneous expectations should explain who disagrees, when the level of disagreement changes, and how it matters for agents’ decisions and aggregate dynamics. The empirical and experimental literature has provided a large collection of evidence to make that modeling discipline possible.

References

- Adam, K. and Nagel, S. [2023], Expectations data in asset pricing, *in* R. Bachmann, G. Topa and W. van der Klaauw, eds, ‘Handbook of Economic Expectations’, Elsevier, pp. 477–506.
- Altig, D., Barrero, J. M., Bloom, N., Davis, S. J., Meyer, B. and Parker, N. [2022], ‘Surveying business uncertainty’, *Journal of Econometrics* **231**(1), 282–303. Annals Issue: Subjective Expectations & Probabilities in Economics.
- Andrade, P., Coibion, O., Gautier, E. and Gorodnichenko, Y. [2022], ‘No firm is an island? How industry conditions shape firms’ expectations’, *Journal of Monetary Economics* **125**, 40–56.
- Andrade, P., Crump, R. K., Eusepi, S. and Moench, E. [2016], ‘Fundamental disagreement’, *Journal of Monetary Economics* **83**, 106–128.
- Andrade, P., Dietrich, A., Leer, J., Schoenle, R., Tang, J. and Zakrajšek, E. [2025], ‘Small and Medium-sized Businesses’ Expectations Concerning Tariffs, Costs, and Prices’, *Federal Reserve Bank of Boston Research Paper Series Current Policy Perspectives Paper* (25-7).
- Andrade, P., Gaballo, G., Mengus, E. and Mojon, B. [2019], ‘Forward Guidance and Heterogeneous Beliefs’, *American Economic Journal: Macroeconomics* **11**(3), 1–29.

- Andrade, P. and Le Bihan, H. [2013], 'Inattentive professional forecasters', *Journal of Monetary Economics* **60**(8), 967–982.
- Andre, P., Haaland, I., Roth, C., Wiederholt, M. and Wohlfart, J. [2026], 'Narratives about the Macroeconomy', *Review of Economic Studies* p. rdag014.
- Andre, P., Pizzinelli, C., Roth, C. and Wohlfart, J. [2022], 'Subjective Models of the Macroeconomy: Evidence From Experts and Representative Samples', *The Review of Economic Studies* **89**(6), 2958–2991.
- Arifovic, J., Salle, I. and Truong, H. [2023], History-dependent monetary regimes: A lab experiment and a henk model, Technical report, Tinbergen Institute Discussion Paper.
- Armantier, O., Topa, G., Van der Klaauw, W. and Zafar, B. [2017], 'An Overview of the Survey of Consumer Expectations', *Economic Policy Review* (23-2), 51–72.
- Armenta, C. A. and Milani, F. [2026], 'Can Heterogeneous Expectations New Keynesian models match the dispersion of survey forecasts?', *Economics Letters* **263**, 112909.
- Armona, L., Fuster, A. and Zafar, B. [2019], 'Home Price Expectations and Behaviour: Evidence from a Randomized Information Experiment', *The Review of Economic Studies* **86**(4), 1371–1410.
- Assenza, T., Heemeijer, P., Hommes, C. and Massaro, D. [2021], 'Managing self-organization of expectations through monetary policy: A macro experiment', *Journal of Monetary Economics* **117**, 170–186.
- Bachmann, R., Topa, G. and van der Klaauw, W., eds [2023], *Handbook of Economic Expectations*, Handbooks in Economics, Elsevier, Amsterdam.
- Baumann, U., Ferrando, A., Georgarakos, D., Gorodnichenko, Y. and Reinelt, T. [2024], SAFE to Update Inflation Expectations? New Survey Evidence on Euro Area Firms, Working Paper 32504, National Bureau of Economic Research.
- Baumann, U., Ferrando, A., Georgarakos, D., Gorodnichenko, Y. and Reinelt, T. [2025], Do Inflation Expectations Become More Anchored during a Disinflation Episode? Evidence for Euro Area Firms, in 'AEA Papers and Proceedings', Vol. 115, American Economic Association 2014 Broadway, Suite 305, Nashville, TN 37203, pp. 266–270.
- Binder, C. [2021], 'Central Bank Communication and Disagreement about the Natural Rate Hypothesis', *International Journal of Central Banking* **17**(2), 81–123.
- Binder, C. and Makridis, C. [2022], 'Stuck in the Seventies: Gas Prices and Consumer Sentiment', *The Review of Economics and Statistics* **104**(2), 293–305.
- Bonomo, M., Carvalho, C., Eusepi, S., Perrupato, M., Abib, D., Ayres, J. and Matos, S. [2026], Price Setting when Expectations are Unanchored, Working Paper 6592658, SSRN.

- Branch, W. A. [2004], 'The Theory of Rationally Heterogeneous Expectations: Evidence from Survey Data on Inflation Expectations', *Economic Journal* **114**(497), 592–621.
- Branch, W. A. and Gasteiger, E. [2019], Endogenously (Non-)Ricardian Beliefs, ECON WPS - Working Papers in Economic Theory and Policy 03/2019, TU Wien, Institute of Statistics and Mathematical Methods in Economics, Economics Research Unit.
- Bruine de Bruin, W., Vanderklaauw, W., Downs, J. S., Fischhoff, B., Topa, G. and Ar-mantier, O. [2010], 'Expectations of Inflation: The Role of Demographic Variables, Ex-pectation Formation, and Financial Literacy', *Journal of Consumer Affairs* **44**(2), 381–402.
- Bryan, M. F. and Venkatu, G. [2001a], 'The Curiously Different Inflation Perspectives of Men and Women', *Economic Commentary* (11/1/2001).
- Bryan, M. F. and Venkatu, G. [2001b], 'The Demographics of Inflation Opinion Surveys', *Economic Commentary* (10/15/2001).
- Bullard, J., Grimaud, A., Salle, I. and Vermandel, G. [2026], 'Soft landing and inflation scares', *Journal of Monetary Economics* **157**, 103871.
- Candia, B., Coibion, O. and Gorodnichenko, Y. [2023], The macroeconomic expectations of firms, in 'Handbook of Economic Expectations', Elsevier, pp. 321–353.
- Candia, B., Coibion, O. and Gorodnichenko, Y. [2024], 'The inflation expectations of US firms: Evidence from a new survey', *Journal of Monetary Economics* **145**, 103569.
- Caplin, A., Gregory, V., Lee, E., Leth-Petersen, S. and Sæverud, J. [2026], 'Subjective Earn-ings Risk', *The Review of Economic Studies* p. rdag070.
- Carlson, J. A. [1977], A Study of Price Forecasts, in 'Annals of Economic and Social Mea-surement, Volume 6, number 1', NBER, pp. 27–56.
- Carroll, C. D. [2003], 'Macroeconomic Expectations of Households and Professional Fore-casters', *Quarterly Journal of Economics* **118**(1), 269–298.
- Carroll, C. and Wang, T. [2023], Chapter 25 - Epidemiological expectations, in R. Bach-mann, G. Topa and W. van der Klaauw, eds, 'Handbook of Economic Expectations', Academic Press, pp. 779–806.
- Cavallo, A., Cruces, G. and Perez-Truglia, R. [2017], 'Inflation Expectations, Learning, and Supermarket Prices: Evidence from Survey Experiments', *American Economic Journal: Macroeconomics* **9**(3), 1–35.
- Chinn, M. and Frankel, J. [1994], 'Patterns in Exchange Rate Forecasts for Twenty-Five Currencies', *Journal of Money, Credit and Banking* **26**(4), 759–770.
- Clements, M. P. [2022], 'Forecaster Efficiency, Accuracy, and Disagreement: Evidence Us-ing Individual-Level Survey Data', *Journal of Money, Credit and Banking* **54**(2-3), 537–568.

- Coibion, O., Georgarakos, D., Gorodnichenko, Y., Kenny, G. and Weber, M. [2024], ‘The Effect of Macroeconomic Uncertainty on Household Spending’, *American economic review* **114**(3), 645–677.
- Coibion, O. and Gorodnichenko, Y. [2012], ‘What Can Survey Forecasts Tell Us About Information Rigidities?’, *Journal of Political Economy* **120**(1), 116–159.
- Coibion, O. and Gorodnichenko, Y. [2026a], *Expectations Matter: The New Causal Macroeconomics of Surveys and Experiments*, Princeton University Press.
- Coibion, O. and Gorodnichenko, Y. [2026b], ‘Inflation expectations and monetary policy: what have we learned and to what end?’, *The Econometrics Journal* p. utag004.
- Coibion, O., Gorodnichenko, Y. and Kumar, S. [2018], ‘How Do Firms Form Their Expectations? New Survey Evidence’, *American Economic Review* **108**(9), 2671–2713.
- Coibion, O., Gorodnichenko, Y. and Ropele, T. [2020], ‘Inflation Expectations and Firm Decisions: New Causal Evidence’, *The Quarterly Journal of Economics* **135**(1), 165–219.
- Coibion, O., Gorodnichenko, Y. and Weber, M. [2022], ‘Monetary Policy Communications and Their Effects on Household Inflation Expectations’, *Journal of Political Economy* **130**(6), 1537–1584.
- Cornand, C. and Hubert, P. [2022], ‘Information frictions across various types of inflation expectations’, *European Economic Review* **146**, 104175.
- Croushore, D. D. [1997], ‘The Livingston survey: Still useful after all these years’, *Business Review-Federal Reserve Bank of Philadelphia* **2**, 1.
- D’Acunto, F., De Fiore, F., Sandri, D. and Weber, M. [2025], ‘A Global Survey of Household Perceptions and Expectations’, *BIS Quarterly Review* pp. 33–48.
- D’Acunto, F., Hoang, D., Paloviita, M. and Weber, M. [2019], Cognitive Abilities and Inflation Expectations, in ‘AEA Papers and Proceedings’, Vol. 109, pp. 562–566.
- D’Acunto, F., Hoang, D., Paloviita, M. and Weber, M. [2023], ‘IQ, Expectations, and Choice’, *The Review of Economic Studies* **90**(5), 2292–2325.
- D’Acunto, F., Malmendier, U., Ospina, J. and Weber, M. [2021], ‘Exposure to Grocery Prices and Inflation Expectations’, *Journal of Political Economy* **129**(5), 1615–1639.
- D’Acunto, F., Malmendier, U. and Weber, M. [2021], ‘Gender Roles Produce Divergent Economic Expectations’, *Proceedings of the National Academy of Sciences* **118**(21), e2008534118.
- D’Acunto, F., Malmendier, U. and Weber, M. [2023], What Do the Data Tell Us About Inflation Expectations?, in R. Bachmann, G. Topa and W. van der Klaauw, eds, ‘Handbook of Economic Expectations’, Academic Press, pp. 133–161.

- D'Acunto, F. and Weber, M. [2024], Information and Macroeconomic Expectations: Global Evidence, Becker Friedman Institute Working Paper 2024-139, Becker Friedman Institute for Economics at the University of Chicago.
- D'Acunto, F. and Weber, M. [2025], Subjective Inflation Expectations of Households: How They Are Formed and Their Role in Economic Choices, *in 'The Routledge Handbook of Economic Expectations in Historical Perspective'*, Routledge, pp. 124–142.
- D'Amico, S. and Orphanides, A. [2008], Uncertainty and Disagreement in Economic Forecasting, Finance and Economics Discussion Series 2008-56, Board of Governors of the Federal Reserve System.
- Das, S., Kuhnen, C. M. and Nagel, S. [2020], 'Socioeconomic Status and Macroeconomic Expectations', *The Review of Financial Studies* **33**(1), 395–432.
- Dominitz, J. and Manski, C. F. [1997a], 'Perceptions of Economic Insecurity: Evidence From the Survey of Economic Expectations', *The Public Opinion Quarterly* **61**(2), 261–287.
- Dominitz, J. and Manski, C. F. [1997b], 'Using Expectations Data to Study Subjective Income Expectations', *Journal of the American Statistical Association* **92**(439), 855–867.
- Dominitz, J. and Manski, C. F. [2007], 'Expected Equity Returns and Portfolio Choice: Evidence from the Health and Retirement Study', *Journal of the European Economic Association* **5**(2–3), 369–379.
- Dovern, J., Fritsche, U. and Slacalek, J. [2012], 'Disagreement Among Forecasters in G7 Countries', *Review of Economics and Statistics* **94**(4), 1081–1096.
- Dräger, L. and Nghiem, G. [2025], 'Inflation Literacy, Inflation Expectations, and Trust in the Central Bank: A Survey Experiment', *Review of Economics and Statistics* pp. 1–45.
- Drobot, S., Puzzello, D., Rholes, R. and Wabitsch, A. [2024], Incentivizing Inflation Expectations, SSRN Working Paper 5226305, SSRN.
- Engelberg, J., Manski, C. F. and Williams, J. [2009], 'Comparing the Point Predictions and Subjective Probability Distributions of Professional Forecasters', *Journal of Business & Economic Statistics* **27**(1), 30–41.
- Evans, G., Gibbs, C. and McGough, B. [2025], 'A Unified Model of Learning to Forecast', *American Economic Journal: Macroeconomics* **17**(2), 102–33.
- Falck, E., Hoffmann, M. and Hürtgen, P. [2021], 'Disagreement about inflation expectations and monetary policy transmission', *Journal of Monetary Economics* **118**, 15–31.
- Fofana, S., Patzelt, P. and Reis, R. [2025], *Household disagreement about expected inflation*, Edward Elgar Publishing.

- Frankel, J. A. and Froot, K. A. [1987a], 'Short-Term and Long-Term Expectations of the Yen/Dollar Exchange Rate: Evidence from Survey Data', *Journal of the Japanese and International Economies* **1**(3), 249–274.
- Frankel, J. A. and Froot, K. A. [1987b], 'Using Survey Data to Test Standard Propositions Regarding Exchange Rate Expectations', *American Economic Review* **77**(2), 133–153.
- Frankel, J. A. and Froot, K. A. [1990], Exchange Rate Forecasting Techniques, Survey Data, and Implications for the Foreign Exchange Market, in R. W. Jones and P. B. Kenen, eds, 'Handbook of International Economics', Vol. 2, Elsevier, Amsterdam, pp. 667–703.
- Fuster, A., Perez-Truglia, R., Wiederholt, M. and Zafar, B. [2022], 'Expectations with Endogenous Information Acquisition: An Experimental Investigation', *Review of Economics and Statistics* **104**(5), 1059–1078.
- Gambetti, L., Korobilis, D., Tsoukalas, J. D. and Zanetti, F. [2025], Agreed and Disagreed Uncertainty, Discussion Papers 2304, Centre for Macroeconomics (CFM).
- Giglio, S., Maggiori, M., Stroebel, J. and Utkus, S. [2021], 'Five Facts about Beliefs and Portfolios', *American Economic Review* **111**(5), 1481–1522.
- Giordani, P. and Söderlind, P. [2003], 'Inflation Forecast Uncertainty', *European Economic Review* **47**(6), 1037–1059.
- Goy, G., Hommes, C. and Mavromatis, K. [2022], 'Forward guidance and the role of central bank credibility under heterogeneous beliefs', *Journal of Economic Behavior & Organization* **200**, 1240–1274.
- Greenwood, R. and Shleifer, A. [2014], 'Expectations of Returns and Expected Returns', *The Review of Financial Studies* **27**(3), 714–746.
- Guiso, L. and Parigi, G. [1999], 'Investment and Demand Uncertainty', *The Quarterly Journal of Economics* **114**(1), 185–227.
- Haruvy, E., Lahav, Y. and Noussair, C. N. [2007], 'Traders' Expectations in Asset Markets: Experimental Evidence', *American Economic Review* **97**(5), 1901–1920.
- Hayek, F. A. [1937], 'Economics and Knowledge', *Economica* **4**(13), 33–54.
- Hayek, F. A. [1945], 'The Use of Knowledge in Society', *American Economic Review* **XXXV**(4), 519–30.
- Heemeijer, P., Hommes, C., Sonnemans, J. and Tuinstra, J. [2009], 'Price Stability and Volatility in Markets with Positive and Negative Expectations Feedback: An Experimental Investigation', *Journal of Economic Dynamics and Control* **33**(5), 1052–1072.
- Hommes, C. [2011], 'The heterogeneous expectations hypothesis: Some evidence from the lab', *Journal of Economic Dynamics and Control* **35**(1), 1–24.

- Hommes, C., Massaro, D. and Salle, I. [2019], 'Monetary and fiscal policy design at the zero lower bound: Evidence from the lab', *Economic Inquiry* **57**(2), 1120–1140.
- Hommes, C., Sonnemans, J., Tuinstra, J. and Van de Velden, H. [2005], 'Coordination of Expectations in Asset Pricing Experiments', *Review of Financial Studies* **18**(3), 955–980.
- Hong, H. and Stein, J. C. [2007], 'Disagreement and the Stock Market', *Journal of Economic Perspectives* **21**(2), 109–128.
- Ito, T. [1988], Foreign Exchange Rate Expectations: Micro Survey Data, NBER Working Paper 2679, National Bureau of Economic Research.
- Ito, T. [1990], 'Foreign Exchange Rate Expectations: Micro Survey Data', *American Economic Review* **80**(3), 434–449.
- Jain, M., Kostyshyna, O. and Zhang, X. [2024], 'How do people view wage and price inflation?', *Journal of Monetary Economics* **145**, 103552.
- Jonung, L. [1981], 'Perceived and Expected Rates of Inflation in Sweden', *The American Economic Review* **71**(5), 961–968.
- Katona, G. [1951], *Psychological Economics*, Elsevier, New York.
- Katona, G. [1960], *The Powerful Consumer: Psychological Studies of the American Economy*, McGraw-Hill, New York.
- Ke, D. [2025], 'Intrahousehold Disagreement about Macroeconomic Expectations', *The Journal of Finance* **80**(3), 1647–1689.
- Keynes, J. M. [1936], *The General Theory of Employment, Interest and Money*, Macmillan, London.
- Knight, F. H. [1921], *Risk, Uncertainty and Profit*, Houghton Mifflin, Boston.
- Koh, K. W., Monninger, A. and Wang, T. [2025], Seeing the Economy Through Colored Glasses: Partisanship in Macro and (Not in) Micro Expectations, Technical report, Working Paper.
- Koşar, G. and Van der Klaauw, W. [2025], 'Workers' Perceptions of Earnings Growth and Employment Risk', *Journal of Labor Economics* **43**(S1), S83–S121.
- Kostyshyna, O., Salle, I. and Truong, H. [2026], Heterogeneity in the Formation of Inflation Expectations: Evidence from Micro Data, Tinbergen Institute Discussion Paper TI 2026-036/VI, Tinbergen Institute.
- Kuchler, T. and Zafar, B. [2019], 'Personal Experiences and Expectations about Aggregate Outcomes', *Journal of Finance* **74**(5), 2491–2542.
- Kurz, M., Piccillo, G. and Wu, H. [2013], 'Modeling diverse expectations in an aggregated New Keynesian Model', *Journal of Economic Dynamics and Control* **37**(8), 1403–1433. Rethinking Economic Policies in a Landscape of Heterogeneous Agents.

- Lahiri, K. and Sheng, X. [2008], 'Evolution of Forecast Disagreement in a Bayesian Learning Model', *Journal of Econometrics* **144**(2), 325–340.
- Lahiri, K. and Sheng, X. [2010], 'Measuring forecast uncertainty by disagreement: The missing link', *Journal of Applied Econometrics* **25**(4), 514–538.
- Link, S., Peichl, A., Roth, C. and Wohlfart, J. [2023], 'Information frictions among firms and households', *Journal of Monetary Economics* **135**, 99–115.
- List, J. A. [2026], Don't Give Up on Lab Experiments: Why the Field Still Needs the Lab, Working Paper 35338, National Bureau of Economic Research.
- Lucas, R. E. [1972], 'Expectations and the Neutrality of Money', *Journal of Economic Theory* **4**(2), 103–124.
- Malmendier, U. and Nagel, S. [2011], 'Depression Babies: Do Macroeconomic Experiences Affect Risk Taking?', *Quarterly Journal of Economics* **126**(1), 373–416.
- Malmendier, U. and Nagel, S. [2016], 'Learning from Inflation Experiences', *The Quarterly Journal of Economics* **131**(1), 53–87.
- Malmendier, U., Nagel, S. and Yan, Z. [2021], 'The Making of Hawks and Doves', *Journal of Monetary Economics* **117**, 19–42.
- Mankiw, G. and Reis, R. [2002], 'Sticky Information versus Sticky Prices: A Proposal to Replace the New Keynesian Phillips Curve', *Quarterly Journal of Economics* **117**(4), 1295–1328.
- Mankiw, N. G., Reis, R. and Wolfers, J. [2003], 'Disagreement about Inflation Expectations', *NBER macroeconomics annual* **18**, 209–248.
- McMahon, M. and Reiche, L. [2024], 'Does the Bank of England Need Gendered Communication?', *National Institute Economic Review* **269**, 29–46.
- Meeks, R. and Monti, F. [2023], 'Heterogeneous beliefs and the Phillips curve', *Journal of Monetary Economics* **139**, 41–54.
- Mokhtarzadeh, F. and Petersen, L. [2021], 'Coordinating Expectations through Central Bank Projections', *Experimental Economics* **24**(3), 883–918.
- Mueller, A. I. and Spinnewijn, J. [2023], Chapter 22 - Expectations data, labor market, and job search, in R. Bachmann, G. Topa and W. van der Klaauw, eds, 'Handbook of Economic Expectations', Academic Press, pp. 677–713.
- Muth, J. [1961], 'Rational Expectations and the Theory of Price Movements', *Econometrica* **29**.
- Ottaviani, M. and Sørensen, P. N. [2006], 'Professional Advice', *Journal of Economic Theory* **126**(1), 120–142.

- Ozden, T. [2025], 'Heterogeneous Expectations and the Business Cycle at the Effective Lower Bound', *International Journal of Central Banking* **21**(1), 273–330.
- Patton, A. J. and Timmermann, A. [2010], 'Why Do Forecasters Disagree? Lessons from the Term Structure of Cross-Sectional Dispersion', *Journal of Monetary Economics* **57**(7), 803–820.
- Petersen, L. and Rholes, R. [2022], 'Macroeconomic expectations, central bank communication, and background uncertainty: A COVID-19 laboratory experiment', *Journal of Economic Dynamics and Control* **143**, 104460.
- Pfajfar, D. and Santoro, E. [2010], 'Heterogeneity, learning and information stickiness in inflation expectations', *Journal of Economic Behavior & Organization* **75**(3), 426–444.
- Pfajfar, D. and Žakelj, B. [2014], 'Experimental evidence on inflation expectation formation', *Journal of Economic Dynamics and Control* **44**, 147–168.
- Pigou, A. C. [1927], *Industrial Fluctuations*, Macmillan, London.
- Reiche, L. [2024], Beyond Groceries: Financial Confidence and the Gender Gap in Inflation Expectations, CESifo Working Paper 11588, CESifo.
- Reis, R. [2022], 'Losing the Inflation Anchor', *Brookings Papers on Economic Activity* **2021**(2), 307–379.
- Ropele, T., Gorodnichenko, Y. and Coibion, O. [2024], 'Inflation Expectations and Misallocation of Resources: Evidence from Italy', *American Economic Review: Insights* **6**(2), 246–261.
- Roth, C. and Wohlfart, J. [2020], 'How Do Expectations about the Macroeconomy Affect Personal Expectations and Behavior?', *The Review of Economics and Statistics* **102**(4), 731–748.
- Salle, I. [2022], 'Comment on "No Firm Is an Island? How Industry Conditions Shape Firms' Expectations" by Philippe Andrade, Olivier Coibion, Erwan Gautier and Yuriy Gorodnichenko', *Journal of Monetary Economics* **125**, 57–61.
- Salle, I., Gorodnichenko, Y. and Coibion, O. [2026], 'Lifetime Memories of Inflation: Evidence from Surveys and the Lab', *Journal of Political Economy: Macroeconomics* . forthcoming.
- Savignac, F., Gautier, E., Gorodnichenko, Y. and Coibion, O. [2024], 'Firms' Inflation Expectations: New Evidence from France', *Journal of the European Economic Association* **22**(6), 2748–2781.
- Shiller, R. J. [1987], Investor Behavior in the October 1987 Stock Market Crash: Survey Evidence, NBER Working Paper 2446, National Bureau of Economic Research.
- Shiller, R. J. [2000], 'Measuring Bubble Expectations and Investor Confidence', *Journal of Psychology and Financial Markets* **1**(1), 49–60.

- Shiller, R. J., Kon-Ya, F. and Tsutsui, Y. [1996], 'Why Did the Nikkei Crash? Expanding the Scope of Expectations Data Collection', *The Review of Economics and Statistics* **78**(1), 156–164.
- Shleifer, A. and Summers, L. H. [1990], 'The Noise Trader Approach to Finance', *Journal of Economic Perspectives* **4**(2), 19–33.
- Smith, A. [1776], *An Inquiry into the Nature and Causes of the Wealth of Nations*, W. Strahan and T. Cadell, London.
- Smith, V. L., Suchanek, G. L. and Williams, A. W. [1988], 'Bubbles, Crashes, and Endogenous Expectations in Experimental Spot Asset Markets', *Econometrica: Journal of the Econometric Society* pp. 1119–1151.
- 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**(1), 39–72.
- Takagi, S. [1991], 'Exchange Rate Expectations: A Survey of Survey Studies', *IMF Staff Papers* **38**(1), 156–183.
- Truong, H., Mirdamadi, M. and Petersen, L. [2026], 'Macroeconomic Literacy and Expectations'.
- Van Hove, L. and Verbraecken, R. [2025], 'Gender Roles and Inflation Expectations: D'Acunto et al. Revisited', *Review of Economics of the Household* **23**(2), 797–818.
- Vissing-Jorgensen, A. [2004], Perspectives on Behavioral Finance: Does "Irrationality" Disappear with Wealth? Evidence from Expectations and Actions, in M. Gertler and K. Rogoff, eds, 'NBER Macroeconomics Annual 2003', Vol. 18, MIT Press, Cambridge, MA, pp. 139–208.
- Wang, T. [2026], Perceived versus Calibrated Income Risks in Heterogeneous-agent Consumption Models.
- Weber, M., Candia, B., Afrouzi, H., Ropele, T., Lluberas, R., Frache, S., Meyer, B., Kumar, S., Gorodnichenko, Y., Georgarakos, D. et al. [2025], 'Tell Me Something I Don't Already Know: Learning in Low-and High-Inflation Settings', *Econometrica* **93**(1), 229–264.
- Weber, M., Gorodnichenko, Y. and Coibion, O. [2022], The Expected, Perceived, and Realized Inflation of U.S. Households before and during the COVID19 Pandemic, Working Paper 29640, National Bureau of Economic Research.
- Woodford, M. [2003], *Interest and Prices: Foundations of a Theory of Monetary Policy*, Princeton University Press.
- Yotzov, I., Bloom, N., Bunn, P., Mizen, P. and Thwaites, G. [2026], 'The Speed of Firm Response to Inflation', *Journal of the European Economic Association* **24**(2), 736–768.

Zarnowitz, V. and Braun, P. A. [1993], Twenty-two Years of the NBER-ASA Quarterly Economic Outlook Surveys: Aspects and Comparisons of Forecasting Performance, *in* J. H. Stock and M. W. Watson, eds, 'Business Cycles, Indicators, and Forecasting', Vol. 28 of *Studies in Business Cycles*, University of Chicago Press, Chicago, pp. 11–94.

Online Appendix: LLM-assisted classification of the literature

We used OpenAI’s GPT-5 model through the Chat Completions API to classify each paper included in our literature review or in Figure 2. The model received the bibliographic metadata available in the BibTeX file, namely authors’ surname, title, abstract and keywords (when available), journal or working paper repository, and publication year. The model was explicitly instructed not to rely on external knowledge beyond these metadata.

For each paper, the model classified three dimensions: (i) the type of economic agents studied, (ii) the research methodology, and (iii) the forecast variables analyzed. The prompt also requested confidence scores for each dimension, an overall confidence score, a flag identifying observations requiring manual review, and a brief textual justification for the classification. Responses were returned as structured JSON and automatically parsed into a database. Papers for which the model reported low confidence or returned an “Unknown” category were flagged for manual inspection.

The complete prompt used for all classifications is reproduced in Box 5.

For each of the three categories, the prompt can return more than one agent type, methodology, and variable. We then use fractional counting, so that papers covering multiple agents, methodologies, or variables do not receive more weight than papers covering only one. For instance, if a paper covers households and firms’ expectations, each dimension received a weight of 0.5.

After removing general review articles, older books such as Keynes’ *General Theory*, and duplicates, the database contains 291 papers.

The resulting heatmaps cross three dimensions (agent-method-variable). Figure 4 reports the variable against methodology plot for completeness, the two others are in the survey.

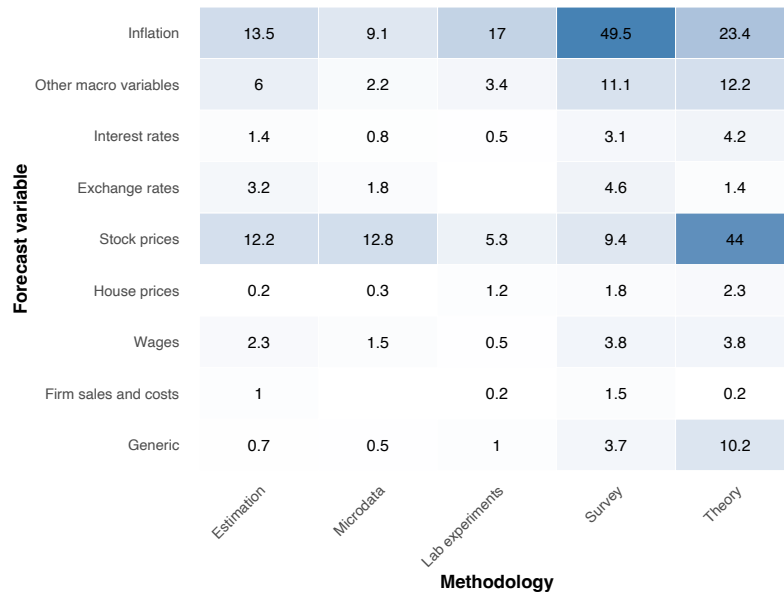


Figure 4: Heatmap of the literature on heterogeneous expectations by methodology

Complete prompt submitted to GPT-5

```
\textbf{Task.} You are classifying academic papers for a systematic
literature review on heterogeneous expectations.

\medskip

\textbf{General guidelines}

\begin{enumerate}
\item Use only the information contained in the title, abstract, keywords
, journal, and publication year. Focus on the abstract whenever
available.
\item Do not use outside knowledge about the paper, its authors, journal,
or topic.
\item Do not infer categories that are not explicitly supported by the
available metadata.
\item When evidence is insufficient, classify the category as \texttt{
Unknown}.
\item Be conservative. Do not assign a category based on weak hints alone
, but do not be overly conservative. For example, an explicit mention
of households or investors in the abstract is sufficient to classify
the corresponding agent.
\item Multiple agent categories may be assigned.
\item Multiple methodology categories may be assigned.
\item Multiple forecast variable categories may be assigned.
\item The objective is consistency rather than completeness.
\item If several classifications appear plausible and the metadata do not
clearly favor one, lower the confidence score and set \texttt{review
= 1}.
\end{enumerate}

\medskip

\textbf{Important}

Every value returned in the fields \texttt{agent}, \texttt{method}, and \
\texttt{variable} must exactly match one of the category labels listed
below. Do not create, shorten, or modify labels.

\medskip

\textbf{Agent categories}

\begin{itemize}
\item Household
\item Firm
\item Professional Forecaster
\item Financial Market Participant
\item Central Banker
\item Laboratory Subject
```

```

\item Unknown
\end{itemize}

\textbf{Agent coding rules}

\begin{itemize}
\item Surveys of consumers, households, individuals, or the general
public $\rightarrow$ Household.
\item Surveys of firms, managers, entrepreneurs, or employers $\rightarrow$ Firm.
\item Surveys of professional economists or SPF respondents $\rightarrow$ Professional Forecaster.
\item Studies of traders, investors, analysts, or asset managers $\rightarrow$ Financial Market Participant.
\item Studies of central bank staff or policymakers $\rightarrow$ Central Banker.
\item Laboratory experiments with student subjects or generic
participants $\rightarrow$ Laboratory Subject.
\item If the experiment explicitly recruits a real-world population,
classify using the corresponding real-world category.
\item Surveys of workers or employees about their own expectations $\rightarrow$ Household.
\item Otherwise return \texttt{Unknown}.
\end{itemize}

\medskip

\textbf{Methodology categories}

\begin{itemize}
\item Theory
\item Survey
\item Laboratory Experiment
\item Field Experiment
\item Administrative / Observational Data
\item Estimation
\item Unknown
\end{itemize}

\textbf{Methodology coding rules}

\begin{itemize}
\item Pure theoretical model $\rightarrow$ Theory.
\item Survey data collection or analysis $\rightarrow$ Survey.
\item Controlled laboratory experiment $\rightarrow$ Laboratory Experiment.
\item Randomized intervention in a natural setting $\rightarrow$ Field Experiment.
\item Administrative records, panel data, market data, transaction data,
or observational microdata $\rightarrow$ Administrative / Observational Data.
\item Structural estimation, DSGE estimation, learning estimation,

```

```

        calibration-estimation, or econometric estimation $\rightarrow$
        Estimation.
\item Multiple methodologies may be assigned.
\item Otherwise return \texttt{Unknown}.
\end{itemize}

\medskip

\textbf{Forecast variable categories}

\begin{itemize}
\item Inflation
\item Output/GDP
\item Unemployment
\item Interest Rate
\item Wages
\item House Prices
\item Exchange Rate
\item Firm Sales/Demand
\item Costs/Input Prices
\item Fiscal Variables
\item Stocks
\item Unknown
\end{itemize}

\textbf{Forecast variable coding rules}

\begin{itemize}
\item Inflation and prices $\rightarrow$ Inflation.
\item GDP, output, growth, production, or economic activity $\rightarrow$
        Output/GDP.
\item Employment or unemployment expectations $\rightarrow$ Unemployment.
\item Interest rates, policy rates, bond yields, or mortgage rates $\rightarrow$
        Interest Rate.
\item Wage expectations, earnings expectations, job-loss probability, or
        unemployment duration $\rightarrow$ Wages.
\item House price expectations $\rightarrow$ House Prices.
\item Exchange rates or currency values $\rightarrow$ Exchange Rate.
\item Sales, revenues, or customer demand $\rightarrow$ Firm Sales/Demand
        .
\item Production or input costs $\rightarrow$ Costs/Input Prices.
\item Taxes, deficits, government spending, debt, or fiscal policy $\rightarrow$
        Fiscal Variables.
\item Stock returns, stock prices, bond prices, or financial market
        expectations $\rightarrow$ Stocks.
\item Otherwise return \texttt{Unknown}.
\end{itemize}

\medskip

\textbf{Confidence rules}

```

Return the following confidence measures:

```
\begin{itemize}
\item \texttt{confidence}
\item \texttt{agent\_confidence}
\item \texttt{method\_confidence}
\item \texttt{variable\_confidence}
\end{itemize}
```

using the scale

```
\begin{itemize}
\item 0.90--1.00: directly supported by title and abstract;
\item 0.70--0.89: likely correct but some ambiguity remains;
\item 0.40--0.69: substantial uncertainty;
\item 0.00--0.39: insufficient information.
\end{itemize}
```

```
\textbf{Set \texttt{review} = 1} if}
```

```
\begin{itemize}
\item the abstract is missing;
\item any confidence score is below 0.70;
\item any category is \texttt{Unknown};
\item multiple plausible classifications exist.
\end{itemize}
```

```
\textbf{Additional output rules}
```

```
\begin{itemize}
\item Copy \texttt{first\_author}, \texttt{year}, and \texttt{title}
      exactly.
\item Set \texttt{abstract\_available} = 1 if an abstract is present and
      0 otherwise.
\item \texttt{source\_of\_evidence} must be one of
\begin{itemize}
\item \texttt{title\_only}
\item \texttt{title\_keywords}
\item \texttt{title\_abstract}
\item \texttt{title\_abstract\_keywords}
\end{itemize}
\item \texttt{uncertainty\_reason} may contain
\begin{itemize}
\item \texttt{missing\_abstract}
\item \texttt{unclear\_agent}
\item \texttt{unclear\_method}
\item \texttt{unclear\_variable}
\item \texttt{multiple\_plausible\_classifications}
\item \texttt{insufficient\_information}
\end{itemize}
\item If there is no uncertainty, return an empty array.
\item \texttt{justification} should consist of one short sentence.
```

```
\end{itemize}
```

```
\textbf{Return only a valid JSON object} with the requested fields,  
followed by the paper metadata (\texttt{first\_author}, \texttt{title  
, \texttt{abstract}, \texttt{keywords}, \texttt{journal}, and \  
\texttt{year}}).
```