Household Inflation Expectations: An Overview of Recent Insights for Monetary Policy

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Abstract: This paper discusses the recent wave of research that has emphasized the importance of measures of consumers' inflation expectations. In contrast to other measures of expected inflation, such as for experts or financial market participants, consumers' inflation expectations capture the broader distribution of societal beliefs about inflation. This research has revealed very significant deviations from traditional assumptions about rationality in consumers' expectations formation. However, households do act on their beliefs about inflation, though in heterogeneous ways that can depart from the predictions of conventional economic models. Recent euro area experiences highlight the importance of tracking the degree of anchoring in consumers' inflation expectations in a way that considers their inherent complexity, heterogeneity, and subjectivity. On average, consumers' medium and longer-term expectations deviate noticeably in levels from central bank targets and, in contrast with expert expectations, often co-move more closely with shorter-term inflation news. By stepping up their engagement with the wider public, central banks may be able to influence expectations by building up greater knowledge and trust and thereby support more effective monetary transmission. Communication efforts need to be persistent because central banks must compete with many other demands on consumers' attention.

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1. Introduction

In recent years, in both economic science and applied economic policy analysis, a resurgent interest in direct survey-based measures of expectations of households and firms has emerged (Coibion *et al.* 2018; Lane 2019, Shleifer 2019, Weber *et al.* 2022). The growing distrust amongst economists for the policy insights from economic models that assume rational or "model-consistent" expectations has been a main driver of this trend. Indeed, even economic models that rely on the assumption that agents only gradually learn model-consistent expectations often seem contradicted by the data, suggesting that consumers may systematically form expectations using simple rules of thumb or very subjective processes and partial information sets (Andre et al. 2022). Understanding these processes is important because the evidence also suggests (see Manski 2004) that consumers make their decisions and economic choices based on their own subjective beliefs.[1]

Methodologically, the recent interest in subjective expectations has in part, been facilitated by advances in survey design as well as the diffusion of the internet, which has enabled researchers to collect expectations data from population-representative samples in a timely and cost-effective manner using online survey platforms.[2] Many central banks, including the ECB, have invested in setting up and fielding such surveys and have increasingly started to use the underlying microdata to shed light on important research and policy questions and as a source of information to help improve central bank communication (see, for example, Lagarde, 2023).[3] A critical advancement in fostering these efforts has been the ability to field Randomised Controlled Trials (RCTs). The design of RCTs makes use of modern web-survey technologies to study in an experimental setting the causal effects of information on expectation formation and how this can influence subsequent economic decisions.[4]

This discussion paper reviews the recent wave of research with survey-based expectation measures with a particular focus on inflation expectations and their implications for monetary policy. As part of the ECB's 2021 monetary policy strategy review, a strong priority was placed on bringing the ECB closer to the general public through enhanced communication (see Assenmacher *et al.* 2021). Traditionally, household beliefs about inflation have not occupied

[1] See also Weber et al. (2022) and D'Acunto and Weber (2024) for further discussion, in particular linked to inflation expectations.
[2] For a review of advances in eliciting expectations and important contributions see Manski (2004 and 2018).
[3] See D'Acunto *et al.* (2023b) and Georgarakos and Kenny (2022) for further discussions.
[4] Haaland *et al.* (2023) provide a detailed review of the use of information provision experiments in economics.

centre stage in the ECB's economic analysis, e.g., relative to measures of expectations derived from financial market prices or expert forecasts. However, professional forecasts and market-based measures are unable to capture the cross-section and time series variation of households' inflation expectations, which in turn drive households' choices and, hence, are crucial for the design of effective monetary policy. The importance of a thorough understanding of what monetary policy can - and cannot - learn from survey-based expectations is also stressed by the recent rise in global and euro area inflation in the wake of the COVID-19 pandemic and the Russian war in Ukraine. Because households' inflation expectations measure broader societal beliefs about inflation, their stability protects against the risk that price instabilities may become widely entrenched and threaten the stability of the monetary system. Moreover, because of the large share of economic activity represented by the household sector, households' inflation expectations are relevant for understanding aggregate economic fluctuations and the distribution of economic outcomes across the economy. To illustrate some of these issues, the paper draws extensively on the ECB's Consumer Expectations Survey (CES), which was set up in 2020 to help measure expectations and household behaviour in a timely and consistent manner across the main euro area countries.

The remainder of the paper is organised as follows. In Section 2 we review some of the main "facts" about expectations based on these new data sources. Drawing on the new wave of research that has studied the properties of subjective inflation expectations, this section also reviews the evidence on what has been learnt about the likely nature of the process governing the formation of consumers' inflation expectations. One reason why researchers and policy institutions have been so interested in survey-based measurement of expectations is that they measure the role of subjective beliefs in driving agents' economic behaviour which ultimately represents the underlying driver of aggregate fluctuations. Section 3 therefore reviews what we have learnt and what is still to be understood about how subjective beliefs about inflation feed into households' economic choices, including consumption and investment choices. In addition, this section examines the significant heterogeneity that exists in the transmission of expectations to consumer behaviour and thus sheds light on the associated relevance for understanding economic developments at the level of the macroeconomy (the primary focus of central banks). Section 4 focuses on the lessons that can be drawn from this research programme for monetary policy, including the evidence on whether central banks might directly influence the publics' expectations about inflation through either their policy actions and/or broader communication strategies. Section 5 summarises and concludes by highlighting

some of the main insights for policy and the open questions or priorities that future research in this field could address.

2. Households' inflation expectations: What have we learnt?

Over the past ten years, an unprecedented investment by central banks has occurred in the collection of consumer expectations data particularly through online surveys, which facilitate timely data collection and flexibility in questionnaire design. In Europe, the ECB launched its new Consumer Expectations Survey in early 2020 (see ECB 2021 and Georgarakos and Kenny 2022), whereas De Nederlandsche Bank has a long tradition of conducting household surveys online (Teppa and Vis 2012). For the US, the Survey of Consumer Expectations (SCE), run by the Federal Reserve Bank of New York (Armantier *et al.* 2015 and Armantier *et al.* 2016), celebrated its 10-year anniversary in 2023. Moreover, similar surveys have been set-up by the Bank of England, the Bank of Japan, the Bank of Canada and the Bundesbank, amongst others.[5] Coincident with this investment in data collection and expectations measurement, a large-scale increase in related research using panels of individual-level consumer inflation expectations data has occurred. Though each of these surveys can differ in terms of their specific design and sampling features, they have nonetheless revealed a broadly consistent set of fundamental patterns, such as a general overestimation of future inflation as measured by official statistics, especially during periods of low inflation, as well as considerable heterogeneity across households. For some time, these two features have led economists to doubt the usefulness of surveys, given that they provided data inconsistent with common assumptions about inflation expectations in standard economic models. Yet, these patterns hold across countries, surveys, elicitation methods, question formats and time periods, suggesting that they are not simply noise or mistakes that researchers and policy makers should discard. Rather, these patterns require a thorough understanding of driving forces and implications for household choices and monetary policy. In this section, we discuss some of these key features and what research has revealed about the insights they bring to our understanding of how inflation expectations are formed. [6]

[5] Table A1 in Appendix I provides an overview of surveys run by central banks in OECD countries.
[6] This section draws partly on recent comprehensive literature reviews by Weber *et al.* (2022) and D'Acunto *et al.* (2023b). For a detailed review of the theoretical literature of expectations formation, see Born *et al.* (2023).

The main stylized facts

The recent wave of survey-based research has clearly uncovered a broadly consistent set of stylized facts that hold across different surveys and countries. A first key feature, emphasised by Weber *et al.* (2022), is the systematic upward "bias" in aggregate numerical inflation expectations when compared to both realized inflation outcomes and the average numerical expectations of professional forecasters (see Figure 1), especially during periods of low inflation. A second important stylised fact is the substantial dispersion in consumers' beliefs about inflation. Consumers' subjective beliefs about inflation are considerably wider than the corresponding distribution amongst expert forecasters (see Figure 2). A third and related, important common feature is the relatively large difference between the mean and median point prediction, with the former lying persistently above the latter (see Table 1). As a result, and in contrast to expert surveys, considerably more uncertainty exists for users of consumer survey data about the precise *level* of aggregate consumer expectations (i.e. where the centre of the distribution across consumers is located). This feature reflects the large mass of individuals who typically report very high levels of expected inflation with this "right tail" pushing up the survey mean relative to the median (which gives less weight to the tails). These regularities in the data underline that proxying households' expectations with the summary statistics (means or medians) of professional and/or market-implied expectations neglect their wide heterogeneity. Unlike expert surveys, such as the ECB's Survey of Professional Forecasters (SPF), where all respondents can be reasonably assumed to use official data and information about the aggregate economy when forecasting inflation, consumers' inflation expectations often draw extensively on information and signals from local, heterogeneous and individual economic environments. As a consequence, consumers' inflation expectations are often less directly impacted by official inflation news (e.g. from published inflation statistics) or inflation-related policy communication. These heterogenous signals are based on the price changes households face in their daily lives and a myriad of other potential consumer-specific factors, which we discuss further below, that shape beliefs about future inflation (D'Acunto and Weber 2024).

Consistent with this highly subjective component in the signals households use to form their inflation expectations, the evidence has revealed a number of systematic demographic

differences in the cross-section that are evident across different surveys and countries.[7] Women typically report higher expected inflation than men. Also, survey respondents from the upper parts of the income distribution or with higher levels of educational attainment tend to report lower rates of expected inflation that tend to be closer to inflation as measured in official statistics. In a recent study, as depicted in Figure 3, D'Acunto *et al.* (2023b) link consumers' inflation expectations to measures of cognitive ability (IQ scores for Finnish males collected during their military service) for each individual of a representative population. The figure also plots mean absolute expectation "errors" for inflation from the CES by respondents' level of financial literacy. Consumer forecast errors decline monotonically along with higher cognitive ability and financial literacy scores, with individuals at the bottom of the IQ and literacy distributions displaying absolute forecast errors that are twice as large as those at the top of the distribution. Such inequality in the accuracy of forming beliefs about future price changes is likely to also have distributional implications given the growing evidence (discussed further below in Section 3) that households act on their subjective beliefs about inflation. Lastly, some systematic differences by age, and as we highlight further below, exist, and research (e.g., Malmendier and Nagel 2016) has suggested that these differences may, in part, reflect a role for subjective life-time experiences in shaping beliefs about the future.

Insights on how expectations are formed and updated

Persistent and systematic differences in subjective inflation expectations across consumers and over time suggest that the process underpinning consumers' inflation expectations departs from the purely full information rational expectations (FIRE) and representative agent paradigms that have dominated so much of macroeconomics since the 1970s.[8] To better understand the origins of the prevailing heterogeneity in beliefs, a series of papers have studied consumers' ability to acquire, understand, and effectively utilise information. Given the importance of inflation expectations for monetary policy, understanding their origins is essential to design policy communication in ways that target especially those households that are likely to form expectations that depart most from "rationality".

Exploiting the panel dimension of the CES, Table 2 highlights aggregate patterns for euro area consumers that are at odds with the FIRE hypothesis. According to FIRE, in most cases,

[7] These systematic patterns are depicted in Table 1 based on the ECB CES data. See also, for example, Arioli *et al.* (2017), Bryan and Venkatu (2001), Bruine de Bruin *et al.* (2010 and 2011), Binder (2015), Jonung (1981), Pfajfar and Santoro (2008), Rumler and Valderrama (2020), or D'Acunto *et al.* (2021b, 2023b and 2023c).
[8] See Muth (1961) and Lucas (1972).

individual forecast errors should not be predictable based on information accessible to the forecaster in real-time. As influential work by Coibion and Gorodnichenko (2015) showed, this prediction is not corroborated in the data, even for some of the most sophisticated agents in the economy, such as professional forecasters. We adapt their test using individual-level data regressing individual forecast errors on forecast revisions. Table 2 shows that for the euro area, consumers exhibit highly predictable forecast errors. The negative correlation between the forecast revision and the expectational error (column 1) suggests that consumers overreact to news about inflation, that is, consumers update their expectations too much today, resulting in negative forecast errors in the future. Overreaction is not limited to specific subgroups of the public, but it is a rather common feature. Even individuals with higher cognitive ability systematically overreact (D'Acunto *et al.* 2023b). Consistent with the idea of overreaction, the evidence also suggests that consumers strongly extrapolate into the future based on their perceptions about price changes today. Such inflation perceptions, which capture realised inflation experiences at the individual level, correlate strongly with consumers' expected rate of inflation over the following 12 months (Table 2, column 2).[9]

Direct exposure to prices, salient prices, and selective recall

The fact that consumers' belief formation is hardly consistent with rational expectations, of course, does not imply that consumers' expectation formation process is completely erratic and that it does not follow some systematic rules of thumb. The mere fact that the heterogeneity of inflation expectations across demographic groups presents systematic patterns suggests that subjective inflation expectations cannot simply reflect noise. Recent evidence suggests that consumers do react particularly strongly to the most salient price signals they observe frequently. Euro area data shows that consumers' aggregate inflation expectations correlate most strongly with price expectations of food and groceries, housing, and transport, as shown by the heatmap in Figure 4. The first column indicates a particularly high correlation between expectations about the change in general prices and expected food inflation. Another important, salient and frequently purchased item which significantly effects inflation expectations is

[9] When averaging across different consumers and consumption patterns, the idiosyncratic error in perceived inflation tends to net out and as a result there is a close correspondence between the dynamics of official inflation and aggregate perceptions of inflation. As a result, the strong positive pass-through of individual perceptions of inflation may help to also explain the close correlation that emerges between realised aggregate HICP inflation and aggregate consumers' inflation expectations. The evidence also suggests that consumers generally perceive their own inflation experience quite accurately. For example, Weber *et al.* (2023a) show that for the US perceived inflation and scanner-data based individual inflation rates are closely linked.

energy, given its highly prevalent use by households for both home-heating and lighting and its importance as a cost driver for transportation services.[10]

Research has also indicated that personal inflation rates observed in heterogeneous individual consumption bundles help to explain the cross-sectional variation of inflation expectations (D'Acunto *et al.* 2021a). By construction, such individual-level realized and perceived inflation signals will deviate from official measures of inflation – both in magnitude and volatility – because households have heterogeneous consumption bundles and face heterogeneous price changes on the same goods they purchase in different locations and across different outlets. Another important finding is that individual households tend not to aggregate price changes based on their overall economic importance, that is, their share of expenditure allocated to each good or service, but rather, they may focus more on price changes of frequently purchased goods that they are exposed to more regularly.[11] What's more, they assign higher weights to price increases compared to equally sized price cuts, a phenomenon that helps to explain the general upward bias in inflation expectations that we observe during times of low and stable inflation.[12] Consistent with these patterns, the updating of expectations over time-based on perceived news about past price changes appears to be asymmetric, with consumers reacting more strongly to inflationary than to disinflationary news, as highlighted for euro area consumers in Figure 5.[13] The implied stronger focus of consumers on price increases rather than equal-sized price cuts suggests that, following a period of rising inflation, households' inflation expectations might remain elevated for an extended period of time even after realized aggregate inflation rates come back down toward the central bank target.[14]

Indeed, the above insights are supported by several studies using survey experiments that provide causal evidence of consumers' reliance on frequently purchased goods at supermarkets

[10] In a recent study Patzelt and Reis (2024) use the CES to study the transmission of electricity prices to consumers inflation expectations finding stronger effects during periods when expectations were less well-anchored.
[11] This finding also offers some rationale for the aforementioned gender gap in inflation expectations to the extent that females tend to be engaged in more frequent shopping to meet household needs.
[12] See D'Acunto *et al.* (2021a). The authors construct at the household level a measure of realized inflation allowing for both heterogeneous, household-specific bundles and household specific prices. They find realized inflation at the household level predicts overall CPI inflation expectations in the cross section and over time.
[13] See Baqaee (2020) for similar evidence based on US data. D'Acunto *et al.* (2021a) show at the individual level that consumers put more weight on price increases compared to equally sized cut in their own bundle when forming overall inflation expectations.
[14] Based on the recent approach of the Fed, ECB, and other central banks to monitor closely the data to drive their imminent monetary policy actions, this fact suggests that temporarily elevated household inflation expectations in times of above-target, but declining inflation should not necessarily be considered as an argument that justifies further monetary policy tightening.

as a source of information about inflation.[15] A key insight from these studies is that the extrapolative nature, high average level, and volatility in inflation expectations are tightly linked to how consumers process signals from selective, often frequently purchased goods. Consistently, CES results shown in Figure 6 indicate the importance of grocery prices for information acquisition about inflation over the next 12 months during times of high inflation. Yet, consumers also consider developments in less frequently purchased goods, such as local house price growth. CES data depicted in Figure 7 also show higher local house price growth expectations are associated with higher inflation expectations in the same region, consistent with the idea that subjective expectations capture aspects of economic life that may not be adequately covered by official price measures.[16]

Consumers' reliance on the price changes they observe in their local economic environment, and especially those of frequently purchased goods, when forming aggregate inflation expectations has important policy implications. First, it raises the concern that an exclusive focus of central banks on measures of core inflation to guide policy making could result in systematic policy mistakes. The conventional rationale for such a focus is that core inflation is a better predictor of future headline inflation than current headline inflation itself, given that price changes in the non-core part of the bundle often mean reverting quickly. This rationale is quite meaningful. At the same time, because consumers focus exactly on the price changes of these non-core items when forming their aggregate inflation expectations, focusing exclusively on core inflation means that policy is designed based on expectations that are very different from those of most agents in the economy. An example of this discrepancy arose during the re-opening of the global economy after the COVID-19 pandemic closures and at the onset of the Russian invasion of Ukraine. Indeed, households' aggregate inflation expectations updated upwards very quickly because the prices of non-core goods such as gas and groceries increased quickly. At the same time, central banks around the world did not change their medium-term inflation expectations because price pressures were contained to a few select categories of mostly non-core goods rather than being broad-based and, hence, forecasts of core inflation did not move substantially (Weber *et al.* 2023a). Dietrich (2023) shows theoretically that when consumers put excessive weight on the price changes of select categories of goods when forming their inflation expectations, such as the goods they purchase most frequently, central

[15] See, for example, Cavallo *et al.* (2017).
[16] For a detailed discussion of owner-occupied housing and inflation measurement, see, for example, Box 10 in the ECB's Strategy Review paper on inflation measurement by Nickel *et al.* (2021).

banks should focus more on headline inflation to guide policy.[17] As we discuss further in Section 4, consumers' reliance on the price changes of a relatively small set of goods when forming aggregate inflation expectations also has implications in terms of central bank communication.

How exactly the competing signals from different information sources are integrated with day-to-day observed price signals remains an important open research question for the future. D'Acunto and Weber (2022) recently put forward a memory framework in which consumers rely on selective recall of received price signals for specific goods when forming beliefs and often underestimate past prices. In this framework, consumers receive new cues about prices and price changes at most times, and newly cued prices potentially crowd out price signals consumers usually rely on when forming inflation expectations, delivering more volatile inflation expectations compared with the rational benchmark. Moreover, a large set of consumers in US data has been shown to mistakenly recall systematically lower past prices relative to prices those individuals had actually paid in the past. Cognitive psychologists suggest that this phenomenon might derive from the fact that individuals tend to recall memories further back in time relative to the time period they are trying to retrieve from memory. In the presence of positive trend inflation, recalling prices from an older time results in consumers underestimating past prices and hence overestimating perceived price changes, which can also help to explain why the average consumer has upward-biased inflation perceptions and expectations. Understanding how consumers make such temporal comparisons, i.e., how far back consumers look to form price change perceptions, represents an important subject for future research.

Information acquisition: Media reporting and state-dependent attention

While direct exposure to price signals strongly shapes expectations formation, for the euro area, results from the CES reported in Figure 6 also indicate a prominent role for traditional media sources (i.e. TV, radio and newspapers) as an information source about inflation for close to 50% of consumers and this share tended to rise somewhat as the level of inflation rose. This compares with 29% and 28% of consumers who report that they obtain information about inflation from official institutions and their own shopping activities, respectively, whereas social media is noticeably less prevalent (11%) as an information source. Traditional media sources provide information based on the aggregation of price-change signals at the economy

[17] See also Dietrich *et al.* (2023).

level, which at least in part might help to counteract households' usage of the idiosyncratic price signals observed through personal shopping activities. The high prevalence of traditional media in the euro area contrasts somewhat with the evidence for US households, where, instead, personal shopping activities are consistently reported as the most important source of information. In fact, traditional media sources are among the least consulted by US households, perhaps because TV and newspapers are not considered an independent source of information by the average US consumer, which may, in turn, reflect the increased polarization of political views across different traditional media outlets (Coibion *et al.* 2022b, 2020b).

An important question for policy and communication purposes is whether households are willing to update their inflation expectations when they learn information about inflation from official statistics, the central bank and other official reports or expert forecasts.[18] RCT methods offer an ideal set-up to study the effects of such information on inflation expectations. In the typical RCT, initially, the prior expectations and planned economic behaviour of all survey respondents are measured using a set of standard survey questions. Respondents are subsequently randomly assigned to either a treatment or a control group. The treatment group receives additional information (e.g., inflation forecasts) that might change their initial beliefs, whereas the control group typically receives no information. After the information provision, both groups are then asked a further set of similar survey questions to elicit their posterior expectation and planned economic behaviour and decisions. These posteriors can then be compared to the elicited priors from the pre-treatment state. Notably, both the treatment and control groups are, due to random assignment, identical in terms of observed and unobserved characteristics. The only thing that differentiates them is the information that the treatment group received. As a result, the difference between posterior and prior expectations between the two groups reflects the causal effect of the information treatment on expectations.[19]

The evidence suggests that once they acquire information about official statistics, consumers update their expectations based on such news conveyed via media and experts (Coibion *et al.* 2023a). When, for instance, confronted with expert forecasts, consumers take this information into account in forming their expectations, while information about food prices has only a limited pass-through to expected inflation (Armantier *et al.* 2016). The fact consumers react to

[18] Carrol (2003) suggested to use epidemiological modelling to describe the transmission of expert or "rational" forecasts to consumers.
[19] As will be discussed further in Section 3, this variation can in turn then be used to assess the causal effect of information treatments on outcome or decision variables such as spending or investment.

publicly available information about aggregate inflation dynamics indicates that they were not aware of this information and previously did not use it to form their inflation expectations. At the same time, the fact that consumers do react less to information about food prices is consistent with consumers already being familiar with this information. Overall, once information based on the aggregate economy reaches households, they are willing to update their inflation expectations in line with this information. This learning dynamic is good news for central banks seeking to co-ordinate consumers' beliefs around their target. However, as we discuss later in Section 4, a major challenge remains, namely how central banks can design effective ways to reach ordinary households with relevant information in the first place.

With the recent globally high inflation, evidence has emerged that consumers have generally increased the amount of attention they give to inflation news compared with a situation where inflation is low and stable. For example, over 60% of CES respondents indicated in January 2023 that they were paying more attention to inflation relative to a year earlier (see Figure 8). This evidence is in line with models of rational inattention because when inflation is relatively high, it is likely to be more costly for consumers to ignore it (and conversely, little individual gains from monitoring inflation very closely may exist during times of low and stable inflation). In a recent paper, Weber *et al.* (2023b) provide results from several survey experiments across countries and time, showing how the changing inflation environment alters the learning process of individuals by making them more attentive to current inflation rates and thereby less reactive to information about inflation. Such "rational inattention" can also help explain consumers' focus on low-cost, easy-to-obtain signals such as prices when grocery shopping.[20] There is also evidence of heterogeneity in the degree of attention, with 37% of CES respondents indicating in January 2023, when inflation was high by historical standards that they had either reduced or kept the same amount of attention as during the past. However, the results of Weber *et al.* (2023b) also show that these least attentive consumers nonetheless revise their expectations more strongly in relation to their more attentive counterparts in a controlled information experiment. This result points to the potential potency of targeted communication about inflation even in a high inflation environment.

Life-time experience and exposure to extreme inflation episodes

Another factor affecting how consumers form beliefs is their own experiences and past exposures to extreme movements in prices and inflation ("experience effects"). Malmendier

[20] For models with rational inattention, see Sims (2003) and Maćkowiak and Wiederholt (2009).

and Nagel (2016) find that consumers overweight their own previous lifetime experience of inflation when thinking about future price changes. Older individuals can draw on longer lifetime histories compared to younger individuals; hence, different age groups will tend to disagree about the future paths of inflation even when both are facing the same current news about inflation. Their model also implies that the inflation expectations of younger consumers, given their shorter lifetime inflation history, should react more strongly to the same shocks relative to older consumers. Extending these ideas, Braggion *et al.* (2023) document that variation in the degree of hyperinflation in the 1920s in Germany can shape today's dispersion in inflation expectations across German towns, even if barely anyone has experienced hyperinflation during their lifetime. They propose as a mechanism an intergenerational transmission of exposure to hyperinflation episodes from parents to their children. Their findings suggest that the current spike in inflation could have long-lasting effects on inflation expectations even once inflation is tamed. Such entrenched effects of inflation experiences on expectation formation are likely to imply that managing inflation expectations is both more difficult and more costly.

Other behavioural or psychological factors and emotions can also help explain heterogeneity and volatility in consumer inflation expectations (e.g., Wohlfart and Goldfayn-Frank 2020; D'Acunto and Weber 2024).[21] One systematic pattern in the data is a strong correlation between inflation expectations and bad news either about a consumer's own financial situation or the macroeconomy more generally. Figure 9 depicts this link between the degree of optimism about economic growth and inflation expectations. More optimistic beliefs about growth tend to be associated with lower inflation expectations.[22] In other words, consumers generally tend not to associate higher inflation with stronger demand and higher economic growth but instead have a "supply-side narrative", whereby higher inflation expectations are associated with bad news and a more pessimistic outlook about their own financial situation (Coibion et al. 2023b) and lower economic growth (Kamdar 2021). This stagflationary view contrasts strongly with how experts form expectations. Experts' expectations often feature a substantial demand-side component whereby short-run inflation is expected to evolve in a

[21] For a discussion of a related literature and effects of emotions on general belief formation, see, Curtin (2019).
[22] See, for example, Ehrmann *et al.* (2017), Abildgren and Kuchler (2021), and Das *et al.* (2020).

manner consistent with a Phillips curve and thus rise with expectations of stronger growth or demand.[23]

Interestingly, however, the above supply side or stagflationary narrative does not appear when it comes to consumers' expectations about nominal wages. Higher wages are not the harbinger of a worse economic outlook but instead are associated with a stronger economic environment (see also Figure 9). Research has identified at least two determinants of this systematic heterogeneity in pessimism and correlation across subjective macroeconomic expectations of different variables within individuals. On the one hand, pessimistic consumers, who tend to have lower socio-economic status, have been shown to learn differently from the same economic information (Kuhnen and Miu 2017). On the other hand, consumers might hold different narratives about how the macroeconomy works, given that they do not base their convictions on economic textbooks but on their personal attributes and economic experiences. New survey research uncovers such hidden mental models of consumers by applying text analysis to consumers' descriptions of how shocks propagate. For instance, Andre *et al.* (2022) reveal that, when faced with different macroeconomic scenarios, consumers use selective recall often influenced by their own experiences, and the way propagation mechanisms of shocks are interpreted tends to be context- and time-dependent.

3. Subjective expectations and economic behaviour: Do consumers act on their inflation beliefs?

One important reason to study consumers' subjective expectations about inflation is that such beliefs may offer an explanation for household choices and decisions, thus providing a more coherent account of economic fluctuations also at an aggregate level (Coibion *et al.* 2020a). At least since Fisher (1922), economists have typically seen inflation expectations as central to the transmission of expected real interest rates to the economy. In contemporary macroeconomic models, this role is encapsulated in the consumption Euler equation, summarising how consumers trade off the utility from enjoying consumption today against the future benefits of postponing consumption until tomorrow. Similarly, higher expected inflation that lowers the expected cost of borrowing could drive borrowing decisions (e.g., for mortgages or consumer durables) or potentially stimulate investment in risky financial or real assets like

[23] See Candia *et al.* (2020) for a discussion and comparison of this pattern across multiple international consumer surveys. Ball and Mazumder (2019 and 2021) present a Philips curve augmented with expert-forecasts from the US SPF and ECB SPF for the euro area, respectively.

housing, particularly if such investments are perceived as offering some protection or hedge against higher inflation. Not surprisingly, therefore, the new wave of research using survey-based expectations has carefully studied the evidence relating changes in inflation expectations with subsequent household decisions, especially consumption. Another related strand of this literature has documented the close correspondence between households' and firms' inflation expectations and subsequently provided evidence for a causal response of price-setting behaviour to changes in inflation expectations. We take stock of the evidence on these important linkages below.

The consumption response to changes in expected inflation

A central prediction of the consumption Euler equation is that higher inflation expectations, by lowering agents' expected real interest rate, will tend to raise the desired level of consumption today against the alternative of saving more today and thus consuming more tomorrow, i.e., it predicts a positive response of current consumption following an increase in expected inflation. This positive response of consumption is a potentially important part of monetary transmission because by lowering policy rates, central banks raise expectations of future inflation which can help stimulate current consumption and aggregate demand. Indeed, at the effective lower bound, with the ability to lower policy rates constrained, creating expectations of higher inflation (e.g., with the use of balance sheet expansion via central bank asset purchases) can be a way of avoiding a liquidity trap and a prolonged recessionary period where deflationary expectations take hold. Consistent with this role in monetary transmission, in commenting on the prevailing environment of relatively low inflation at the ECB press conference in 2015, Draghi (2015) noted, *"When we are at practically zero nominal rates, the real rates are being driven by the expectation of inflation. So lower expectations of inflation imply higher real rates … that's why we fight negative expectations of inflation".*[24]

Recent years have seen a rich set of studies that have shed light on the empirical relevance and quantitative importance of the above mechanisms. While early work found only little evidence that higher inflation expectations were associated with higher desired consumption (Bachmann

[24] For borrowers, when expected inflation rises, this positive intertemporal substitution effect is reinforced by an additional positive income effect associated with a reduced real burden of interest payments on debt. For savers, however, the income effect (e.g., due to lower expected real returns on savings or lower expected real earnings) may go in the opposite direction and could even fully offset any positive impulse to spending due to intertemporal prices. Hence, at the aggregate level, the belief that higher inflation expectations may help to engender an increase in consumption and aggregate demand hinges on the belief that – on balance - the intertemporal substitution effects out-weigh any counteracting real income effects.

et al. 2015 using the Michigan Survey of Consumers), a critical mass of more recent studies has emerged reporting evidence that current spending responds positively to expectations of higher inflation (Figure 10 and 11).[25] An important limitation of many studies in this area, however, is that they mainly report correlations and not water-tight causal evidence. It is, therefore, possible that any observed positive association may reflect any unobserved factors that simultaneously drive both inflation expectations and spending (e.g., positive or negative consumer sentiment about the economy). The evidence for a positive response of spending to higher inflation expectations in D'Acunto *et al.* (2022b) aims to overcome this shortcoming by using a pre-announced increase in the VAT *or unconventional fiscal policy* in Germany in 2005 as a source of exogenous variation in inflation expectations (see Figure 10). They compare the evolution of inflation expectations and durable purchase propensities of German households to those of observationally equivalent euro area households that were not exposed to the announcement but faced broadly the same interest rates to provide causal evidence for a positive link between inflation expectations and consumption spending. An additional and crucial insight from this empirical test is that policy can causally manage households' beliefs and their consumption choices only when it is designed in such a way that makes the Euler equation channel very salient and clear to consumers.[26] Indeed, in the same analysis, D'Acunto *et al.* (2022b) found that the same population of German households did not react to other policy measures, such as forward guidance that had similar aims, because consumers do not understand the connection between forward guidance and future expected prices and hence how forward guidance should affect the trade-off between current and future consumption.

While evidence for a positive consumption response to higher expected inflation that is in line with conventional economic thinking has gradually emerged, the estimated aggregate responses are typically quite modest. Duca-Radu *et al.* (2020) highlight how a positive response of current consumption of durables and other big-ticket items will only tend to materialise when expectations about future inflation rise relative to current perceptions of actual inflation (see Figure 11). This study also estimates the consumption response of moving from a situation of undesirably low expected inflation (e.g., at 0%) to a rate of expected inflation more in line with price stability (e.g., of 2%) whilst holding perceptions about past inflation and interest rates

[25] See D'Acunto *et al.* (2018 and 2022a), Crump *et al.* (2022), Vellekoop and Wiederholt (2019), Duca-Radu *et al.* (2020), Dräger and Nghiem (2021), and Ichiue and Nishiguchi (2015).
[26] Under these conditions, the effects can be macroeconomically important. For example, back of the envelope calculations in D'Acunto et al. (2022b) suggest that the period of higher inflation expectations (after the announced 3 percentage point VAT rate increase but before its actual implementation) was associated with 10.3% higher real durable consumption growth in Germany.

fixed. This change is associated with a 0.28% cumulative increase in private consumption over a three-year period, which, though modest, is nonetheless macroeconomically relevant. Coibion *et al.* (2022b) document that the positive response for spending on day-to-day goods and services (i.e., non-durables) tends to be stronger for more educated, higher income and financially unconstrained consumers. D'Acunto *et al.* (2023c) document another important cross-sectional heterogeneity in the consumption response to a change in inflation expectations. These authors use data from Finland in which they merge the individual-level inflation expectations, registry data, and measures of IQ. In the full sample, the authors detect a small positive but statistically insignificant relationship between individuals' inflation expectations and their willingness to purchase durable goods. This unconditional result, however, camouflages large heterogeneity in the association across agents. In particular, agents at the bottom of the IQ distribution do not plan to substitute intertemporally when they expect higher inflation. In stark contrast, consumers with higher IQ levels behave in line with the consumer Euler equation: they are more likely to be ready to purchase durable goods when they expect higher inflation, and this positive association is both economically and statistically significant. Broadly consistent with this evidence, Duca-Radu *et al.* (2020) show that the positive consumption response to higher inflation is strongest for more financially literate consumers. Also, they find stronger responses for consumers with a larger stock of accumulated savings and who are, as a result, less financially constrained.

Supply-side narratives and bad news about future real income

Despite the above cumulation of evidence supporting an Euler equation type mechanism, other studies have pointed to countervailing consumption responses. Coibion *et al.* (2023b) run an RCT on Dutch households during the ELB. Their results show that any positive causal effects of higher inflation expectations on nondurable spending are imprecisely estimated, but there is a sharp *negative* effect on durable spending (which echoes the findings of the earlier study of Bachmann *et al.* (2015).[27] This result for consumption of durables and big-ticket items is surprising because, a priori, one might expect the real interest rate channel to operate more strongly when it comes to durable goods, which are more likely to be purchased with credit. One mechanism that can trigger such a response is the "supply-side narrative" discussed earlier in Section 2, i.e., that real income and economic growth expectations and inflation expectations

[27] The most recent survey designs often include information provision experiments that allow assessing the causal effects of different types of economic information and signals on agents' formation and update of subjective expectations (for recent surveys of this approach see Fuster and Zafar, 2022 and Haaland *et al.* 2023).

of many households typically move in oppositive directions. Those survey participants in Coibion *et al.* (2023b) with exogenously higher inflation expectations also become more pessimistic in their economic outlook. Hence, according to this result, monetary policy faces a serious challenge when seeking to actively inform the public's inflation expectations. In particular, there are risks that the policy could backfire or have unintended consequences. For example, in the current context where inflation is high and above target, central banks might be tempted to reduce the inflation expectations of the public as a way to strengthen policy effectiveness and monetary transmission. However, were such communication to engender more positive sentiment amongst the public about the future of the economy and thus actually stimulate spending on durables or total spending, it could potentially offset or even derail central bank efforts to reign in demand and stabilise prices.[28]

Another way to shed light on how consumers' inflation expectations might influence their behaviour is simply to ask them directly. Figure 12 provides evidence on consumers' self-reported behavioural response to their expectations of future price changes. The data was collected using the CES in August 2023, a period in which the euro area economy was experiencing very high and persistent inflation by historical standards. Consistent with this experience of higher inflation, the most prevalent consumer response is to "shop around" more actively, and this response is particularly prevalent amongst consumers who are pessimistic about their own financial situation. Strikingly, the results also point to heterogeneity in how consumption responds to expectations of inflation, with more than 30% indicating they expect to reduce consumption and only a considerably smaller fraction indicating plans to increase spending or bring forward consumption (i.e., in line with an Euler equation). Also, only few CES respondents indicate that they would draw down on their savings or look to negotiate higher pay as a result of their expectations about prices. Such results suggest that aggregate spending might not increase significantly in response to higher inflation expectations. In line with this evidence and using a similar approach, Kamdar *et al.* (2023) find that for the majority of consumers, spending does not respond to increased inflation expectations, with 20% of

[28] On a more positive note, the resulting boost in consumer confidence might also deliver the soft landing many commentators have mentioned. So far, most of the work in this area focuses on how information about one specific variable shifts individuals' beliefs. Yet, as discussed in Section 2, consumers update their inflation expectations based on different sources and we know less about how individuals update their outlook for other variables when receiving certain information. This "joint updating" of different expectations could also be very heterogeneous reflecting individuals' different mental models of the world and/or different subjective experiences.

consumers actually reducing expenditure in response to higher expected inflation.[29] Considering that wages are set in nominal terms, a negative response of consumption to higher inflation expectations might be triggered by lower expected real wages. In fact, recent research by Pilossoph and Ryngaert (2023) in the US suggests that, following an increase in expected inflation, consumers do not expect their nominal wages to catch-up. However, the associated anticipation of lower real wages does stimulate their job search activities. US consumers intensify on-the-job-search as a way to increase their earnings. The authors show that higher search intensity and job-to-job transitions, in turn, contribute to aggregate labour market dynamics. As a result, higher expected inflation could lead to wage-price pressures through job-search instead of directly via higher negotiated wages in the current job as in the conventional wage-price spiral.

Investment, borrowing and other household choices

In addition to the allocation of disposable income between consumption and saving, the real interest rate channel associated with a change in inflation expectations can impact other consumer choices, such as decisions about how to finance durable consumption or how to allocate savings across financial investments. For instance, Malmendier and Steiny Wellsjo (2023) find that after personal experiences of high inflation, the demand for inflation protection becomes a key motivation for homeownership. Also, Botsch and Malmendier (2023) show that personal experiences during the Great Inflation correlate positively with interest rate expectations and, therefore, mortgage choices with, for example, experiences of high and volatile interest rates provoking over-investment and/or over payment in fixed-rate mortgages particularly by young consumers. Such potential distortions also highlight the potential long-term re-distributional effects of heterogeneity in inflation expectations, in this case, from the affected consumers to bank shareholders. Arguably, however, these studies do not necessarily identify a clear role for expectations in the transmission because causation can go directly from experiences to behaviour without necessarily being "channelled" through a change in expectations.

[29] One likely explanation for such a reduction in spending is the reduction in real incomes that is associated with higher perceived and expected inflation. This negative real income effect is likely to be stronger also for income-constrained households operating close to their budget constraints. Consistent with this idea, Duca-Radu, Kenny and Reuters (2020) find that only wealthier consumers with a relatively large stock of accumulated savings are able to substitute intertemporally in line with the consumption Euler equation.

Table 3 uses the CES to study the transmission between changes in inflation expectations and economic choices, including whether consumers think it is a good time i) to save, ii) to borrow, iii) to invest in risky assets (e.g., stocks), and iv) to purchase housing. The results, which do not necessarily imply a causal response, are consistent with the conventional view that with higher expected inflation, real interest rate expectations decrease. These lower real interest rate expectations are associated with a lower desirability of saving, a higher desirability of borrowing money, and an increased tendency to invest in stocks and housing. An interesting insight from this analysis is that the association with expected inflation is typically three or four times smaller than the corresponding association with the expected nominal mortgage interest rates.[30] This result highlights the potential potency of nominal interest rates as a tool for influencing consumer behaviour when compared with attempting to operate via expectations of inflation. In particular, although consumers' subjective expectations about future inflation certainly influence their economic decisions in line with the expected effect on real rates, nominal interest rates that consumers typically observe (e.g. on their mortgages) appear to be more relevant both on average and in absolute terms.[31] This finding is in line with a large body of earlier experimental evidence emphasizing the importance of nominal rather than real variables in consumer decisions (e.g. Shafir *et al.* 1997; Fehr and Tyran 2001; Fehr and Tyran 2014 and Felici *et al.* 2023).

The importance of nominal concepts in driving household behaviour also provides important scope for redistributive effects. Surprise inflation erodes the real value of debt with fixed nominal interest obligations (Fisher 1922), redistributing wealth from nominal savers to borrowers (Auclert 2019). These redistributive effects can be sizable, given the large nominal positions held by households (Doepke and Schneider 2006). Schnorpfeil *et al.* (2023) study the extent to which households are aware of the erosion channel of nominal positions in an RCT on customers of a major German bank in which participants receive information on inflation-induced erosion of either nominal assets or nominal debt. They find participating households, on average, are largely aware of inflation-induced nominal-asset erosion, yet they have limited knowledge about the debt-erosion channel of inflation. Consequently, respondents who receive

[30] The analysis focusses on mortgage rates because such rates are the rates experienced or more likely to be observed by consumers. In Section 4 we discuss further consumer responses to policy rates set by central banks.
[31] Felici *et al.* (2023) document a similar result using a panel data set across the euro area countries. Section 4 discusses the high level of inattention of consumers to monetary policy and interest rate announcements. The results in Table 3 refers to expected interest rate changes by consumers suggesting that a behavioral response of consumers to interest rates only emerges at the point when consumers actually experience those changes and incorporate them into their subjective expectations.

information about nominal-debt erosion have more positive beliefs about debt, and they update upward perceptions and expectations of their own real net wealth. Building a greater understanding of the potential redistributive effects of surprise inflation mediated via expectations, on consumer behaviour and, therefore, on the aggregate economy is an important area for future research.[32]

Consumer inflation expectations: Relevance for price and wage-setting

From the perspective of monetary policy, a pivotal question surrounds the relevance of consumers' inflation expectations for price- and wage-setting decisions across the economy, i.e., the possible causal link between household expectations and actual inflation and wage dynamics. Clearly, surveys at the firm level play a central role in this analysis. Yet, consumer surveys have also provided important complementary insights, which is perhaps not too surprising because firms must agree or negotiate wages with workers and households. In addition, higher expectations of inflation may distort relative price signals and thus make it more likely that firms will try to pass on any increase in their costs, e.g. because they will be less concerned about potential losses in market share.[33]

In this vein, Anderson and Simester (2010) provide evidence that consumer expectations matter for firms' price-setting policies because of a fear of customer antagonism (. In normal times, firms might be hesitant to raise prices to not lose customers, but once every consumer expects heightened inflation to begin with, firms effectively increase their pricing power and can more easily pass through increases in marginal costs. Consistent with the role of consumer expectations in understanding price-setting dynamics, Coibion and Gorodnichenko (2015) study the missing disinflation in the US economy following the Great Recession of 2008-2009,

[32] The potential aggregate implications of redistribution are highlighted in Auclert (2019) who develops a heterogeneous agent New Keynesian model in which individuals with larger negative net nominal positions, debtors, have larger marginal propensities to consume as compared to savers. A direct implication of this model is that the redistribution of unexpected inflation can stimulate aggregate demand because the winners of it consume more out of their windfall gains relative to those that cut consumption in response to the eroded real value of accumulated savings.

[33] Despite this compelling intuition for a role of inflation expectations in actual price and wage-setting decisions, in a recent contribution, Rudd (2022) has called into question economists' and policy makers' excessive - and at times uncritical - faith in the idea that households' and firms inflation expectations of future inflation are a key determinant of actual inflation. In particular, he points to a lack of theoretical micro foundations for such a relationship as well as a dearth of empirical evidence and also highlights a risk of policy mistakes if it is adhered to uncritically.

arguing that the puzzle of missing disinflation during this period could be resolved by the rise of household inflation expectations between 2009 and 2011.[34]

Coibion and Gorodnichenko (2015) also present evidence that inflation expectations in firm surveys exhibit very similar biases, substantial dispersion and idiosyncratic fluctuations as observed for households. Furthermore, Candia *et al.* (2023) report new cross-country evidence that managers and decision-makers in firms form expectations that are closer to those of households and differ markedly compared with measures of expectations extracted from financial markets or asset prices or from surveys of professional forecasters. As a result, household surveys may offer a useful way to proxy for expectations at the firm level. In the end, it is the expectations of the people who work in firms or who manage them that are most likely to be of help in explaining economic outcomes. Building on this insight, one recent development has been to use household surveys to track expectations of respondents who take decisions in firms as part of their jobs or business activities (e.g. as small business owners). (Evidence from the CES (discussed further in Section 4) shows that mean and median expectations of managers and decision-makers are very similar to those of other consumers, though they might still feature different dynamics at specific points in time. For example, as discussed in Georgarakos *et al.* (2023), during the initial phase of the acceleration of inflation in the euro area following the outbreak of the Ukraine war, evidence exists that the inflation expectations of price and wage setters in the CES reacted more strongly thereby potentially contributing to risks of an amplification of the overall persistence of the initial inflationary shock.[35]

Linking beliefs, expectations and behaviour: Some open questions

Based on the foregoing discussion, it is clear that a recent wave of literature has uncovered important connections – including causal effects – between subjective inflation beliefs and consumer (or firm) decisions and behaviour. However, the findings across different studies have not always been fully consistent and they have not made the precise mechanisms that can explain the empirical result fully clear. One possible explanation for the conflicting results for

[34] Several recent studies (Abberger *et al.* 2023, Coibion *et al.* 2018, Coibion *et al.* 2020c) have used firm surveys to implement RCTs to study whether a causal connection exists between firms' inflation expectations and their price setting. Despite some initial mixed evidence, this line of research has increasingly found evidence of a causal response of prices to changes in inflation expectations.
[35] See also McClure *et al.* (2022) on US managers.

consumption may be state dependency in the economic mechanisms due to unobserved time-varying heterogeneity (e.g., as a result of fluctuating consumer sentiment, differences and changes in subjective models or narratives about the economy, or occasionally binding constraints on borrowing and access to liquidity). An alternative explanation for the conflicting results may relate to the overall representativeness of different survey samples and the extent to which they weight more heavily different population segments. The further investigation of these factors would, therefore, seem a particularly important area for future research.

Another pressing priority would be to investigate more carefully the key differences that may exist across different types of consumers in how they respond to changes in their subjective beliefs about inflation. Such differential reactions to individual expectations about future economic outcomes could also shed further light on the potential distributional effects of heterogeneous inflation expectations. If some consumers act on their subjective beliefs that are not shaped by economic fundamentals, their choices could be systematically biased away from optimal decision-making. Addressing these questions requires very large sample sizes, both in the cross-section and in the time dimension, to help better identify the persistence of any effects. It is clear from the above evidence that the link with price-setting behaviour and the association between households' and firms' inflation expectations also represents a potentially fruitful area for continued research. While such analysis will need to draw on firm surveys, it will also need to draw on administrative data on actual market prices, and it may need to focus not just on generic expectations of firms but rather on those individuals who actually play a role in setting prices either as a result of their job characteristics or business activities. Finally, another key domain where household decisions are critical for macroeconomic policy is the labour market. To date, research is only beginning to investigate the possibility of causal effects of expected inflation on decisions associated with real wages, including consumers' willingness to participate in the labour market or their job search activities. As such choices have far-reaching implications for the aggregate state and tightness of the labour market and, hence, on wage outcomes, they seem particularly warranting closer attention in the future.

4. Lessons for monetary policy and central bank communication

Central bankers have traditionally believed that it is desirable to maintain inflation expectations "well-anchored" and close to target (e.g., Mishkin 2007; Bernanke 2007; Dovern and Kenny 2020; Carvalho *et al.* 2023). According to this logic, well-anchored inflation expectations help to reduce the persistence of shocks to actual inflation and thus also help to mitigate the risk of

either an inflationary or a deflationary spiral. It is clear, though, from the discussion in Sections 2 and 3 that the highly dispersed, extrapolative, and idiosyncratic nature of consumer inflation expectations poses important questions and challenges for what monetary policy can - or should - expect to achieve in terms of influencing consumers' inflation expectations. Moreover, the complex nature of the link between expectations and behaviour implies central banks face considerable uncertainty about how their interventions – even if they are effective in guiding inflation expectations - might impact individual decisions and, thus, aggregate outcomes. When confronted with such wide variation in expectations, what can monetary policy makers realistically hope to achieve when it comes to shaping consumers' beliefs about inflation? What strategies might pay off when communicating with the public at large about inflation?

Imperfect anchoring of medium-run expectations

Expectations at medium-run horizons are often seen as the most relevant when it comes to discussions about anchoring. As central banks, including the ECB, typically define their price stability objective to be achieved over the medium-term, such longer-horizon measures offer a direct metric of how well public beliefs are aligned with those objectives, i.e., of how credible the achievement of price stability is from consumers' perspective. Anchoring of expectations can be defined in different ways. A first perspective relates to *level anchoring,* which refers to how well the level of expectations is aligned with the central bank objective. A second concept is *shock anchoring* (Ball and Mazumder 2011), which measures, independently of their level, the degree to which medium-run expectations respond to short-term movements in expectations or short-term news about inflation.

While professional forecasters and financial markets seem to have, on balance, quite well-anchored medium and long-term inflation expectations that cluster around the central banks' objective, the situation with consumers is much more complex.[36] For the cross-section of euro area households, a perfect level anchoring of consumers' inflation expectations is typically rejected.[37] Consumers' medium (3-year ahead) inflation expectations, as depicted in Figure 13, feature considerable disagreement as reflected by a much larger interquartile range relative to experts. The distribution, like short-run expectations, is considerably right-skewed, implying a

[36] See also Coibion *et al.* (2020a). For the euro area, professional forecasters' expectations seem to be generally more anchored, while recent work by Corsello *et al.* (2021) documents a de-anchoring in levels and shock sensitivity of long-term expectations during a disinflationary period since 2013/14. Also, earlier work by Dovern and Kenny (2020) found a risk of de-anchoring in times of persistently low inflation for experts.
[37] Similarly, evidence for the US suggests that a large fraction of consumers believe the Fed's inflation target to be above 10 per cent (Coibion *et al.* 2022a).

mean that is systematically higher than the median value. This relatively limited degree of anchoring is equally observed amongst those consumers who play a role in wage and price setting as it is amongst the wider population. In addition, it is also reflected in a strong positive co-movement between expected inflation over the short term (1-year ahead) and expected inflation 3- and 5-years ahead which suggests that short-term news about inflation tends to spill over into the medium term (Figure 14). At the same time, the situation for central banks when it comes to the anchoring of consumers' inflation expectations is not completely hopeless. One does observe a term structure of inflation expectations depicted in Figure 15, which is downward sloping during the period of the most recent 2022-2023 inflation surge. This downward-sloping term structure suggests that the ECB's target seems to have some traction for households when forming beliefs about future price changes well into the future. In addition, as with expert expectations, disagreement about future inflation rates decreases for longer-term expectations, which may be indicative of a common "anchoring factor" linked to monetary policy that helps to coordinate longer-term beliefs about inflation.

The above discussion suggests central banks need to closely monitor the *degree of anchoring* using a comprehensive set of indicators instead of focussing on a single headline statistic or the level of expectations. Ehrmann *et al.* (2023) put forward a new probabilistic indicator using the CES, which measures the probability assigned by the public to the possibility that price stability will be maintained over a 3-year period. Figure 16 depicts the cross-sectional distribution for this indicator during the high-inflation period in 2022, indicating a significant increase in the share of CES respondents, attaching a relatively low probability (below 50%) to this outcome during the period when inflation started to rise in the euro area. Aside from drawing on such probabilistic indicators, the recent experience also highlights the importance of looking at measures of the cross-sectional distribution, such as the skewness of expectations, as an early-warning indicator of possible future de-anchoring. In this vein, Reis (2021) finds that a thickening right tail of short-term inflation expectations might provide an early sign of upside de-anchoring.[38] Euro area data shows that the distribution of short-term one-year ahead inflation expectations moved noticeably during the recent inflation surge in the euro area. At the same time, as data from before (April 2021) and after the inflation surge (April 2023) – depicted by Figure 17 – shows, the right tail of distribution for medium-term 3-year ahead inflation expectations in the euro area moved considerably less. This finding suggests that the extreme inflation developments were not expected to persist as strongly over

[38] For a further discussion, see Reis (2023a and 2023b).

the medium term and thus points to some degree of anchoring of medium-term expectations compared with short-term inflation beliefs.

Limited attention to monetary policy: A challenge for central banks

Standard economic models typically assume that agents in the economy observe all economic news, including monetary policy decisions and other policy announcements (e.g., forward guidance about future policy rates). However, little evidence supports the idea that central bank interest rate setting decisions or their announcement have a significant or direct effect on households' inflation expectations. Focusing on standard monetary policy and using an event study approach, Lamla and Vinogradov (2019) and De Fiore et al. (2022) find that consumers generally do not alter their subjective inflation expectations around Federal Open Market Committee announcements. In contrast to financial market participants, the evidence also suggests that households do not update their inflation beliefs in response to forward guidance announcements by the ECB (D'Acunto *et al.* 2021). The finding that for consumers, forward guidance is of limited usefulness is also corroborated by international evidence, as Coibion *et al.* (2023a) conclude that there is a limited pass-through of forward guidance into consumers' perceived real interest rates. The authors find that households are inattentive to important short-term market interest rate changes and even when provided with factual information about such developments they only update their beliefs marginally.[39] Thus, both the absence of common knowledge about current market interest rates and the limited effect of central bank announcements on beliefs about future prices could explain the ineffectiveness of forward guidance in influencing consumer behaviour directly. Another factor that potentially inhibits the effectiveness of central bank policy announcements on consumers' beliefs and behaviour about future inflation is the economic narratives people use in interpreting monetary policy news. According to recent evidence by Andre *et al.* (2022), most US consumers (57%) expect inflation to increase after a rise in the federal funds rate, contrasting with only a minority of experts holding that view (17%).[40] While such a positive impact of higher interest rates has some validity in the short-run (e.g. because for households on variable rate mortgages, the rate rise will imply higher interest expenses and an associated increase in their immediate cost of

[39] While information about long-term interest rates has larger effects, it, too, is transitory and to be absorbed by consumers requiring persistent and repeated communication efforts to persistently shift their expectations and behavior. In contrast, providing factual information about inflation rates shifts consumers' beliefs by more than information about interest rates.

[40] In line with this finding, Coibion *et al.* (2020b) document that consumers decrease their inflation expectations when informed about a decrease in interest rates.

living), it is much harder to rationalise this co-movement over the medium-term for which the inflation reducing effects of monetary policy should be more relevant. Given substantial heterogeneity and most consumers not forming expectations according to the underlying principles of forward guidance, it is not surprising that studies have not found much support for its effectiveness for consumers.

Aside from inattention to policy decisions and communication about future rates, the evidence also suggests that consumers exhibit quite low levels of interest in central bank strategies more widely. For instance, only 22% of consumers heard about the changed monetary policy strategy of the ECB in 2021 (Ehrmann *et al.* 2023), while the decision of the US Federal Reserve to adopt average inflation targeting had no impact on consumer inflation expectations and behaviour (Coibion *et al.* 2023b). On average, in 2022, according to the CES, less than 35% of consumers are interested in monetary policy matters despite the recent surge in inflation. Such a widespread lack of interest can also explain why people do not actively search for information about monetary policy. This challenge of reaching a predominantly inattentive public highlights the need to make central bank communication more exciting and accessible by reducing its complexity for ordinary citizens. Table 4 summarises the level of interest in monetary policy and the channels through which consumers receive information about the ECB. Most informed consumers gather information about the ECB via indirect sources (traditional media) only. Direct central bank communication to the public reaches only a very small fraction of consumers. Given this evidence, managing consumers' inflation expectations via monetary policy in a discretionary way when faced with shocks is a complex challenge for central banks.

Effective communication: Building institutional knowledge and trust

The above evidence on consumers' low attentiveness to policy communication may contribute to reducing the overall effectiveness of monetary policy and would thus appear undesirable. In a recent study, Ehrmann *et al.* (2023) exploit the context of the ECB's 2021 strategy review to study how central bank communication can help raise consumers' belief that price stability will be maintained. This study shows evidence that consumers are extremely hard to reach. Nevertheless, conditional on reaching consumers, communicating information about a central bank's objective along with a relatively simple explanation about how monetary policy functions can raise consumers' perceptions that the ECB will deliver price stability over the medium term. Indeed, simple explanations about the stabilising role of monetary policy can

raise subjective probabilities that price stability will be maintained, especially among the less financially literate respondents in the CES.

Another important strand of recent research has emphasised the importance of building up institutional trust which measures the central banks overall level of social capital. Increasing trust in the ECB is, on average, associated with medium-term inflation expectations that are better anchored at the ECB's price stability objective. Moreover, trust in the ECB tends to fluctuate less with time compared to, e.g., short-term inflation expectations. Hence, public trust in the central bank can help to anchor consumer inflation expectations also at times during which inflation (temporarily) deviates from the target. Christelis *et al.* (2020) find that the association with trust may work heterogeneously depending on the level of inflation beliefs of individual consumers. As shown in Figure 18, when considering the level of inflation expectations, higher trust raises the expectations for people with exceptionally low inflation expectations (that are well below target). However, increased trust tends to decrease the expectations of consumers with higher inflation expectations. Acting in this way, trust helps coordinate consumer beliefs about inflation around a central banks' target and may, therefore, be a crucial asset for central banks, particularly in times of high inflation.

How can central banks build up higher trust? One factor that appears to correlate positively with trust is knowledge. Figure 19 indicates a positive association between increasing institutional knowledge and trust in the ECB.[41] Factual knowledge about central banking seems to be very limited among the wider public, suggesting considerable returns from such an investment. When asked about several objectives of the ECB, euro area consumers in the CES are largely uninformed about the ECB's main responsibilities. For instance, only about one in two consumers correctly identifies the primary mandate or inflation objective, while about two in three consumers correctly associate the ECB with banking supervision.[42] Thus, significant potential gains exist in the euro area by improving consumers' understanding of the ECB's main objectives and responsibilities. This potential also seems unevenly distributed among consumers, suggesting particularly high gains from targeted communication.

Boosting policy effectiveness: Simple and relatable communication via multiple channels

[41] Hayo and Neuenkirch (2014) document higher knowledge about the central bank to be associated with higher trust in the central bank for German households.
[42] Table 4 also shows that a large fraction of the public seems unaware of the ECB's mandate and how the level of knowledge differs across different consumers.

The recent evidence provides useful insights into the medium via which central banks should communicate the message they should send, and it highlights how the identity of the messenger can make a difference. A key insight is that central banks need to send clear, easy-to-understand, and relatable messages that are accessible to non-experts. Moreover, rather than communicating about the technicalities of different policy instruments, i.e., the technical means through which objectives should be reached (D'Acunto *et al.* 2020), they need to focus their communication on the goals of policy by specifying the objective of a decision and the outcomes that aim to achieve. Moreover, the medium of the message matters too. In contrast to experts, central banks reach consumers primarily via indirect channels, with traditional media (news and television) typically being found to be the most important (Blinder *et al.* 2023). However, only those interested in monetary policy that already have a high degree of trust in the central bank and more anchored inflation expectations actively follow traditional media about monetary policy. Hence, augmenting traditional channels of communication with methods that allow for more direct messaging might reach broader parts of the population.[43] Indeed, different types and channels of communication can target different types of agents in the economy (Assenmacher *et al.* 2021) and may thus be more effectively pursued in parallel. Recent CES data shows traditional media sources such as newspapers and television serve especially as information sources for the elderly, whereas direct central bank communication, for instance, via social media or web sources, are noticed more by younger consumers (Table 4).[44] To effectively build knowledge about monetary policy and contribute to strengthening the public's overall trust in central banks, making use of both direct and indirect communication channels in a complementary way would seem to be the most effective way forward.[45]

To convey messages to the public, trust in the source of communication and how consumers can relate to it play a pivotal role. For instance, compared to summary reports of monetary policy from different intermediated sources, receiving direct communication from the FOMC seems to have a higher impact on individuals' inflation expectations (Coibion *et al.* 2022a). The main reason for this result might be how households in the US assess the credibility of different

[43] It is important to note here that the recent strand of literature that has implications on how to design effective policy communication to manage households' expectations in no way suggests that other traditional forms of communication, and especially the important objective of adequately managing the expectations of financial market participants, should be neglected. See Blinder *et al.* (2023) for a review of the extensive literature on central bank communication.

[44] Conrad *et al.* (2022) provide a recent analysis showing similar diversity in the information acquisition channels used by German households.

[45] See also Box 5 in Assenmacher *et al.* (2021).

information sources. Generalising this finding to other regions, such as the euro area, which has a more diverse news landscape, would be an important challenge for future research.

Finally, research has suggested that targeted communication, which considers its audience's diversity, can also be effective. D'Acunto *et al.* (2022a) show in the context of the US society that consumers belonging to demographic groups that were traditionally underrepresented in top policy-making institutions such as the FOMC, e.g., women and African Americans, tend to have lower trust in such institutions and to adjust their expectations less to the information and policies communicated by those institutions. Conversely, the salience of a more diverse composition of those institutions increases such groups' trust and willingness to adjust expectations to policy announcements and information based on aggregate data. Reflecting different identities (gender, race, nationality, etc.) in central bank policy committees and in policy communication could increase trust in specific and otherwise underrepresented and hard-to-reach subgroups of the population and thereby also enhance the overall effectiveness of monetary policy. Projecting these results to a multi-country context, such as the euro area, highlights the potential importance of diversity in central bank communication in the euro area relative to a more homogenous national context. In particular, such results underline the importance of close collaboration with national central banks in the case of the euro area.

5. Conclusions: Main insights and open questions for policy and research

The past decade has seen a resurgent interest in direct survey measures of inflation expectations for households and firms. This trend has been supported by advances in survey design methods and more widespread internet penetration. These developments have opened up the possibility of measuring subjective beliefs about inflation online in a scientifically robust manner across population-representative samples. In addition, it has been possible to link such data to other indicators of consumer behaviour and choices, including consumption and household investment and even price- and wage-setting decisions that are taken at the firm level. Central Banks, including the ECB - as demonstrated by its development in 2020 of a new online expectations survey among euro area consumers- have been at the forefront of this research program. These efforts have focused on tracing out the implications of households' inflation expectations' formation for the understanding of business cycles and monetary policy transmission, as well as helping to assess the effects and usefulness of central bank communication efforts.

In this discussion paper, we have reviewed some of the main insights from this growing research field with a particular focus on its relevance to central banks and monetary policy. In contrast to other measures of expected inflation, such as from financial experts or market participants, consumers' inflation expectations represent the broader distribution of societal beliefs about inflation. A first broad insight from this research program is the very significant and persistent deviations from traditional assumptions about rationality in expectation formation that are often embodied in conventional economic models. For example, there is clear evidence that households are not fully informed about inflation but rather base their beliefs on partial and selective information sets that draw on the price signals to which they are personally exposed. Such factors also help to explain the widespread and persistent cross-sectional dispersion in households' subjective beliefs about inflation. Such disagreement and diversity in subjective beliefs pose obvious challenges for central bank communication aiming to coordinate expectations around its objective.

Consistent with the highly subjective nature of consumers' inflation expectations, the evidence points to quite low interest in and attention to news about inflation, especially from official sources. However, an important recent insight is the state-dependence of households' attention to inflation and, as a result, the extent to which consumers are informed about publicly available signals about inflation that can be gleaned from official inflation statistics. For example, recent research has highlighted that households are more attentive and informed in high-inflation environments (Weber et al. 2023b). However, when inflation is low and stable, households tend to reduce the amount of attention they allocate to monitoring inflation-related news. These results strongly advocate for the incorporation of information frictions and heterogeneity into the models used by central banks for policy and risk analysis.

Another broad conclusion from recent research in this area is that households appear to act on their beliefs about inflation - yet often in heterogeneous and context-dependent ways. A considerable amount of evidence has emerged showing a causal response of consumption to higher expectations of future inflation, in line with the role that economists typically assign to the real interest rate in business cycle propagation and monetary transmission. However, this result appears heterogeneous across the population, driven by more educated, higher IQ and financially literate consumers as well as stronger after policy measures whose design and communication emphasize the economic relationship between inflation and the consumption-saving decision. Moreover, the result appears context-dependent, with some studies showing

that consumption may respond negatively to higher expected inflation, especially if higher expected inflation signals a drop in expected future real incomes. These results also point to the potentially important role of broader consumer narratives and sentiment (e.g., the degree of pessimism and optimism) in driving the causal relation between spending and inflation expectations. For example, an expected increase in future inflation may represent a signal of bad economic news in the future and, hence, it may engender more precautionary behaviour. On the other hand, if such an increase in expected inflation is associated with a positive narrative (e.g., "the economy is expected to grow strongly in the future"), it may lead to more spending and less precautionary behaviour. Beyond the implications for consumer spending, research has also started to look at the relevance of household inflation expectations for labour supply as well as household investment, borrowing, and risk-taking behaviour. However, much more research is still needed on these topics.

For monetary policy and central bank communication, several important insights emerge from the recent evidence and research. Given consumers' relative inattention to policy rates, inflation expectations of households typically react in a muted way and with a considerable lag to both conventional and unconventional monetary policy shocks. These lags reflect the fact that expectations are highly sensitive to actual inflation and subjective inflation experiences and, hence, a stronger transmission to expectations will most likely occur only with a delay and after monetary policies, lagged transmission to actual prices is eventually observed by consumers.

While household inflation expectations likely respond only very sluggishly to monetary policy shocks, research has emphasized the potential of central bank communication in influencing households' inflation expectations more directly. Such communication efforts require significant investment by central banks because consumers are very difficult to reach, and monetary policy - in trying to catch consumers' attention - must compete with many other likely more pressing concerns and interests. A particularly important insight is the importance of communicating about the price stability target, which can help coordinate consumers' beliefs about future inflation and anchor them more closely around the central banks' objective. Such anchoring effects may be particularly important in helping to ensure effective monetary transmission by, for example, helping to avoid a relatively large output loss following an inflationary or cost push shock. The recent literature has also emphasized the importance of diverse policy committees in helping to reach out to the public. For example, research for the

US economy has shown that reflecting different identities (e.g. gender, race, etc.) in central bank policy committees and in policy communication could increase trust in specific and otherwise underrepresented and hard-to-reach subgroups of the population and thereby also enhance the overall effectiveness of monetary policy. Looking forward, the exploration of the benefits of such diversity in the multi-country and multi-cultural context of the euro area would represent an important priority for future research.

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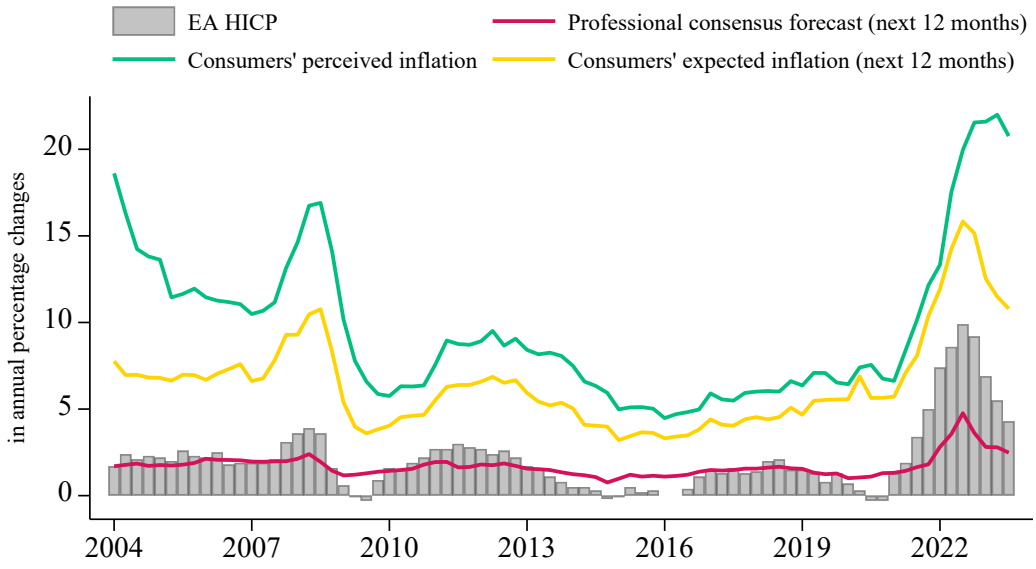
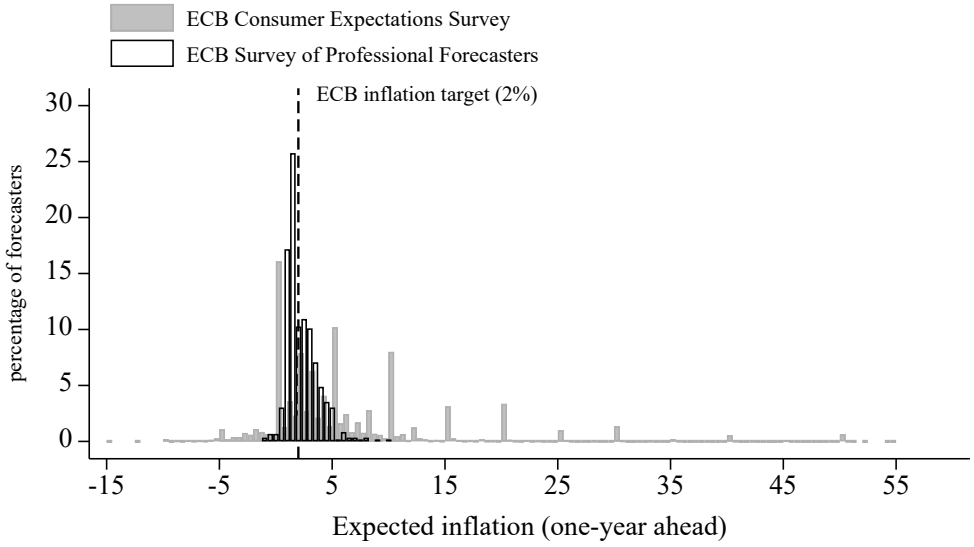
Tables and Charts

Figure 1: Actual inflation, consumers' perceived and expected inflation in the euro area



Source: European Commission – Business and consumer surveys (EA countries, changing composition) and ECB Survey of Professional Forecasters (SPF), latest observation: October 2023.
Notes: The figure depicts the average consumer perceived and expected inflation, and professional forecaster inflation expectations over the next 12 months at a quarterly frequency. HICP inflation depicts the inflation rate across EA countries (changing composition).

Figure 2: The distribution of expected inflation: Consumers versus experts



Source: ECB Consumer Expectations Survey (CES: EA-11) and ECB Survey of Professional Forecasters (SPF), pooled April 2020 to December 2023 data.
Notes: The figure depicts the unweighted cross-sectional distribution of euro area consumers (CES) and experts (SPF) one-year ahead inflation expectations. In both surveys, expectations are elicited as point forecasts of inflation over the next 12 months. Consumers' expectations are winsorised at the most extreme two percentiles to account for outliers. The CES includes the six largest countries before April 2022 and the EA-11 countries afterwards. The x-axis is truncated at 55 for visual clarity. The sample used includes from April 2022 onwards also from five new countries included in the ECB Consumer Expectations Survey: Austria, Finland, Greece, Ireland, and Portugal.

Table 1: Inflation expectations by demographic and economic characteristics

	Year of data collection		
	2020 and 2021	2022	2023
	mean (median)		
Average HICP inflation	1.5 (1)	8.4 (8.8)	5.5 (5.4)
Professional Forecasters	1.3 (1.3)	3.2 (3.0)	2.9 (2.8)
Consumers	3.7 (2.0)	7.2 (5.0)	5.8 (4.0)
Household Income			
bottom 20	4.4 (2.1)	8.2 (5.1)	6.8 (4.4)
in between	3.6 (2.0)	7.0 (5.0)	5.6 (4.0)
top 20	3.2 (2.0)	6.4 (5.0)	5.0 (3.9)
Employment situation			
employed	3.6 (2.0)	7.0 (5.0)	5.8 (4.0)
unemployed	3.8 (2.1)	7.2 (5.1)	5.8 (4.1)
Education			
no University	3.8 (2.1)	7.4 (5.0)	6.0 (4.0)
University	3.4 (2.0)	6.8 (5.0)	5.4 (4.0)
Age			
18-29	3.0 (1.4)	5.8 (3.6)	5.0 (3.0)
30-49	3.8 (2.0)	7.4 (5.0)	6.2 (4.0)
50-64	4.0 (2.4)	8.0 (5.9)	6.4 (4.5)
65+	3.6 (2.2)	7.2 (5.5)	5.8 (4.5)
Gender			
male	3.2 (2.0)	6.4 (5.0)	5.2 (3.9)
female	4.0 (2.0)	7.8 (5.0)	6.4 (4.3)
Countries			
Austria	-	10.0 (7.0)	6.0 (4.9)
Belgium	3.4 (2.1)	6.4 (5.0)	4.8 (3.3)
Germany	2.8 (2.0)	5.8 (5.0)	4.4 (3.2)
Greece	-	16.8 (11.7)	14.8 (10.5)
Spain	4.2 (2.0)	6.8 (5.0)	6.4 (4.7)
Finland	-	8.6 (6.0)	4.8 (3.7)
France	3.2 (1.8)	4.8 (4.0)	4.8 (3.5)
Ireland	-	10.6 (7.8)	7.0 (4.9)
Italy	5.2 (2.9)	10 (6.4)	7.2 (4.9)
Netherlands	3.2 (2.1)	6.2 (5.0)	4.4 (3.6)
Portugal	-	11.0 (8.0)	7.4 (4.9)

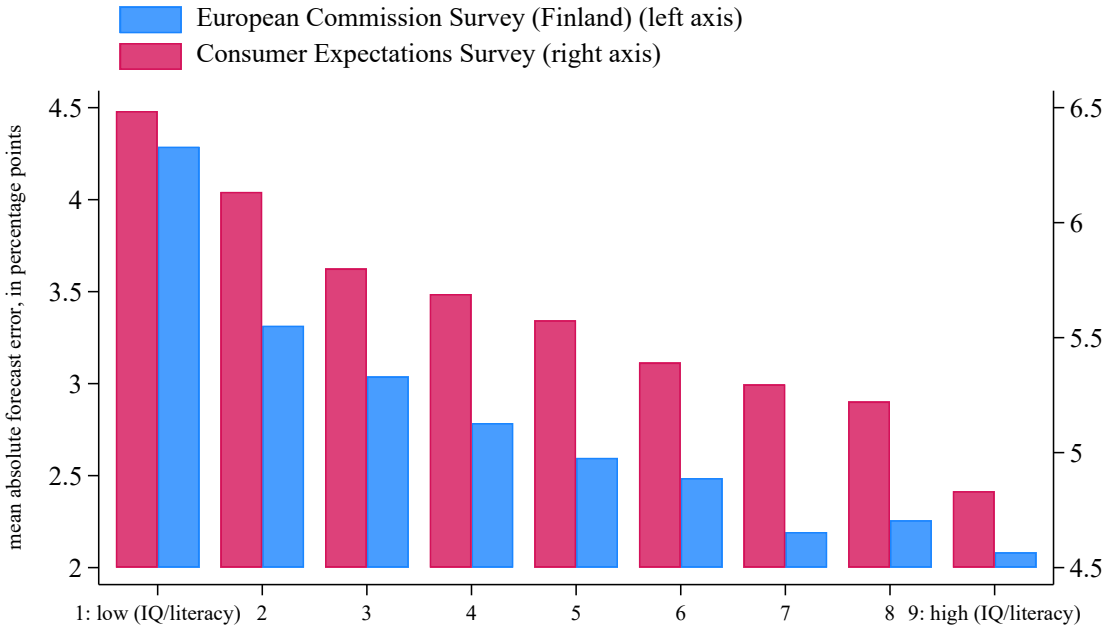
Source: ECB Consumer Expectations Survey (CES: EA-11) and ECB Survey of Professional Forecasters (SPF), latest observation: December 2023.
Notes: Most extreme observations for consumers are winsorised at the most extreme two percentiles to account for outliers. The sample mean is calculated as the average of the population weighted survey-month averages for each subgroup of consumers. The Median, in brackets, is calculated as the median of the survey-month (interpolated) medians. The sample is split into three subsamples: 2020/2021 spans the months April 2020 to December 2021 (predominantly low inflation rates), the year 2022 (rapidly rising and high inflation rates) and the months January to December 2023 (decreasing inflation rates). The CES sample used includes from April 2022 onwards, also data from five new countries included in the survey: Austria, Finland, Greece, Ireland, and Portugal.

Table 2: Behavioural features of consumers' inflation expectations formation

Objective forecast errors on forecast revision	(1)	Expected inflation on perceived inflation	(2)
Forecast revision (t)	-0.491***	*Perceived inflation (t)*	0.331***
	(0.019)		(0.015)
		Realised inflation (t)	0.13**
			(0.06)
R-2 (within)	0.28	R-2 (within)	0.13
Number of Observations	408,848	Number of Observations	566,142

Source: ECB Consumer Expectations Survey (CES: EA-11), pooled data from April 2020 to December 2023.
Notes: This table reports the coefficient estimates from linear specifications, including year dummies and individual fixed effects. Standard errors in parenthesis are clustered on individual and wave level. Objective forecast errors are calculated as country-specific inflation rates 12 months from today minus the current forecast over the same horizon. Significance levels: *p<0.10, **p<0.05, ***p<0.01.

Figure 3: Cognitive ability, financial literacy, and consumer forecast errors



Source: Statistics Finland (pooled data from January 2001 to March 2015) and ECB Consumer Expectations Survey (CES: EA-11, pooled data from April 2020 to December 2023).
Notes: The figure plots individuals' forecast error of inflation expectations. IQ is measured on a nine-point scale through the standardized test score from the Finnish Defence Forces. Data for the CES has been residualised on the age, education, country, and survey-wave dimension and aggregated into nine bins with financial literacy originally measured on a five-point scale from 0 correct responses to correct responses to a standard set of financial literacy questions. The CES sample used includes from April 2022 onwards, also data from five new countries included in the survey: Austria, Finland, Greece, Ireland, and Portugal.

Table 3: Consumers response to inflation expectations

(a) Saving and borrowing

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable:	**Good time: Save money (binary)**				**Good time: Borrow money (binary)**			
Expected change in inflation	-0.001***	-0.001***	-0.000***	-0.000***	0.004***	0.002***	0.000***	0.001***
	(-8.10)	(-7.78)	(-4.55)	(-4.24)	(41.07)	(27.78)	(6.66)	(7.10)
Expected deposit interest rates	0.017***	0.005***	0.003***	0.003***				
	(34.51)	(12.71)	(7.77)	(7.88)				
Expected mortgage interest rates					-0.015***	-0.013***	-0.007***	-0.009***
					(-50.65)	(-43.82)	(-26.91)	(-26.55)
Not liquidity constrained (Binary)				0.036***				0.024***
				(15.26)				(11.22)
Worse financial situation (Binary)				-0.017***				-0.020***
				(-9.64)				(-12.87)
Fixed effects	Country	Individual	Individual + wave	Individual + wave	Country	Individual	Individual + wave	Individual + wave
Number of observations	576,290	556,436	556,436	556,436	576,293	556,439	556,439	556,439
R-squared (overall)	0.04	0.37	0.38	0.38	0.06	0.34	0.36	0.36

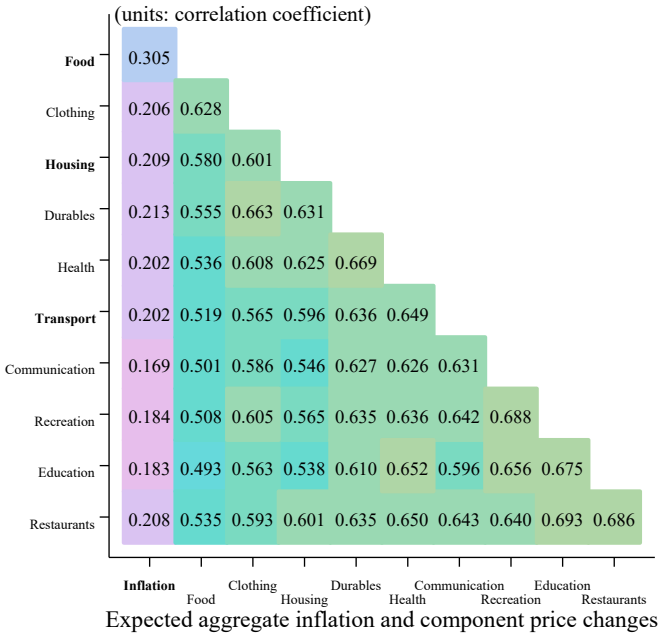
(b) Investments

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable:	**Good time: Invest in risky assets (binary)**				**Good time: Invest in housing (binary)**			
Expected change in inflation	0.001***	0.000***	-0.000	-0.000	0.000	0.001***	-0.000	-0.000
	(8.65)	(4.97)	(-0.88)	(-0.58)	(0.45)	(11.01)	(-0.42)	(-0.15)
Expected mortgage interest rates	-0.008***	-0.004***	-0.002***	-0.002***	-0.010***	-0.007***	-0.004***	-0.004***
	(-25.13)	(-15.23)	(-8.15)	(-7.83)	(-25.17)	(-26.33)	(-13.81)	(-13.54)
Not liquidity constrained (Binary)				0.030***				0.030***
				(13.91)				(13.14)
Worse financial situation (Binary)				-0.013***				-0.013***
				(-8.75)				(-7.96)
Fixed effects	Country	Individual	Individual + wave	Individual + wave	Country	Individual	Individual + wave	Individual + wave
Number of observations	576,291	556,437	556,437	556,437	576,290	556,436	556,436	556,436
R-squared (overall)	0.02	0.39	0.40	0.40	0.02	0.46	0.47	0.47

Source: ECB Consumer Expectations Survey (CES: EA-11), pooled March 2021 to December 2023 data.

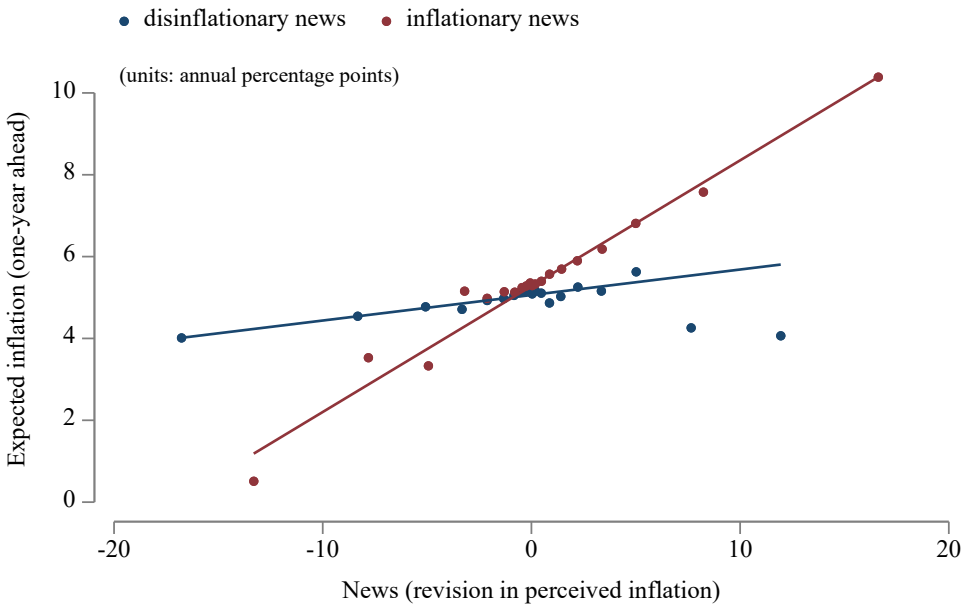
Notes: Robust t statistics in parentheses, with standard errors, are clustered on the individual level throughout. Significance levels: *p<0.10, **p<0.05, ***p<0.01. Expectations have been winsorised at the most extreme 2.5 percentiles to account for outliers. The expected change in inflation is derived from expected inflation (one-year ahead) minus the currently perceived inflation rate. Respondents are asked each month if they think it's a very good, good, neither good or bad, bad or very bad time to (i) save money in savings accounts, (ii) borrow money from a bank, (iii) invest money in risky financial assets such as stocks, (iv) buying real estate in your neighbourhood today. Liquidity constraints are measured as the self-reported sufficient financial resources to make a payment of one-months' salary. Consumers who report to expect to be much worse off or somewhat worse off are coded as expecting a worse financial situation over the next 12 months. The CES sample used includes from April 2022 onwards, also data from five new countries included in the survey: Austria, Finland, Greece, Ireland, and Portugal.

Figure 4: Co-movement of inflation expectations with expected changes in HICP components



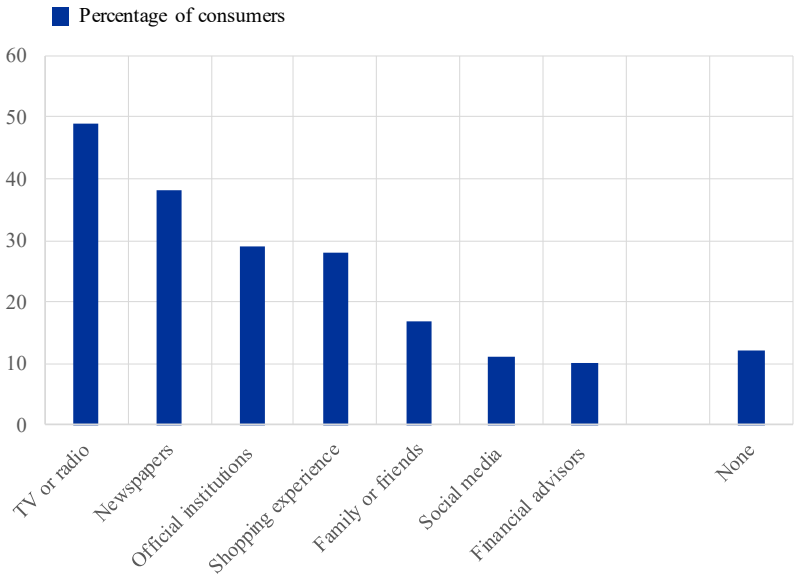
Source: ECB Consumer Expectations Survey (CES: EA-11), authors' calculations.
Notes: Population weighted data from July 2023. The figure depicts unconditional correlations derived from individuals' reported aggregate expectations about prices in general HICP components expectations. In line with the aggregate inflation forecast horizon, consumers are asked for each HICP category how they think prices will change over the next 12 months. Respondents choose from a slider bounded by -50 and +50 percent change. Both expectation concepts are elicited from respondents as point forecasts in July 2023. Both series have been winsorised at the most extreme two percentiles to account for outliers. Data on expectations for HICP components is currently collected as experimental data and not part of the regular survey data. The sample used includes from April 2022 onwards, also data from five new countries included in the survey: Austria, Finland, Greece, Ireland, and Portugal.

Figure 5: Asymmetric passthrough of inflation news to inflation expectations



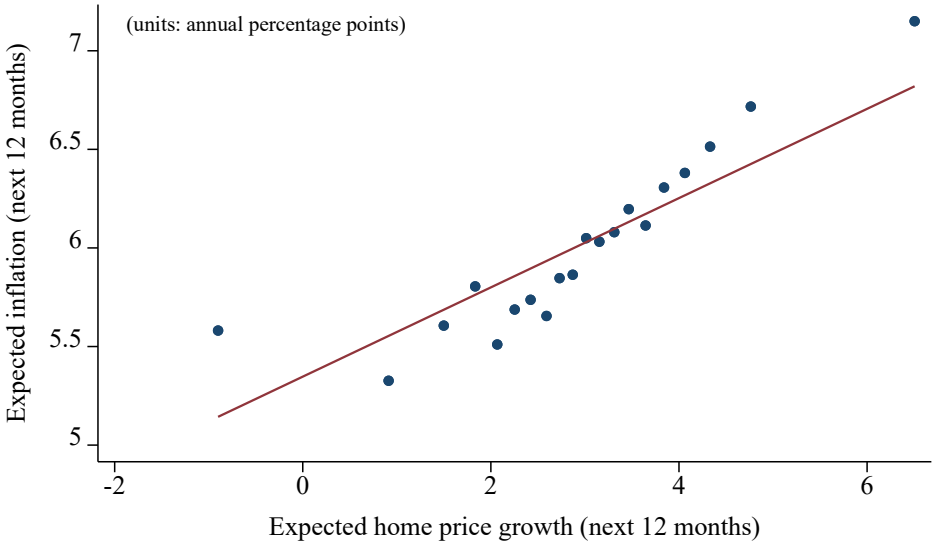
Source: ECB Consumer Expectations Survey (CES: EA-11), authors' calculations.
Notes: Pooled April 2020 to December 2023 data. The figure plots individuals' inflation expectations and news about current inflation measured as the revision in perceived inflation split by the direction of the news. Inflationary news is measured as an upward revision, while disinflationary news is measured as no revision or downward revision. The linear fit accounts for individual fixed-effects and survey-wave dummies. Both series have been winsorised at the most extreme two percentiles to account for outliers. The sample used includes from April 2022 onwards, also data from five new countries included in the survey: Austria, Finland, Greece, Ireland, and Portugal.

Figure 6: Consumers' information sources about inflation over the next 12 months



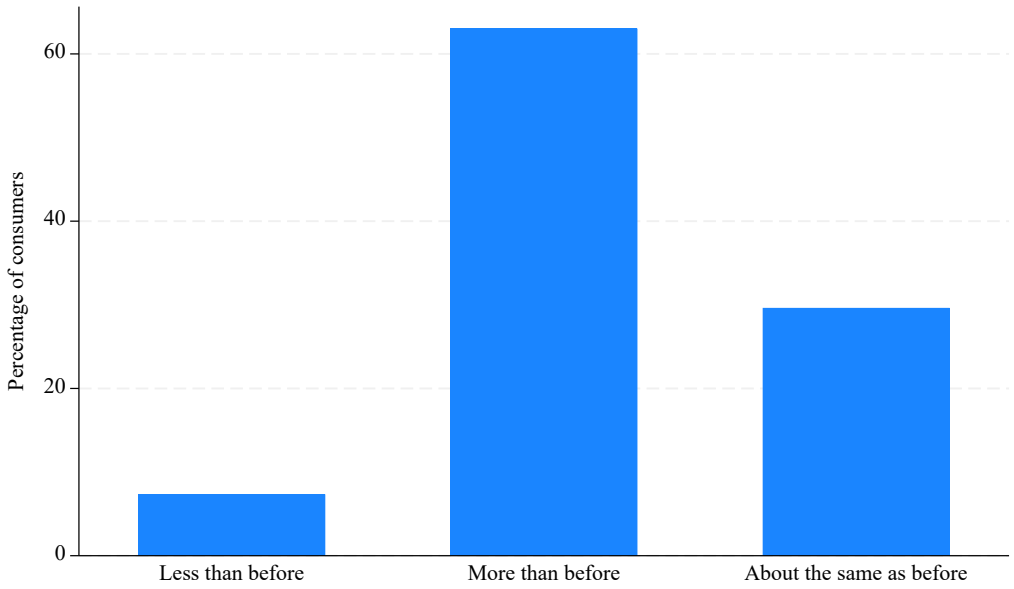
Source: ECB Consumer Expectations Survey (CES: EA-11), authors' calculations.
Notes: Population weighted data pooled from August 2022, January 2023, and August 2023. This figure depicts experimental data that are not part of the regular survey data. Respondents were asked to report (up to three) sources they would use to *inform themselves about inflation in the country they currently live in over the next 12 months* from a list of the above-shown sources. The list also included a possibility to choose *none of these sources*.

Figure 7: Extrapolation from local house prices to inflation expectations



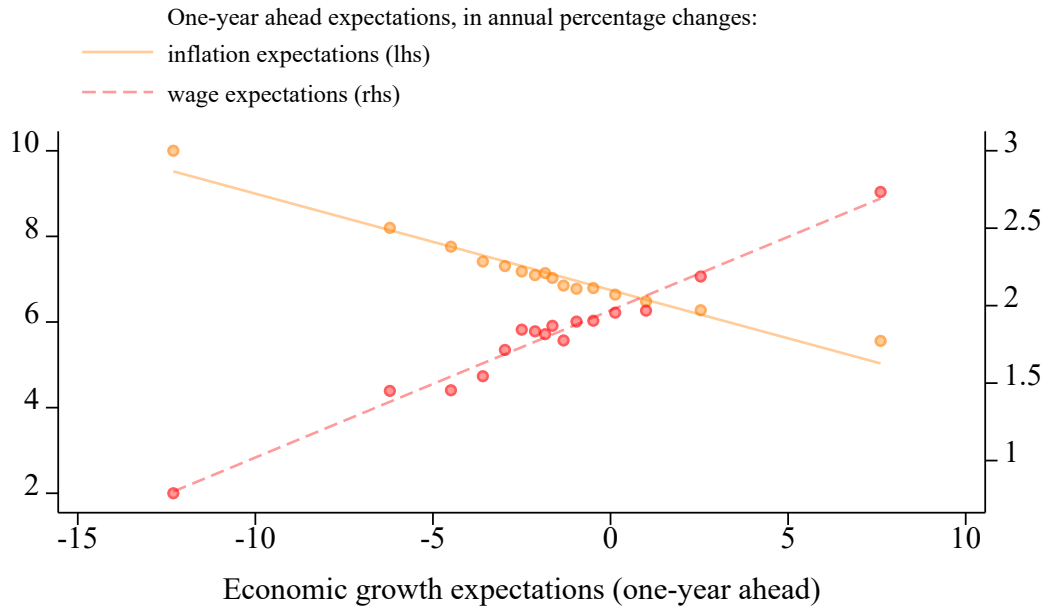
Source: ECB Consumer Expectations Survey (CES: EA-11), authors' calculations.
Notes: Pooled April 2020 to December 2023 data. The figure plots pooled and weighted data of average regional inflation expectations and average regional home price expectations aggregated on the NUTS-1 level of each country since April 2020. The linear fit of the NUTS-1 level aggregates accounts for country and time dummies.

Figure 8: Euro area consumers' attention to inflation in January 2023 compared to 12 months before



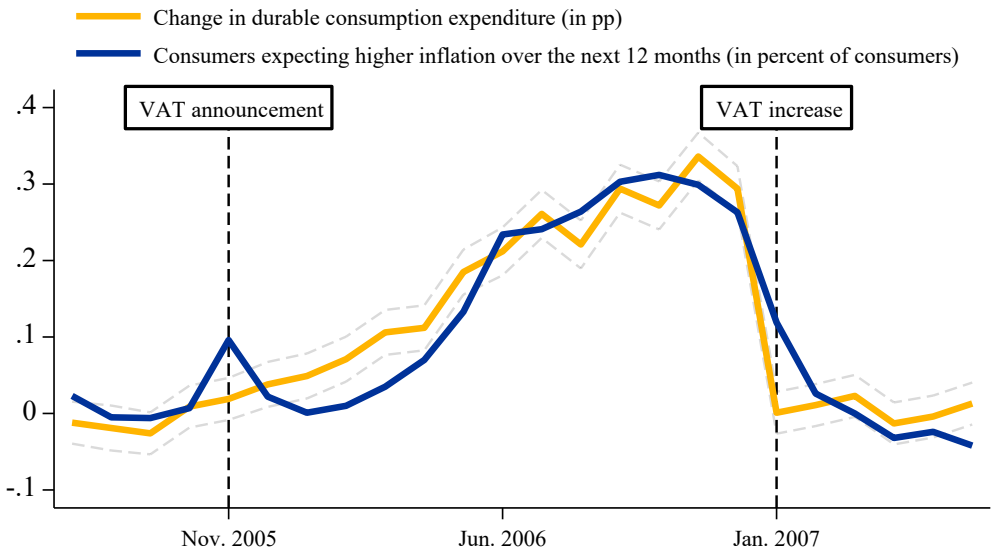
Source: ECB Consumer Expectations Survey (CES: EA-11), authors' calculations.
Notes: Population weighted data from January 2023. This figure depicts experimental data that are not part of the regular survey data. In January 2023 (when euro area inflation stood at 8.6%), respondents were asked whether they *currently pay less, more or about the same attention to changes in prices in general in the country they currently live in compared to 12 months ago* (i.e. January 2022 when euro area inflation stood at 5.1%).

Figure 9: Expectation formation and macroeconomic sentiment



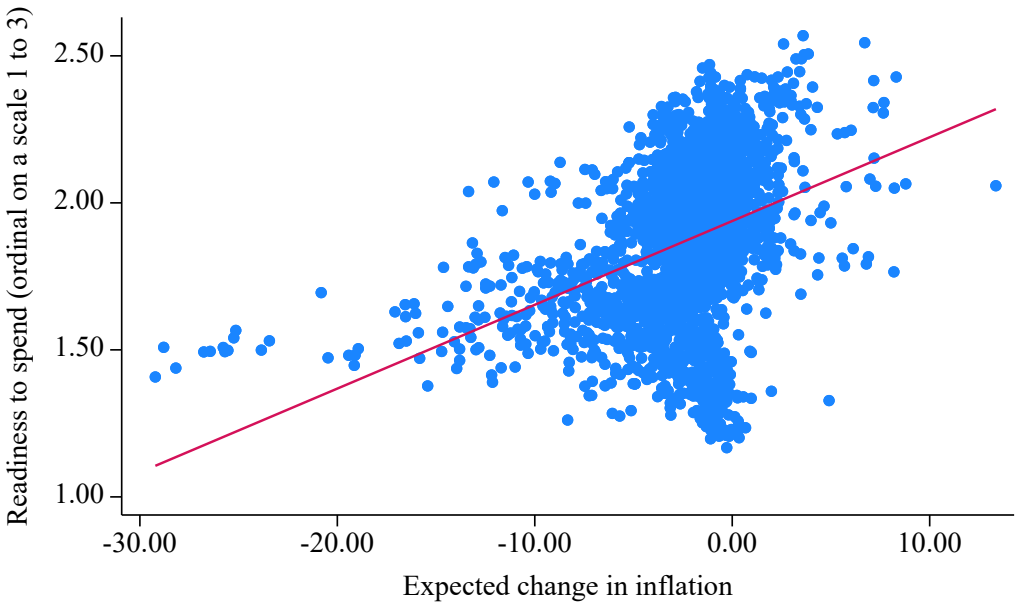
Source: ECB Consumer Expectations Survey (CES: EA-11), authors' calculations.
Notes: Pooled June 2022 to December 2023, quarterly data. The Figure depicts the association between economic growth expectations (x-axis) vis-à-vis inflation and wage expectations (y-axis) of employed consumers. All three subjective expectations are elicited as point forecasts over the same horizon of the next 12 months. The linear fit accounts for individual fixed effects and survey-wave dummies. Both series have been winsorised at the most extreme two percentiles to account for outliers. Wage expectations of employed consumers are collected as experimental data and are, at the time of writing, not part of the regular survey data.

Figure 10: Consumers durable consumption and inflation expectations



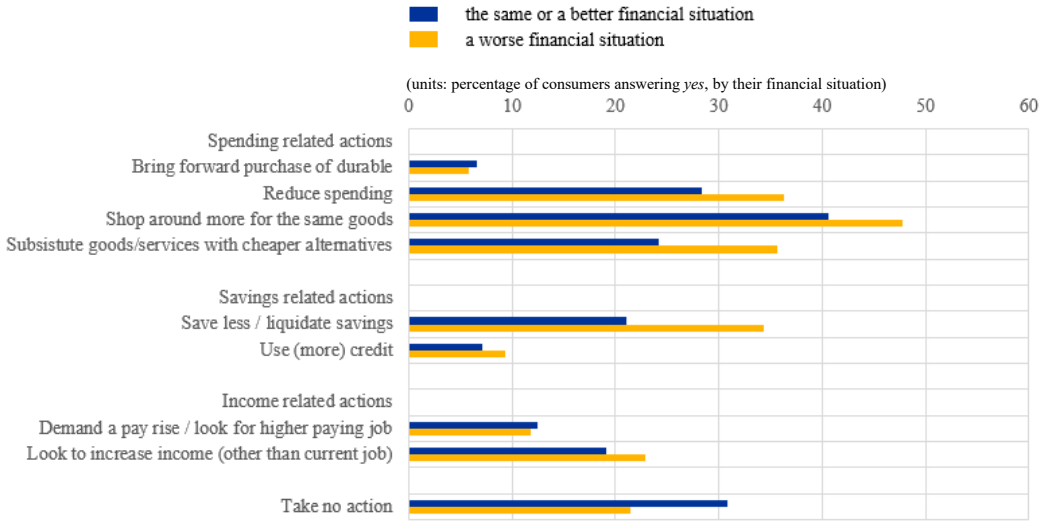
Source: GFK Consumer Climate MAXX, authors' calculations.
Notes: This figure plots the share of German consumers thinking it is a good time to purchase larger ticket items (durable consumption goods). The blue line shows a contemporaneous increase in consumers' inflation expectations during the period after the VAT increase announcement (November 2005). D'Acunto *et al.* (2022b) show how the effects of such an unconventional fiscal policy on inflation expectations lead to increasing durable consumption expenditure (yellow line) by exploiting a difference-in-differences strategy across other euro area countries which were not affected by the VAT policy announcement. The plotted treatment effect shows the time-varying difference in the willingness to spend on durable goods (compared to a base month in June 2005) between the groups exposed to the VAT shock after December 2006 and a control group of individuals with similar observable characteristics compared to the treated individuals.

Figure 11: Readiness to spend and expected change in inflation



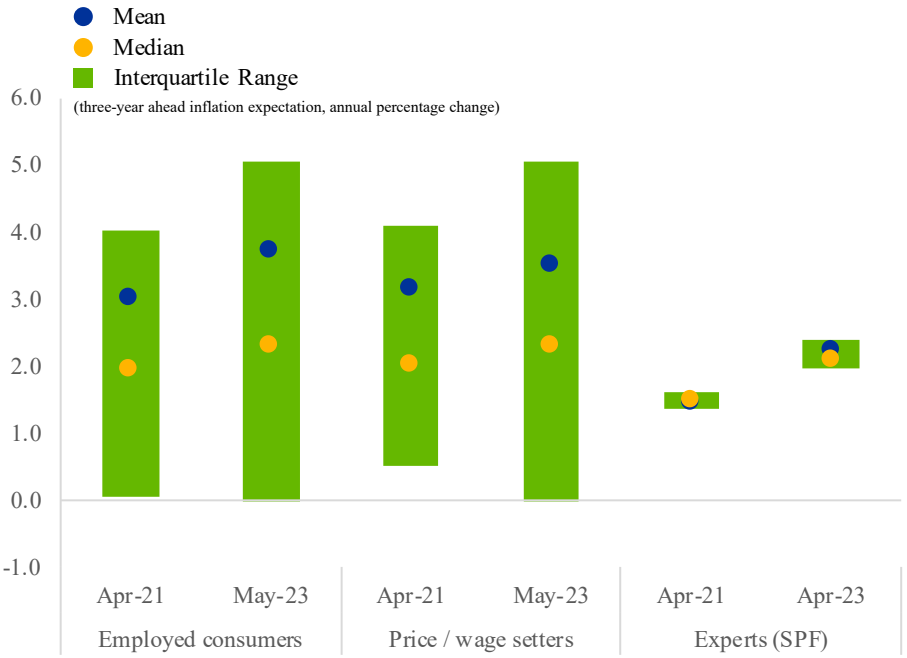
Source: European Commission – Business and consumer surveys, Duca-Radu, Kenny and Reuter (2022), reprint with authors' permission.
Notes: One dot is a country aggregate (weighted by individual weights) at one moment in time (identified by month and year) expected changes in inflation. Readiness to spend is coded 1 for not being the right moment to spend, 2 for being neither the right moment nor the wrong moment and 3 for being the right moment to spend.

Figure 12: Consumers response to expectations of future price change



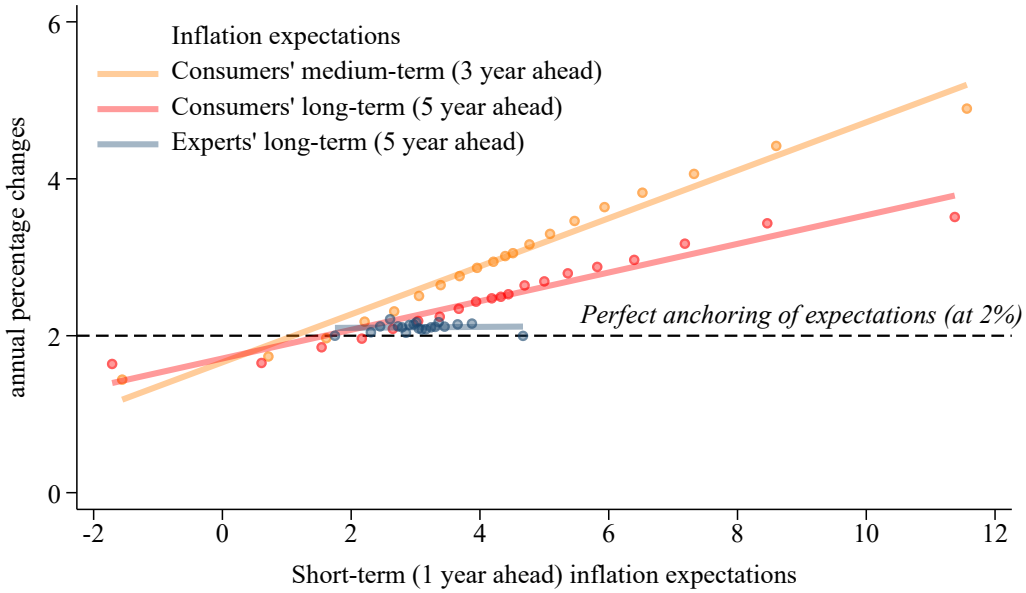
Source: ECB Consumer Expectations Survey (CES: EA-11), authors' calculations.
Notes: Population weighted data from August 2023. In August 2023, the CES asked consumers what actions they plan to take regarding their expectations about changes in prices in general over the next 12 months. The different options (multiple responses possible) were given as a closed list, including a *no action* choice. The figure depicts the percentage of consumers choosing a specific response to inflation over the next 12 months, broken down by the expected change in their financial situation over the next 12 months. Respondents are asked if they expect they expect to be financially to be (*much/somewhat*) *worse* / *about the same* or (*much/somewhat*) *better off*.

Figure 13: Medium-term inflation expectations of consumers, managers, and experts



Source: ECB Consumer Expectations Survey (CES: BE, DE, ES, FR, IT, NL) and ECB Survey of Professional Forecasters (SPF), authors' calculations.
Notes: The figure shows the mean and (interpolated) median and interquartile range of three-year ahead inflation expectations. In April 2021 and May 2023, the CES asked employees whether they currently play a role (multiple responses possible) in wage setting (not asked in Apr-21), price setting, hiring, leading a team, or deciding on investments. Management responsibilities of employed consumers are collected as experimental data and are, at the time of writing, not part of the regular survey data. For professional forecasters, two year ahead inflation expectations have been used from the 2021 Q2 and 2023 Q2 data release (collected during April of each year). Consumer expectations have been winsorised at the most extreme two percentiles to account for outliers.

Figure 14: Co-movement of short- and longer-term inflation expectations

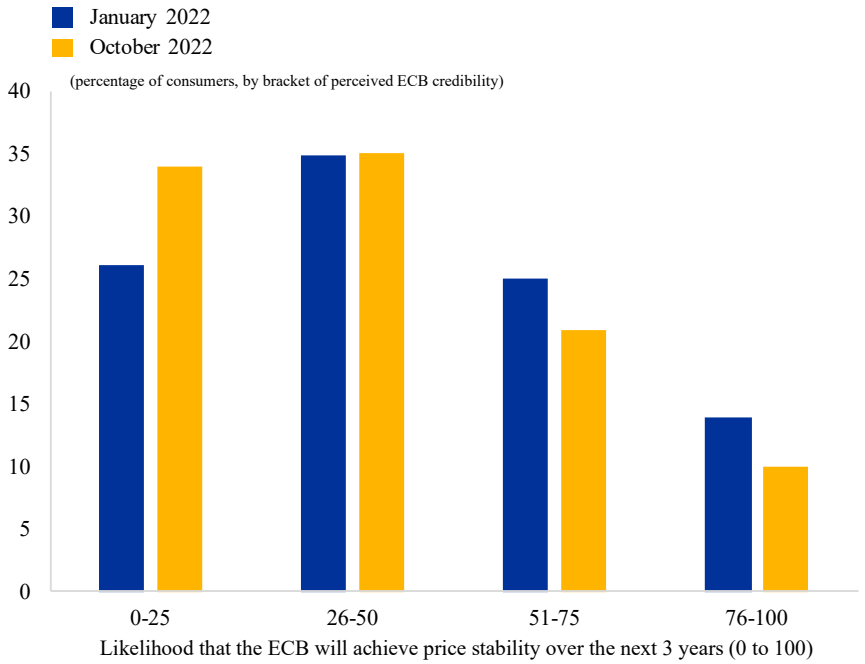


Source: ECB Consumer Expectations Survey (CES: EA-11), ECB Survey of Professional Forecasters (SPF), authors' calculations.
Notes: Pooled February 2022 to December 2023 data. The figure plots three-year and five-year ahead inflation expectations elicited as open-ended point forecasts (y-axis) against one-year ahead inflation expectation forecasts (x-axis). Five-year ahead inflation expectations in the ECB Consumer Expectations Survey (CES) are collected as experimental data and are, at the time of writing, not part of the regular survey data. Expectations have been winsorised at the most extreme two percentiles to account for outliers. The linear fit accounts for respondent/forecaster fixed effects and survey-wave dummies. The CES sample used includes from April 2022 onwards, also data from five new countries included in the survey: Austria, Finland, Greece, Ireland, and Portugal.

Figure 15: The term structure of euro area inflation expectations

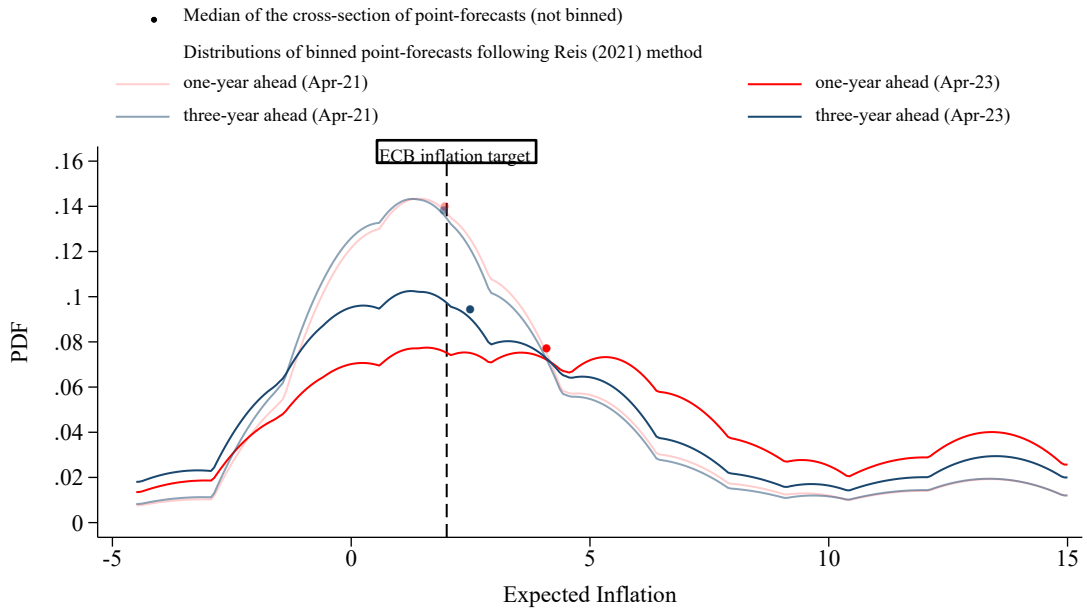
Source: ECB Consumer Expectations Survey (CES: EA-11), authors' calculations.
Notes: Pooled June 2022 to June 2023 data. The figure depicts population weighted data. Expectations have been winsorised at the most extreme two percentiles to account for outliers. Statistics are calculated based on the pooled sample spanning the inflation surge in the euro area in 2022 and 2023. Five-year ahead inflation expectations are collected as experimental data and are, at the time of writing, not part of the regular survey data.

Figure 16: The cross-sectional distribution of ECB credibility



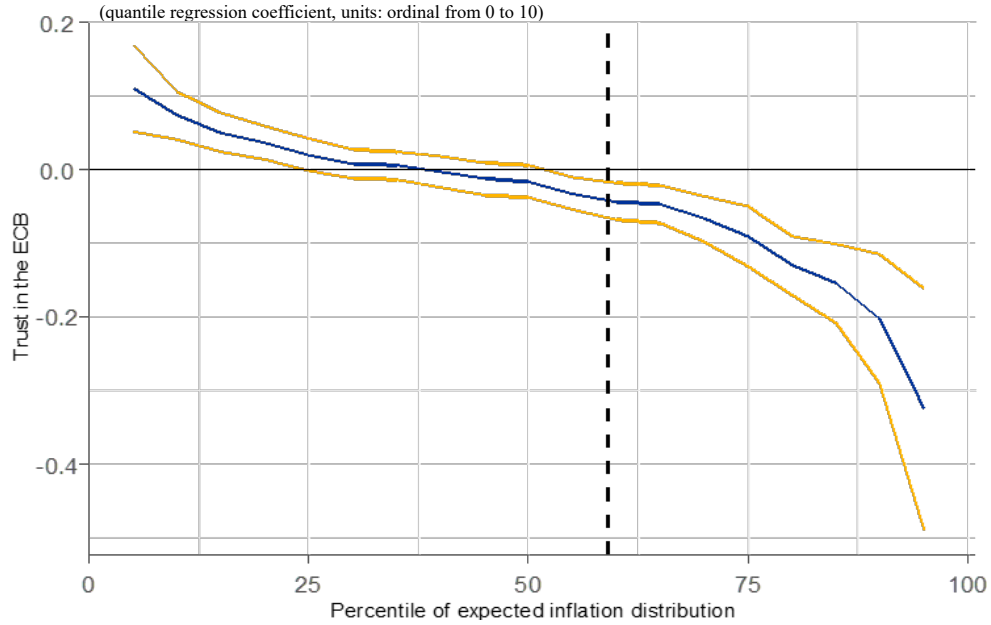
Source: ECB Consumer Expectations Survey (CES: EA-11), authors' calculations.
Notes: Population weighted data. The figure shows the percentage of consumers assessing *the likelihood of the ECB to achieve price stability over the next 3 years* collected before the euro area inflation surge in 2022 (January 2022) and around the peak of inflation rates in the euro area (October 2022). The perceived likelihood is collected on a continuous scale from 0 to 100 and has been aggregated. The data depicted here are collected as experimental data and are, at the time of writing, not part of the regular survey data.

Figure 17: Degree of anchoring in consumer inflation expectations



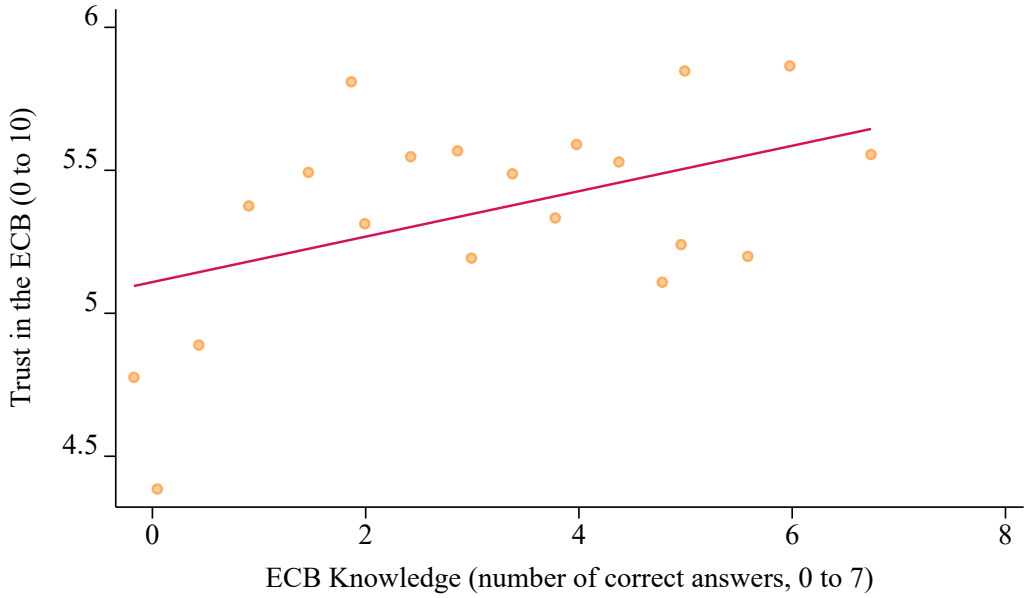
Source: ECB Consumer Expectations Survey (CES: BE, DE, ES, FR, IT, NL), authors' calculations.
Notes: Population weighted data from April 2021 and April 2023. The figure depicts the distribution of inflation expectations across. The dots depict the location of the population-weighted median in each wave. The data for continuous point forecasts has been binned in the range -5 to 15 following Reis (2021) by first rounding to the nearest digit and then taking the mid-point in pre-specified intervals before fitting a kernel density with a bandwidth of 1.3 to the data.

Figure 18: Evidence for anchoring of inflation expectations due to greater trust in the ECB



Source: Christelis *et al.* (2020), reprint with authors' permission, authors' calculations.
Notes: Coefficient estimates (and associated 95% confidence intervals) of trust in the ECB from a series of Quantile Regressions (QR) regressing individual inflation expectations on trust in the ECB and individual socio-economic characteristics. The positive QR estimates imply that trust in the ECB raises inflation expectations among individuals with very low inflation expectations. QR estimates at the sixth and higher deciles display a negative sign, suggesting a progressively stronger negative association of trust in the ECB with inflation expectations among those with higher inflation expectations. The vertical line is drawn at the percentile of the expected inflation distribution that corresponds to 2 percent inflation.

Figure 19: Knowledge about the ECB and trust in the ECB



Source: ECB Consumer Expectations Survey, authors' calculations.
Notes: Population weighted data from May 2020, February 2021, September 2021, August 2022, and August 2023 data. The figure plots respondents' factual knowledge about the ECB measured as the sum of correct responses to questions about the ECB's role and responsibility as an institution (x-axis) against trust in the ECB (y-axis) measured on an 11-point scale ranging from no trust (0) to full trust (10). This data is collected as experimental data and, at the time of writing, is not part of the regular survey data. The linear fit absorbs individual fixed effects and time dummies. The sample used includes from April 2022 onwards, also data from five new countries included in the survey: Austria, Finland, Greece, Ireland, and Portugal.

Table 4: Consumers' interest and knowledge about monetary policy

	Interested in monetary policy (yes/no)	Channels of receiving ECB news (last month)					ECB factual knowledge (0 to 7)	ECB credibility next 3 years (0 to 100)	Trust in the ECB (0 to 10)
		TV/ Radio	Newspaper	Web	ECB web	No info			
	(percentage of consumers)	*(percentage of consumers)*					*(average)*	*(average)*	*(average)*
EA	33%	39%	20%	11%	12%	44%	3.2	40.7	5.2
Big-4									
DE	37%	42%	21%	9%	11%	38%	3.4	40.6	5.3
ES	46%	35%	18%	12%	15%	46%	3.2	39.1	5.1
FR	26%	33%	19%	11%	12%	47%	2.8	42.6	5.4
IT	29%	46%	22%	16%	13%	40%	3.1	39.9	5.0
Age									
18-34	30%	27%	14%	14%	18%	49%	2.8	41.3	5.3
35-49	31%	32%	16%	11%	13%	50%	3.1	39.6	5.0
50-64	32%	42%	20%	9%	8%	46%	3.3	40.2	5.1
65+	41%	55%	32%	10%	8%	31%	3.4	41.7	5.6
Gender									
women	27%	33%	15%	8%	10%	52%	2.8	39.5	5.1
men	40%	45%	27%	14%	14%	36%	3.6	41.9	5.4
Income									
Q1	24%	31%	12%	8%	10%	54%	2.6	38.9	4.8
Q2, Q3, Q4	34%	40%	21%	11%	12%	43%	3.1	40.7	5.3
Q5	43%	45%	30%	14%	13%	37%	3.9	43.1	5.6
Financial literacy									
Low/Medium	28%	32%	14%	10%	13%	49%	2.4	39.8	5.1
High	38%	44%	26%	12%	11%	40%	3.8	41.3	5.3

Source: ECB Consumer Expectations Survey (EA-11), authors' calculations.

Notes: Population weighted data based on pooled August 2022 and August 2023. Respondents are classified as interested in monetary policy if they report to be *considerably* or *a great deal interested* in monetary policy. Columns (2) to (6) report consumers' news acquisition (multiple sources possible), and column (7) reports consumers' perceived credibility of the ECB, measured as the average probability that the ECB will achieve price stability over the next 3 years. Column (8) reports the average score of correct responses to a set of seven factual knowledge questions about the ECB's responsibilities and objectives. Column (9) reports the average degree of trust in the ECB measured on a scale from 0 (no trust at all) to 10 (complete trust). Data in columns (1), (7) and (8) are collected as experimental data and are, at the time of writing, not part of the regular survey data.

Appendix I: Challenges in measuring expectations

Equipped with still relatively new but the by now increasingly used inflation expectations data discussed in this paper, it remains essential to acknowledge that measuring inflation expectations is still a challenge (Manski, 2004; Georgarakos and Kenny, 2022; ECB, 2021; Weber *et al.* 2022). Particularly important is careful survey design when relying on such data for central banking or decision-making more generally.[46] Of course, the fact that expectations are measured with error akin to other micro-founded indicators does not necessarily negate their usefulness for monetary policy. One reason for this is that new forms of empirical analysis, such as randomised controlled trials, are robust to significant levels of measurement error in the data.

A careful and consistent survey design can also help to mitigate measurement error originating from the survey itself.[47] For instance, *priming* in surveys might induce systematic biases if respondents are repeatedly forced to revise answers deemed "unrealistic" or if, as part of the question formulation, they are provided with official statistics such as past inflation rates. Also, differences in *question wording* (e.g., inflation/deflation, prices in general, consumer prices) can yield a difference in reported levels of expectations but are less likely to influence their dynamics over time.[48] In fact, by eliciting different types of expectations, such as qualitative, point forecasts, and subjective density forecasts, the ECB's CES is able to demonstrate a high degree of internal consistency across these concepts.[49] Similarly, while differing in question-wording and sampling strategies summarised in Table A1, consumers across three major international surveys from the Bank of England, the New York Fed, and the European Central Bank display very similar time-series dynamics in reaction to the recent surge in inflation as depicted by Figure A1. Given the global nature of the recent inflationary shock, such broad consistency in the dynamics across different surveys is reassuring from a measurement perspective.

[46] See Chapter 1 in Bachmann *et al.* (2022) for a review of the extensive literature on eliciting expectations.
[47] See Weber *et al.* (2022) for a detailed discussion of measurement challenges specific to inflation expectations.
[48] See, for instance, Bruine de Bruin et al. (2011 and 2017) for a discussion of different question wordings.
[49] ECB (2021) compares different measures of inflation expectations elicited in the CES.

Consumer surveys can only be informative for policymaking if they maintain a high quality. Survey and sample management play a key role in ensuring high data quality. By rotating respondents, after several completed survey rounds while maintaining a sufficient panel to investigate individual changes over time, high-quality surveys avoid excessive *learning from survey-taking.* This feature is also known as panel conditioning and is well-known in the survey literature (see Kim and Binder, 2023). It refers to the possibility that agents know they will be surveyed repeatedly about macroeconomic expectations, and this makes them consult sources of economic information that they (and agents similar to them) would not have otherwise consulted to form their expectations when making economic choices. In the CES, some degree of panel conditioning can be observed for both the probabilistic and the non-probabilistic subsample, as shown in Figure A2. Respondents who participate for more waves, on average, have lower levels of inflation expectations, which could indicate some learning from the survey itself. However, this effect seems to be most dramatic for the first waves after entering the panel, highlighting the inherent trade-off between excessive learning and maintaining a sufficient panel dimension for each respondent to aid in the analysis of individual decision-making over time. At the same time, these surveys also need to actively monitor the impact of attrition and panel turnover on sample representativeness and thus avoid sample compositional effects on the dynamics of aggregate survey results (Engelberg *et al.* 2011).

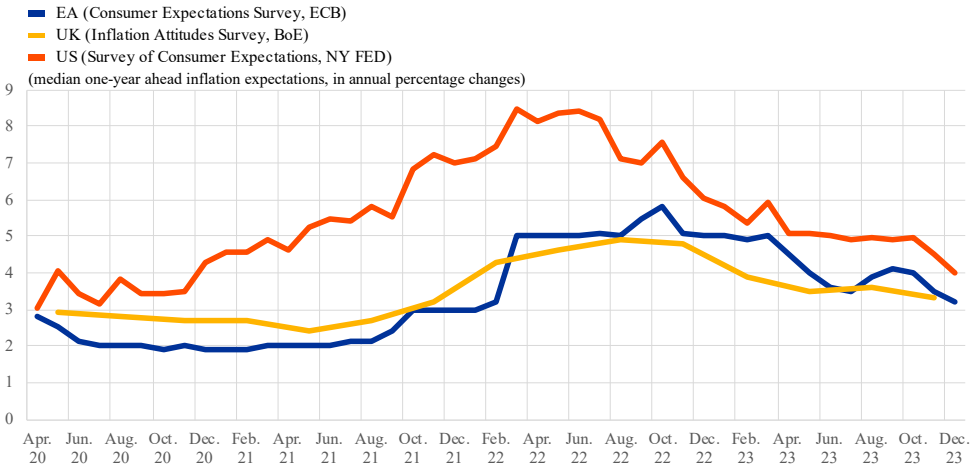
Moreover, state-of-the-art surveys reduce *survey fatigue and low-effort responses*, which might otherwise plague the reliability of survey-based data. As demonstrated in Figure A3, respondents with very particularly low response time display the highest forecast error compared to no clear relationship once a certain time is spent, usually above 10 minutes, on the questionnaire. This indicates that speeding through the survey might indeed be problematic for a small subset of respondents.

Table A1: Overview: Surveys of consumer inflation expectations run by central banks

Survey name	Institution	Wording	Question type	Target sample size	Country coverage	Frequency	Inception	Panel structure
Consumer Expectations Survey (CES)	European Central Bank	"prices in general"	Qualitative, Quantitative, Probabilistic	20,000	Belgium, Germany, France, Spain, Italy, Netherlands, Austria, Finland, Ireland, Greece, Portugal	Monthly	2020	Rotating panel
Survey of Consumer Expectations (SCE)	New York Fed	"the rate of inflation (deflation)"	Qualitative, Quantitative, Probabilistic	1,300	US	Monthly	2013	Rotating panel
Canadian Survey of Consumer Expectations	Bank of Canada	"the rate of inflation (deflation)"	Qualitative, Quantitative, Probabilistic	2,000	Canada	Quarterly	2014	Rotating panel
Survey on Consumer Expectations (BOP-HH)	Deutsche Bundesbank	"the inflation rate"	Qualitative, Quantitative, Probabilistic	2,500 to 5,000	Germany	Monthly	2019	Rotating panel
DNB Household Survey (DHS)	Dutch National Bank	"(consumer) prices"	Qualitative, Quantitative, Probabilistic	1,500	Netherlands	Annual	1993	Rotating panel
Inflation Attitudes Survey	Bank of England	"prices in the shops generally"	Qualitative, Quantitative	2,200	UK	Monthly	2001	Repeated cross-section
OeNB Euro Survey	Austria National Bank	"prices in general"	Qualitative, Quantitative	1,000	Bulgaria, Croatia, Poland, Romania, Czech Republic, Hungary, Albania, Bosnia and Herzegovina, North Macedonia, Serbia	Annually	2007	Repeated cross-section
The Opinion Survey on the General Public's Views and Behaviours	Bank of Japan	"price levels"	Qualitative, Quantitative	4,000	Japan	Quarterly	1993	Repeated cross-section
Tara-ā-Whare Household Expectations Survey	Reserve Bank of New Zealand	"the annual rate of inflation"	Qualitative, Quantitative	1,000	New Zealand	Quarterly	1995	Repeated cross-section

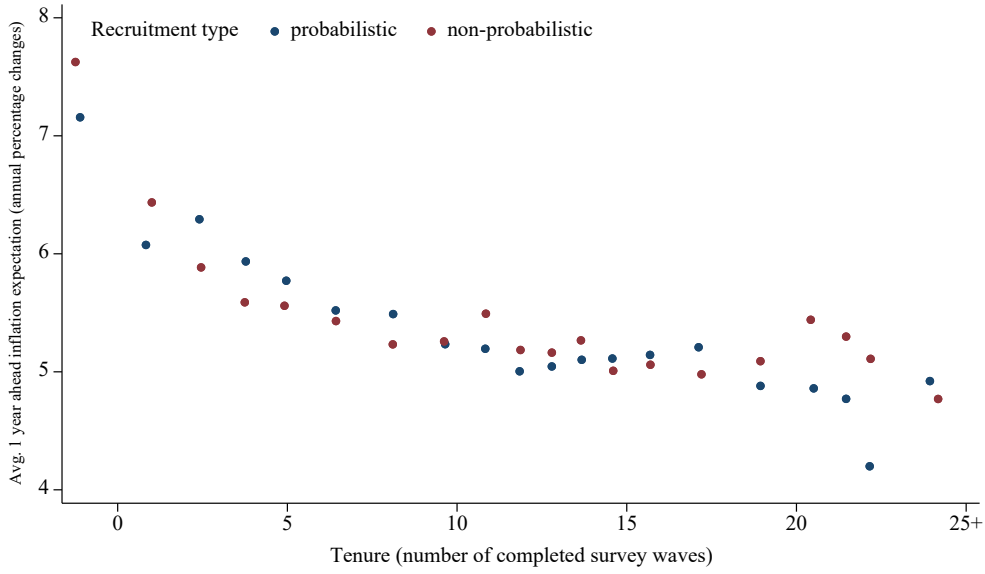
Note: Data collected as of December 2023. The overview only includes surveys run by central banks. It does not include surveys which are designed by statistical institutes and administered or advertised by central banks.

Figure A1: A global surge in short-term inflation expectations



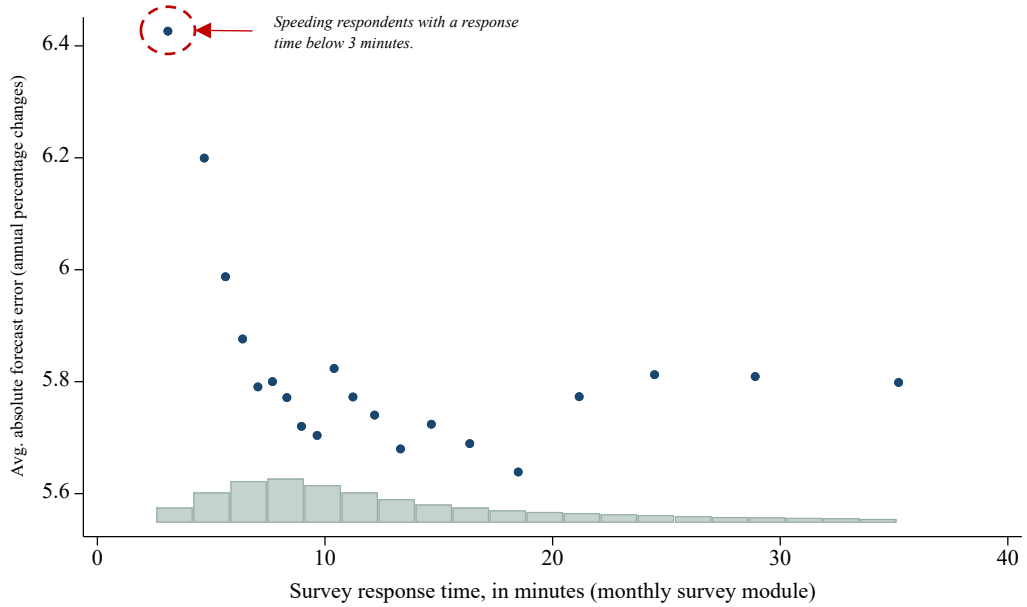
Source: ECB Consumer Expectations Survey (CES, EA-6), authors' calculations, latest data: December 2023.
Notes: The figure plots the median one-year ahead point forecasts elicited by the three expectations surveys and as reported on the webpage of each of the three central banks. The Inflation Attitudes Survey by the Bank of England runs at a quarterly frequency, while the ECB and NY-FED surveys are run every month.

Figure A2: The level of inflation expectations (one-year ahead) and survey tenure



Source: ECB Consumer Expectations Survey (CES, DE, ES, FR, IT), authors' calculations.
Notes: Pooled April 2020 to December 2023 data. The figure plots, for the four countries which feature both probabilistically (respondents recruited via random digit dialling) and non-probabilistically (via access panels) recruited respondents, average one-year ahead inflation expectations (y-axis) against twenty quantiles survey tenure (censored at 25) of the monthly module (x-axis). Survey tenure is calculated as the total number of completed survey waves, including any non-consecutive participation. Averages and quantiles are computed net of country and wave-specific differences to account for any changes in the questionnaire or remaining country-specific differences, which explains the negative x-axis range.

Figure A3: Absolute forecast error in inflation expectations (one-year ahead) and survey response time



Source: ECB Consumer Expectations Survey (CES, EA-11), authors' calculations.
Notes: Pooled April 2020 to December 2023 data. The figure plots the average absolute forecast error of consumers one-year ahead inflation expectations (y-axis) against twenty quantiles of the survey response time (in minutes) of the monthly module (x-axis). The forecast error is computed as euro area HICP (t+12) – expected inflation (t). The histogram on the x-axis depicts the associated distribution of the response time to the monthly module in the survey. Averages and quantiles are computed net of wave-specific differences. Para data on survey response times is part of the experimental data and not part of the regular survey data. The sample used includes from April 2022 onwards, also data from five new countries included in the survey: Austria, Finland, Greece, Ireland, and Portugal.