Attention to the Macroeconomy*

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Abstract

We collect novel measures of households' and firms' attention to the economy based on open-ended survey questions, fielded during a large shock to inflation. We provide three sets of stylized facts. First, we characterize the cross-sectional and time variation in attention. Attention to the macroeconomy exhibits large and persistent cross-sectional heterogeneity, responds strongly to changes in the economic environment, and is negatively correlated with attention to household- or firm-level topics. Second, we explore the link between attention and expectation formation. More attentive respondents are more likely to adjust inflation expectations during the shock, have higher confidence in their beliefs, and hold smaller misperceptions about realized inflation, yet their expectations about future inflation deviate more strongly from professional forecasts. Third, we study experiences as a potential driver of attention. Consistent with similarity-based recall, individuals with past experiences of adverse inflation outcomes pay more attention to inflation in response to the shock.

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1 Introduction

Attention is a key determinant of belief formation and decision-making (Bordalo, Gennaioli and Shleifer, 2020, 2022). In macroeconomic contexts, how much attention agents pay to aggregate developments in general and how much attention is allocated to specific variables – e.g., inflation, monetary policy, or GDP growth – should be central to agents' expectation formation and thereby affect business cycle fluctuations and the transmission of policies (Mackowiak and Wiederholt, 2009; Paciello and Wiederholt, 2014; Reis, 2006a). However, the empirical properties of attention to the economy – how it varies across economic agents and over time, its allocation across different aspects of the economy, and its association with agents' beliefs – are not well understood. One potential reason is that there exist limited direct individual-level data on attention allocation. Perhaps because of this lack of empirical guidance, canonical macroeconomic theories differ in their assumptions both on how attention is allocated and on its relation to economic expectations.

In this paper, we introduce new data on households' and firms' attention to the economy, with the goal of providing guidance for future theoretical work. A key challenge in the design of attention measures is to accommodate the varying notions of attention present in macroeconomic models. According to some theories, agents might pay limited attention to information that is publicly available (Kohlhas and Walther, 2021; Maćkowiak, Matějka and Wiederholt, 2023; Sims, 2003), while in other models agents pay selective attention to information that is stored in their memory (Gennaioli and Shleifer, 2010; Khaw, Stevens and Woodford, 2017; Woodford, 2009).

Our measure of attention aims to capture these varying notions from the theoretical literature. We rely on open-ended text responses to a prompt that puts survey respondents into the mindset relevant for their economic decision-making. Specifically, we ask respondents what comes to their mind when thinking about their own economic situation. Our measures of attention are then constructed as dummy variables indicating whether a respondent refers to a specific topic – such as inflation, monetary policy, or household- or firm-level economic topics. Compared to a more structured question format, the key advantage of this open-ended measure is that it provides a snapshot of respondents' spontaneous considerations, without changing participants' attention or restricting which topics are captured through the displayed response options. We validate our attention measure using measures of news consumption and Google Trends data.

We include these measures of attention in quarterly panel surveys of German households from a representative online panel and German firms participating in the ifo Business Survey. The surveys were conducted between December 2020 and March 2023, i.e., before and during a historic shock to inflation. Each wave comprises up to 5,000 households and up to 3,500 firms. Our datasets allow us to document a set of novel stylized facts on the empirical properties of attention and its link to economic expectations. We discuss to what extent different theories are

consistent with the patterns we uncover, and which facts they fail to explain. While our evidence is purely descriptive, it is based on naturally occurring variation in attention, large samples of households and firms, and a period with a changing economic environment. As such, our data allow us to paint a unique and comprehensive picture of agents' real-world attention allocation to different aspects of their economic situation, as well as its potential drivers and consequences.

We document three sets of results. In a first step, we characterize the cross-sectional and time variation of attention to different aspects of the economy. There is substantial variation in attention to macroeconomic topics both across and within the household and the firm samples. On average, firms are more attentive to aggregate developments than households. Moreover, attention to macroeconomic variables is strongly persistent at the individual level, with individual fixed effects accounting for approximately 41% and 33% of the total variation in attention to macroeconomic variables in the household and the firm sample, respectively. The fixed effects are highly correlated with proxies for information acquisition costs and for economic exposure to the variable of interest, consistent with attention being allocated according to its costs and benefits (Gabaix, 2014, 2019; Gabaix and Graeber, 2023; Maćkowiak et al., 2023).

During the recovery from the coronavirus recession and amidst a historic shock to inflation, both households and firms increase their attention to inflation. In December 2020 – when inflation was close to zero – only 3% of households and 5% of firms are attentive to inflation. By 2022, when annual inflation reached 10%, up to 38% of households and 43% of firms are attentive to inflation. These patterns are in line with models in which economic agents pay higher attention when the environment becomes more volatile (Gabaix, 2014; Maćkowiak and Wiederholt, 2015; Reis, 2006a,b; Sims, 2003). In addition, these patterns may reflect an increased media coverage of inflation, as in models where the news media selectively covers a subset of all economic topics and thereby independently shifts agents' attention (Chahrour, Nimark and Pitschner, 2021).

Turning to the joint dynamics of attention to different topics, we document that attention to aggregate variables is negatively correlated with attention to household- or firm-level variables. By contrast, attention is positively correlated across different aggregate variables. These relationships hold both in the cross-section and conditional on individual fixed effects. The empirical co-movement of attention to different topics is consistent with theories of costly information acquisition or processing, where attention to one topic can crowd out attention to another topic (Mackowiak and Wiederholt, 2009). Our findings suggest that this crowd-out occurs primarily between macroeconomic and local topics rather than between different aggregate variables. The patterns are less supportive of sticky information models, which posit that attention to different topics increases or decreases jointly (Mankiw and Reis, 2002; Reis, 2006a).

In a second step, we zoom in on inflation to examine the relationship between attention and belief formation. More attentive respondents are more likely to adjust their inflation expectations from one wave to the next – consistent with them being more likely to notice the rapidly changing

inflation outlook over our sample period. Attention is strongly positively associated with confidence in expectations, and more attentive respondents hold smaller misperceptions about realized inflation. These patterns on updating, confidence and misperceptions are consistent with the predictions of canonical models of information frictions (Mackowiak and Wiederholt, 2009; Reis, 2006a). However, the expectations of attentive households and firms deviate more strongly upward from professional forecasts than the expectations of inattentive agents. This suggests that higher attention is not necessarily associated with a convergence of beliefs to benchmarks, which is less supportive of these models. Potential explanations could be that agents rely on their own – potentially mis-specified – subjective models of the economy when interpreting information (Andrade, Crump, Eusepi and Moench, 2016; Andre, Pizzinelli, Roth and Wohlfart, 2022a; Andre, Schirmer and Wohlfart, 2024; Laudenbach, Weber, Weber and Wohlfart, 2024) or that agents retrieve specific experiences from their memory database when paying attention (Bordalo, Burro, Coffman, Gennaioli and Shleifer, 2023a).

Turning to expectation dispersion, attentive households disagree somewhat less about future inflation than inattentive households. In the firm sample, there is no clear relationship between attention and disagreement. Although the theoretical predictions for the link between attention and belief dispersion are less clear-cut (Angeletos and Pavan, 2007), in many macro models belief disagreement arises because agents pay less than full attention to the state of the economy (Maćkowiak et al., 2023; Mankiw, Reis and Wolfers, 2003). The patterns in our data suggest that – on top of inattention – other sources of heterogeneity in beliefs are important. These factors could include heterogeneity in the information agents acquire (Fuster, Perez-Truglia, Wiederholt and Zafar, 2022; Van Nieuwerburgh and Veldkamp, 2009) or retrieve from their memory when increasing their attention to a given topic (Bordalo et al., 2023a), or disagreement about structural relationships in the economy, leading to different processing of a given piece of information (Andrade et al., 2016; Andre et al., 2022a; Laudenbach et al., 2024).

In a third step, we study the role of experiences as a potential driver of attention to the macroeconomy. Here, we focus on households, as we elicited rich measures of their inflation experiences in the pre-shock period. Theories of associative memory posit that "what comes to mind" reflects (i) the experiences in an individual's memory database and (ii) the context, which triggers the retrieval of specific experiences through similarity-based recall (Bordalo et al., 2023a; Bordalo, Conlon, Gennaioli, Kwon and Shleifer, 2023c). We test the predictions of these models using both across-cohort and within-cohort variation in inflation experiences.

Respondents who have experienced adverse inflation outcomes in the past pay more attention to inflation. This is consistent with experiences in the memory database being an important driver of attention allocation. Moreover, the relationship between experiences and attention becomes stronger during the inflation shock – i.e., as the context becomes more similar to the relevant experiences in the memory database – consistent with similarity-based recall. The stronger increase in attention over the course of the shock among households with adverse inflation

experiences is reflected in a stronger updating of inflation expectations, pushing expectations further away from professional forecasts. Thus, similarity-based recall offers an explanation for our earlier finding that higher attention is not associated with a convergence of expectations to the benchmark of professional forecasts.

Our findings suggest that, when inflation increases, households may retrieve past experiences of high inflation and be more attentive to this information stored in their memory database. Agents with such experiences consequently revise their expectations upward. Thus, similarity-based recall seems to contribute to extrapolative belief formation in the context of inflation, consistent with recent evidence on stock return expectations (Jiang, Liu, Peng and Yan, 2023). We provide evidence against several alternative explanations for the time-varying relationship of experiences with attention and expectations, such as differences in news consumption or differences in exposure to the current inflation shock. To confirm the external validity of our findings, we also provide evidence on how experiences are correlated with the updating of inflation expectations in response to the shock using data from the US Survey of Consumer Expectations.

We build on and contribute to a growing empirical literature studying attention to the economy. Some recent work has used experiments to shed light on the causal determinants of information acquisition, e.g., studying the role of perceived uncertainty (Mikosch, Roth, Sarferaz and Wohlfart, 2024) or perceived stake size (Fuster et al., 2022; Roth, Settele and Wohlfart, 2022).[1] While these studies offer clean causal evidence on specific micro mechanisms operating in models of inattention, they rely on stylized measures of attention such as the willingness to pay for a professional forecast. Our measure, based on a broad and neutral prompt and implemented in large-scale panel surveys, arguably offers a more direct description of agents' real-world attention allocation and allows studying its dynamics and co-movement with individuals' expectations over time.

Other papers have studied attention using observational data, constructing measures of attention from data on beliefs. For instance, Coibion and Gorodnichenko (2015) measure information rigidities among professional forecasters leveraging the predictability of ex-post forecast errors from ex-ante forecast revisions, uncovering increased inattention during the Great Moderation. Goldstein (2023) documents increases in attention after large shocks using the persistence of a forecaster's deviation from the mean forecast as a measure of inattention. Pfäuti (2024) uses data on professional forecasts to show that attention to inflation declined steadily during the Great Moderation. Similarly, Bracha and Tang (2022) document a positive relationship between attention and the level of inflation using the accuracy of consumers' perceptions of current economic conditions as a measure of attention. Unlike measures of attention computed from survey expectations, our measure based on a separate open-ended

[1] Capozza, Haaland, Roth and Wohlfart (2022) provide a review of the literature studying information acquisition.

question allows studying the relationship between attention and beliefs rather than assuming that the two are related in a particular way.

Closer to our approach, some studies rely on measures of agents' real-world attention allocation that are not constructed from belief data. Coibion, Gorodnichenko and Kumar (2018) show that firm managers who report tracking inflation exhibit smaller backcast and forecast errors regarding inflation. They also document that firm managers facing higher incentives to be attentive are more likely to track inflation. Korenok, Munro and Chen (2023) use data from Twitter and internet searches to show that attention to inflation increases once inflation exceeds certain thresholds. Song and Stern (2023) use text-based measures of attention constructed from 10-K filings of firms with the US Securities and Exchange Commission to document that firms' attention to the macroeconomy is countercyclical and to study the role of attention in the transmission of monetary policy. Flynn and Sastry (2023) follow a similar approach to show that higher firm attention is associated with smaller input-choice mistakes. Studies in finance have used logins as a measure of attention to financial accounts (Sicherman, Loewenstein, Seppi and Utkus, 2016). For example, Giglio, Maggiori, Stroebel and Utkus (2021) show that attention as proxied by a higher number of logins is associated with a stronger pass-through of households' beliefs to portfolio decisions. Compared to previous studies, our large-scale firm and household panels containing measures of both attention and expectations – collected during a drastically changing economic environment – allow us to document several new stylized facts, such as the co-movement of attention across topics, the deviation of attentive households' expectations from professional forecasts, or the association of experiences with attention to the economy.

Weber, Candia, Afrouzi, Ropele, Lluberas, Frache, Meyer, Kumar, Gorodnichenko, Georgarakos, Coibion and Kenny (2024) study macroeconomic attention based on an approach that is complementary to ours. Using information experiments in different countries and at different points in time, they show that agents respond less to exogenously provided information in high inflation contexts, consistent with higher attention and stronger priors about inflation. These findings align with the time variation of attention as measured in our open-ended data.

Finally, our paper is closely related to a literature that examines how economic beliefs are shaped by personal experiences (D'Acunto, Malmendier, Ospina and Weber, 2021; Goldfayn-Frank and Wohlfart, 2020; Laudenbach et al., 2024; Malmendier and Nagel, 2011; Malmendier, Nagel and Yan, 2021) and memory (Afrouzi, Kwon, Landier, Ma and Thesmar, 2023; Bordalo et al., 2023a; Bordalo, Conlon, Gennaioli, Kwon and Shleifer, 2023b; Bordalo et al., 2023c, 2020; Enke, Schwerter and Zimmermann, 2024; Graeber, Zimmermann and Roth, 2023; Hartzmark, Hirshman and Imas, 2021; Jiang et al., 2023; Salle, Gorodnichenko and Coibion, 2023). We build on the seminal work of Malmendier and Nagel (2016), who show that inflation experiences persistently affect households' inflation expectations. Our study highlights that experiences are also reflected in attention allocation, and that the link of attention and expectations with experiences varies with the economic environment. Our results point to an important role of

similarity-based recall in macroeconomic contexts.

2 Data

In this section, we describe the macroeconomic environment during our data collections, our samples, and our attention measure.

2.1 Macroeconomic environment

Our data collection took place between December 2020 and March 2023, covering the period just before and during a historic surge in inflation. The rise of inflation occurred in the aftermath of the Covid-19 pandemic amidst supply-chain disruptions and labor shortages as well as demand-side pressures from loose monetary policy and fiscal stimulus programs. As shown in Appendix Figure A.1, German CPI inflation was -0.3% at the start of our sample period. It started increasing in mid-2021 and accelerated further after Russia's invasion of Ukraine in early 2022, reaching levels of around 10% by the end of the year 2022 before reverting back. The figure highlights that the surge in inflation was unexpected by households, firms and also professional forecasters. In response to the increase in inflation, the European Central Bank (ECB) started raising interest rates from the zero lower bound in mid-2022, reaching a level of 3.5% in March 2023. While inflation rose, aggregate unemployment remained fairly stable at values between 5% and 6% from mid-2021.

2.2 Samples

Household panel We conducted quarterly surveys of German households between December 2020 and March 2023 in collaboration with the online panel provider Dynata, which is widely used in the social sciences (Haaland, Roth and Wohlfart, 2023). In each wave, we recontacted all respondents who participated in at least one of the previously conducted waves. We then supplemented the data collection with new respondents to obtain an overall sample size of approximately 5,000 respondents for each wave. From the March 2022 wave onward, the sample size was lower at around 2,500 respondents.[2] Panels A and B of Appendix Figure A.2 depict the composition of our sample by the wave a respondent entered the panel and by tenure. Attrition is typically highest between the first and the second waves of participation, and more limited thereafter. For instance, among respondents to wave 1, 51% participated in wave 2 and 49% participated in wave 3. Conditional on participating more than once, respondents participated on average 4.6 times.

[2]We drop partial responses and duplicate responses to any given wave.

Table 1: Summary statistics

	GSOEP	Survey samples					
	(1) Mean	(2) Mean	(3) p25	(4) Median	(5) p75	(6) SD	(7) N
Panel A: Households							
Female	0.51	0.45	0.00	0.00	1.00	0.50	40,516
Age	51.19	52.53	40.00	50.00	60.00	13.85	40,516
East	0.17	0.17	0.00	0.00	0.00	0.38	40,516
Log(HH net income)	7.96	7.78	7.60	8.01	8.36	0.69	40,516
At least highschool	0.39	0.50	0.00	1.00	1.00	0.50	40,516
Employed	0.64	0.59	0.00	1.00	1.00	0.49	38,421
Homeowner	0.49	0.47	0.00	0.00	1.00	0.50	38,092
Stockowner	0.26	0.42	0.00	0.00	1.00	0.49	38,092
Panel B: Firms							
Employees		1241.38	14.00	40.00	123.00	96037.48	32,541
Export share		0.14	0.00	0.01	0.20	0.23	19,957
Manufacturing firm		0.29	0.00	0.00	1.00	0.45	32,612
Services firm		0.41	0.00	0.00	1.00	0.49	32,612
Construction firm		0.08	0.00	0.00	0.00	0.27	32,612
Retail/wholesale firm		0.22	0.00	0.00	0.00	0.41	32,612
High influence on decisions in firm		0.78	1.00	1.00	1.00	0.42	20,417

Notes: This table provides summary statistics for the household sample (Panel A) and the firm sample (Panel B). Column 1 shows population benchmarks from the 2020 wave of the German Socioeconomic Panel, which is representative of the German population. Column 7 indicates for how many observations in our panel dataset a particular variable is available, counting repeat respondents multiple times.

Panel A of Table 1 shows summary statistics of our household sample pooled across all survey waves and a comparison with benchmarks from the 2020 wave of the German Socioeconomic Panel (GSOEP), a representative household survey. Our sample is roughly representative of the population in terms of gender, age, region, and total household income. The main difference of our sample to the population is a higher average educational attainment, a common feature in online surveys (Haaland et al., 2023).

Firm panel In parallel to the household surveys, we conducted surveys containing mostly identical questions with firms participating in the ifo Business Survey (IBS), a long-standing monthly survey of a large and representative panel of German firms.[3] Respondents to the online portion of the regular IBS received a separate link to our survey module in the invitation email to the regular IBS of the last month in each quarter. Roughly half of the invited participants responded to our survey module, resulting in an overall sample size of approximately 3,000

[3]The IBS provides the basis for the ifo Business Climate Index, the most recognized leading indicator of the German business cycle. See Sauer, Schasching and Wohlrabe (2023) for details on the IBS. The IBS micro data have been used extensively in previous research in economics (e.g., Bachmann, Carstensen, Lautenbacher and Schneider, 2024; Bachmann, Elstner and Sims, 2013; Bachmann, Born, Elstner and Grimme, 2019; Buchheim, Dovern, Krolage and Link, 2022; Enders, Hünnekes and Müller, 2019).

firms per wave at the start of our sample period. This number increased to around 3,500 by the end of the period. Panels C and D of Appendix Figure A.2 display the composition of the firm samples for each wave by the first wave a firm participated and by tenure in the panel. Attrition rates are lower than in the household survey. For instance, of those who responded to wave 1 of the firm survey, 73.2% also participated in wave 2 and 72.8% participated in wave 3. Conditional on participating more than once, respondents participated on average 7.0 times.

Panel B of Table 1 shows summary statistics for the firms who completed our survey. 29% of the firms operate in the manufacturing sector, 41% in services industries, 8% in construction, and 22% are retailers or wholesalers. The median number of employees is 40 and the average share of exports in the firms' revenue is 14%. In wave 3, we asked respondents about their influence on the firm's decisions regarding investment, production, personnel, and price setting. 78% of managers report to have "very high influence" on decisions in at least one of these areas. This is in line with Sauer et al. (2023), who document that the vast majority of respondents to the regular IBS are in an upper management position, such as owner, CEO, or department head.

2.3 Measuring attention

Measurement There are at least two challenges in designing an attention measure. First, different macroeconomic theories imply different notions of attention. Some theories posit that agents might pay limited attention to information that is in principle publicly available (Mackowiak and Wiederholt, 2009; Mankiw and Reis, 2002; Sims, 2003). Other theories have a broader notion of attention, where agents might also pay limited attention to information that is in principle available in their memory (Bordalo et al., 2023a; Gennaioli and Shleifer, 2010; Khaw et al., 2017; Da Silveira, Sung and Woodford, 2020; Sung, 2024; Woodford, 2009). A key challenge for our exercise is to measure attention in a way that is flexible enough to accommodate these different theoretical notions. Second, the measurement itself should ideally not change agents' attention allocation. For instance, the measurement should not prime individuals on a specific topic – say, inflation – and thereby draw respondents' attention to inflation-related information stored in their memory.

We designed our measure of attention with the goal of overcoming these two challenges. We rely on an open-ended question format that allows survey participants to provide written responses – a method that has recently become more commonly used to measure individuals' thoughts and reasoning in economic contexts (Andre et al., 2022a; Andre, Haaland, Roth and Wohlfart, 2022b; Andre et al., 2024; Bursztyn, Egorov, Haaland, Rao and Roth, 2023; Stantcheva, 2021). To elicit attention allocation to *economic* topics, we require a prompt that puts survey respondents into the mindset relevant for their economic decision-making. Specifically, we ask our respondents the following question:

What topics come to mind when you think about the economic situation of your

household/company?

Although this prompt may still influence respondents' attention allocation, it is broad, relatively neutral, and avoids priming on specific macroeconomic or household-/firm-level economic topics. The written text responses to this question provide a unique snapshot of the topics that are on top of respondents' minds when they think about their economic situation. Depending on respondents' attention allocation, we would expect them to think of either aggregate or more household- or firm-specific economic topics when confronted with this prompt. Compared to a more structured question format, our open-ended elicitation does not influence or restrict participants' responses through the displayed response options. Overall, our open-ended elicitation format minimizes concerns that the measurement itself might change respondents' attention.

What comes to respondents' minds when they think about their economic situation could reflect information they recently received from the external world but also more distant experiences retrieved from their memory. As such, our measure should be flexible enough to accommodate various notions of attention from the theoretical literature.

We count a survey response as being attentive to a specific topic if that topic is mentioned in the open-ended question. While responses are classified as attentive or inattentive to a given issue, it is important to keep in mind that the measures contain noise, e.g., due to differences in the interpretation of the prompt or in the extent to which a respondent is explicit about the topics that are on top of mind. Moreover, respondents may only write about the issues they pay most attention to while neglecting other issues they are partially attentive to. Thus, while there is likely a *difference in the average level of attention* between responses being classified as attentive or inattentive according to our measure, it would be misleading to interpret this as *full attention* and *complete inattention*.

The surveys contain several other questions, which we introduce throughout the paper when discussing the exercises that make use of them. Appendix D provides instructions of the key survey questions in German and translated to English.

Coding scheme To quantitatively analyze the unstructured text data, we devise a coding scheme that contains codes for a range of macroeconomic and household- or firm-level topics. Each response can be assigned multiple codes. Table 2 provides an overview of the main factors in our coding scheme along with example responses, while Appendix C provides the complete list of codes for macroeconomic, household-level, and firm-level topics along with the explanations contained in our original coding manual. Our main codes of interest capture mentions of four macroeconomic topics: the Covid-19 pandemic, inflation, interest rates or monetary policy, and economic growth. We also define variables that aggregate all macroeconomic or all household- or firm-level codes contained in our scheme ("Any macro topic", "Any household-level topic" and "Any firm-level topic", respectively).

We instruct several research assistants to apply the coding scheme to the open-text responses. All coders are Bachelor or Master students in economics. 92.1% of the open-text responses from the household survey and 99.4% of the responses from the firm survey can be assigned at least one code from our scheme. For a subset of the data (1,896 responses from waves 3 to 6 of the household survey and 1,541 responses from waves 1 to 5 of the firm survey), two research assistants code the responses independently of each other, and conflicts are resolved through discussion between the reviewers. We detect a high inter-rater reliability: when one coder assigned a given code to a household's response, there is a 77.7% chance that the other coder does so too. The corresponding number is 79.5% for the firm survey. The inter-rater reliability increases to 91.3% for households and to 87.9% for firms when calculating it based on the subset of topics that most of our analysis focuses on, namely Covid-19, inflation, monetary policy, and economic growth.

To check the quality of our coding scheme, we conduct two additional exercises. First, Appendix Table A.1 shows for the case of inflation that our hand-coded data are strongly positively correlated with simple counts of inflation-related words, both in the pooled sample and within each survey wave. Second, we use an AI-based approach to code a subset of the responses from the March 2023 wave of the household survey.[4] Appendix Figure A.3 compares the distribution across topics as hand-coded based on our coding scheme with the topic distribution as coded using artificial intelligence methods, while Appendix Table A.2 displays cross-sectional correlations between hand-coded and AI-coded measures for key topics. Both exercises demonstrate a high degree of overlap between the two coding methods. Overall, these patterns corroborate the reliability and validity of our coding scheme.

Validation 1: News consumption To validate our measure of attention constructed from the open-ended data, we correlate it with structured measures of news consumption that are included in some of our survey waves. First, referring to inflation in the open-ended data is strongly positively correlated with the number of reports on inflation a respondent states to have read in the news, seen on TV, or heard on the radio over the last three months, both among households and among firms (Appendix Figure A.4 Panels A and C). Second, it is strongly positively associated with the number of minutes a household or firm manager reports to have spent consuming news about inflation over the last week (Figure A.4 Panels B and D). These patterns validate the open-ended data and motivate its use to study predictions of macroeconomic models in which attention and information acquisition are closely linked (Gabaix, 2014; Maćkowiak et

[4]The AI-coding is generated using Scikit-LLM's zero-shot multi-label classifier with GPT-4 as the underlying AI-model (Pedregosa, Varoquaux, Gramfort, Michel, Thirion, Grisel, Blondel, Prettenhofer, Weiss, Dubourg et al., 2011). The classified data is a random subsample ($n = 200$) from the survey wave in March 2023. The codes are reformulated into whole sentences, as recommended by the Scikit-LLM guidelines, using exclusively information provided in the coding scheme handed to the research assistants who initially hand-coded the survey responses. The codes assigned by the multi-label classifier (per default, no more than ten per response) are then compared to the codes assigned in the hand-coding.

Table 2: Coding scheme and example responses for the open-ended data

Category	Explanation	Examples
Any macro	Covid-19, inflation, monetary policy, growth, labor market, stock market, housing market, fiscal policy, regulation, structural transformation, trade, pension system, health system, education system, inequality, migration, environment/climate change, uncertainty, other macro topics.	"Taxes"; "The labor market"; "Politics is increasingly burdening me through levies and taxes, and through regulations on the industry, which in the end also affect me again through rising consumer prices"; "The war in Ukraine and the inflation."; "Debt crisis, financial crisis, economic upswing."; "I am afraid of the effects of the war."; "Firstly, climate change and, as a result of it, the energy crisis, which of course is also extremely intensified due to the war in Ukraine. And of course, like everyone else, we are also affected by inflation."
Covid-19	Covid, corona, pandemic, lockdown.	"Due to Corona, I have been on short-time work for a year already. Therefore, my financial situation doesn't look too rosy. The government urgently needs to take action here."; "Tense due to Covid-19"; "Income has been halved since Corona"
Inflation	Inflation, rising prices, price level, price increase, purchasing power, gas prices, electricity prices.	"Rising food prices"; "Difficult times and skyrocketing prices"; "Inflation rate and the monetary value of one's own savings"; "Currently the very high inflation rate"; "Price increase in food, higher energy costs, saving not possible"; "Electricity has become very expensive."
Monetary policy	Interest rates, monetary policy, central bank, ECB, negative interest rate.	"Interest rates and investment"; "Low interest rates"; "No interest on assets, uncertainty in stock investment."; "Pension adjustments, interest rates, DAX."; "That credit interest rates are becoming increasingly expensive and prices are rising. Hopefully, there will be a salary increase soon."
Growth	Economic growth, GDP, general economic situation, aggregate economy, business cycle, upswing, downturn, insolvencies, company bankruptcies, aggregate demand, overall industrial production, economic crisis, recession.	"Recession, Economic Crisis"; "The faltering economy and rising inflation"; "One economic crisis after another is eroding my retirement savings, so that I will soon become a welfare case."; "The economic situation in Germany is stable, in my eyes."; "Economic crisis. High prices for food and energy."
Any household-level	Overall household situation, spending, income, job situation, saving, financial assets, housing costs, debt, health issues, insurance, uncertainty, other household-level topics.	"Concern about job loss in the future."; "We are doing well. No debt. A vacation is possible."; "Relatively secure, due to fixed income from pension"; "old-age poverty"; "I'm just barely making ends meet with my money."; "The economic situation is bad, with only one earner with a low pension among two adults."; "We are getting along well and don't have to cut back. In addition to everyday expenses, there is also enough money left over for vacation and leisure activities."
Any firm-level	Overall firm situation, costs, supply chain, demand, labor input, profits/profitability, liquidity/solvency, process organization, government aid programs, R&D, regulation, financing, short-time work, capacity utilization, rent/housing costs, uncertainty, other firm-level topics.	"Automation + process optimization"; "Sustainability, innovation, product life cycles"; "increasing material and energy costs, personnel costs, parts supply"; "Liquidity bottlenecks, difficult storage, dissatisfaction with the banks"; "How do I get specialized staff, especially mathematicians and computer scientists?"; "There is hardly any suitable skilled personnel, investment backlog and tough competition"; "Investment in digitization and expansion of our product portfolio."

Notes: This table provides an overview of the main topics in our coding scheme, an explanation for each code, and example extracts from open-text responses (translated into English). All example responses – except for the firm-level categories – draw on the household survey. For the codes "Covid-19", "Inflation", "Monetary policy", and "Growth", the explanations correspond to the instructions in the coding manual handed out to research assistants. For "Any macro", "Any household-level", and "Any firm-level", the explanations include all codes in the coding scheme that are subsumed under these aggregate categories. The complete coding scheme handed out to research assistants can be found in Appendix C.

al., 2023; Reis, 2006a).

Validation 2: Structured attention measure We provide another validation using an additional data collection with a sample of German households. The survey was conducted in September 2023 on the platform Prolific, which is widely used in the social sciences (Peer, Rothschild, Gordon, Evernden and Damer, 2021). Out of the 502 respondents who completed our survey, 34 fail to pass a simple screener question and are dropped from the sample.

Participants first respond to our main open-ended question on attention allocation. On the next survey screen, they are again asked which topics come to their mind when thinking about the economic situation of their household. However, instead of writing their response into an open-text box, they are asked to select all relevant topics from a list presented to them, where the order of the topics is randomized. Compared to the open-ended elicitation, the alternative structured elicitation mitigates the concern that respondents may be hesitant or unable to write down their thoughts. At the same time, the structured elicitation mechanically changes attention by exposing respondents to cues in the form of the included response options. Appendix E provides the instructions in German and translated to English.

As shown in Appendix Figure A.5, the baseline fractions of respondents indicating attention to different aggregate and household-level topics are higher in the structured measure across all topics, which is a common finding when comparing structured and open-ended elicitations (see, e.g., Andre et al., 2022a). This pattern may indicate a lower effort cost of indicating that a particular topic matters, as well as mechanical increases in attention driven by the displayed response options. However, given these baseline differences, the variation of attention across topics appears very similar in both elicitation modes. Across respondents, attention as measured in the open-ended question is highly correlated with attention as measured in the structured question for the key topics used in the analysis below (Appendix Table A.3).

Validation 3: Google Trends data As a final validation, we compare the evolution of our survey measure of attention to different macro variables with the evolution of Google searches measured in Google Trends data – a commonly used measure of attention in the social sciences (Choi and Varian, 2012; Fetzer, Hensel, Hermle and Roth, 2021). We focus on attention to inflation, growth, and monetary policy. We do not include Covid-19, as Google searchers about this topic are likely primarily driven by health concerns rather than economic motives. Appendix Figure A.6 shows that the evolution of Google searches over our sample period and the distribution of searches across the different topics closely resemble the patterns for our survey measures of attention.

Survey participation and attention After the initial question on attention allocation, each survey wave includes several questions on macroeconomic issues. Re-contacted respondents

may recall the topic of our survey and therefore express more thoughts about macroeconomic topics in the question on attention allocation. To check whether this is the case, we regress dummy variables indicating whether a respondent pays attention to a given topic on a dummy variable indicating whether the response is from a recontacted participant, time fixed effects and individual fixed effects. As shown in Appendix Table A.4, repeated participation in our panel is not associated with a systematic increase in attention to macroeconomic topics, neither in the household nor in the firm panel.

3 Attention to the macroeconomy: Descriptive facts

In this section, we present our main evidence on attention to the macroeconomy. First, we describe the cross-sectional and time variation in attention. Second, we provide evidence on the link between attention and beliefs. Third, we study the role of experiences as a potential driver of attention and beliefs.

3.1 Cross-sectional and time-variation in attention

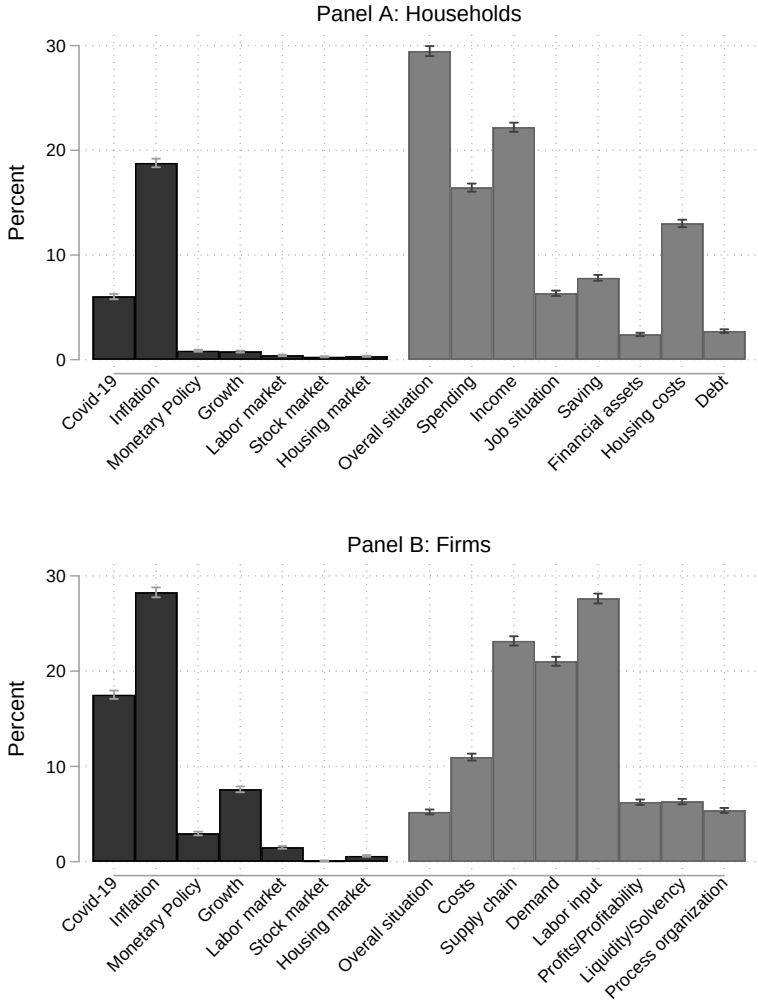
Attention allocation across topics and groups of agents We start by describing how households' and firms' attention varies across different topics, pooling all our survey waves. 75% of households pay attention to at least one household-level topic, while 28% are attentive to at least one macroeconomic topic. Panel A of Figure 1 shows that inflation is the macroeconomic topic that is most frequently attended to by households (19%), followed by Covid-19 (6%). Households' attention to growth and monetary policy is very low at 1%. Within household-level topics, the household's general economic situation (30%), income (22%), consumption/spending (16%), and housing costs (13%) are most important.

Among firms, 80% mention at least one firm-specific topic. A similarly high fraction (67%) pay attention to at least one macroeconomic topic. Panel B of Figure 1 shows that, within macro topics, firms pay most attention to inflation (28%), followed by Covid-19 (17%), growth (8%), and monetary policy (3%). The overall higher levels of attention to macroeconomic topics among firms than among households are consistent with recent evidence on information frictions among the two sets of agents (Link, Peichl, Roth and Wohlfart, 2023). Within firm-specific topics, issues regarding labor input (28%), supply chains (23%), and demand for firms' own product/service (21%) are the most frequently mentioned topics.

Variance decomposition How much of the overall variation in attention is explained by systematic changes over time and how much by persistent individual-level heterogeneity?[5] We

[5]We use the term "individual" interchangeably for both households and firms, abstracting from the fact that different waves of the firm survey can potentially be answered by different persons working at the same firm. In

Figure 1: Attention allocation across topics



Notes: This figure presents the distribution of attention to different macroeconomic topics (black) and household-/firm-level topics (grey) pooled across all waves from December 2020 to March 2023. The bars indicate the fractions of respondents paying attention to a given topic. The measure of attention is based on people's responses to our main open-ended question: *"What topics come to mind when you think about the economic situation of your company/household?"* Panel A shows results for households. Panel B displays results for firms.

shed light on this issue by decomposing the panel variation of attention into three components: fixed individual characteristics, common variation over time, and a residual that captures idiosyncratic time variation at the individual level. To do this, we regress our main measures of attention on (i) individual fixed effects only, (ii) time fixed effects only, and (iii) both sets of fixed effects jointly, and compare the R-squared of these regressions (see Giglio et al. (2021) for such a decomposition in the context of stock return expectations). We focus on dummy variables indicating attention to a set of macroeconomic topics as well as dummy variables for paying attention to at least one macroeconomic or to at least one household- or firm-level topic, respectively.

practice, however, the questionnaires are usually filled out by the same person and churn rates are very low, see Sauer et al. (2023) for details.

The results are shown in Table 3. Panel A is based on the samples of respondents that appear at least twice in our data, i.e., the largest possible samples for this exercise. Individual fixed effects are an important source of variation in attention in the household sample. Across topics, the individual fixed effects by themselves explain between 25% and 42% of the variation in attention (Column 1), while time fixed effects by themselves account for at most 10% of the variation in attention to a given topic (Column 2). Systematic time variation is most important for attention to inflation, where time fixed effects by themselves account for 10.1% of the overall variation. Including individual and time fixed effects together leaves between 55% and 72% of the variation in attention to a given topic unexplained (Column 3). This variation reflects idiosyncratic time variation at the household level. Similarly to the patterns for households, individual fixed effects are a central source of variation in attention in the firm sample (Column 5). The importance of time fixed effects is also similar among firms and households, the only difference being stronger systematic time variation in attention to Covid-19 (Column 6). Between 59% and 72% of the variation in attention is idiosyncratic firm-level variation (Column 7). Panels B and C restrict the samples to households or firms that appear at least four times or at least six times in our panels. The results of the variance decomposition are very similar in these restricted samples.

Sources of individual fixed effects in attention What respondent characteristics drive the strong individual persistence in the tendency to pay attention to particular topics? We regress the individual fixed effects (estimated by regressing attention jointly on time and individual fixed effects) on a set of respondent characteristics. The results for the household sample are shown in Appendix Table A.5. Households' self-reported exposure to movements in a given variable is positively related to how much attention they pay to this variable, in line with recent experimental evidence (Roth et al., 2022). Conversely, self-reported information acquisition costs are strongly negatively related to attention, in line with other studies (D'Acunto, Hoang, Paloviita and Weber, 2023; Mikosch et al., 2024). These patterns align with theories positing that attention is allocated endogenously depending on costs and benefits (Gabaix, 2014, 2019; Maćkowiak et al., 2023). Moreover, older and more educated respondents are more likely to pay attention to both macroeconomic and household-level topics, while the patterns by employment status and income are less systematic. Appendix Table A.6 shows the results for the firm sample. We find similar patterns for exposure as for households. Firm size is positively associated with attention to both macroeconomic and firm-level topics. Moreover, attention to inflation is more pronounced in the manufacturing sector than in the services and retail/wholesale sectors. In Section 3.3, we provide evidence on the long-lasting effects of prior experiences as another potential source of persistent differences in attention across individuals.

Table 3: Variance decomposition of attention allocation

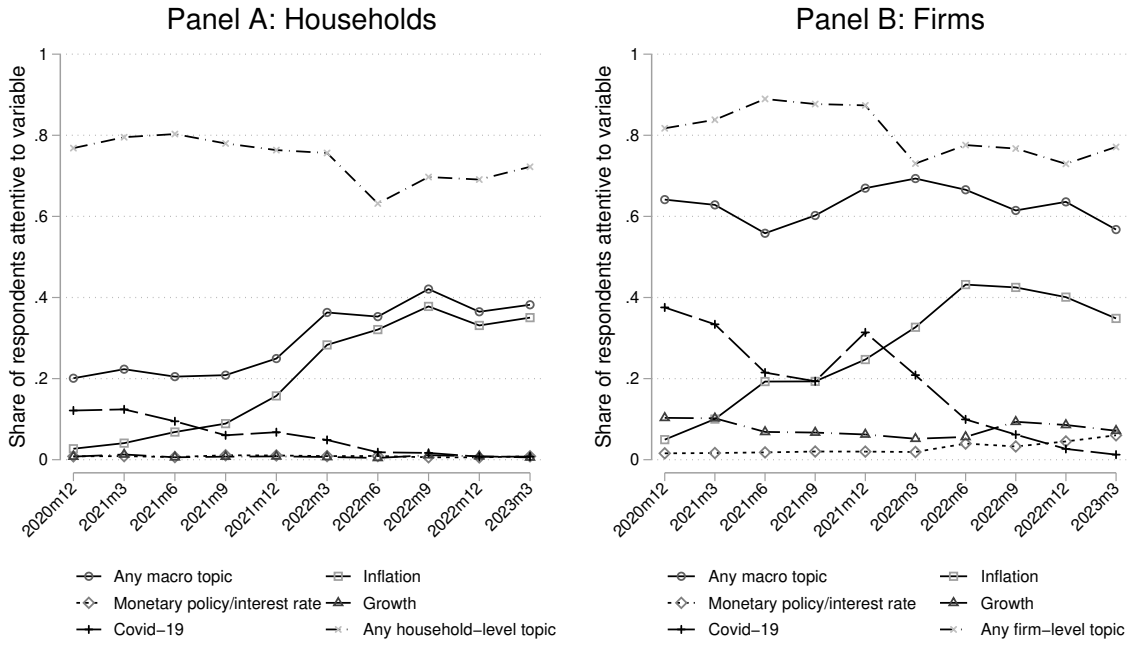
	Households R^2 (%) of panel regression				Firms R^2 (%) of panel regression			
	(1) Indiv. FE	(2) Time FE	(3) Time FE + Indiv. FE	(4) Obs.	(5) Indiv. FE	(6) Time FE	(7) Time FE + Indiv. FE	(8) Obs.
Panel A: At least two non-missing observations								
Any macro topic	41.1	3.2	43.3	31,348	33.0	0.7	33.7	27,554
Inflation	38.1	10.1	44.9	31,348	31.8	8.0	38.7	27,554
Monetary policy	27.9	0.0	28.0	31,348	34.3	0.7	35.0	27,554
Growth	25.2	0.1	25.3	31,348	27.4	0.5	27.8	27,554
Covid-19	37.9	2.7	39.6	31,348	32.2	10.5	41.1	27,554
Any household-/firm-level topic	42.3	1.4	43.3	31,348	32.2	2.0	33.7	27,554
Panel B: At least four non-missing observations								
Any macro topic	37.1	3.3	39.7	24,076	30.3	0.8	31.0	23,839
Inflation	34.0	9.8	41.6	24,076	29.0	8.2	36.5	23,839
Monetary policy	24.2	0.1	24.3	24,076	31.7	0.6	32.4	23,839
Growth	20.3	0.1	20.4	24,076	24.1	0.5	24.5	23,839
Covid-19	31.2	2.7	33.2	24,076	28.8	10.4	38.4	23,839
Any household-/firm-level topic	37.4	1.5	38.6	24,076	28.6	2.0	30.1	23,839
Panel C: At least six non-missing observations								
Any macro topic	34.6	3.6	37.8	15,303	28.6	0.8	29.4	19,086
Inflation	30.9	9.9	39.7	15,303	26.6	8.9	35.0	19,086
Monetary policy	21.6	0.1	21.7	15,303	30.7	0.7	31.4	19,086
Growth	16.2	0.1	16.3	15,303	21.1	0.5	21.5	19,086
Covid-19	27.6	2.9	30.1	15,303	27.0	10.5	37.1	19,086
Any household-/firm-level topic	34.4	1.5	35.8	15,303	26.4	1.9	28.1	19,086

Notes: This table displays the R-squared from regressing dummies for mentioning different topics in the response to the open-ended question on individual fixed effects (Columns 1 and 5), time fixed effects (Columns 2 and 6), and both time and individual fixed effects (Columns 3 and 7). Columns 4 and 8 display the number of observations. For each variable, only respondents with at least two (Panel A), four (Panel B), and six non-missing observations (Panel C) for the corresponding variable are included, respectively.

Attention allocation over time We next turn to how attention to various variables systematically evolves over time. According to Panel A of Figure 2, households' attention to Covid-19 decreases steadily throughout the sample period. Meanwhile, the fraction of households paying attention to inflation rises from close to 0% in December 2020 to 38% in September 2022, and then remains at this elevated level. Panel B of Figure 2 shows broadly similar changes in attention over time for firms and households: while attention to Covid-19 declines, there is a steady increase in attention to inflation from close to 0% in December 2020 to a maximum of 43% in June 2022. Subsequently, attention to inflation slightly declines until the end of the sample period. Monetary policy receives little attention from both firms and households throughout the sample period.

These changes in attention mirror the business cycle movements in Germany over our sample period: while the economy recovered from the coronavirus recession, it experienced increasing inflationary pressures starting in mid-2021, which were aggravated by Russia's invasion of Ukraine in February 2022 and the associated energy shortages. The increase in attention to inflation amidst increasing inflationary pressures is in line with models in which attention and information acquisition endogenously respond to changes in the economic environment.

Figure 2: Attention to different topics over time



Notes: This figure displays the evolution of the fractions of respondents that raise different topics in the open-ended survey question among households (Panel A) and firms (Panel B) across survey waves. The "Any macro topic" and "Any household-/firm-level topic" summarize all household-/firm-level topics and all topics related to the macroeconomy, respectively. The remaining lines refer to specific macroeconomic topics, i.e., inflation, monetary policy/interest rates, growth, and Covid-19.

In particular, these models predict that agents become more attentive when the environment becomes more volatile (Gabaix, 2014; Maćkowiak and Wiederholt, 2015; Reis, 2006a,b; Sims, 2003). In addition, the increase in attention to inflation could reflect increased media coverage of inflation over our sample period, as in models where the news media selectively covers a subset of all economic topics and thereby independently shifts agents' attention (Chahrour et al., 2021). Remarkably, the ECB's sharp rate hikes from 0% to 3.5% were not associated with strong increases in households' or firms' attention to monetary policy.

Co-movement of attention We next address the question of how attention to different variables co-moves. On the one hand, in sticky information models, agents face an exogenous probability of acquiring full information (Mankiw and Reis, 2002) or endogenously decide when to acquire full information (Reis, 2006a). This implies a positive co-movement of attention to different variables. On the other hand, according to theories featuring limited cognitive resources, acquiring more information about a given topic may reduce the available capacity to acquire and process other pieces of information (Gabaix, 2014). For instance, some theories predict attentional crowd-out between aggregate and local (sector-specific) information (Mackowiak and Wiederholt, 2009).

To shed light on the empirical co-movement of attention to different variables, we estimate specifications of the following type:

$$\text{Attention topic A}_{it} = \beta_0 + \beta_1 \text{Attention topic B}_{it} + X_{it}'\Pi + \phi_t + \varepsilon_{it}, \quad (1)$$

where the attention variables indicate whether a respondent mentions topic A or B when responding to the open-ended question, respectively. X_{it} includes a set of basic controls, which in some specifications is replaced by individual fixed effects.[6] In addition, all specifications include survey wave fixed effects, ϕ_t. Throughout the paper, standard errors are clustered at the respondent level.

Panel A of Table 4 shows the results for the household sample. Attention to inflation and attention to monetary policy are strongly positively associated with each other. Specifically, being attentive to monetary policy or interest rates increases the likelihood of being attentive to inflation by 30.1 p.p. according to our pooled OLS estimates (Column 3, $p < 0.01$) and by 13.0 p.p. conditional on individual fixed effects (Column 4, $p < 0.01$). Attention to economic growth is weakly positively related to attention to inflation or monetary policy (Columns 1, 2, 5, and 6). Lastly, attention to macroeconomic topics and attention to household-level topics are strongly negatively associated with one another, with attention to household-level topics reducing attention to aggregate topics by 19.1 p.p. and 27.9 p.p. according to pooled OLS and individual fixed effects estimates, respectively (Columns 7 and 8, $p < 0.01$). Panel B of Table 4 shows broadly similar results for the firm sample. Appendix Figure A.7 provides pairwise correlation coefficients for attention to a broader set of macroeconomic and household- or firm-level topics.

Appendix Table A.7 shows that the negative relationships between attention to macroeconomic and attention to household-/firm-level topics are robust to excluding Covid-19 from the macroeconomic topics, suggesting that the patterns are not driven by the specific circumstances of the pandemic at the beginning of our sample period. Another concern is that the open-response format might mechanically produce negative relationships between attention to different topics, as respondents may only provide a response of a certain length. Given that attention is strongly *positively* correlated across some topics (e.g., inflation and monetary policy), this concern appears to be less severe. In addition, the length of responses could reflect limits to their actual "attention budget" rather than additional filtering introduced through the response format.

Our results on the co-movement of attention to different topics have important implications

[6] Specifically, we control for gender, age, education, employment status, income, homeownership, and stock ownership in the household sample, which are mostly elicited in the first wave a household participates in the panel. In the firm sample, we control for firms' number of employees (in logs) and export share, dummies for broad industry group, and a dummy taking value one if the respondent reports having "very high" influence on the firm's decisions regarding investment, production, personnel, or price setting, which is elicited in survey wave 3.

Table 4: Co-movement of attention to different topics

	Attention to inflation				Attention to monetary policy		Attention to any macro topic	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Households								
Attention to growth	0.146***	0.064**			0.013	0.012		
	(0.027)	(0.031)			(0.009)	(0.008)		
Attention to monetary policy			0.301***	0.130***				
			(0.030)	(0.031)				
Attention to any household-level topic							-0.191***	-0.279***
							(0.007)	(0.008)
Distinct respondents	10,758	7,126	10,758	7,126	10,758	7,126	10,758	7,126
Observations	34,980	31,348	34,980	31,348	34,980	31,348	34,980	31,348
R-squared	0.11	0.45	0.12	0.45	0.01	0.28	0.07	0.47
Panel B: Firms								
Attention to growth	0.030***	-0.004			0.029***	0.010**		
	(0.011)	(0.011)			(0.005)	(0.005)		
Attention to monetary policy			0.210***	0.112***				
			(0.019)	(0.020)				
Attention to any firm-level topic							-0.301***	-0.281***
							(0.007)	(0.008)
Distinct respondents	6,283	4,952	6,283	4,952	6,283	4,952	6,283	4,952
Observations	28,885	27,554	28,885	27,554	28,885	27,554	28,885	27,554
R-squared	0.10	0.39	0.11	0.39	0.02	0.35	0.07	0.37
Controls	Yes	No	Yes	No	Yes	No	Yes	No
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual/Firm FE	No	Yes	No	Yes	No	Yes	No	Yes

Notes: This table displays regressions of dummy variables indicating households' (Panel A) and firms' (Panel B) attention to a given topic – i.e., an indicator taking value one if the topic is mentioned in response to the open-ended survey question – on dummy variables indicating attention to another topic. Attention to macroeconomic topics in general (Columns 7 and 8) includes all macro topics. Attention to household-level or firm-level topics covers all local-level topics. Columns 1, 3, 5, and 7 control for the individual's gender, age, education, employment status, household income, homeownership, and stock ownership, and the respondent's influence on decisions in the firm, the firm's number of employees (in logs) and export share, as well as dummies for four broad industry groups, respectively. Columns 2, 4, 6 and 8 instead control for household and firm fixed effects, respectively, and thus drop singleton observations. All specifications control for survey wave fixed effects. Standard errors clustered at the household/firm level are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

for modeling. Our data are consistent with attentional crowd-out between different variables, as predicted by theories featuring costly acquisition and processing of information (e.g., Gabaix, 2014; Mackowiak and Wiederholt, 2009; Zorn, 2020). Our results suggest that this crowd-out does not occur across different macroeconomic variables. Instead, the positive correlation of attention across different aggregate topics, in particular between inflation and monetary policy, points to a role for attentional spillovers in this domain. Such spillovers could be driven by the fact that aggregate topics are often covered together in the news. By contrast, our results are consistent with attentional crowd-out between aggregate and local (household- or firm-level)

topics, in line with the assumption in Mackowiak and Wiederholt (2009). Our findings are less supportive of sticky information models (Mankiw and Reis, 2002; Reis, 2006a), in which agents acquire information about all topics jointly.

Summary Our first set of results can be summarized as follows:

Result 1.

(a) Households' and firms' attention varies strongly across topics, with attention being highest for household- and firm-level topics. Attention to macroeconomic topics is dominated by attention to Covid-19 and inflation.

(b) Among both households and firm managers, individual fixed effects are an important source of variation in attention allocation.

(c) Over the course of the recovery from the coronavirus recession and amidst increasing inflationary pressures, households and firms become less attentive to Covid-19 and more attentive to inflation.

(d) Attention to aggregate topics is negatively correlated with attention to household- and firm-level economic topics, while attention is positively correlated across different macroeconomic topics.

3.2 Attention and beliefs

In canonical models, attention to the macroeconomy affects economic outcomes mainly through its effects on economic agents' beliefs (Bordalo, Gennaioli and Shleifer, 2018; Maćkowiak and Wiederholt, 2015; Reis, 2006a). In this section, we document the empirical relationship between attention and households' as well as firms' expectations, and discuss the extent to which different theories can explain the observed patterns. We focus on inflation, for which there is a major shift in the environment and strong variation in attention over our sample period. Moreover, expected inflation is a key variable for both households and firms in canonical macro models. This exercise is purely correlational and should be interpreted as such. Nevertheless, we consider it a useful starting point to empirically understand the role of attention in macroeconomic expectation formation.

Belief data In each wave of our household and firm surveys, we elicit respondents' expectations about the inflation rate over the next 12 months, as well as their confidence in their inflation expectations on a five-point categorical scale. We winsorize inflation expectations at 30% to reduce the impact of outliers.[7] None of our findings are sensitive to the exact choice

[7] Our data contain no negative outliers for expected inflation.

of the cutoff or to whether we set to missing extreme observations instead. Median inflation expectations in our firm and household samples closely track median inflation expectations from representative firm and household surveys conducted by the Bundesbank (Appendix Figure A.8), which suggests that our expectations data are of high quality.

Cross-sectional correlations We start by analyzing differences in beliefs between attentive and inattentive households. In particular, we regress different aspects of respondents' beliefs about inflation on a dummy variable for being attentive to inflation as well as a set of control variables and time fixed effects.

Canonical theories of inattention, such as sticky information models (e.g., Mankiw and Reis, 2006) or noisy information models (e.g., Woodford, 2003), posit that more attentive agents adjust their expectations more quickly when signals change. During our sample period, which covers an unexpected surge in inflation, attentive households are indeed 2.1 p.p. more likely to change their expectations about 12-month-ahead inflation from one survey wave to the next by at least 0.5 p.p., compared to an overall fraction of 79% reporting such changes in beliefs (Table 5 Panel A Column 1, $p < 0.01$). Another prediction of these models is that higher attention is associated with reduced subjective uncertainty about future inflation. Consistent with this prediction, attentive household respondents are 0.17 standard deviations more confident in their expectations (Column 2, $p < 0.01$).

In workhorse models, more attentive agents' beliefs are better calibrated, i.e., their beliefs are closer to benchmarks. In the household survey, we elicit perceptions of realized inflation over the previous 12 months, i.e., the current inflation rate at the time of the survey. Attentive households, on average, exhibit 0.1 p.p. lower inflation perceptions over the combined pre-shock and shock period (Column 5, $p = 0.13$), resulting in a 0.5 p.p. smaller absolute misperception of realized inflation (Column 6, $p < 0.01$). The choice of benchmark is more complicated for expectations about future inflation. Using the actual realization of inflation as an ex-post benchmark is not meaningful, as our sample period is short and contains extreme realizations of inflation. Thus, respondents with lower forecast errors were not necessarily better calibrated from an ex-ante perspective. We instead rely on professional forecasts – the only available ex-ante benchmark. Although professional forecasts themselves may be biased, they are typically much less dispersed than household or firm expectations (Andre et al., 2022a; Candia, Coibion and Gorodnichenko, 2024).[8] Attentive households expect 0.17 p.p. higher inflation compared to inattentive households on average over our sample period (Column 3, $p < 0.1$). However, higher attention is not associated with a smaller absolute deviation of respondents' expectations from the average professional forecast. In fact, the inflation expectations of attentive households differ more strongly from professional forecasts than the expectations of inattentive households,

[8]We rely on professional forecasts from FocusEconomics, a company that provides economic analyses and forecasts for almost all countries in the world. Their economic forecasts are based on the consensus of a diverse range of reputable sources including investment banks, economic think tanks, and international organizations.

Table 5: Attention and beliefs: Cross-sectional correlations

	Absolute change in expectation ≥ 0.5 p.p.	Confidence (z)	Expected inflation	Absolute deviation from expert forecast	Perceived current inflation	Absolute deviation from current level
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Households						
Attention to inflation	0.021***	0.168***	0.167*	0.101	-0.110	-0.500***
	(0.007)	(0.016)	(0.087)	(0.085)	(0.072)	(0.061)
Distinct respondents	6,716	10,758	10,758	10,758	8,330	8,330
Observations	20,983	34,980	34,980	34,980	24,407	24,407
R-squared	0.02	0.12	0.16	0.10	0.14	0.07
Mean dep. var.	0.79	0.04	7.08	4.88	6.32	2.67
SD dep. var.	0.41	0.99	6.49	6.17	5.26	4.26
Panel B: Firms						
Attention to inflation	0.013**	0.043**	0.211***	0.198***		
	(0.006)	(0.017)	(0.046)	(0.045)		
Distinct respondents	4,402	6,193	6,235	6,235		
Observations	18,426	27,126	28,112	28,112		
R-squared	0.02	0.02	0.49	0.23		
Mean dep. var.	0.80	0.04	5.47	3.00		
SD dep. var.	0.40	1.02	3.44	2.72		
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table displays regressions of households' (Panel A) and firms' (Panel B) beliefs on attention to inflation – i.e., an indicator taking value one if inflation is mentioned in response to the open-ended survey question. The dependent variables are an indicator that is one if the respondent changed 12-month ahead inflation expectations by at least 0.5 p.p. between the previous and the current survey wave (Column 1), a respondent's confidence in their own inflation forecast (z-scored, Column 2), expected inflation over the next twelve months (Column 3), the absolute deviation of expected inflation from the mean professional forecast from FocusEconomics (Column 4), a respondent's perception of the current inflation rate over the last 12 months (Column 5), and the absolute deviation of this perception from the actually realized current inflation rate (Column 6). Besides survey wave fixed effects, all regressions control for the individual's gender, age, education, employment status, household income, homeownership, and stock ownership, and the respondent's influence on decisions in the firm, the firm's number of employees (in logs) and export share, as well as dummies for four broad industry groups, respectively. For a version with individual fixed effects, see Appendix Table A.8. Standard errors clustered at the individual/firm level are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

albeit not significantly so (Column 4, $p = 0.24$). Thus, the prediction of smaller deviations from benchmarks among attentive households is borne out for beliefs about current but not for expectations about future inflation. Potential explanations could be that agents rely on their own – potentially mis-specified – subjective model of the economy when interpreting information (Andrade et al., 2016; Andre et al., 2022a, 2024; Laudenbach et al., 2024) or that agents retrieve specific experiences from their memory database when increasing attention (Bordalo et al., 2023a).

In the firm sample, we find similar patterns for the frequency of updating, confidence, levels of expectations, and deviations from professional forecasts as among households, as shown in Columns 1-4 of Panel B. Appendix Table A.8 shows a version of Table 5 that includes individual fixed effects and therefore only exploits variation in attention and beliefs within the same household or firm over time. The estimates are mostly similar to the pooled OLS estimates, although they are somewhat smaller and less precise. One exception is that the association between attention and a household's absolute misperception of realized inflation is no longer significantly negative but close to zero and insignificant. Given that the inclusion of fixed effects shuts down most of the available variation – particularly in the household sample, where some respondents only participate a few times – we view these results as encouraging.

Disagreement How is attention associated with disagreement in expectations? Table 6 illustrates how the cross-sectional dispersion in inflation expectations as measured by the standard deviation, the interquartile range, and the difference between the 90th and the 10th percentile differs between attentive and inattentive respondents. To only capture within-wave disagreement, the inflation expectations are purged of survey wave fixed effects before calculating dispersion. The table displays these differences separately for households and for firms both for the full sample period and for different subperiods.

The table shows that disagreement in inflation expectations is lower among households that are attentive to inflation than among inattentive households according to the cross-sectional standard deviation and the difference between the 90th and the 10th percentile. The interquartile range is more similar between attentive and inattentive households, suggesting that attention is mostly reflected in the width of the tails of the distribution of inflation expectations. Differences in dispersion between attentive and inattentive households exist in all sub-periods, i.e., both before and during the period of elevated inflation. The differences are quantitatively meaningful. For instance, the difference between the 90th and the 10th percentile is 9.7 p.p. among inattentive households and only 8.0 p.p. among attentive households. At the same time, disagreement is also substantial among attentive households. Among both attentive and inattentive households, dispersion first decreases in response to the inflation shock and then reverts to higher levels following Russia's invasion of Ukraine. Appendix Table A.9 highlights that also disagreement about realized inflation is lower among attentive than among inattentive households.

In contrast to the patterns among households, the differences in expectation dispersion between attentive and inattentive firms are smaller and less systematic. If anything, dispersion seems to be somewhat higher among attentive firms than among inattentive firms. Consistent with recent evidence (Link et al., 2023), dispersion in inflation expectations is much smaller among firm managers than among households. The dispersion of firms' expectations increases somewhat over the course of the shock, reverting back in the period of decreasing inflationary pressures starting in December 2022. However, these changes over time are less pronounced

than among households.

The theoretical predictions for the link between attention and belief dispersion are less clear-cut than the predictions for updating, confidence or deviations from benchmarks (Angeletos and Pavan, 2007). However, in many macroeconomic models, belief dispersion arises because agents do not pay full attention to the state of the economy (Maćkowiak et al., 2023; Mankiw et al., 2003; Reis, 2006a). Inattention is modeled either as signals about the economy being perceived with idiosyncratic noise or as signals being acquired at different points in time, generating belief disagreement. In our data, we detect (i) a high level of belief dispersion even among attentive households and (ii) a similar degree of dispersion among attentive as among inattentive firms. These findings suggest that – on top of inattention – other sources of heterogeneity in beliefs are important. These factors could include heterogeneity in the specific information agents acquire (Fuster et al., 2022; Van Nieuwerburgh and Veldkamp, 2009) or retrieve from their memory when increasing their attention to a topic (Bordalo et al., 2023a), or disagreement about structural relationships in the economy, leading to different processing of a given piece of information (Andrade et al., 2016; Andre et al., 2022a; Laudenbach et al., 2024).

Taken together, our second main result is the following:

Result 2. Higher attention is associated with a higher frequency of expectation adjustment, higher confidence in beliefs, and smaller misperceptions of realized inflation. Yet, attentive respondents' inflation expectations deviate more strongly from professional forecasts. Attentive households disagree less about future inflation than inattentive households, while expectation dispersion is at a similar level among attentive and inattentive firms.

3.3 Experiences, attention, and beliefs

In this section, we provide evidence on the role of personal experiences as a potential driver of households' attention to the macroeconomy as well as their expectations. We focus on households, as we collected direct measures of inflation experiences in the pre-shock period for this sample. We supplement the evidence from our self-collected panel datasets from Germany with data from an existing panel survey with US households.

3.3.1 Main evidence

Theoretical predictions Theories of associative memory posit that what is on top of individuals' minds depends on the experiences in their memory database (Bordalo et al., 2023c). In addition, these theories predict that the context determines which experiences individuals retrieve through similarity-based recall. In particular, individuals should become more likely to retrieve a specific experience – and be attentive to this piece of information stored in their memory database – once the context becomes more similar to that experience (Bordalo et al.,

Table 6: Attention and disagreement about future inflation

	Households			Firms		
	(1) SD	(2) IQR	(3) p90-p10	(4) SD	(5) IQR	(6) p90-p10
Full Sample: 2020m12 – 2023m3						
(A) Attentive to inflation	4.93	3.00	8.00	2.65	2.40	4.70
(IA) Inattentive to inflation	6.43	2.94	9.72	2.40	1.70	3.97
p-value: (A)=(IA)	0.00	0.57	0.00	0.00	0.00	0.00
Period 1: 2020m12 – 2021m6						
(A) Attentive to inflation	5.75	2.30	8.45	2.05	1.26	2.67
(IA) Inattentive to inflation	7.20	2.80	11.95	1.95	1.03	2.47
p-value: (A)=(IA)	0.00	0.06	0.02	0.38	0.03	0.11
Period 2: 2021m9 – 2021m12						
(A) Attentive to inflation	3.84	2.07	5.50	2.29	1.67	3.27
(IA) Inattentive to inflation	5.79	2.00	7.57	2.07	1.73	3.23
p-value: (A)=(IA)	0.00	0.35	0.00	0.04	0.71	0.85
Period 3: 2022m3 – 2022m9						
(A) Attentive to inflation	5.32	3.42	8.80	2.93	2.85	6.00
(IA) Inattentive to inflation	6.46	3.80	12.00	2.91	2.75	5.50
p-value: (A)=(IA)	0.00	0.09	0.01	0.79	0.57	0.25
Period 4: 2022m12 - 2023m3						
(A) Attentive to inflation	4.57	3.53	8.47	2.55	2.50	5.00
(IA) Inattentive to inflation	5.38	3.43	9.20	2.64	3.00	5.00
p-value: (A)=(IA)	0.00	0.67	0.19	0.92	0.05	1.00

Notes: This table displays the standard deviation, the interquartile range, and the range between the 90th and 10th percentile of inflation expectations separately for respondents that pay attention to inflation according to our text-based measure and those who do not. Before calculating the dispersion measures, the data are purged of survey wave fixed effects. The displayed p-values refer to tests of the equality of standard deviations (Columns 1 and 4, Levene's test) and tests of the equality of the interquartile range and the range between the 90th and 10th percentile (remaining columns, bootstrapped) between respondents that are attentive (A) and respondents that are inattentive (IA) to inflation according to the open-ended measure.

2023a; Enke et al., 2024). We test these predictions by studying correlations between inflation experiences and attention to inflation, and how the strength of these correlations responds to the inflation shock.

Experience measures In our empirical analysis, we consider two different types of experiences. First, we consider a collective cohort-level experience: having lived through the oil crises of the 1970s, when inflation reached historically high levels. We build on prior work by Binder and Makridis (2022), who use an indicator for whether the respondent was born before 1965 as a proxy for having experienced the oil crises. We similarly create a dummy

variable indicating those cohorts that were at least teenagers by the late 1970s.[9] Given that the oil price shocks of the 1970s were large and persistently pushed up inflation, we would expect respondents with such experiences to be more likely to retrieve memories of extremely high inflation outcomes. Second, we use survey measures of more personal experiences, which vary within cohorts. Specifically, we elicited whether respondents ever incurred substantial real income drops or real wealth losses due to increases in inflation in March and June 2021, i.e., prior to the surge in inflation,.[10] These measures capture across-cohort variation arising from differences in experienced aggregate inflation rates as well as within-cohort variation from (i) differential co-movement of one's income or wealth with inflation, (ii) differences in experienced household-level inflation rates, or (iii) differential encoding of a given experienced aggregate inflation rate in individuals' memory.

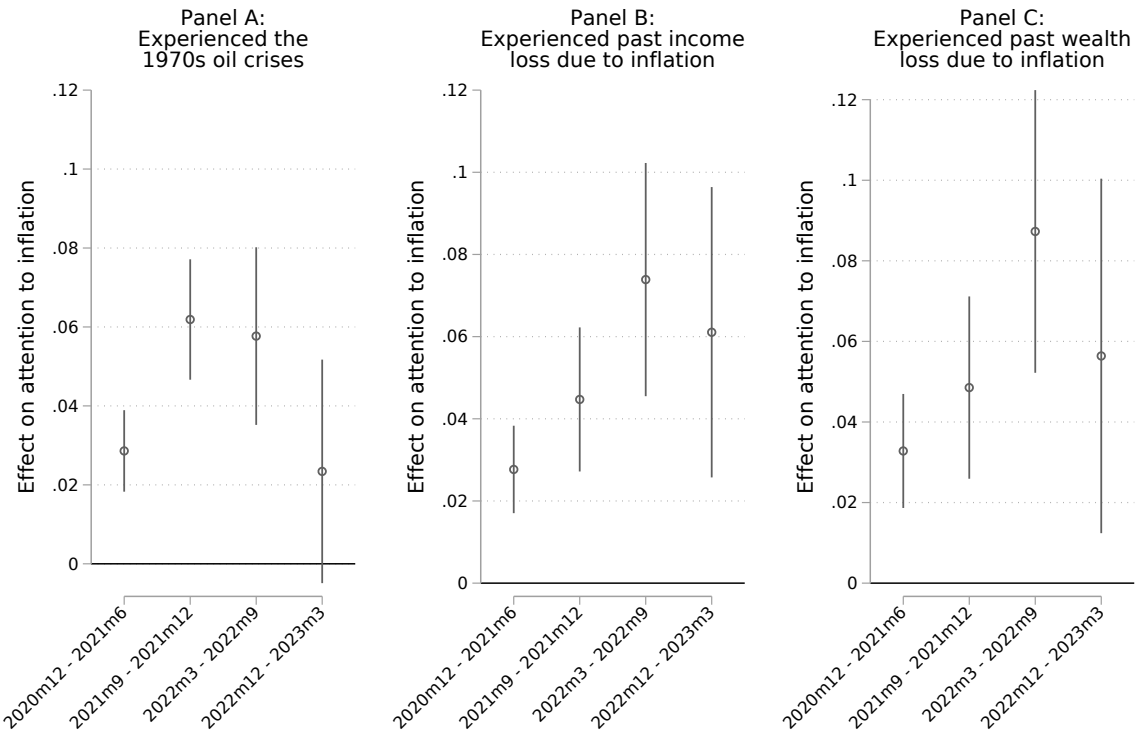
Results: Attention Panel A of Figure 3 shows that individuals who experienced the oil crises are 2.9 p.p. more likely to pay attention to inflation in the pre-shock period ($p < 0.01$), conditional on a set of control variables. This difference in attention becomes significantly more pronounced – reaching a level of 6.2 p.p. – when the inflation shock first hits the economy in September and December 2021 (p-value of the interaction < 0.01) and then remains at a similarly high level during the period following Russia's invasion of Ukraine (March to September 2022). During the period of decreasing inflationary pressures starting in December 2022, cohort differences in attention revert back to a lower level of 2.3 p.p. We find similar patterns – i.e., higher baseline levels of attention as well as a stronger increase in attention once inflation rises – when focusing on our direct measures of personal experiences with inflation, though the increase in attention occurs somewhat more gradually over the course of the shock (Panels B and C). Columns 1-3 of Table 7 show that changes in the correlation of experiences with attention over the course of the shock are robust to including individual fixed effects.

Results: Inflation expectations We also explore whether experience-driven attention allocation is reflected in how respondents update their inflation expectations. Columns 4-6 of Table 7 display fixed-effects regressions of inflation expectations on interactions of experience measures with indicators for the periods of high inflation, using the pre-shock period as omitted base period. Cohort-level and personal experiences of adverse inflation outcomes are associated with a significantly stronger increase in inflation expectations in response to the inflation shock. For instance, individuals who have lived through the oil crisis exhibit a 0.6 p.p. (Column 4, $p < 0.01$)

[9]We elicited respondents' age using a question with six brackets. Thus, we cannot precisely pin down a respondent's birth year and classify those aged 55 or older as having experienced the oil crises. This captures cohorts born 1965 or earlier for respondents who entered the panel in 2020 and cohorts born 1968 or earlier for respondents who entered the panel in 2023.

[10]We decided against eliciting positive experiences with inflation, as inflation is negatively encoded by most individuals, particularly in the German context. For instance, recent evidence suggests that debtors are not aware of the positive effects of inflation on their real wealth (Hackethal, Schnorpfeil and Weber, 2023).

Figure 3: Experiences and attention over time



Notes: This figure displays the effects of different experience measures on households' attention to inflation as captured in the open-ended text data during the different time periods displayed on the x-axes. Panel A uses an indicator for cohorts aged 55+ at the time of the survey, i.e., those who were at least teenagers during the oil crises of the 1970s. Panels B and C use information on whether the respondent has ever experienced a real income loss or a real wealth loss due to inflation elicited in the pre-shock period (March and June 2021) and assign this value to all waves. We use the first observation for those that responded to the question in multiple waves. The estimates are based on regressions of a dummy variable for paying attention to inflation on interaction terms of dummies for the time periods indicated on the x-axes with the respective experience measure (the coefficient estimates on which are displayed), as well as a set of controls, namely gender, age (only Panels B and C), education, employment status, household income, homeownership, and stock ownership, as well as survey wave fixed effects. Standard errors are clustered at the household level. Confidence intervals refer to the 95% level.

stronger updating of inflation expectations when the inflation shock first hits the economy in the second half of 2021. The effect increases to 1 p.p. in the period following Russia's invasion of Ukraine in 2022 ($p < 0.01$). Interestingly, differences in expectations by experiences do not revert back during the period of decreasing inflationary pressures starting in December 2022.

These patterns suggest that similarity-based recall can be a source of extrapolative belief formation in the context of inflation: once the shock hits the economy, individuals with extreme inflation experiences become more likely to retrieve these experiences – i.e., to pay attention to these pieces of information stored in their memory – and increase their inflation expectations, leading to higher average expectations about future inflation.

Columns 7-9 show that the stronger increase in inflation expectations among individuals with previous inflation experiences is reflected in a stronger increase in the absolute distance of their expectations to professional forecasts. Together with our finding of a stronger increase in

Table 7: Experiences, attention, and beliefs

	Attention to inflation			Expected inflation next 12 months			Absolute deviation from expert forecast		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Cohorts that experienced oil crises									
× 1(t ∈ {21m9, 21m12})	0.036***			0.565***			0.556***		
	(0.009)			(0.130)			(0.127)		
× 1(t ∈ {22m3, 22m6, 22m9})	0.030**			1.029***			0.946***		
	(0.013)			(0.162)			(0.157)		
× 1(t ∈ {22m12, 23m3})	0.003			1.042***			0.934***		
	(0.016)			(0.188)			(0.181)		
Infl. experience: Income loss									
× 1(t ∈ {21m9, 21m12})		0.025***			0.175			0.185	
		(0.010)			(0.137)			(0.135)	
× 1(t ∈ {22m3, 22m6, 22m9})		0.050***			0.681***			0.657***	
		(0.014)			(0.176)			(0.172)	
× 1(t ∈ {22m12, 23m3})		0.050***			0.606***			0.533***	
		(0.018)			(0.209)			(0.203)	
Infl. experience: Wealth loss									
× 1(t ∈ {21m9, 21m12})			0.025**			0.030			0.066
			(0.012)			(0.176)			(0.173)
× 1(t ∈ {22m3, 22m6, 22m9})			0.046***			0.582**			0.581**
			(0.018)			(0.232)			(0.229)
× 1(t ∈ {22m12, 23m3})			0.017			0.635**			0.610**
			(0.023)			(0.258)			(0.253)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distinct respondents	7,126	4,913	4,913	7,925	5,404	5,404	7,925	5,404	5,404
Observations	31,348	23,820	23,820	36,451	27,913	27,913	36,451	27,913	27,913
R-squared	0.45	0.43	0.43	0.67	0.65	0.65	0.65	0.63	0.63
Mean dep. var.	0.09	0.07	0.07	0.08	0.06	0.06	0.08	0.06	0.06
SD dep. var.	0.28	0.26	0.26	0.26	0.24	0.24	0.26	0.24	0.24

Notes: The dependent variables are a household's attention to inflation as measured in the open-ended data (Columns 1-3), the household's expected inflation over the next 12 months (Columns 4-6), and the absolute deviation of the household's expected inflation from the mean professional forecast reported to FocusEconomics (Columns 7-9). The first experience measure is an indicator for cohorts aged 55+ at the time of the survey, i.e., those who were at least teenagers during the oil crises of the 1970s. The second and third measure use information on whether the respondent has ever experienced a real income loss or a real wealth loss due to inflation elicited in the pre-shock period (March and June 2021) and assign this value to all waves. We use the first observation for those that responded to the question in multiple waves. The interaction terms interact dummies for time periods with the respective experience measure, i.e., they estimate a differential effect relative to the base period (December 2020-June 2021). All specifications include individual fixed effects and survey wave fixed effects, and thus drop singleton observations. Standard errors are clustered at the household level. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

attention to inflation among individuals with past experiences of high inflation, these patterns suggest that similarity-based recall could be a driver of our earlier finding that higher attention is not associated with a smaller deviation of expectations from benchmarks (Section 3.2).

Alternative explanation 1: News supply Instead of similarity-based recall, the time-varying relationships of experiences with attention and beliefs could reflect permanent differences in news consumption across households coupled with an increase in the supply of inflation-related news in response to the shock. To address this possibility, we repeat the fixed-effects

estimations presented in Table 7 including additional control variables. Specifically, we control for interactions of dummy variables for the shock periods with a dummy variable indicating whether the respondent reported above-median news consumption regarding inflation in the pre-shock period. As shown in Columns 2, 5, and 8 of Appendix Tables A.10 and A.11, our main coefficient estimates are unaffected by this exercise.

Alternative explanation 2: Current exposure to inflation Alternatively, individuals with adverse past inflation experiences could live in households that are generally more exposed to inflation shocks. Their differential tendency to increase attention to inflation in response to the shock may therefore reflect their general exposure to inflation rather than memory-related factors. To address this possibility, we repeat our fixed effects estimations additionally controlling for a dummy indicating whether the respondent's assessment of the extent to which their household's economic situation depends on the inflation rate as measured in the pre-shock period is above the sample median, interacted with dummy variables for the shock periods. Columns 3, 6, and 9 of Appendix Tables A.10 and A.11 show that the time-varying relationships of experiences with attention to inflation and inflation expectations are robust to these additional controls.

Placebo Columns 10 through 12 of Appendix Table A.10 show that experiences with inflation are unrelated to the evolution of attention to macro topics *other than inflation or monetary policy* over the course of shock. Thus, consistent with similarity-based recall, individuals with inflation experiences think more about inflation (but not about other macro topics) once the environment becomes more inflationary.

Taken together, our third main result is the following:

Result 3. Individuals with past experiences of adverse inflation outcomes pay more attention to inflation. The effects of experiences on attention increase during the inflation shock, consistent with similarity-based recall, and are reflected in a stronger updating of inflation expectations.

3.3.2 External validity: Evidence from the US

A potential concern is that our findings are specific to the German context. We therefore probe the external validity of our findings using household panel data from the US. Since no existing dataset from the US contains comparable data on attention to the macroeconomy, we focus on how inflation experiences are associated with the updating of inflation expectations in response to the inflation shock.

Data We leverage the New York Fed's Survey of Consumer Expectations (SCE), a high-quality probability-based panel dataset representative of the US population. The SCE includes rich data

Table 8: Experiences and beliefs: Evidence from the US

	Horizon: 12 mths.		Horizon: 2-3 yrs.
	(1)	(2)	(3)
	Expected inflation	Absolute deviation from expert forecast	Expected inflation
Cohort < 1965	0.533*	0.554**	0.599**
× 1(t ∈ {21m4, 22m6})	(0.277)	(0.262)	(0.255)
Cohort < 1965	0.765**	0.644*	0.523
× 1(t ∈ {22m7, 23m3})	(0.385)	(0.352)	(0.354)
Time FE	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes
Distinct respondents	5,268	5,268	5,269
Observations	42,081	42,081	42,085
R-squared	0.64	0.65	0.62
Mean dep. var	7.70	5.79	6.07
SD dep. var	7.83	7.23	7.47

Notes: This table examines the relationship between households' experiences and updating of inflation expectations over the shock period using data from the New York Fed's Survey of Consumer Expectations (SCE). The dependent variable is a household's point expectation about inflation over the next 12 months (Column 1), the absolute deviation of this expectation from the mean professional forecast from the SPF (Column 2), or the household's point expectation about inflation over the time period between 24 and 36 months after the survey (Column 3). The experience measure is an indicator for the cohorts born before 1965, i.e., those who were at least teenagers during the oil crises of the 1970s. The interaction terms interact dummies for time periods with the experience measure, i.e., they estimate a differential effect relative to the base period (May 2020-March 2021). All specifications include individual fixed effects and survey wave fixed effects. Standard errors are clustered at the household level. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

on inflation expectations and is widely used in economic research (Armantier, Nelson, Topa, van der Klaauw and Zafar, 2016; Armona, Fuster and Zafar, 2019; Crump, Eusepi, Tambalotti and Topa, 2022; Fuster et al., 2022). The SCE has a rotating panel structure: every month, a set of new respondents enter the survey and stay in the panel for a maximum of 12 months. Given that our identification hinges on within-person variation and that inflation in the US started increasing to elevated levels from April 2021, our sample period starts in May 2020.[11] It ends in March 2023, consistent with our German panels. Our final sample consists of 5,268 distinct households. Appendix Table A.12 provides summary statistics for our sample.

Empirical specification Similarly to our analysis of the German household panel, our experience measure is an indicator for the cohorts born before 1965, i.e., those who were at

[11] In April 2021, CPI inflation in the US rose to over 4.1% from 2.6% in March 2021.

least teenagers during the oil crises of the 1970s. We regress respondents' expectations on individual fixed effects, survey wave fixed effects, as well as interaction terms of dummies for the period of increasing inflation (April 2021-June 2022) and the period of decreasing inflation (July 2022-March 2023) with a dummy for being born before 1965. The coefficients on the interaction terms indicate how individuals with different experiences differentially update their inflation expectations in response to the shock compared to the pre-shock period from May 2020 to March 2021.

Results Table 8 displays the results. Respondents who have lived through the oil crises exhibit a 0.53 p.p. stronger increase in 12-month-ahead inflation expectations than younger cohorts going from the pre-shock period to the period of increasing inflation between April 2021 and June 2022 (Column 1, $p < 0.1$). As in the German data, this updating is not reversed during the period of still elevated but decreasing inflation between July 2022 and March 2023, with the cohort-difference increasing to 0.77 p.p. ($p < 0.05$). Column 2 highlights that the differential updating is reflected in a stronger increase in the deviation of expectations from expert benchmarks.[12] Cohorts that have lived through the oil crises also exhibit a stronger updating of their expectations about inflation between 24 and 36 months after the survey (Column 3), suggesting that similarity-based recall of past experiences can be associated with a de-anchoring of expectations about future inflation. Taken together, the table confirms the patterns we uncover in the German data, demonstrating the external validity of our findings.

4 Conclusion and implications

Attention to the economy is a central element in macroeconomic models that depart from the full-information rational expectations assumption, but its empirical properties are not fully understood. To fill this gap, we collect new panel data on households' and firms' attention to the macroeconomy based on open-ended survey questions. We use these data to document three sets of novel stylized facts. In a first step, we characterize the cross-sectional and time variation in attention to the economy. Attention to the macroeconomy displays substantial and sustained variation across individuals, shifts towards inflation in response to a surge in inflation, and is negatively associated with attention to household- and firm-level topics. In a second step, we examine the link between attention to the economy and macroeconomic expectation formation, focusing on inflation. Consistent with standard models of inattention, attentive respondents adjust their inflation expectations more frequently during the shock, are more confident in their expectations, and hold smaller misperceptions regarding realized inflation. Yet, contrary to the predictions of these models, the expectations of attentive respondents differ more strongly from

[12] We rely on the average forecast from the Philadelphia Fed's Survey of Professional Forecasters (SPF) as a benchmark.

professional forecasts. In a final step, we then explore personal experiences as a potential driver of households' attention to the economy. Individuals with past experiences of adverse inflation outcomes pay more attention to inflation and increase their attention more strongly in response to a shock to inflation, consistent with theories of similarity-based recall. Inflation experiences are also associated with a stronger increase in inflation expectations in response to the shock.

What features would a macroeconomic model consistent with our findings need to have? While formulating a full theory is beyond the scope of our paper, we briefly sketch how such a model could look like. A model that could generate many of the patterns we document should feature a limited capacity to acquire or process information, leading to pronounced inattention to many topics. It should feature an important role for experiences and memory, which draw agents' attention to different macroeconomic or local topics depending on the context through similarity-based recall, e.g., as in Bordalo et al. (2023c). Limited cognitive resources in turn lead to shifts in attention between macroeconomic and local topics. Heterogeneity in experiences, economic exposure to macroeconomic variables, and cognitive resources generates strong heterogeneity in attention to the macroeconomy, part of which is persistent at the individual level. Attention to the macroeconomy affects economic outcomes by changing agents' beliefs and increasing agents' confidence in their beliefs. Exploring business cycle dynamics and the transmission of policies through the lens of such a model could be a fruitful avenue for future theoretical work.

From a methodological perspective, our paper highlights the value of bringing new types of data to open questions in macroeconomics. The rich and detailed picture of agents' attention allocation obtained using our measure points to the promise of using open-ended text responses to measure attention in economic contexts. Such measures could be included in existing panel surveys of households and firms, and be routinely analyzed using human or AI-based coding. These data could help policymakers make informed decisions and provide new empirical insights that inform future theoretical work.

References

Afrouzi, Hassan, Spencer Y Kwon, Augustin Landier, Yueran Ma, and David Thesmar, "Overreaction in Expectations: Evidence and Theory," *The Quarterly Journal of Economics*, 2023, *138* (3), 1713—1764.

Andrade, Philippe, Richard K Crump, Stefano Eusepi, and Emanuel Moench, "Fundamental Disagreement," *Journal of Monetary Economics*, 2016, *83*, 106–128.

Andre, Peter, Carlo Pizzinelli, Christopher Roth, and Johannes Wohlfart, "Subjective Mdels of the Macroeconomy: Evidence from Experts and Representative Samples," *The Review of Economic Studies*, 2022, *89* (6), 2958–2991.

_ , Ingar Haaland, Christopher Roth, and Johannes Wohlfart, "Narratives about the Macroeconomy," *ECONtribute Discussion paper*, 2022, (127).

_ , Philipp Schirmer, and Johannes Wohlfart, "Mental Models of the Stock Market," *CESifo Working Paper No. 10691*, 2024.

Angeletos, George-Marios and Alessandro Pavan, "Efficient Use of Information and Social Value of Information," *Econometrica*, 2007, *75* (4), 1103–1142.

Armantier, Olivier, Scott Nelson, Giorgio Topa, Wilbert van der Klaauw, and Basit Zafar, "The Price Is Right: Updating Inflation Expectations in a Randomized Price Information Experiment," *Review of Economics and Statistics*, 2016, *98* (3), 503–523.

Armona, Luis C, Andreas Fuster, and Basit Zafar, "Home Price Expectations and Behavior: Evidence from a Randomized Information Experiment," *Review of Economic Studies*, 2019, *86*, 1371–1410.

Bachmann, Rüdiger, Kai Carstensen, Stefan Lautenbacher, and Martin Schneider, "Uncertainty and Change: Survey Evidence of Firms Subjective Beliefs," *NBER Working Paper No. 29430*, 2024.

_ , Steffen Elstner, and Eric R Sims, "Uncertainty and Economic Activity: Evidence from Business Survey Data," *American Economic Journal: Macroeconomics*, 2013, *5* (2), 217–49.

Bachmann, Rüdiger, Benjamin Born, Steffen Elstner, and Christian Grimme, "Time-Varying Business Volatility and the Price Setting of Firms," *Journal of Monetary Economics*, 2019, *101*, 82–99.

Binder, Carola and Christos Makridis, "Stuck in the Seventies: Gas Prices and Consumer Sentiment," *Review of Economics and Statistics*, 2022, *104* (2), 293–305.

Bordalo, Pedro, Giovanni Burro, Katherine B Coffman, Nicola Gennaioli, and Andrei Shleifer, "Imagining the Future: Memory, Simulation and Beliefs," *Review of Economic Studies*, 2023.

_ , **John J Conlon, Nicola Gennaioli, Spencer Y Kwon, and Andrei Shleifer**, "How People Use Statistics," *Working Paper*, 2023.

_ , _ , _ , _ , **and** _ , "Memory and Probability," *The Quarterly Journal of Economics*, 2023, *138* (1), 265–311.

_ , **Nicola Gennaioli, and Andrei Shleifer**, "Diagnostic Expectations and Credit Cycles," *The Journal of Finance*, 2018, *73* (1), 199–227.

_ , _ , **and** _ , "Memory, Attention, and Choice," *The Quarterly Journal of Economics*, 2020, *135* (3), 1399–1442.

_ , _ , **and** _ , "Salience," *Annual Review of Economics*, 2022, *14*, 521–544.

Bracha, Anat and Jenny Tang, "Inflation Levels and (In-)Attention," *FRB of Boston Working Paper*, 2022.

Buchheim, Lukas, Jonas Dovern, Carla Krolage, and Sebastian Link, "Sentiment and Firm Behavior During the COVID-19 Pandemic," *Journal of Economic Behavior and Organization*, 2022, *195*, 186–198.

Bursztyn, Leonardo, Georgy Egorov, Ingar Haaland, Aakaash Rao, and Christopher Roth, "Justifying Dissent," *The Quarterly Journal of Economics*, 2023, *138* (3), 1403–1451.

Candia, Bernardo, Olivier Coibion, and Yuriy Gorodnichenko, "The Inflation Expectations of US Firms: Evidence from a New Survey," *Journal of Monetary Economics*, 2024.

Capozza, Francesco, Ingar Haaland, Christopher Roth, and Johannes Wohlfart, "Recent Advances in Studies of News Consumption," *Working Paper*, 2022.

Chahrour, Ryan, Kristoffer Nimark, and Stefan Pitschner, "Sectoral Media Focus and Aggregate Fluctuations," *American Economic Review*, 2021, *111* (12), 3872–3922.

Choi, Hyunyoung and Hal Varian, "Predicting the Present with Google Trends," *Economic Record*, 2012, *88*, 2–9.

Coibion, Olivier and Yuriy Gorodnichenko, "Information Rigidity and the Expectations Formation Process: A Simple Framework and New Facts," *American Economic Review*, 2015, *105* (8), 2644–2678.

_ , _ , **and Saten Kumar**, "How Do Firms Form Their Expectations? New Survey Evidence," *American Economic Review*, 2018, *108* (9), 2671–2713.

Crump, Richard K, Stefano Eusepi, Andrea Tambalotti, and Giorgio Topa, "Subjective Intertemporal Substitution," *Journal of Monetary Economics*, 2022, *126*, 118–133.

D'Acunto, Francesco, Daniel Hoang, Maritta Paloviita, and Michael Weber, "IQ, Expectations, and Choice," *Review of Economic Studies*, 2023, *90* (5), 2292–2325.

D'Acunto, Francesco, Ulrike Malmendier, Juan Ospina, and Michael Weber, "Exposure to Grocery Prices and Inflation Expectations," *Journal of Political Economy*, 2021, *129* (5), 1615–1639.

Enders, Zeno, Franziska Hünnekes, and Gernot J Müller, "Monetary Policy Announcements and Expectations: Evidence from German Firms," *Journal of Monetary Economics*, 2019, *108*, 45–63.

Enke, Benjamin, Frederik Schwerter, and Florian Zimmermann, "Associative Memory, Beliefs and Market Interactions," *Journal of Financial Economics*, 2024.

Fetzer, Thiemo, Lukas Hensel, Johannes Hermle, and Christopher Roth, "Coronavirus Perceptions and Economic Anxiety," *Review of Economics and Statistics*, 2021, *103* (5), 968–978.

Flynn, Joel P and Karthik Sastry, "Attention Cycles," *Available at SSRN 3592107*, 2023.

Fuster, Andreas, Ricardo Perez-Truglia, Mirko Wiederholt, and Basit Zafar, "Expectations with Endogenous Information Acquisition: An Experimental Investigation," *Review of Economics and Statistics*, 2022, *104* (5), 1059–1078.

Gabaix, Xavier, "A Sparsity-Based Model of Bounded Rationality," *The Quarterly Journal of Economics*, 2014, *129* (4), 1661–1710.

_ , "Behavioral Inattention," in "Handbook of Behavioral Economics: Applications and Foundations 1," Vol. 2, Elsevier, 2019, pp. 261–343.

_ **and Thomas Graeber**, "The Complexity of Economic Decisions," *Available at SSRN*, 2023.

Gennaioli, Nicola and Andrei Shleifer, "What Comes to Mind," *The Quarterly Journal of Economics*, 2010, *125* (4), 1399–1433.

Giglio, Stefano, Matteo Maggiori, Johannes Stroebel, and Stephen Utkus, "Five Facts About Beliefs and Portfolios," *American Economic Review*, 2021, *111* (5), 1481–1522.

Goldfayn-Frank, Olga and Johannes Wohlfart, "Expectation Formation in a New Environment: Evidence from the German Reunification," *Journal of Monetary Economics*, 2020, *115*, 301–320.

Goldstein, Nathan, "Tracking Inattention," *Journal of the European Economic Association*, 2023, *21*, 2682–2725.

Graeber, Thomas, Florian Zimmermann, and Christopher Roth, "Stories, Statistics, and Memory," *CESifo Working Paper*, 2023.

Haaland, Ingar, Christopher Roth, and Johannes Wohlfart, "Designing Information Provision Experiments," *Journal of Economic Literature*, 2023, *61* (1), 3–40.

Hackethal, Andreas, Philip Schnorpfeil, and Michael Weber, "Households' Response to the Wealth Effects of Inflation," *Working Paper*, 2023.

Hartzmark, Samuel M, Samuel D Hirshman, and Alex Imas, "Ownership, Learning, and Beliefs," *The Quarterly Journal of Economics*, 2021, *136* (3), 1665–1717.

Jiang, Zhengyang, Hongqi Liu, Cameron Peng, and Hongjun Yan, "Investor Memory and Biased Beliefs: Evidence from the Field," *Available at SSRN*, 2023.

Khaw, Mel Win, Luminita Stevens, and Michael Woodford, "Discrete Adjustment to a Changing Environment: Experimental Evidence," *Journal of Monetary Economics*, 2017, *91*, 88–103.

Kohlhas, Alexandre N and Ansgar Walther, "Asymmetric Attention," *American Economic Review*, 2021, *111* (9), 2879–2925.

Korenok, Oleg, David Munro, and Jiayi Chen, "Inflation and Attention Thresholds," *Review of Economics and Statistics*, 2023.

Laudenbach, Christine, Annika Weber, Rüdiger Weber, and Johannes Wohlfart, "Beliefs About the Stock Market and Investment Choices: Evidence from a Survey and a Field Experiment," *Review of Financial Studies*, 2024.

Link, Sebastian, Andreas Peichl, Christopher Roth, and Johannes Wohlfart, "Information Frictions Among Firms and Households," *Journal of Monetary Economics*, 2023, *135*, 99–115.

Mackowiak, Bartosz and Mirko Wiederholt, "Optimal Sticky Prices under Rational Inattention," *American Economic Review*, 2009, *99* (3), 769–803.

Maćkowiak, Bartosz and Mirko Wiederholt, "Business Cycle Dynamics under Rational Inattention," *The Review of Economic Studies*, 2015, *82* (4), 1502–1532.

_ , Filip Matějka, and Mirko Wiederholt, "Rational Inattention: A Review," *Journal of Economic Literature*, 2023, *61* (1), 226–273.

Malmendier, Ulrike and Stefan Nagel, "Depression Babies: Do Macroeconomic Experiences Affect Risk-taking?," *The Quarterly Journal of Economics*, 2011, *126* (1), 373–416.

_ and _ , "Learning from Inflation Experiences," *The Quarterly Journal of Economics*, 2016, *131* (1), 53–87.

_ , _ , and Zhen Yan, "The Making of Hawks and Doves," *Journal of Monetary Economics*, 2021, *117*, 19–42.

Mankiw, N Gregory and Ricardo Reis, "Sticky Information Versus Sticky Prices: A Proposal to Replace the New Keynesian Phillips Curve," *The Quarterly Journal of Economics*, 2002, *117* (4), 1295–1328.

_ **and** _ , "Pervasive Stickiness," *The American Economic Review*, 2006, *96* (2), 164–169.

_ **,** _ **, and Justin Wolfers**, "Disagreement About Inflation Expectations," *NBER Macroeconomics Annual*, 2003, *18*, 209–248.

Mikosch, Heiner, Christopher Roth, Samad Sarferaz, and Johannes Wohlfart, "Uncertainty and Information Acquisition: Evidence from Firms and Households," *American Economic Journal: Macroeconomics*, 2024, *16*, 1–33.

Nieuwerburgh, Stijn Van and Laura Veldkamp, "Information Immobility and the Home Bias Puzzle," *The Journal of Finance*, 2009, *64* (3), 1187–1215.

Paciello, Luigi and Mirko Wiederholt, "Exogenous Information, Endogenous Information, and Optimal Monetary policy," *Review of Economic Studies*, 2014, *81* (1), 356–388.

Pedregosa, Fabian, Gaël Varoquaux, Alexandre Gramfort, Vincent Michel, Bertrand Thirion, Olivier Grisel, Mathieu Blondel, Peter Prettenhofer, Ron Weiss, Vincent Dubourg et al., "Scikit-learn: Machine Learning in Python," *the Journal of Machine Learning Research*, 2011, *12*, 2825–2830.

Peer, Eyal, David Rothschild, Andrew Gordon, Zak Evernden, and Ekaterina Damer, "Data Quality of Platforms and Panels for Online Behavioral Research," *Behavior Research Methods*, 2021, pp. 1–20.

Pfäuti, Oliver, "Inflation–Who cares? Monetary Policy in Times of Low Attention," *Journal of Money, Credit and Banking*, 2024.

Reis, Ricardo, "Inattentive Consumers," *Journal of Monetary Economics*, 2006, *53* (8), 1761–1800.

_ , "Inattentive Producers," *The Review of Economic Studies*, 2006, *73* (3), 793–821.

Roth, Christopher, Sonja Settele, and Johannes Wohlfart, "Risk Exposure and Acquisition of Macroeconomic Information," *American Economic Review: Insights*, 2022, *4* (1), 34–53.

Salle, Isabelle, Yuriy Gorodnichenko, and Olivier Coibion, "Lifetime Memories of Inflation: Evidence from Surveys and the Lab," *NBER Working Paper*, 2023.

Sauer, Stefan, Moritz Schasching, and Klaus Wohlrabe, "Handbook of ifo Surveys," *ifo Beiträge zur Wirtschaftsforschung No. 100*, 2023.

Sicherman, Nachum, George Loewenstein, Duane J Seppi, and Stephen P Utkus, "Financial Attention," *The Review of Financial Studies*, 2016, *29* (4), 863–897.

Silveira, Rava Azeredo Da, Yeji Sung, and Michael Woodford, "Optimally Imprecise Memory and Biased Forecasts," 2020.

Sims, Christopher A, "Implications of Rational Inattention," *Journal of Monetary Economics*, 2003, *50* (3), 665–690.

Song, Wenting and Samuel Stern, "Firm Inattention and the Efficacy of Monetary Policy: A Text-based Approach," *Available at SSRN 3900641*, 2023.

Stantcheva, Stefanie, "Understanding Tax Policy: How Do People Reason?," *The Quarterly Journal of Economics*, 2021, *136* (4), 2309–2369.

Sung, Yeji, "Macroeconomic Expectations and Cognitive Noise," *working Paper*, 2024.

Weber, Michael, Bernardo Candia, Hassan Afrouzi, Tiziano Ropele, Rodrigo Lluberas, Serafin Frache, Brent Meyer, Saten Kumar, Yuriy Gorodnichenko, Dimitris Georgarakos, Olivier Coibion, and Geoff Kenny, "Tell Me Something I Don't Already Know: Learning in Low and High-Inflation Settings," *Working Paper*, 2024.

Woodford, Michael, "Imperfect Common Knowledge and The Effects of Monetary Policy," in Philippe Aghion, Roman Frydman, Joseph E. Stiglitz, and Michael Woodford, eds., *Knowledge, Information, and Expectations in Modern Macroeconomics: In Honor of Edmund S. Phelps*, Princeton, NJ: Princeton Univ. Press, 2003.

_ , "Information-constrained State-dependent Pricing," *Journal of Monetary Economics*, 2009, *56*, S100–S124.

Zorn, Peter, "Investment under Rational Inattention: Evidence from US Sectoral Data," *CESifo Working Paper*, 2020.

Online Appendix: Attention to the Macroeconomy

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Summary of the Online Appendix

Section A contains additional figures.

Section B contains additional tables.

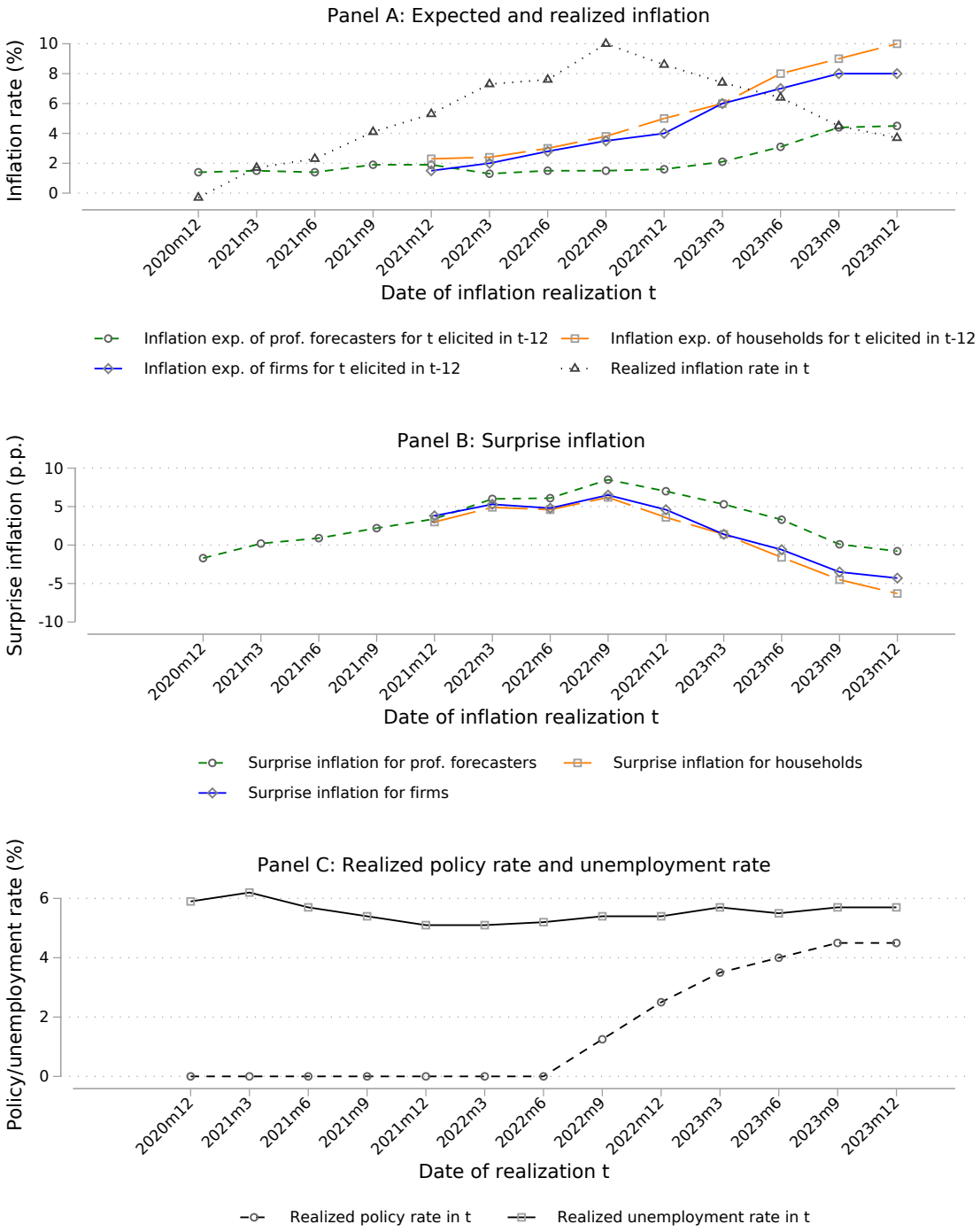
Section C provides the full list of codes in our scheme for the open-ended data.

Section D provides the key survey questions from our household and firm panels.

Section E provides the key survey questions from our September 2023 validation survey.

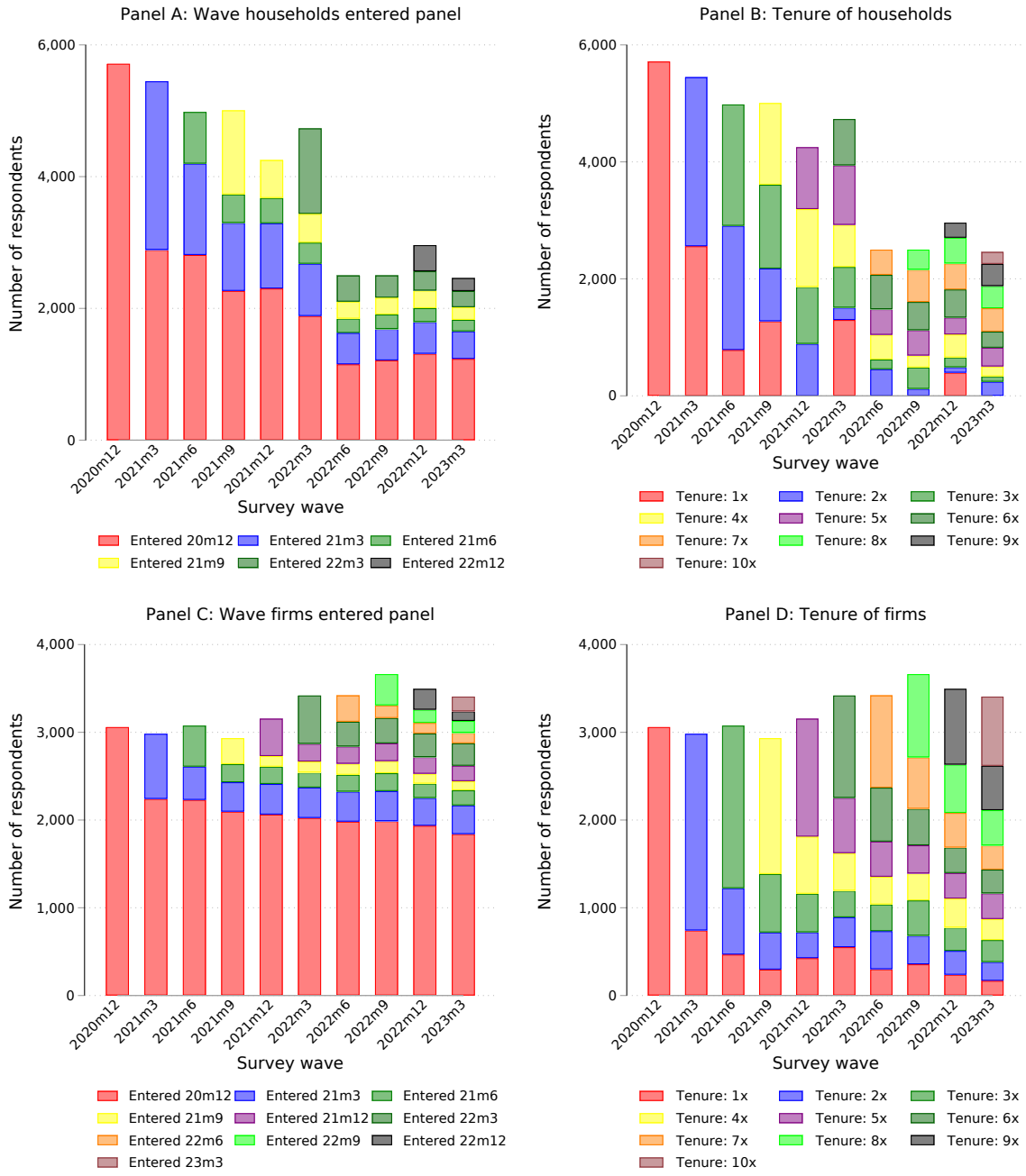
A Additional figures

Figure A.1: Setting: Unexpected shock to inflation



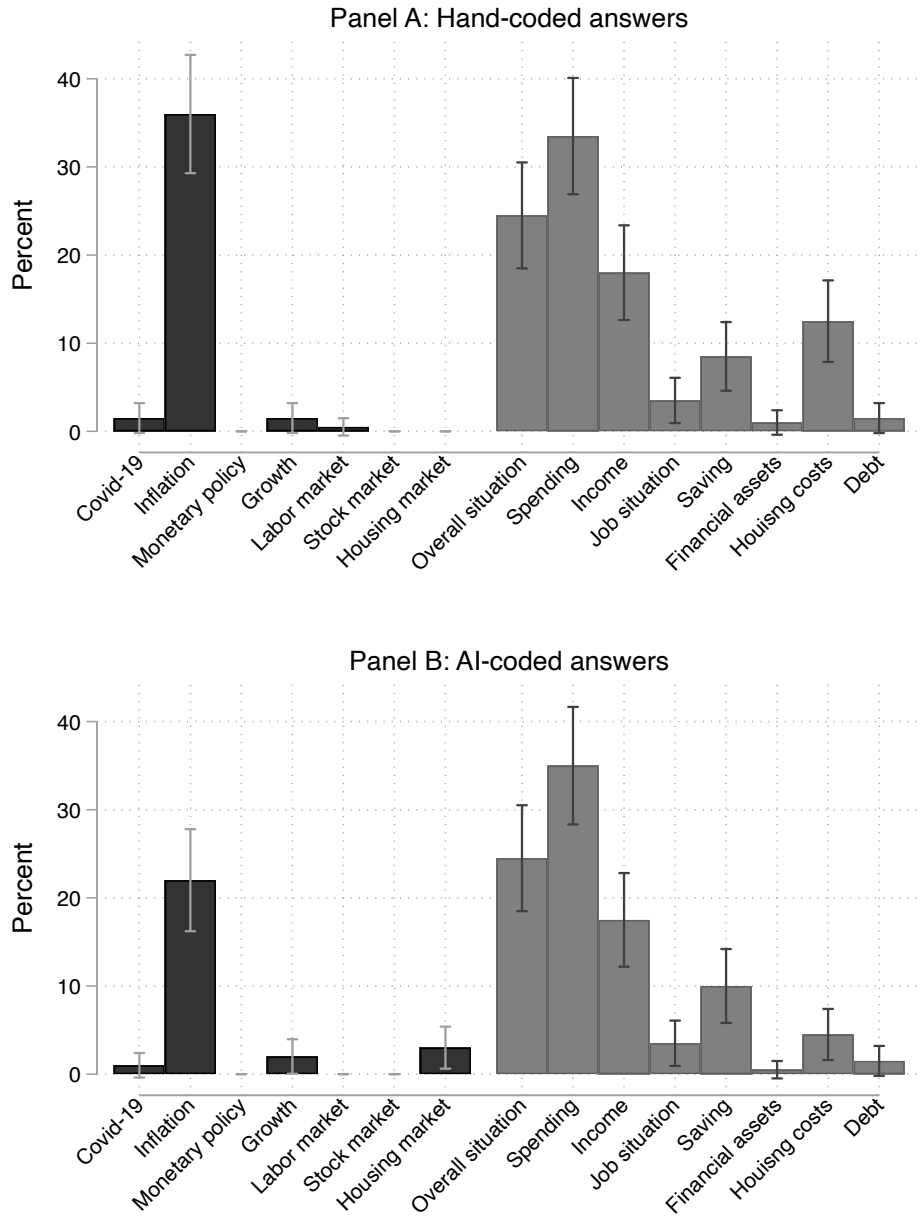
Notes: Panel A displays the median expected inflation rate over the next 12 months among households and firms along with the average professional forecast from FocusEconomics and the ex-post realized inflation rate in Germany. Expectations are shifted by 12 months such that the dates depicted on the x-axis refer to the date of the inflation realization, i.e., the date the expectations refer to. Panel B displays the "surprise inflation", i.e., the difference between forecasts and ex-post realized inflation rates in percentage points. Panel C shows the development of the policy rate of the ECB and of the unemployment rate in Germany.

Figure A.2: Survey participation across waves



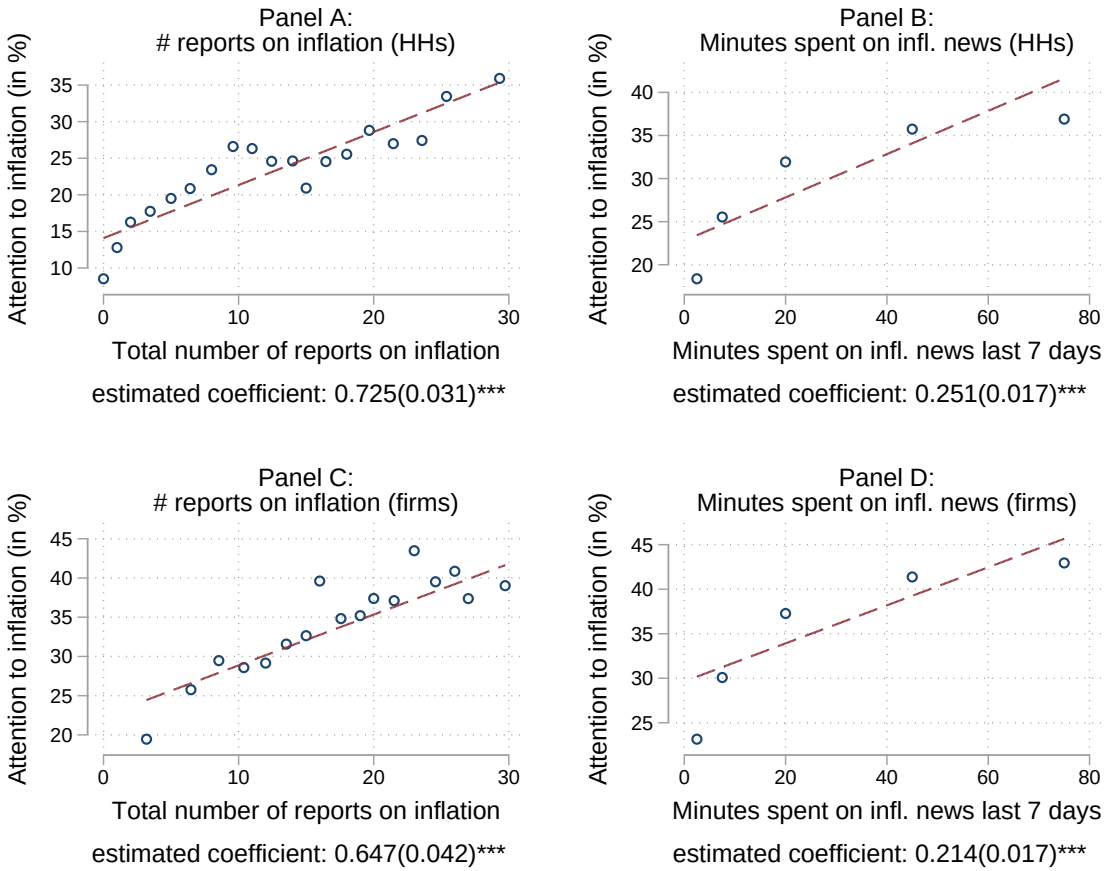
Notes: This figure displays the composition of the different survey waves in terms of the wave responding households and firms entered the panel (Panels A and C) and in terms of their tenure in the panel (Panels B and D).

Figure A.3: Attention allocation across topics in the open-ended data as classified using human coding and as classified using AI-coding



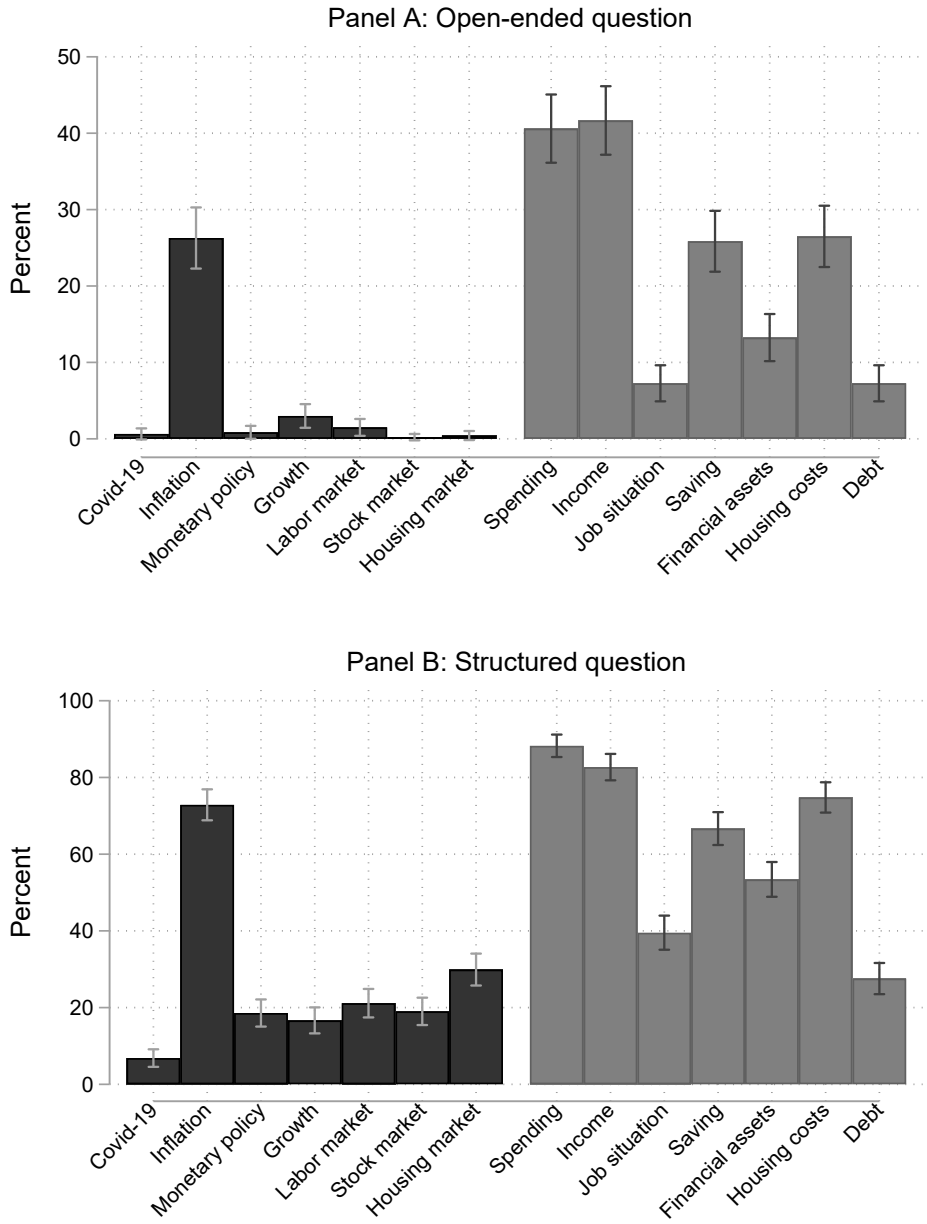
Notes: This figure presents a validation exercise for the hand-coding of the open-ended data based on a subsample from the household survey wave in March 2023, which was both hand-coded and AI-coded using GPT-4. It shows the distribution of attention to different macroeconomic topics (black) and household-level topics (grey). The bars indicate the fractions of respondents paying attention to a given topic. The measure of attention is based on people's responses to our main open-ended question: "What topics come to mind when you think about the economic situation of your household?" Panel A shows results from the hand-coding. Panel B displays results from the AI-coding.

Figure A.4: Attention as measured in the open-ended question and news consumption



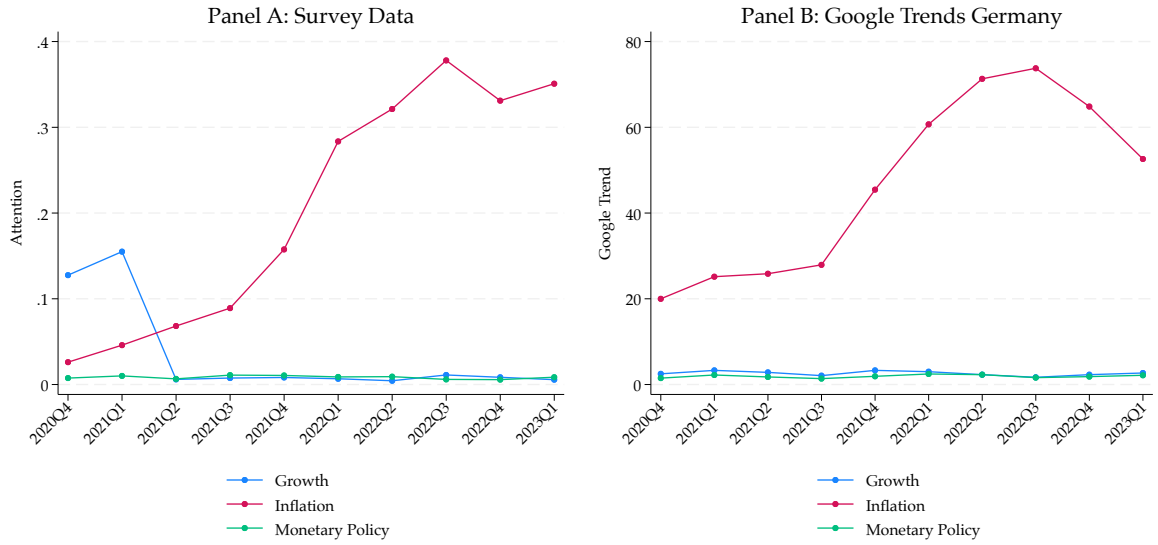
Notes: This figure displays binned scatter plots regressing attention to inflation – i.e., an indicator taking value one (expressed as 100% for expositional reasons) if inflation is mentioned in response to the open-ended survey question – on different measures of news consumption regarding inflation. Panels A and C regress attention on the total number of reports on inflation a respondent reports to have read in the news, to have seen on TV, or to have heard in the radio over the last three months. Panels B and D regress attention on the number of minutes a household or firm manager reports to have spent consuming news about inflation over the last week. Panels A and B focus on households, while Panels C and D focus on firms. Standard errors clustered at the household/firm level are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Figure A.5: Attention allocation across topics as measured in the open-ended and as measured in a structured survey question



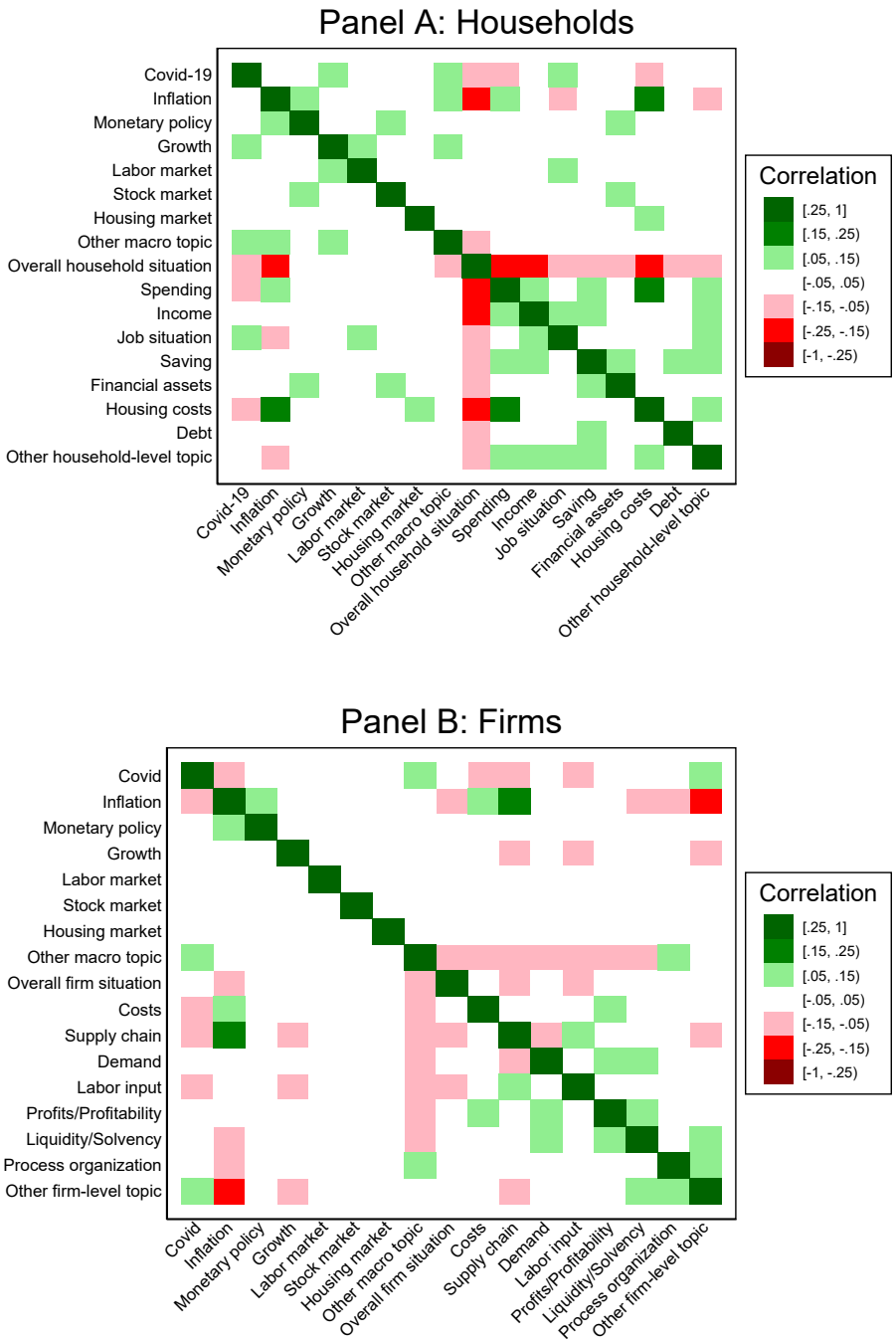
Notes: This figure presents a validation exercise of our hand-coded attention data based on an additional German household survey run with Prolific in September 2023. It shows the fractions of respondents paying attention to different topics according to the open-ended question (Panel A) and according to a structured question included later in the survey (Panel B), including error bands. Aggregate topics are displayed in black, while household-level topics are displayed in grey.

Figure A.6: Attention as measured in the open-ended question and Google Trends data



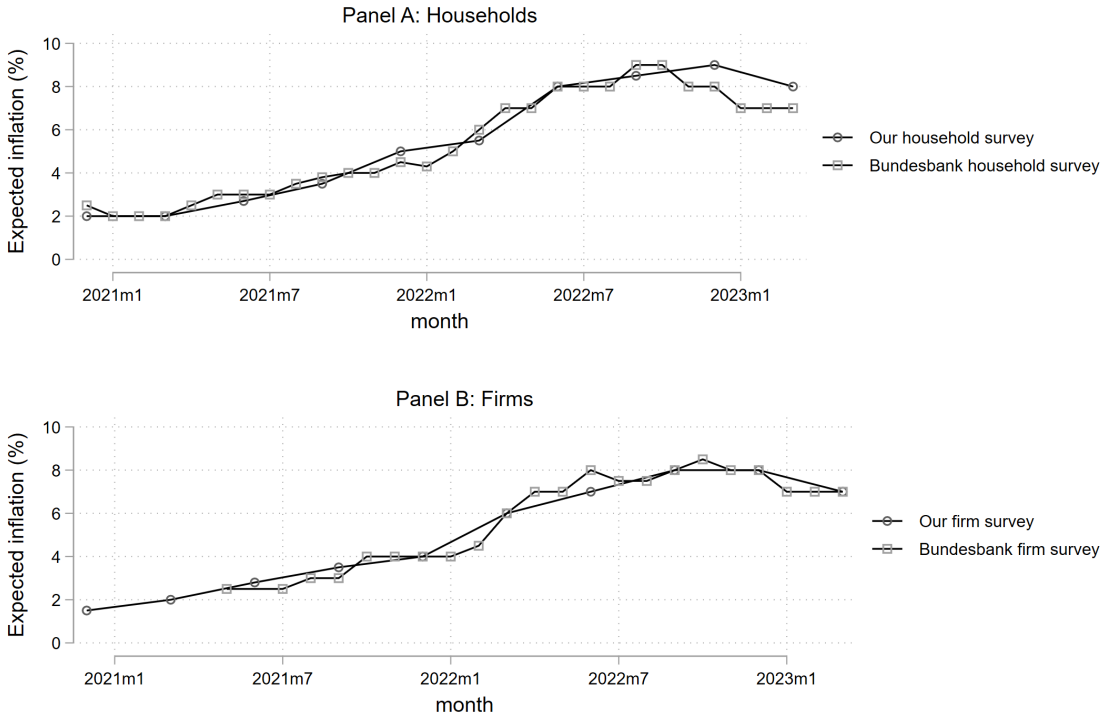
Notes: This figure displays the evolution of the fractions of household respondents that raise different topics in the open-ended survey question across survey waves (Panel A) and weekly Google Trends data for Germany (Panel B). The lines refer to specific macroeconomic topics: inflation, monetary policy, and growth. Google Trends offers a platform to explore search data, delivering a search intensity metric for each query that ranges from 0 to 100. A score of 100 indicates the peak popularity of the terms queried within a specific area and period. Users can formulate queries using single search terms or broader topics that include multiple related terms. We follow the latter approach. To make the searches comparable in relative terms, we select the three topics at the same time. We aggregate the respective topics to quarterly frequency for comparability to the survey data. Note that due to the quarterly aggregation, the peak searches within our period (in our case, inflation) are below 100, as the peak refers to the weekly data.

Figure A.7: Attention: Correlations across topics



Notes: This figure presents correlation coefficients between attention to different topics as measured in the open-ended data. Positive correlation coefficients within specific ranges are presented in varying shades of green, while negative correlation coefficients are presented in varying shades of red. Panel A focuses on households, while Panel B focuses on firms. The categories "Other macro topic", "Other household-level topic", and "Other firm-level topic" subsume all macro, household-level, and firm-level topics in our coding scheme that are not displayed in their own columns/rows in the figure (i.e., the categories in the figure are broader than the original "other" categories in our coding scheme displayed in Appendix Tables A.13, A.14, and A.15).

Figure A.8: Median inflation expectations in our surveys compared to Bundesbank surveys



Notes: This figure compares the development of the median inflation expectations in our household and firm surveys over time to the development of median expectations in the Bundesbank Online Panels of Firms and of Households (BOP-HH and BOP-F, respectively), which aim to be representative of the underlying populations.

B Additional tables

Table A.1: Relationship b/w hand-coded data and word count: Attention to inflation

	Hand-coded	Automated word count					Correl-ation
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Inflation	Price	Cost	Expen-sive	Joint word count	hand-coded vs. joint word count
Panel A: Households							
Wave 1: 2020m12	0.03	0.01	0.02	0.01	0.03	0.05	0.60
Wave 2: 2021m3	0.04	0.01	0.02	0.01	0.03	0.06	0.75
Wave 3: 2021m6	0.07	0.02	0.04	0.02	0.04	0.10	0.81
Wave 4: 2021m9	0.09	0.04	0.05	0.02	0.05	0.13	0.78
Wave 5: 2021m12	0.16	0.07	0.07	0.02	0.04	0.17	0.88
Wave 6: 2022m3	0.28	0.09	0.14	0.04	0.06	0.27	0.88
Wave 7: 2022m6	0.32	0.21	0.17	0.05	0.06	0.39	0.82
Wave 8: 2022m9	0.38	0.20	0.20	0.08	0.06	0.43	0.86
Wave 9: 2022m12	0.33	0.23	0.19	0.06	0.07	0.42	0.80
Wave 10: 2023m3	0.35	0.23	0.18	0.06	0.08	0.44	0.82
Total (Waves 1-10)	0.19	0.09	0.09	0.03	0.05	0.22	0.84
Panel B: Firms							
Wave 1: 2020m12	0.05	0.01	0.04	0.01	0.03	0.09	0.69
Wave 2: 2021m3	0.10	0.01	0.07	0.01	0.04	0.14	0.79
Wave 3: 2021m6	0.19	0.02	0.15	0.03	0.03	0.23	0.87
Wave 4: 2021m9	0.19	0.03	0.14	0.04	0.06	0.28	0.78
Wave 5: 2021m12	0.25	0.07	0.16	0.04	0.02	0.28	0.89
Wave 6: 2022m3	0.33	0.09	0.24	0.07	0.02	0.39	0.76
Wave 7: 2022m6	0.43	0.19	0.24	0.07	0.03	0.48	0.82
Wave 8: 2022m9	0.42	0.19	0.28	0.10	0.02	0.52	0.75
Wave 9: 2022m12	0.40	0.20	0.22	0.09	0.02	0.46	0.76
Wave 10: 2023m3	0.35	0.20	0.16	0.06	0.02	0.41	0.79
Total (Waves 1-10)	0.28	0.11	0.17	0.06	0.03	0.34	0.81

Notes: Column 1 indicates the fraction of respondents mentioning inflation in response to the open-ended survey question based on manual coding by RAs. Columns 2-5 show the fractions of respondents mentioning specific words based on automated counts of the following words "inflation" (Column 2), "preis" (Column 3), "koste" (Column 4) + at least one out of the following: "steig", "stieg", "erhöh", "anheb", or "hoch"; "teuer" or "teurer" (Column 5). Column 6 shows the fraction of respondents for which at least one of the words and word combinations from Columns 2-5 is mentioned. Column 7 depicts the correlation coefficient between hand-coded data (Column 1) and automated word count (Column 6). Panel A focuses on households, while Panel B focuses on firms.

Table A.2: Correlation between hand-coded and AI-coded open-ended data on attention

	Hand-coded				
	(1) Covid-19	(2) Inflation	(3) Growth	(4) Any macro	(5) Any personal
AI-coded: Covid-19	0.997***	-0.079	-0.004		
	(0.004)	(0.070)	(0.007)		
AI-coded: Inflation	-0.006	0.808***	0.015		
	(0.006)	(0.032)	(0.013)		
AI-coded: Growth	-0.003	0.421**	0.746***		
	(0.004)	(0.205)	(0.219)		
AI-coded: Any macro topic				0.727***	0.014
				(0.051)	(0.045)
AI-coded: Any household-level topic				0.004	0.680***
				(0.050)	(0.058)
Observations	200	200	200	200	200
R-squared	0.66	0.52	0.75	0.53	0.52
Mean dep. var.	0.01	0.36	0.01	0.45	0.72

Notes: This table presents a validation exercise for the hand-coding of the open-ended data based on a subsample from the household survey wave in March 2023, which was both hand-coded and AI-coded using GPT-4. It regresses dummy variables indicating whether a respondent pays attention to a given topic according to the AI-coding on dummy variables indicating whether a respondent pays attention to a given topic according to the hand-coding. Robust standard errors are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Table A.3: Correlation between attention as measured in open-ended and as measured in structured survey question

	Open-ended					
	(1)	(2)	(3)	(4)	(5)	(6)
	Covid-19	Inflation	Monetary policy	Growth	Any macro topic	Any household-level topic
Structured: Covid-19	0.098*	-0.032	-0.012*	0.012		
	(0.053)	(0.086)	(0.007)	(0.040)		
Structured: Inflation	0.008*	0.159***	0.008*	0.002		
	(0.005)	(0.041)	(0.004)	(0.014)		
Structured: Monetary policy	-0.008	0.040	0.032	0.039*		
	(0.005)	(0.059)	(0.024)	(0.023)		
Structured: Growth	-0.018*	0.089	-0.006	0.072**		
	(0.010)	(0.062)	(0.020)	(0.029)		
Structured: Any macro topic					0.151***	-0.032
					(0.049)	(0.050)
Structured: Any household-level topic					-0.072	0.469**
					(0.203)	(0.192)
Observations	468	468	468	468	468	468
R-squared	0.10	0.04	0.02	0.04	0.01	0.02
Mean dep. var.	0.01	0.26	0.01	0.03	0.29	0.79

Notes: This table presents a validation exercise of our hand-coded attention data based on an additional German household survey run with Prolific in September 2023. It regresses dummy variables indicating whether a respondent pays attention to a given topic according to the open-ended data on dummy variables indicating whether a respondent pays attention to a given topic according to a structured survey question included later in the survey. Robust standard errors are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Table A.4: Attention: New vs. recontacted respondents

	Attention to					
	(1)	(2)	(3)	(4)	(5)	(6)
	Covid-19	Inflation	Monetary policy	Growth	Any macro topic	Any household- or firm-level topic
Panel A: Households						
Recontact	-0.003	0.008	-0.001	-0.002	-0.015	0.002
	(0.006)	(0.008)	(0.002)	(0.002)	(0.010)	(0.009)
Distinct respondents	10,758	10,758	10,758	10,758	10,758	10,758
Observations	34,980	34,980	34,980	34,980	34,980	34,980
R-squared	0.03	0.11	0.00	0.00	0.07	0.02
Mean dep. var.	0.06	0.19	0.01	0.01	0.30	0.75
SD dep. var.	0.24	0.39	0.09	0.09	0.46	0.43
Panel B: Firms						
Recontact	-0.000	-0.015	0.002	-0.007	-0.024*	-0.017*
	(0.010)	(0.011)	(0.004)	(0.007)	(0.012)	(0.010)
Distinct respondents	6,283	6,283	6,283	6,283	6,283	6,283
Observations	28,885	28,885	28,885	28,885	28,885	28,885
R-squared	0.13	0.10	0.01	0.01	0.02	0.02
Mean dep. var.	0.18	0.28	0.03	0.08	0.67	0.80
SD dep. var.	0.38	0.45	0.17	0.26	0.47	0.40
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual/Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table displays regressions of a household's (Panel A) or firm's (Panel B) attention to a given topic (indicated at the top) as measured in the open-ended data on a dummy taking value zero for respondents that participate in the panel for the first time and one for those being recontacted in a later wave. All regressions control for survey wave fixed effects as well as household or firm fixed effects. Standard errors clustered at the household/firm level are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Table A.5: Correlates of fixed effects in attention: Households

	Attention				
	(1)	(2)	(3)	(4)	(5)
	Inflation	Monetary policy	Growth	Any macro topic	Any household-level topic
Self-reported exposure (z)	0.050***	0.003***	0.004***	0.064***	0.019***
	(0.002)	(0.001)	(0.001)	(0.003)	(0.003)
Information acquisition costs (z)	-0.015***	-0.001	0.001	-0.019***	-0.013***
	(0.003)	(0.001)	(0.001)	(0.004)	(0.004)
Female	0.005	-0.003***	-0.003**	0.003	0.054***
	(0.005)	(0.001)	(0.001)	(0.007)	(0.007)
Age	0.002***	0.000***	-0.000	0.002***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
At least high school	0.004	0.005***	0.001	0.039***	0.049***
	(0.005)	(0.001)	(0.001)	(0.007)	(0.007)
Employed	-0.001	-0.000	0.002	-0.004	-0.029***
	(0.006)	(0.001)	(0.002)	(0.008)	(0.009)
Log(Income)	0.000	0.000	0.000	-0.011*	0.018***
	(0.004)	(0.001)	(0.001)	(0.006)	(0.006)
Home owner	-0.008	0.003**	-0.001	-0.013	-0.021***
	(0.006)	(0.001)	(0.001)	(0.008)	(0.008)
Stock owner	-0.008	0.003**	0.002	-0.014	0.018**
	(0.006)	(0.001)	(0.001)	(0.008)	(0.008)
Observations	10,758	10,758	10,758	10,758	10,758
R-squared	0.06	0.01	0.01	0.05	0.04

Notes: This table displays regressions of a household's average attention to a given topic (indicated at the top) as measured in the open-ended data after purging of survey wave fixed effects on a set of covariates. "Self-reported exposure" indicates the average of the respondent's reports on whether the respective variable is relevant for the economic situation of the household (again purged of survey wave fixed effects), which is elicited on a categorical five-point scale ranging from "not important" to "very important". For macro topics (Column 4), this variable is defined as the respondent's mean exposure across inflation, monetary policy, and growth, and for household-level topics, it refers to a respondent's mean exposure across occupation-level labor market developments and local costs of living. "Information acquisition costs" capture a household's perceived difficulty of finding relevant information about the development of the economy on a categorical five-point scale. The exposure and information acquisition costs measures are standardized using the mean and standard deviation in the sample. We further control for a respondent's gender, age, education, employment status, household income, homeownership, and stock ownership. Robust standard errors are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Table A.6: Correlates of fixed effects in attention: Firms

	Attention				
	(1) Inflation	(2) Monetary policy	(3) Growth	(4) Any macro topic	(5) Any firm-level topic
Self-reported exposure (z)	0.050***	0.020***	0.014***	0.045***	
	(0.004)	(0.002)	(0.002)	(0.004)	
High influence on decisions in firm	-0.029**	-0.001	-0.006	0.003	0.050***
	(0.012)	(0.005)	(0.007)	(0.014)	(0.012)
Log(Employees)	0.006**	0.002*	0.004**	0.014***	0.012***
	(0.003)	(0.001)	(0.002)	(0.003)	(0.002)
Export share	-0.037*	-0.008	0.033**	0.030	-0.055**
	(0.022)	(0.007)	(0.015)	(0.027)	(0.022)
Services firm	-0.120***	0.026***	-0.002	-0.007	-0.040***
	(0.010)	(0.004)	(0.006)	(0.012)	(0.010)
Construction firm	-0.003	0.056***	0.004	-0.005	-0.037**
	(0.017)	(0.009)	(0.010)	(0.018)	(0.015)
Retail/Wholesale firm	-0.053***	0.018***	-0.014**	0.002	-0.015
	(0.012)	(0.004)	(0.007)	(0.013)	(0.011)
Observations	6,283	6,283	6,283	6,283	6,283
R-squared	0.08	0.05	0.01	0.03	0.02

Notes: This table displays regressions of a firm's average attention to a given topic (indicated at the top) as measured in the open-ended data after purging of survey wave fixed effects on a set of covariates. "Self-reported exposure" indicates the average of the respondent's reports on whether the respective variable is relevant for the economic situation of the firm (again purged of survey wave fixed effects), which is elicited on a categorical five-point scale ranging from "not important" to "very important". For macro topics (Column 4), this variable is defined as the respondent firm's mean exposure across inflation, monetary policy, and growth. We did not elicit a firm's exposure to local topics, which is why this variable is not included in the specification in Column 5. The exposure measure is standardized using the mean and standard deviation in the sample. We further control for the respondent's influence on decisions in the firm, the firm's number of employees (in logs) and export share, as well as dummies for four broad industry groups. Robust standard errors are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Table A.7: Co-movement of attention to different topics: Robustness

	Attention to any macro topic (baseline)		Attention to any macro topic excl. Covid-19	
	(1)	(2)	(3)	(4)
Panel A: Households				
Attention to any household-level topic	-0.191***	-0.279***	-0.164***	-0.245***
	(0.007)	(0.008)	(0.007)	(0.007)
Distinct respondents	10,758	7,126	10,758	7,126
Observations	34,980	31,348	34,980	31,348
R-squared	0.07	0.47	0.10	0.47
Panel B: Firms				
Attention to any firm-level topic	-0.301***	-0.281***	-0.276***	-0.266***
	(0.007)	(0.008)	(0.008)	(0.008)
Distinct respondents	6,283	4,952	6,283	4,952
Observations	28,885	27,554	28,885	27,554
R-squared	0.07	0.37	0.08	0.38
Controls	Yes	No	Yes	No
Time FE	Yes	Yes	Yes	Yes
Individual FE	No	Yes	No	Yes

Notes: This table displays regressions of dummy variables indicating households' (Panel A) and firms' (Panel B) attention to macroeconomic topics – i.e., an indicator taking value one if any macroeconomic topic is mentioned in response to the open-ended survey question – on dummy variables indicating attention to household-level or firm-level topics, respectively. Columns 1 and 2 replicate the baseline results displayed in Columns 7 and 8 of Table 4. In Columns 3 and 4, Covid-19 is dropped from the macroeconomic topics (and also not coded as a household- or firm-level topic). Columns 1 and 3 control for the individual's gender, age, education, employment status, household income, homeownership, and stock ownership, and the respondent's influence on decisions in the firm, the firm's number of employees (in logs) and export share, as well as dummies for four broad industry groups, respectively. Columns 2 and 4 instead control for household and firm fixed effects, respectively, and thus drop singleton observations. All specifications control for survey wave fixed effects. Standard errors clustered at the household/firm level are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Table A.8: Attention and beliefs: Within-individual patterns

	Absolute change in expectation ≥ 0.5 p.p.	Confidence (z)	Expected inflation	Absolute deviation from expert forecast	Perceived current inflation	Absolute deviation from current level
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Households						
Attention to inflation	0.014	0.022*	0.430***	0.406***	0.114*	0.013
	(0.009)	(0.013)	(0.071)	(0.070)	(0.068)	(0.057)
Distinct respondents	4,720	7,126	7,126	7,126	5,568	5,568
Observations	18,987	31,348	31,348	31,348	21,645	21,645
R-squared	0.28	0.66	0.68	0.66	0.65	0.61
Mean dep. var.	0.79	0.06	6.93	4.67	6.30	2.53
SD dep. var.	0.41	0.98	6.12	5.74	4.97	3.93
Panel B: Firms						
Attention to inflation	0.005	0.023*	0.168***	0.163***		
	(0.008)	(0.013)	(0.033)	(0.032)		
Distinct respondents	3,484	4,820	4,892	4,892		
Observations	17,508	25,753	26,769	26,769		
R-squared	0.22	0.55	0.75	0.62		
Mean dep. var.	0.80	0.04	5.46	2.99		
SD dep. var.	0.40	1.02	3.41	2.69		
Controls	No	No	No	No	No	No
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual/Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table displays regressions of households' (Panel A) and firms' (Panel B) beliefs on attention to inflation – i.e., an indicator taking value one if inflation is mentioned in response to the open-ended survey question. The dependent variables are an indicator that is one if the respondent changed 12-month ahead inflation expectations by at least 0.5 p.p. between the previous and the current survey wave (Column 1), a respondent's confidence in their own inflation forecast (z-scored, Column 2), expected inflation over the next twelve months (Column 3), the absolute deviation of expected inflation from the mean professional forecast from FocusEconomics (Column 4), a respondent's perception of the current inflation rate over the last 12 months (Column 5), and the absolute deviation of this perception from the actually realized current inflation rate (Column 6). Besides survey wave fixed effects, all regressions control for household or firm fixed effects, and thus drop singleton observations. For a version without fixed effects, see Table 5. Standard errors clustered at the household/firm level are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Table A.9: Attention and disagreement about the current inflation rate

	Households		
	(1) SD	(2) IQR	(3) p90-p10
Full Sample: 2021m9 – 2023m3			
(A) Attentive to inflation	4.06	2.67	5.16
(IA) Inattentive to inflation	5.25	2.80	6.82
p-value: (A)=(IA)	0.00	0.05	0.00
Period 2: 2021m9 – 2021m12			
(A) Attentive to inflation	3.19	2.00	3.90
(IA) Inattentive to inflation	5.21	2.50	5.13
p-value: (A)=(IA)	0.00	0.00	0.00
Period 3: 2022m3 – 2022m9			
(A) Attentive to inflation	4.36	2.85	5.41
(IA) Inattentive to inflation	5.54	3.15	7.51
p-value: (A)=(IA)	0.00	0.01	0.00
Period 4: 2022m12 – 2023m3			
(A) Attentive to inflation	4.00	2.34	6.00
(IA) Inattentive to inflation	4.76	3.00	7.84
p-value: (A)=(IA)	0.00	0.00	0.00

Notes: This table displays the standard deviation, the interquartile range, and the range between the 90th and 10th percentile of the perceived inflation rate over the 12 months before the survey separately for respondents in the household panel that pay attention to inflation according to our text-based measure and those who do not. Before calculating the dispersion measures, the data are purged of survey wave fixed effects. The displayed p-values refer to tests of the equality of standard deviations (Column 1, Levene's test) and tests of the equality of the interquartile range and the range between the 90th and 10th percentile (remaining columns, bootstrapped) between respondents that are attentive (A) and respondents that are inattentive (IA) to inflation according to the open-ended measure.

Table A.10: Experiences and attention: Robustness

	Attention to inflation									Attention to macro without inflation or mon. pol.		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Cohorts that experienced oil crises												
× 1(t ∈ {21m9, 21m12})	0.036***	0.038***	0.038***							0.013		
	(0.009)	(0.009)	(0.009)							(0.011)		
× 1(t ∈ {22m3, 22m6, 22m9})	0.030**	0.026*	0.025*							0.020*		
	(0.013)	(0.013)	(0.013)							(0.011)		
× 1(t ∈ {22m12, 23m3})	0.003	0.006	0.005							0.008		
	(0.016)	(0.017)	(0.017)							(0.012)		
Infl. experience: Income loss												
× 1(t ∈ {21m9, 21m12})				0.025***	0.025***	0.019**					-0.011	
				(0.010)	(0.010)	(0.010)					(0.012)	
× 1(t ∈ {22m3, 22m6, 22m9})				0.050***	0.050***	0.036**					-0.014	
				(0.014)	(0.014)	(0.014)					(0.013)	
× 1(t ∈ {22m12, 23m3})				0.050***	0.050***	0.040**					-0.019	
				(0.018)	(0.018)	(0.018)					(0.014)	
Infl. experience: Wealth loss												
× 1(t ∈ {21m9, 21m12})							0.025**	0.027**	0.019			-0.003
							(0.012)	(0.012)	(0.012)			(0.015)
× 1(t ∈ {22m3, 22m6, 22m9})							0.046***	0.044**	0.030*			-0.015
							(0.018)	(0.018)	(0.018)			(0.017)
× 1(t ∈ {22m12, 23m3})							0.017	0.018	0.005			-0.015
							(0.023)	(0.023)	(0.023)			(0.017)
High news consumption on inflation (pre-shock)												
× 1(t ∈ {21m9, 21m12})		0.002			-0.004			-0.007				
		(0.009)			(0.009)			(0.010)				
× 1(t ∈ {22m3, 22m6, 22m9})		0.015			0.012			0.008				
		(0.013)			(0.014)			(0.014)				
× 1(t ∈ {22m12, 23m3})		0.000			-0.004			-0.005				
		(0.017)			(0.018)			(0.018)				
High self-reported exposure to infl. (pre-shock)												
× 1(t ∈ {21m9, 21m12})			0.038***			0.035***			0.036***			
			(0.009)			(0.009)			(0.009)			
× 1(t ∈ {22m3, 22m6, 22m9})			0.099***			0.092***			0.095***			
			(0.013)			(0.014)			(0.014)			
× 1(t ∈ {22m12, 23m3})			0.075***			0.060***			0.066***			
			(0.017)			(0.018)			(0.018)			
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distinct respondents	7,126	5,662	5,662	4,913	4,913	4,913	4,913	4,913	4,913	7,126	4,913	4,913
Observations	31,348	26,432	26,432	23,820	23,820	23,820	23,820	23,820	23,820	31,348	23,820	23,820
R-squared	0.45	0.44	0.44	0.43	0.43	0.43	0.43	0.43	0.43	0.37	0.35	0.35
Mean dep. var.	0.20	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.12	0.13	0.13
SD dep. var.	0.40	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.33	0.34	0.34

Notes: The dependent variables are a household's attention to inflation (Columns 1-9) and a household's attention to macroeconomic topics excluding inflation and monetary policy as measured in the open-ended data (Columns 10-12). The first experience measure is an indicator for cohorts aged 55+ at the time of the survey, i.e., those who were at least teenagers during the oil crises of the 1970s. The second and third measure use information on whether the respondent has ever experienced a real income loss or a real wealth loss due to inflation elicited in the pre-shock period (March and June 2021) and assign this value to all waves. We use the first observation for those that responded to the question in multiple waves. The interaction terms interact dummies for time periods with the respective experience measure, i.e., they estimate a differential effect relative to the base period (December 2020-June 2021). All specifications include individual fixed effects and survey wave fixed effects, and thus drop singleton observations. "High news consumption on inflation" is a dummy variable taking value one for respondents with an above-median average consumption of inflation news during the pre-shock period, as measured on a categorical eleven-point scale. "High self-reported exposure to inflation" is a dummy variable taking value one for respondents with an above-median average exposure to inflation in the pre-shock period, as measured on a categorical five-point scale. Standard errors are clustered at the household level. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Table A.11: Experiences and beliefs: Robustness

	Expected inflation next 12 months								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Cohorts that experienced oil crises									
× 1(t ∈ {21m9, 21m12})	0.565***	0.617***	0.610***						
	(0.130)	(0.129)	(0.129)						
× 1(t ∈ {22m3, 22m6, 22m9})	1.029***	1.000***	0.995***						
	(0.162)	(0.166)	(0.165)						
× 1(t ∈ {22m12, 23m3})	1.042***	0.973***	0.958***						
	(0.188)	(0.196)	(0.195)						
Infl. experience: Income loss									
× 1(t ∈ {21m9, 21m12})				0.175	0.176	0.103			
				(0.137)	(0.137)	(0.141)			
× 1(t ∈ {22m3, 22m6, 22m9})				0.681***	0.682***	0.570***			
				(0.176)	(0.176)	(0.179)			
× 1(t ∈ {22m12, 23m3})				0.606***	0.615***	0.446**			
				(0.209)	(0.209)	(0.211)			
Infl. experience: Wealth loss									
× 1(t ∈ {21m9, 21m12})							0.030	0.038	-0.050
							(0.176)	(0.177)	(0.177)
× 1(t ∈ {22m3, 22m6, 22m9})							0.582**	0.599**	0.456*
							(0.232)	(0.234)	(0.233)
× 1(t ∈ {22m12, 23m3})							0.635**	0.695***	0.449*
							(0.258)	(0.258)	(0.260)
High news consumption on inflation (pre-shock)									
× 1(t ∈ {21m9, 21m12})		0.004			-0.047			-0.043	
		(0.129)			(0.136)			(0.137)	
× 1(t ∈ {22m3, 22m6, 22m9})		-0.032			-0.042			-0.092	
		(0.166)			(0.175)			(0.177)	
× 1(t ∈ {22m12, 23m3})		-0.313			-0.294			-0.355*	
		(0.194)			(0.207)			(0.207)	
High self-reported exposure to infl. (pre-shock)									
× 1(t ∈ {21m9, 21m12})			0.496***			0.476***			0.495***
			(0.129)			(0.140)			(0.138)
× 1(t ∈ {22m3, 22m6, 22m9})			0.845***			0.701***			0.738***
			(0.165)			(0.178)			(0.177)
× 1(t ∈ {22m12, 23m3})			1.073***			1.055***			1.069***
			(0.193)			(0.209)			(0.209)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distinct respondents	7,925	6,460	6,460	5,404	5,404	5,404	5,404	5,404	5,404
Observations	36,451	31,533	31,533	27,913	27,913	27,913	27,913	27,913	27,913
R-squared	0.67	0.66	0.66	0.65	0.65	0.65	0.65	0.65	0.65
Mean dep. var.	6.67	6.31	6.31	6.27	6.27	6.27	6.27	6.27	6.27
SD dep. var.	6.29	6.15	6.15	6.10	6.10	6.10	6.10	6.10	6.10

Notes: The dependent variable is a household's expected inflation over the next 12 months. The first experience measure is an indicator for cohorts aged 55+ at the time of the survey, i.e., those who were at least teenagers during the oil crises of the 1970s. The second and third measure use information on whether the respondent has ever experienced a real income loss or a real wealth loss due to inflation elicited in the pre-shock period (March and June 2021) and assign this value to all waves. We use the first observation for those that responded to the question in multiple waves. The interaction terms interact dummies for time periods with the respective experience measure, i.e., they estimate a differential effect relative to the base period (December 2020-June 2021). All specifications include individual fixed effects and survey wave fixed effects, and thus drop singleton observations. "High news consumption on inflation" is a dummy variable taking value one for respondents with an above-median average consumption of inflation news during the pre-shock period, as measured on a categorical eleven-point scale. "High self-reported exposure to inflation" is a dummy variable taking value one for respondents with an above-median average exposure to inflation in the pre-shock period, as measured on a categorical five-point scale. Standard errors are clustered at the household level. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Table A.12: Summary statistics: Survey of Consumer Expectations

	SCE sample					
	(1) Mean	(2) p25	(3) Median	(4) p75	(5) SD	(6) N
Female	0.49	0.00	0.00	1.00	0.50	42,143
Age	49.84	37.00	49.00	63.00	15.44	42,158
Census region: Midwest	0.25	0.00	0.00	1.00	0.43	42,156
Census region: Northeast	0.19	0.00	0.00	0.00	0.39	42,156
Census region: South	0.35	0.00	0.00	1.00	0.48	42,156
Census region: West	0.21	0.00	0.00	0.00	0.41	42,156
Log(HH gross income)	11.12	10.71	11.12	11.74	0.82	41,801
At least highschool	0.58	0.00	1.00	1.00	0.49	42,143
Employed	0.68	0.00	1.00	1.00	0.47	42,158
Homeowner	0.72	0.00	1.00	1.00	0.45	42,155

Notes: This table provides summary statistics for our sample from the New York's Fed Survey of Consumer Expectations (SCE). The sample includes observations from between May 2020 and March 2023.

C Full list of codes for classification of open-ended data

In this appendix, we present the full list of codes and explanations that we initially handed out to research assistants to code the open-ended responses to the question: *What topics come to mind when you think about the economic situation of your household/company?* Each response could receive multiple codes. Some topics appear both as a macro and as a household- or firm-level code, which were meant to be used depending on the context. Research assistants were instructed to err on the side of using the household- or firm-level instead of the macro code in unclear or ambiguous cases.

Table A.13: List of codes for classification of open-ended data: Macroeconomic topics

Category	Explanation
Covid-19	Everything related to the pandemic (also if personal consequences of the pandemic for the respondents' household are mentioned – in that case indicate "corona" under "macro topic" and the specific personal consequences under the respective "personal topic"), Covid, corona, pandemic, lockdown.
Inflation	Inflation, rising prices, price level, price increase, purchasing power, gas prices, electricity prices.
Monetary policy	Interest rates, monetary policy, central bank, ECB, negative interest rate.
Growth	Economic growth, GDP, general economic situation, aggregate economy, business cycle, upswing, downturn, insolvencies, company bankruptcies, aggregate demand, overall industrial production, economic crisis, recession.
Labor market	Short-time work, employment, labor market, unemployment rate.
Stock market	DAX, stock exchange, stock market.
Housing market	Housing/residential market, real estate prices, rents
Fiscal policy	tax policy; general generosity of welfare system, government debt: overall financial situation of the government/state, deficit, public debt, public budget (deficit/surplus), value-added tax (reduction).
Regulation	Regulation, minimum wage, subsidies (R&D grants/funding).
Structural transformation	Long-term trends in the economy, digitalization, structural change, structural problems.
Trade	Imports, exports, outsourcing, foreign countries (e.g., "US elections", "Brexit"), globalization, etc.
Pension system	Pension system, old-age poverty.
Health system	Healthcare system, nursing care, shortage of nurses.
Education	Education system, vocational training, universities, schools, research, development.
Inequality	Inequality, income distribution, wealth distribution, social gap, poverty, social equity, gender inequality.
Migration	(Im-)migration, asylum seekers, refugees.
Environment/ Climate change	Environment, pollution, climate, climate crisis.
Uncertainty	Uncertainty about macroeconomic development.
Other	Residual code for macro topics.

Notes: This table lists all macroeconomic topics in our coding scheme and provides an explanation for each topic.

Table A.14: List of codes for classification of open-ended data: Household-level topics

Category	Explanation
Overall situation	General financial and economic situation of the household.
Spending	Expenditure/spending, consumption.
Income	Income, liquidity, money troubles, shortage/lack of money, insufficient financial security, etc.
Job situation	Job loss, job security, job search, short-time work.
Saving	Capital accumulation, retirement provision, old-age provision, building up reserves.
Financial assets	Shares, other financial investments, investment decisions.
Housing costs	Rental costs, house prices, ancillary leasing costs.
Debt	Debt, loans, amortisation payments, interest payments on existing debt, etc.
Health issues	Health risks, medical expenses.
Insurance	Insurance, protection, provision.
Uncertainty	Uncertainty about the financial and economic future of the household/the individual.
Other	Residual code for household-level topics.

Notes: This table lists all household-level topics in our coding scheme and provides an explanation for each topic.

Table A.15: List of codes for classification of open-ended data: Firm-level topics

Category	Explanation
Overall situation	Overall situation of firm.
Costs	Energy costs, material costs, purchase prices, prices of intermediate inputs, labor costs, freight costs.
Supply chain	Problems with supply chain, bottlenecks in primary products/raw materials, logistics problems, suppliers.
Demand	Sales, demand, customers, orders/order situation/order backlog, competitive pressure.
Labor input	Labor shortage, shortage of skilled workers, vacancies, layoffs, personnel development, (vocational) training.
Profits/ Profitability	profits, margin, EBIT, profitability.
Liquidity/ Solvency	Liquidity, reserves, equity, insolvency.
Process organization	Work processes, digitalization, work-from-home, restructuring, process optimization.
Government aid programs	KfW loans (Investment Bank of German Government), financial aid and governmental crisis response programs (e.g., in response to Covid crisis) (all if related to own firm, only).
R&D	Innovation, quality improvement, product development.
Regulation	Approval processes/authorization procedures, bureaucracy/relation to public/tax authorities, public tender offers, taxation system/tax burden, environmental requirements (all if related to own firm, only).
Financing	Financing conditions, lending, debt.
Short time work	Employees put to short-time work, short-time work announced by the firm to the Federal Employment Agency.
Capacity utilization	Utilization of production capacities.
Rent and housing costs	Rent, housing costs.
Investment	Investment.
Uncertainty	Uncertainty regarding future development of firm.
Other	Residual code for firm-level topics.

Notes: This table lists all firm-level topics in our coding scheme and provides an explanation for each topic.

D Instructions of panel surveys

This Appendix provides an overview of the translated and original survey instructions of the key questions in the household and firm surveys. We provide an overview of the main questions (asked in all waves) as well as additional questions only asked in subsets of the waves. In principle, the survey is identical for the household and firm panels. However, some questions are only asked in the household panel due to space constraints in the firm survey. Moreover, the wording of some questions is slightly tailored to better fit the respective situation of households and firms. Section D.1 provides instructions translated to English, while Section D.2 provides the original instructions in German.

D.1 English translation

D.1.1 Core instructions included in all waves

Attention:

What topics come to mind when you think about the economic situation of your company/household?

_____

Expected inflation:

What do you think, what will the inflation rate (measured by the consumer price index) likely be in Germany over the next 12 months (i.e., until XXX)? __%

Confidence in forecast:

How certain are you about your previous estimate?
very uncertain ☐ ☐ ☐ ☐ ☐ very certain

D.1.2 Additional instructions included in subsets of the waves

Perceived current inflation (household survey only, starting 2021m9):

What do you think was the inflation rate in Germany over the last 12 months (i.e., from XXX to XXX)? __%

Experienced income loss (household survey only, 2021m3 & 2021m6):

Has your household income ever increased significantly less than the general price level?
☐ Yes ☐ No

Experienced wealth loss (household survey only, 2021m3 & 2021m6):

Has your wealth ever lost significant value due to inflation?
☐ Yes ☐ No

Minutes spent on inflation news (HH: 2021m12-2022m12; Firms: 2021m12-2022m9):

What do you think, how much time have you spent consuming news on inflation from various media (TV, newspaper, news websites, radio etc.) in the past 7 days?
☐ Less than 5 minutes
☐ Between 5 minutes and 10 minutes
☐ Between 10 minutes and 30 minutes
☐ Between 30 minutes and 60 minutes
☐ More than 60 minutes

Consumed reports on inflation (2021m9-2022m12):

How many reports on inflation in Germany do you estimate you have seen or heard in the last 3 months in the following media?

- Television
  none ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ 10 or more
- Newspapers/News websites
  none ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ 10 or more
- Radio
  none ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ 10 or more

Information acquisition costs (household survey only, 2021m9):
Imagine that you wanted to inform yourself about the development of the economy (e.g., inflation) in Germany. How difficult would it be for you to find relevant information about the development of the economy?
very easy ☐ ☐ ☐ ☐ ☐ very difficult

Self-reported exposure (HH: all waves, firms: 2021m9-2023m3):
To what extent do you agree with the following statements?

- Inflation in Germany is important for the economic situation of my firm/household.
  strongly disagree ☐ ☐ ☐ ☐ ☐ strongly agree
- Monetary policy of the ECB (e.g., interest rate policy) is important for the economic situation of my firm/household.
  strongly disagree ☐ ☐ ☐ ☐ ☐ strongly agree
- Economic growth in Germany is important for the economic situation of my firm/household.
  strongly disagree ☐ ☐ ☐ ☐ ☐ strongly agree
- (Household survey only:) The development of labor market conditions in my occupation are important for the economic situation of my household.
  strongly disagree ☐ ☐ ☐ ☐ ☐ strongly agree
- (Household survey only:) The costs of living in our location are important for the economic situation of my household.
  strongly disagree ☐ ☐ ☐ ☐ ☐ strongly agree

D.2 Original instructions in German

D.2.1 Core instructions included in all waves

Attention:

Welche Themen kommen Ihnen in den Sinn, wenn Sie an die wirtschaftliche Situation Ihres Unternehmens/Haushalts denken? _____

Expected inflation:

Was denken Sie, wie hoch wird die Inflationsrate (gemessen am Verbraucherpreisindex) über die nächsten 12 Monate (also bis zum XXX) in Deutschland wahrscheinlich sein? __%

Confidence in forecast:

Wie sicher sind Sie sich bei dieser Einschätzung?
sehr unsicher ☐ ☐ ☐ ☐ ☐ sehr sicher

D.2.2 Additional instructions included in subsets of the waves

Perceived current inflation (household survey only, starting 2021m9):

Was denken Sie, wie hoch war die Inflationsrate in Deutschland über die letzten 12 Monate (also über den Zeitraum von XXX bis XXX)? __%

Experienced income loss (household survey only, 2021m3 & 2021m6):

Ist Ihr Haushaltseinkommen schon einmal deutlich weniger stark gestiegen als das allgemeine Preisniveau?
☐ Ja ☐ Nein

Experienced wealth loss (household survey only, 2021m3 & 2021m6):

Hat Ihr Vermögen schon einmal aufgrund von Inflation stark an Wert verloren?
☐ Ja ☐ Nein

Minutes spent on inflation news (HH: 2021m12-2022m12; Firms: 2021m12-2022m9):

Was schätzen Sie, wieviel Zeit haben Sie in den letzten 7 Tagen insgesamt damit verbracht, Nachrichten zur Inflation in verschiedenen Medien (Fernsehen, Zeitung, Nachrichten-Websites, Radio, etc.) zu konsumieren?
☐ Weniger als 5 Minuten
☐ Zwischen 5 Minuten und 10 Minuten
☐ Zwischen 10 Minuten und 30 Minuten
☐ Zwischen 30 Minuten und 60 Minuten
☐ Mehr als 60 Minuten

Consumed reports on inflation (2021m9-2022m12):

Was schätzen Sie, wie viele Berichte zur Inflation in Deutschland haben Sie in den letzten 3 Monaten in den folgenden Medien gesehen bzw. gehört?

- Fernsehen
  keine ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ 10 und mehr
- Zeitungen/Nachrichten-Websites
  keine ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ 10 und mehr
- Radio
  keine ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ 10 und mehr

Information acquisition costs (household survey only, 2021m9):
Stellen Sie sich vor, Sie wollen sich über die Entwicklung der Wirtschaft (wie z.B. der Inflation) in Deutschland informieren. Wie schwierig wäre es für Sie, relevante Informationen über die Entwicklung der Wirtschaft zu finden?
sehr leicht ☐ ☐ ☐ ☐ ☐ sehr schwierig

Self-reported exposure (HH: all waves, firms: 2021m9-2023m3):
Inwiefern stimmen Sie den folgenden Aussagen zu?

- Die Inflation in Deutschland ist wichtig für die derzeitige wirtschaftliche Situation unseres Unternehmens/meines Haushalts.
  stimme nicht zu ☐ ☐ ☐ ☐ ☐ stimme voll zu
- Die Geldpolitik der EZB (z.B. Zinspolitik) ist wichtig für die derzeitige wirtschaftliche Situation unseres Unternehmens/meines Haushalts.
  stimme nicht zu ☐ ☐ ☐ ☐ ☐ stimme voll zu
- Das Wirtschaftswachstum in Deutschland ist wichtig für die derzeitige wirtschaftliche Situation unseres Unternehmens/meines Haushalts.
  stimme nicht zu ☐ ☐ ☐ ☐ ☐ stimme voll zu
- (Household survey only:) Die Entwicklung des Arbeitsmarkts für meine Berufsgruppe ist wichtig für die derzeitige wirtschaftliche Situation meines Haushalts.
  stimme nicht zu ☐ ☐ ☐ ☐ ☐ stimme voll zu
- (Household survey only:) Die Entwicklung der Lebenshaltungskosten in meiner Wohngegend ist wichtig für die derzeitige wirtschaftliche Situation meines Haushalts.
  stimme nicht zu ☐ ☐ ☐ ☐ ☐ stimme voll zu

E Instructions of validation survey

This Appendix provides an overview of the translated and original survey instructions of the key questions in the validation survey that we conducted with a sample of German households in September 2023 on the platform Prolific. Section E.1 provides instructions translated to English, while Section E.2 provides the original instructions in German.

E.1 English translation

Attention: open-ended:

What topics come to mind when you think about the economic situation of your household?

_____

Attention: structured (randomized order of response options, except last):

Now please think again about the economic situation of your household. Which of the following topics come to mind? Please check all that apply.
☐ Covid-19 pandemic
☐ Inflation in Germany
☐ Interest rates and monetary policy of the European Central Bank (ECB)
☐ Economic growth in Germany
☐ The German labor market
☐ The German stock market
☐ The German real estate market
☐ Russia's war against Ukraine
☐ Energy supply in Germany
☐ Consumption spending of your household
☐ Your household income
☐ Job situation of the household members
☐ Savings behavior of your household
☐ Financial assets of your household
☐ Your expenditure on rent and housing
☐ Your household's cost of living
☐ Your household's debt
☐ None of the topics mentioned

E.2 Original instructions in German

Attention: open-ended:

Welche Themen kommen Ihnen in den Sinn, wenn Sie an die wirtschaftliche Situation Ihres Haushalts denken? _____

Attention: structured (randomized order of response options, except last):

Denken Sie nun bitte nochmals an die wirtschaftliche Situation Ihres Haushalts. Welche der folgenden Themen kommen Ihnen dabei in den Sinn? Bitte kreuzen Sie alle zutreffenden

Themen an.
☐ Covid-19 Pandemie
☐ Inflation in Deutschland
☐ Zinsen und Geldpolitik der Europäischen Zentralbank (EZB)
☐ Wirtschaftswachstum in Deutschland
☐ Der deutsche Arbeitsmarkt
☐ Der deutsche Aktienmarkt
☐ Der deutsche Immobilienmarkt
☐ Russlands Krieg gegen die Ukraine
☐ Energieversorgung in Deutschland
☐ Konsumverhalten Ihres Haushalts
☐ Ihr Haushaltseinkommen
☐ Arbeitsplatzsituation der Haushaltsmitglieder
☐ Sparverhalten Ihres Haushalts
☐ Finanzanlagen Ihres Haushalts
☐ Ihre Ausgaben für Miete und Wohnen
☐ Lebenshaltungskosten Ihres Haushalts
☐ Schulden Ihres Haushalts
☐ Keines der genannten Themen