Consumers' Macroeconomic Expectations

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Abstract

After the financial crisis of 2008, central banks around the world have increased their communication efforts to reach consumers, with the aim of both guiding and anchoring their inflation expectations. For the expectations channel of monetary policy to work as intended, central banks need a thorough understanding of the formation process of expectations by the general public and of the relationship between expectations and economic choices. This warrants reliable and detailed data on consumers' expectations of macroeconomic variables such as inflation or interest rates. We thus survey the available survey data and issues regarding the measurement of macroeconomic expectations. Furthermore, we discuss the research frontier on important aspects of the expectations channel: We evaluate the evidence on whether expectations are formed consistently with standard macroeconomic relationships, discuss the insights with respect to the anchoring of inflation expectations, explore the role of narratives and preferences and lastly, we survey the research on causal effects of central bank communication on expectations and economic choices.

Keywords: Consumers' macroeconomic expectations, central bank communication, survey data.

JEL classification: E52, E30, D84, C83.

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"The effects of monetary policy depend critically on the public getting the message about what policy will do months or years in the future." Yellen (2013)

"The ECB needs to be understood by the markets that transmit its policy, but it also needs to be understood by the people whom it ultimately serves. People need to know that it is their central bank, and making its policy with their interests at heart." Lagarde (2019)

"Both the likelihood and the cost of current high inflation becoming entrenched in expectations are uncomfortably high. In this environment, central banks need to act forcefully. They need to lean with determination against the risk of people starting to doubt the long-term stability of our fiat currencies." Schnabel (2022)

1   Introduction

With the paradigm shift elevating communication as a policy tool, central banks increasingly aim to both anchor and guide macroeconomic expectations by consumers, particularly consumers' inflation and interest rate expectations (Lagarde, 2019; Schnabel, 2022; Ehrmann and Wabitsch, 2022). This shift of attention occurred after the global financial crisis of 2008, when nominal interest rates in most advanced economies hit the effective lower bound (ELB) (Blinder et al., 2008). At the ELB, central banks could not use the interest rate channel to prop up demand after the crisis. This was one factor pushing inflation rates below target in many industrialized countries, which forced central banks to develop unconventional policy instruments. One of these instruments was forward guidance on future interest rates coupled with the central bank reaching a specific target. In the case of the ECB, that was its inflation target, so that the forward guidance statement read until 22 July 2021:

> *"The Governing Council expects the key ECB interest rates to remain at their present or lower levels until it has seen the inflation outlook robustly converge to a level sufficiently close to, but below, 2% within its projection horizon, and such convergence has been consistently reflected in underlying inflation dynamics."*[1] (ECB, 2021)

Such target-based forward guidance was arguably designed to guide inflation and interest rate expectations of market participants.

Since mid-2021, many central banks face the opposite challenge with inflation surging due to demand and supply shocks related to the COVID-19 crisis and fueled by price hikes in energy and food sectors caused by the war in Ukraine. In such an inflation environment with inflation rates above target, monetary policy becomes more focused on anchoring inflation expectations close to target. This is highlighted also in the monetary policy statement of the ECB Governing Council meeting on 27 October 2022:

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[1]After its strategy review in July 2021, the forward guidance statement was slightly adjusted to account for the new, symmetric definition of the ECB's inflation target at 2%. Nevertheless, the target-based nature of forward guidance remained the same.

"The Governing Council's monetary policy is aimed at reducing support for demand and guarding against the risk of a persistent upward shift in inflation expectations." (ECB, 2022)

How does the expectations channel of monetary policy transmit to the real economy and to inflation? First, expected inflation influences the real interest rate via the Fisher equation. Assuming that nominal interest rates remain constant, an increase in expected inflation will lower the real interest rate. Similarly, a change in the nominal interest rate will only transmit to the real interest rate one-for-one as long as inflation expectations remain unchanged or well anchored. At the same time, consumers' perceptions of current or future nominal interest rates may affect their view of the real rate. Second, inflation expectations affect consumption demand via the real interest rate. Assuming that consumers optimize consumption with respect to a budget constraint that allows for intertemporal savings, the Euler equation shows that current consumption falls if the real interest rate rises as consumers increase savings to allow for higher consumption in the future (Clarida et al., 1999). Third, under the assumptions of sticky prices and monopolistic competition, modern Phillips curves show that inflation expectations correlate positively with the current inflation rate (Clarida et al., 1999). If expectations of future inflation increase, marginal costs of production will increase due to higher wage costs, causing forward-looking firms to raise prices already today.

The ability of central banks to rely on the expectations channel hinges on being able to influence expectations, but also on retrieving timely data on macroeconomic expectations of the general public. In order to measure and monitor expectations, researchers and central banks rely mostly on survey data, where in recent years central banks, such as the Fed in the U.S. as well as the European Central Bank (ECB) and the Bundesbank among others, have developed their own surveys of consumers' macroeconomic expectations.

The retrieved survey data delivers great insights, but at the same time highlights significant challenges for monetary policy in guiding and anchoring expectations: Inflation expectations by consumers and firm managers, but also by professional forecasters, are typically not formed in line with full information rational expectations, as assumed in standard macroeconomic models (Coibion and Gorodnichenko, 2015; Coibion et al., 2018). Instead, there is evidence that inflation expectations are formed in line with theories of imperfect information (Coibion and Gorodnichenko, 2015; Dräger and Lamla, 2017b) and the accuracy of expectations varies across socio-demographic groups and with cognitive ability (D'Acunto et al., 2019a, 2022).[2] Moreover, the degree of anchoring of both consumers' and firm managers' inflation expectations is time-varying (Kumar et al., 2015; Dräger and Lamla, 2018), where factors such as trust in the central bank, inflation experience, preferences about inflation and monetary policy or narratives about inflation developments play an important role (Andre et al., 2022; Dräger et al., 2022b). Finally, the evidence for a link between consumers' inflation expectations and their consumption choices, both inside and outside of the

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[2]In this survey article, we do not focus on deviations of full information rational expectations in consumers' inflation expectations, on differences between consumers', firms' and professional forecasters' macroeconomic expectations, or on socio-demographic variation in inflation expectations. These important aspects and stylized facts are discussed in detail in another recent survey article, see D'Acunto et al. (2022).

ELB, is somewhat mixed, although the majority of studies find evidence in line with the Euler equation (D'Acunto et al., 2018; Dräger and Nghiem, 2021; Crump et al., 2022).

Furthermore, inflation expectations are not formed in isolation, but interact with expectations about other macroeconomic variables such as the unemployment rate or interest rates. An important question for the expectations channel is then how inflation expectations co-move with other macroeconomic expectations and whether this co-movement is in line with predictions from macroeconomic theories. Claus and Nguyen (2020) show the impact of monetary policy announcements on a range of consumer expectations in the short- and medium-run. Identifying the characteristics of consumers whose macroeconomic expectations are formed in line with theoretical predictions may be used as a measure to identify the groups of consumers for which communication under the expectations channel might yield the desired effects (Carvalho and Nechio, 2014; Dräger et al., 2016). In addition, consistency of macroeconomic expectations or disagreement among consumers' expectations may vary over time, implying that the expectations channel may work better in some situations than in others (Dräger et al., 2016; Dräger et al., 2022b).

One could argue that the effectiveness of central bank communication with the general public is conditional on two margins (Haldane and McMahon, 2018; Ehrmann and Wabitsch, 2022): First, the communication by the central bank must reach a wider audience of non-experts. Second, given that sufficient attention is generated, the general public must understand and trust the statement in order to adjust their expectations in the desired direction. Both margins are evaluated in several survey experiments and event studies. For the first margin, the event studies by Lamla and Vinogradov (2019, 2021) and Fiore et al. (2021) document little or no effect of policy announcements on consumers' expectations. This suggests that reaching the public is still a major challenge for central bank communication. However, Lamla and Vinogradov (2019, 2021) report a positive effect on attention towards monetary policy after policy announcements. The second margin is tested in survey experiments using information treatments, e.g. by Coibion et al. (2022b) and Dräger et al. (2022a). These studies show that consumers revise their expectations significantly when provided with information on current or projected inflation in both low and high inflation regimes.

In this survey article, we focus on the formation of consumers' macroeconomic expectations and on aspects of consumers' expectations within the expectations channel.[3] Chapter 2 discusses the available data sets for consumers' macroeconomic expectations and reviews the main innovations in concepts and measurement. After presenting the most frequently used data sources in section 2.1, section 2.2 discusses issues related to the wording and framing of questions measuring consumers' inflation expectations. Section 2.3 evaluates differences in inflation expectations derived from point forecasts versus probabilistic forecasts, and section 2.4 discusses methods to generate causal evidence on expectations from experiments, distinguishing between laboratory, survey or natural experiments.

In chapter 3, we survey the insights on the formation of consumers' macroeconomic expectations in relation to theory that the research has uncovered so far. In section 3.1, we survey the literature on the consistency of consumers' expectations with macroeconomic theories. Even if most consumers

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[3]Of course other aspects like sentiment are relevant as well see, e.g. Lagerborg et al. (2022), but these are not the focus of this paper.

are likely not familiar with concepts like the Phillips curve, the Fisher equation, the Taylor rule or the Euler equation, it is important to evaluate whether they nevertheless form expectations in line with the concepts and which conditions increase the likelihood that they do so. This knowledge makes it easier for central banks to judge to which extent or under which conditions the expectations channel might work. In section 3.2, we explore the relevance of changes in inflation and interest rate expectations for consumption and spending decisions. In the same vein, we evaluate in section 3.3 how the degree of anchoring of consumers' inflation expectations developed over time and which factors contribute to a stable degree of anchoring. Section 3.4 then discusses the evidence on the role of preferences and narratives for macroeconomic expectations. While these factors are not considered in standard macroeconomic models, the findings in behavioral economics and psychology as well as the empirical results suggest that these might be important drivers of macroeconomic expectations and, hence, important factors in the expectations channel. Section 3.5 reviews the evidence on the effectiveness of central bank communication in steering and guiding consumers' expectations, particularly their inflation expectations. This is evaluated mainly using field and survey experiments to generate causal evidence. Finally, section 5 summarizes and gives an outlook on open questions and promising avenues for future research.

2 Concepts and Measurement of Expectations

2.1 Survey data sets

To measure what consumers expect in terms of the macroeconomic environment in the future, we cannot rely only on implicit information from market data or from professional forecasters. Instead, survey data sets measure consumers' macroeconomic expectations by asking a representative sample of the population about their macroeconomic forecasts. In recent years, the individual survey responses of existing consumer surveys have increasingly become available for research. At the same time, many more surveys have been initiated, both by public institutions such as central banks and by individual research teams. This is no doubt related to the rise in online surveys, which made data collection of consumer surveys much more feasible.

The longest running surveys of consumers' macroeconomic expectations are the *Michigan Surveys of Consumers (MSC)* for the US population and the *EC Consumer Survey* for European Union.[4] The MSC is conducted by the Survey Research Center at the University of Michigan.[5] It is available monthly since 1978,[6] where each monthly wave contains about 500 participants. In addition, it contains a rotating panel component where about 40 percent of each wave are re-interviewed after six months. The *EC Consumer Survey* is coordinated by the Directorate General for Economic and Financial Affairs (DG ECFIN) and conducted by the national statistical institutes in each EU

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[4]Giving the growing interest in eliciting expectations of consumers, more and more countries established regular surveys. For an overview see: https://soc.isr.umich.edu/about-survey.html.

[5]See https://data.sca.isr.umich.edu/.

[6]Inflation expectations in the MSC are available since 1953, albeit at a lower frequency.

country.[7] The country-panel data is available monthly since 1985 at an aggregate level, but the microdata can only be accessed via the national statistical institutes. In contrast to the *MSC* data, it consists of repeated cross-sections, where the representative country samples range between 600 in small EU countries to 2,000 in the larger countries.

Both surveys collect a range of qualitative and quantitative macroeconomic expectations. Qualitative expectations about the general economic situation form part of the *consumer confidence index*, which is calculated in both surveys. Regarding consumers' inflation expectations, both the *MSC* and the *EC Consumer Survey* record qualitative and quantitative expectations of future changes in *prices in general*. The *MSC* asks about expectations over the next 12 months and the next 5-10 years, whereas the *EC Consumer Survey* collects perceptions of price changes in the past 12 months and expectations over the next 12 months. One disadvantage of the *EC Consumer Survey* data set is that quantitative inflation perceptions and expectations are only available quarterly since January 2004. In addition to inflation expectations, both surveys collect consumers' qualitative unemployment expectations. The *MSC* additionally asks about qualitative expectations on future interest rates for borrowing.

After the global financial crisis of 2008, being close to the ELB, many central banks introduced forward guidance and consequently measuring and monitoring consumers' (inflation) expectations increased substantially in relevance. This led to the emergence of several new surveys on consumers' macroeconomic expectations conducted by central banks. The pioneer in this respect is the *Survey of Consumer Expectations (SCE)* conducted by the Federal Reserve Bank of New York (Armantier et al., 2017).[8] The *SCE* is available monthly since 2013 for a representative sample of US consumers. In contrast to the *MSC*, its cross-section is larger with about 3,000 respondents per month and includes a longer rotating panel dimension, where consumers are re-interviewed in up to 12 consecutive months. In addition, the core questionnaire of the *SCE* elicits both point and density forecasts for inflation and nationwide house prices, where the latter also provide an estimate of individual consumers' forecast uncertainty. Expectations of future unemployment, interest rates and stock prices are elicited by asking for the perceived probability of an increase in the variables in the future. In addition to the core questionnaire, the *SCE* includes quarterly or yearly modules on credit access, household spending, housing, the labor market and public policy that may be linked to the core modules.

Following the *SCE's* example, other central banks across the world initiated their own surveys on consumer expectations. For instance, the European Central Bank (ECB) started the pilot phase in January 2020 for a monthly *Consumer Expectations Survey*, starting with the Euro area countries Belgium, France, Germany, Italy, the Netherlands and Spain and a monthly cross-section of about 10,000 respondents across all countries.[9][10] The survey collects forecasts of inflation and the general economic outlook (Coibion et al., 2021). In addition, the Bundesbank has been running their

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[7]See https://ec.europa.eu/info/business-economy-euro/indicators-statistics/economic-databases/business-and-consumer-surveys_en.

[8]See https://www.newyorkfed.org/microeconomics/sce#/.

[9]See https://www.ecb.europa.eu/stats/ecb_surveys/consumer_exp_survey/html/index.en.html.

[10]Other central banks also run their own surveys of consumer expectations, e.g. Bank of Canada (https://www.bankofcanada.ca/publications/canadian-survey-of-consumer-expectations/).

own *Survey on Consumer Expectations* since 2019.[11] The survey is representative of the German population with a monthly sample size ranging between 2,000 and 3,000 respondents and including a rotating panel component. Similar to the *SCE*, the Bundesbank *Survey on Consumer Expectations* collects point and density forecasts for inflation and house prices. Moreover, it measures point forecasts for current perceived inflation, long-run inflation expectations, and expected interest rates on savings accounts. Macroeconomic expectations on unemployment, economic growth, lending and savings rates, as well as German stock prices are measured qualitatively. The *Survey on Consumer Expectations* is particularly attractive for researchers, since it regularly opens calls for additional questions or survey experiments that can be added to the core questionnaire. Participating projects evaluate, for instance, the role of preferences for expectations, the effect of the recent inflation surge on inflation expectations and effects of a hypothetical change in the monetary policy strategy (Dräger et al., 2022a,b; Hoffmann et al., 2022). Another important dataset has been generated by the Federal Reserve Bank of Cleveland Fed during the COVID-19 pandemic, which collected information on consumers' macroeconomic expectations from daily surveys. This results in a large sample with about 60,000 individual observations, which can be used to analyze in real time the changes in consumers' inflation and GDP growth expectations in response to the evolution of the pandemic in the US (Dietrich et al., 2022b).

In addition to official surveys, researchers increasingly conduct also customized surveys to analyze specific research questions on consumers' macroeconomic expectations. The advantage of these is that researchers can specify their own questions and run survey experiments. The *Chicago Booth Expectations and Attitudes Survey* is a repeated survey on macroeconomic expectations and households' economic choices on a large cross-section of respondents participating in the *Kilts-Nielsen Consumer Panel*, which collects scanner data on non-durable consumption of participating households. This dataset has been used, for instance, to evaluate the effect of monetary and fiscal policy communication on inflation expectations and to analyze consumers' expectations during the COVID-19 pandemic (Coibion et al., 2020a,c,e, 2022b; Weber et al., 2022). Other frequently analyzed U.S. sources for customized surveys include the online platform *Amazon's Mechanical Turk (mTurk)* or the panels by *Prolific, Surveymonkey, Lucid* or *Qualtrics*.

In terms of representativeness of survey sources, a difference emerges between probabilistic samples and non-probabilistic samples. Surveys such as the *EC Consumer Survey* are drawn from population registers and are therefore directly representative for the underlying population in the respective countries. Other surveys calculate population weights that can be used in estimations to weight individual observations such that the resulting sample is representative.

2.2 Importance of question wording

When it comes to eliciting quantitative macroeconomic expectations, there exist several question types. The wording of the questions is of utmost importance, since many consumers struggle with concepts like inflation or GDP (Blinder and Krueger, 2004). This leads to a large cross-sectional dispersion in consumers' quantitative inflation forecasts, where forecast accuracy typically improves

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[11]See https://www.bundesbank.de/en/bundesbank/research/survey-on-consumer-expectations.

with income and education, and is higher for men compared to women (Bryan and Venkatu, 2001a,b; Pfajfar and Santoro, 2009; D'Acunto et al., 2019c).

Question wording is an important issue when measuring consumers' inflation expectations, which is often overlooked. While most consumers have a general understanding of the term "inflation", for instance from media reports, many are not familiar with the details of the consumer price index underlying the calculation of the inflation rate. As discussed in Bruine de Bruin et al. (2012); Bruine de Bruin et al. (2011), asking consumers to provide estimates of future changes in *"prices in general"*, as in the *MSC* questionnaire, leads to higher and more dispersed inflation forecasts compared to asking about the expected *"inflation rate"*, as in the *SCE*. In a related study with German consumers, Dräger and Fritsche (2013) find a similar difference for both inflation perceptions and expectations, see Figure 1. When the questions are phrased in terms of changes in the *"inflation rate"*, respondents give perceived and expected values closer to actual inflation and less concentrated at multiples of five. One reason for this effect is that asking about *"prices in general"* may lead respondents to think about specific prices, such as grocery or gas prices (Bruine de Bruin et al., 2011). These price categories typically show larger price increases than the average consumption basket, which may cause an overestimation of current and expected inflation (D'Acunto et al., 2019c; Armantier et al., 2017).[12] Similarly, asking about the *"inflation rate"* may remind consumers about reports on recent official inflation or on the inflation target. As discussed in Dräger and Fritsche (2013), asking about forecasts for the *"inflation rate"* leads to a higher share of "don't know" answers, indicating that this question wording is perceived as more demanding. In order to avoid potential bias from thinking about selected prices, newer surveys like the *SCE* or the Bundesbank *Survey on Consumer Expectations* phrase questions about quantitative inflation forecasts in terms of the *"inflation rate"*. It remains an open question, however, which wording better captures the perceived and expected inflation rate that consumers react to in their economic choices regarding consumption and saving.

As shown in Figure 2 and discussed also in D'Acunto et al. (2022), despite the different question wordings which might cause an upwards bias in the *MSC* inflation forecast of consumers by asking about changes in *"prices in general"*, the mean and median inflation expectations from point forecasts measured in the *MSC* consistently lie below those from the *SCE*. This might be due to a probing question included in the *MSC*. Whenever respondents give an inflation forecast above 5 percent, the survey interviewers probe by asking whether the given forecast of X percent was correct. This could cause a correction of many responses above 5 percent, thus leading to a lower cross-sectional inflation estimate. When comparing the median inflation forecast in the *MSC* and *SCE* in Figure 2, it also becomes apparent that the *MSC* median forecast exhibits a higher volatility. This may be due to the longer panel component of the *SCE*, where respondents stay for up to 12 months in the panel. As discussed in Kim and Binder (2020), this may lead to "learning-through-survey" effects,

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[12]A recent study in this regard is presented by Dietrich et al. (2022a) who evaluate consumers' expectations of price growth in sub-categories of goods included in the consumer price index versus their expectations of aggregate inflation. The authors find that consumers' expectations of price changes in individual goods categories are lower, less volatile and exhibit lower disagreement than their expectations of aggregate individual. This suggests that consumers find it easier to access price changes in goods categories versus changes in the aggregate index. In line with previous studies, expectations of aggregate inflation seem to be shaped over-proportionally by gasoline and food price expectations.

Figure 1: Distribution of Inflation Perceptions and Expectations with Different Wordings

Quantitative Inflation Perceptions and Expectations
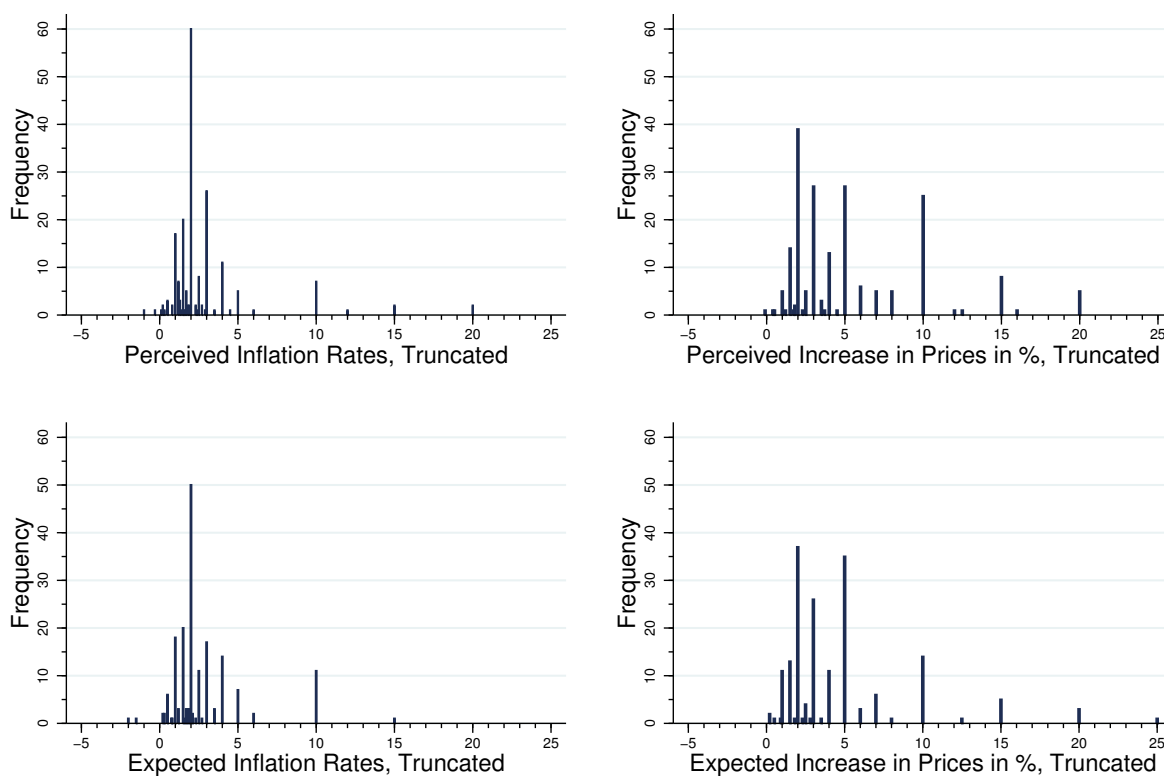
Note: Distribution of current perceived and expected inflation rates (12 months ahead) in a customized survey of German consumers from Dräger and Fritsche (2013). Both perceived and expected inflation rates are truncated by excluding the upper and lower 1% of the distribution.

Figure 2: Median inflation expectations 12 months ahead in the MSC and SCE
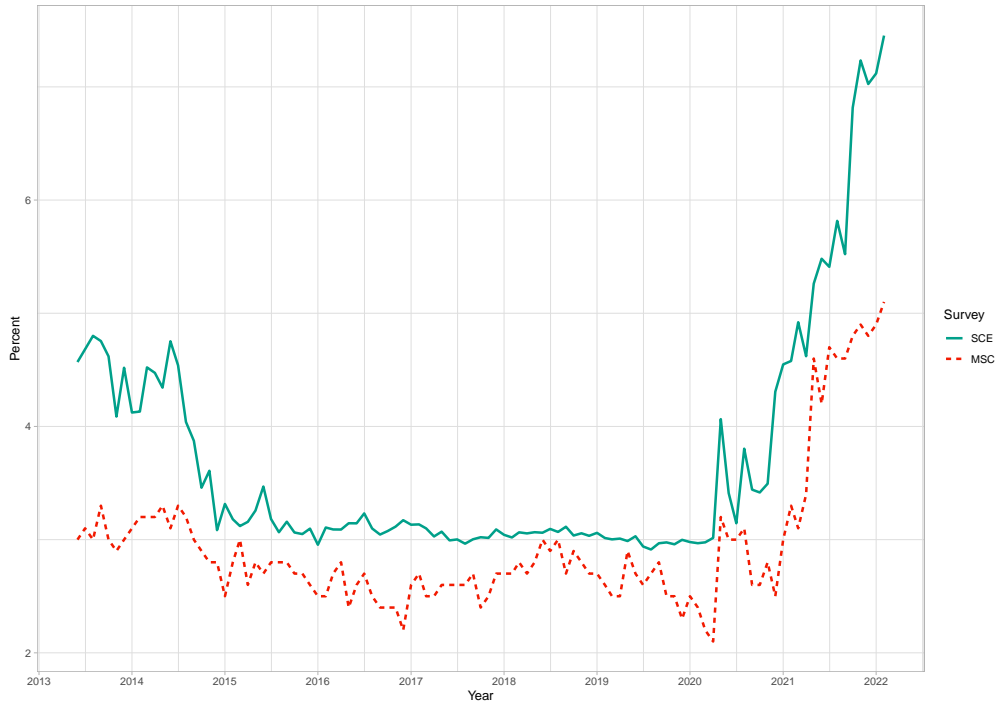
Note: Monthly cross-sectional median inflation expectations 12 months ahead in the Michigan Survey of Consumers (MSC) and the New York Fed Survey of Consumer Expectations (SCE) for U.S. consumers.

as respondents spend more time in the panel become better informed and less uncertain about their inflation forecasts.[13]

2.3 Point forecasts versus probabilistic forecasts

Most surveys elicit inflation expectations as point forecasts, asking respondents *"by about what percent do you expect prices to go (up/down) on average?" (MSC)*. However, more recent surveys such as the *SCE*, the Bundesbank *Survey on Consumer Expectations* or the ECB *Consumer Expectations Survey* additionally measure probabilistic forecasts.[14] These are elicited by providing bins, e.g. for expected inflation, and asking respondents to allocate 100% probability mass among these bins.[15] By fitting a distribution over the given probabilities, the mean forecast value as well as the individual forecast uncertainty at a given point in time can be estimated.

As discussed in D'Acunto et al. (2022), both question types have their advantages and disadvantages, and it generally depends on the research question which measure is preferable. By providing

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[13]Further reasons for the discrepancy might be possible, e.g. differences in sample size, calculation of population weights or survey mode. A more thorough analysis of these relative factors might be an interesting avenue for future research.

[14]For a survey of the evolution of measures of probabilistic macroeconomic forecasts by consumers, see Manski (2018).

[15]Probabilistic questions for macroeconomic forecasts have a longer history in Surveys of Professional Forecasters (SPF), see for instance the US SPF fielded by the Federal Reserve Bank of Philadelphia, https://www.philadelphiafed.org/surveys-and-data/real-time-data-research/survey-of-professional-forecasters.

the bins for expected inflation, which give an upper and lower bound and are typically more narrow for values closer to zero, the probabilistic question provides additional information compared to the point forecast question. This information likely anchors expectations and excludes very high or low forecasts. Therefore, inflation forecasts from probabilistic questions are typically lower than those from point forecast questions and show a lower cross-sectional dispersion. However, questions related to individual forecast uncertainty can only be analyzed using probabilistic questions.

Another potential pitfall of probabilistic forecasts results from framing effects from the way bins are chosen and presented. As discussed in a survey experiment by Becker et al. (2023), shifting, compressing or expanding the scale of the provided bins in probabilistic inflation forecast questions significantly changes the resulting mean expectations as well as the individual forecast uncertainty and cross-sectional disagreement. This effect can be as large as several percentage points.

2.4 Causal evidence on consumers' macroeconomic expectations

The recent literature on consumers' macroeconomic expectations increasingly focuses on identifying causal effects. In terms of methodology, this can be achieved in three ways: First, the formation of expectations and the effect of a change in expectations on economic choices can be analyzed in a controlled laboratory experiment. Second, randomized control trials (RCTs) can be used to treat random subgroups of a survey cross-section with information treatments in a survey experiment. Third, unforeseen changes in economic policy or other events can be used as a natural experiment to evaluate their effect on macroeconomic expectations.

All three methods have their relative advantages and disadvantages: Laboratory experiments offer a very controlled environment where the effects can be clearly identified. Moreover, they are typically incentivized and so ensure that participants are motivated to put effort into the task. On the downside, these advantages could also pose disadvantages for the analysis of consumers' macroeconomic expectations. Since imperfect information or rational inattentiveness is an important issue for the formation of macroeconomic expectations by laypersons (Sims, 2003; Coibion and Gorodnichenko, 2015; Dräger and Lamla, 2017b), a controlled experiment may offer easier access to information and more incentive for attention than is present in the real world. Furthermore, lab experiments face challenges in terms of sample size as well as sample bias. By contrast, RCTs in consumer surveys offer a way to implement a survey experiment in a less controlled environment. Respondents are randomly provided with different information (or no information if they are part of the control group) and researchers test how this information affects the answers to questions after the treatment. This way, respondents do not necessarily know that they are part of an experiment and give their macroeconomic forecasts in the same survey environment in which macroeconomic expectations are typically measured. An obvious downside of this approach is that the responses will be more noisy than in a controlled laboratory experiment. Additionally, RCTs only allow for information treatments, whereas any form of interactive experimental game is not possible in a survey environment. Finally, natural experiments offer the opportunity to analyze the effect of an unforeseen event, for instance a policy shock, on consumers' formation of macroeconomic expectations. A clear advantage of this approach is that the effect happens in the real world with all

confounding factors present. The obvious disadvantage is that truly unforeseen events happen only rarely and cannot be engineered by the researcher.

Survey experiment or RCTs are the most popular method in the literature to identify causal effects on consumers' macroeconomic expectations. Information treatments in consumer surveys are used, *inter alia*, to evaluate the effect of central bank communication or forward guidance on consumers' inflation, interest rate or unemployment expectations (Lamla and Vinogradov, 2019; Coibion et al., 2020a, 2022b), to analyze the effect of information about the coronavirus or policy responses to the pandemic on consumers' macroeconomic expectations and economic sentiment (Binder, 2020; Bui et al., 2022), to test the effect of policy committee diversity on consumers' expectations across socio-demographic groups (D'Acunto et al., 2021) or to evaluate how spillover effects from an inflation surge to inflation expectations can be mitigated (Dräger et al., 2022a).

Armantier et al. (2015) and Pfajfar and Zakelj (2014) conduct laboratory experiments on the formation of consumers' inflation expectations. Comparing the choices within the experiment with survey responses on inflation point forecasts, Armantier et al. (2015) show that survey inflation expectations correlate well with with choices in a financially incentivized experiment where returns depend on expected inflation. Pfajfar and Zakelj (2014) evaluate the formation of inflation expectations when subjects operate within a standard macroeconomic model driven by exogenous shocks. The authors find that a large share of participants forms expectations rationally or in line with adaptive learning and that about a third of respondents switches between different forecasting models.

As natural experiments are rare, only few studies exist using them for an analysis of consumers' macroeconomic expectations. D'Acunto et al. (2018) use the unexpected VAT increase in Germany, which was announced in 2005 and became effective in 2007, to evaluate the effect of the policy change on consumers' inflation expectations. The authors show that the shock increased consumers' inflation expectations and led to an increased willingness to buy durable goods. Dräger et al. (2022) document that the Russian invasion of Ukraine on February 24, 2022, which was unforeseen in terms of its exact date and the extent of the attack, led to increased inflation expectations among German experts, who interpreted this shock mainly in terms of a supply shock and consequently were less likely to favor immediate reaction of monetary policy.

3 Consistency of Expectations with Theory

3.1 Consistency of expectations with macroeconomic relationships

For many years, the discussion on macroeconomic expectations centered around identifying certain facts and observations. Research focused on comparing moments of inflation expectations across time, countries and individuals with realized values and inferred relevant biases (see, e.g., Carroll, 2003, Capistrán and Timmermann, 2009, and Ehrmann et al., 2017) or levels of integration (Döpke et al., 2008a) from the results.

With the emergence of alternative hypotheses for expectation formation, such as rational inattention or sticky information, the focus of the empirical literature on consumers' macroeconomic

expectations shifted towards testing the validity and the applicability of these hypotheses (see, e.g., Coibion, 2006, Coibion and Gorodnichenko, 2012, Coibion and Gorodnichenko, 2015, Döpke et al., 2008b, and Dräger and Lamla, 2017b). Those papers used survey microdata to test how often consumers revise their macroeconomic expectations, how much they adjust their expectations in response to forecast errors and what factors might have triggered these behavior. The results again rejected the hypothesis of full information rational expectations, but found support for expectation formation under limited information, such as in the rational inattention or sticky information literature.

Based on this evidence, researches started to test the validity of relationships derived in standard macroeconomic models using microdata on consumers. For instance, backbone relationships such as the Euler Equation can be tested directly if one measures individual inflation and spending expectations as well as current spending and nominal interest rate perceptions. Hence, in contrast to previous studies focusing on a single variable for expectations, for this purpose one has to consider expectations about different economic indicators such as inflation, unemployment, interest rates or economic growth simultaneously.

Carvalho and Nechio (2014) explore whether consumers form expectations in line with monetary policy following a Taylor type rule. The authors study consistency of expectations with the Taylor rule by evaluating the fractions of answers within the cross-section of the Michigan Survey that give consistent interest rate expectations, given their answers to the questions on expected unemployment and inflation. The results are then compared across demographic groups and to the Survey of Professional Forecasters (SPF). Dräger et al. (2016) extend this approach by calculating how many consumers form expectations consistent with several economically relevant relationship like the Fisher Equation, the Taylor rule and the Phillips Curve trade-off. The authors show that having theory-consistent expectation improves the forecast accuracy of expectations and thereby allows consumers to make better decisions. Moreover, the authors show that the share of consumers with theory-consistent expectations is not time-invariant. For instance, milestones in the Fed's central bank communication, such as the introduction of forward guidance on interest rates or the publication of the explicit inflation target, coincide with a larger share of consumers' expectations that are consistent with the Fisher equation. As discussed further in section 3.5, the transmission of communication via the media and the perception of news by consumers also correlate with consistency shares.

The idea to test the validity of macroeconomic models with data from individual consumers can be extended to testing the general understanding of central bank strategic choices by the general public. For instance, Hoffmann et al. (2022) test, using the Bundesbank Survey on Consumer Expectations and an RCT design, whether changes in the inflation targeting framework have implications for the inflation expectations formation by consumers.

Notably, the consistency of macroeconomic expectations cannot and should not only be analyzed in terms of the first moments, but also evaluating second moments might be a fruitful avenue. Dräger and Lamla (2017a) provide evidence that disagreement of consumers as well as professional fore-

casters in interest rate expectations is mainly driven by the disagreement in inflation expectations, but surprisingly not by disagreement on economic activity such as unemployment expectations.

3.2   Consistency of expectations with consumption and spending decisions

Expectations data can also be used to analyze changes in consumers' current and expected consumption in response to changes in expected inflation and, thus, the real interest rate. The theoretical consumption Euler equation captures this relationship. Using microdata on consumers' macroeconomic expectations and spending, the literature evaluates to which extent consumers act on their expectations and whether the correlations are consistent with the theoretical relationship.[16] Notably, consistency would be crucial if central banks aim at steering consumers' inflation expectations in order to boost consumption spending at the ELB. Bachmann et al. (2015) examine the relationship between expected inflation and spending attitudes using the microdata from the Michigan Survey of Consumers. Notably and in contrast to several studies that followed, the documented effects were either rather small, insignificant or even had the wrong sign, both before and during the ELB period. Duca et al. (2021) report correlations in line with the Euler equation in a large panel of European countries.

D'Acunto et al. (2016) measure the causal effect from an unexpected tax change on consumption in durable goods using a natural experiment setting in Germany. They report a significant increase in current consumption following the unanticipated announcement of an increase in the value added tax by three percentage points, which signaled higher inflation in the future.

Kanz et al. (2021) explore the effect of providing information on inflation forecasts and exchange rate predictions by professional forecasters on consumers' inflation and exchange rate expectations and track whether this has implications for their self-reported consumption plans.

With interest rates close to the ELB, Crump et al. (2022) use the New York Fed SCE data on consumption expectations and inflation expectations to infer the elasticity of intertemporal substitution, the response of expected consumption growth to changes in the real interest rate. Besides providing empirical evidence in line with the consumption Euler equation, the authors also document excessive sensitivity to expected income changes. Dräger and Nghiem (2021) test whether consumers' spending decisions are in line with an Euler equation for German consumers at the ELB. They show that consumers indeed increase current spending if they expect higher inflation. This effect becomes stronger for financially literate consumers as well as when consumer have observed news on monetary policy. Accounting for individuals' cognitive abilities, D'Acunto et al. (2019b) show that only consumers with high cognitive abilities behave in line with the consumer Euler equation. Those consumers also able to forecast inflation more accurately.

The recent RCT studies by Coibion et al. (2020c, 2023a,b,c) as well as Kumar et al. (2023), use the exogenous variation induced by the information treatments of the RCT to instrument for the effect of respondents' inflation expectation on their economic choices. Thereby, the causal effect of

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[16]While many articles use survey evidence on self-reported spending and savings decision as measures of consumption or saving, there is growing interest in connecting survey data with actual spending or other administrative datasets. For instance, Coibion et al. (2020d,e) link scanner data of daily grocery shopping from the Kilts-Nielsen Consumer Panel to survey evidence on participating households' macroeconomic expectations.

exogenous variation in consumers' macroeconomic expectations on later consumption and savings choices can be measured. Coibion et al. (2023c) show that changes in perceived real rates due to forward guidance cause changes in durable consumption. Similarly, Coibion et al. (2023b) demonstrate in a Dutch consumer survey that exogenous variation in inflation expectations causes adjustments in durable spending. Coibion et al. (2020c) use exogenous variation in firms' inflation expectations in an Italian survey and show that this impacts on firms' pricing, demand for credit, employment decisions and capital accumulation. Finally, two recent companion papers evaluate the impact of exogenous variation in macroeconomic uncertainty by firms (Kumar et al., 2023) and households (Coibion et al., 2023a) on economic choices. In both studies, higher induced macroeconomic uncertainty leads to significantly and persistent changes in firms' prices, employment and investment as well as households' spending, which are in line with frequently observed patterns during periods with high uncertainty, such as recession.

3.3 Anchoring of expectations

Linking several data sources and expectations measures from consumers, professionals and firms is also helpful in assessing the level of anchoring of expectations. Ensuring that expectations remain anchored is crucial for monetary policy as it helps to mitigate inflation shocks (Schnabel, 2022). While policy makers and economists agree that having anchored expectations helps in achieving and maintaining price stability, there is no consensus on the preferred measure of anchoring and its interpretation. Survey expectations can provide valuable insights in this regard and complement measures of anchoring from financial market inflation premia. Anchored expectations can be defined by simply monitoring the levels of expectations with respect to their distance to the inflation target, by comparing consumer expectations with professionals' inflation expectations, but can also be measured via the responsiveness to news shocks or the co-movement between short-term expectations and long-term expectations as well as in terms of changes in the overall distribution of expectations and variances.

Dovern and Kenny (2020) test the strength of anchored expectations by relying on different approaches of measuring anchoring in order to draw a more comprehensive picture. Using microdata from the Survey of Professional Forecasters, they show that in the aftermath of the financial crisis mean inflation expectations declined, but the responsiveness to other co-variates did not change substantially. Notably, inflation uncertainty increased, pointing towards risks of de-anchoring. Kumar et al. (2015) evaluate the anchoring of firm managers' inflation expectations in a sample of New Zealand firms. Even though the country has a long tradition of inflation targeting and managers trust in the ability of the Reserve Bank of New Zealand to control inflation, their inflation expectations are un-anchored along several dimensions, as shown by mean expectations significantly above the inflation target, a high degree of individual forecast uncertainty as well as a relatively high co-movement between short- and long-run expectations.

Regarding the anchoring of consumers' inflation expectations, Dräger and Lamla (2018) consider the co-movement between short- and long-run inflation expectations as a measure for the degree of anchoring. Using the Michigan Survey of Consumers microdata, the authors show that there

Figure 3: Anchoring of Inflation Expectations
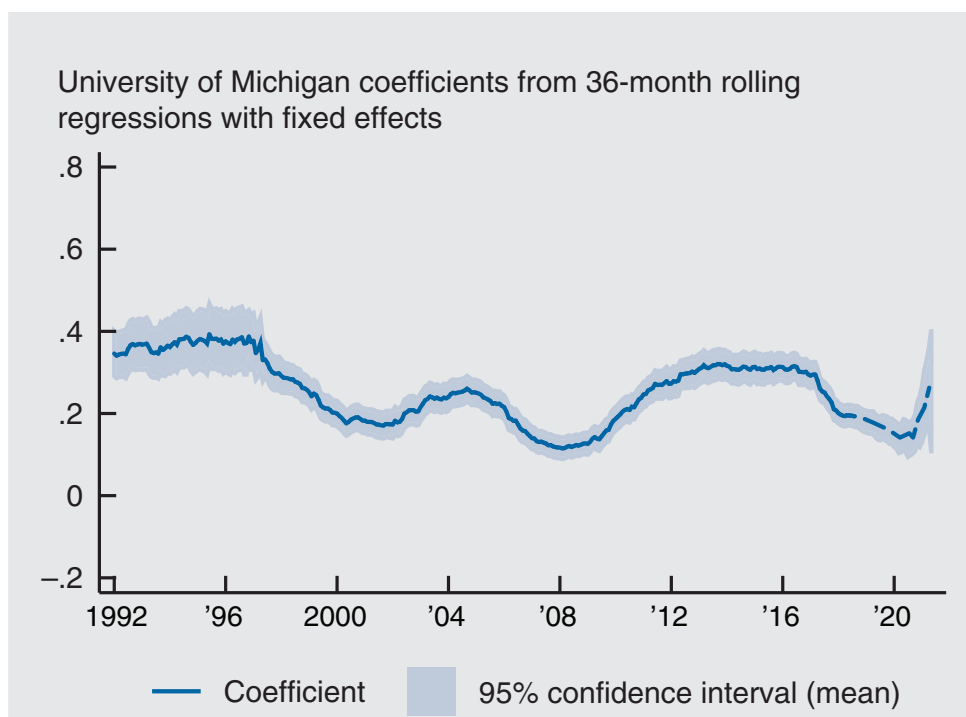
Notes: Figure taken from Barlevy et al. (2021). The figure shows the strength of the comovement between short- and long-run inflation expectations. Dashed line denotes coefficients based on truncated samples with less than 36 months of observations in the regression.

is significant co-movement from changes in short- to changes in long-run expectations. This co-movement is time-varying and can be explained partly by consumers' individual inflation experience. Until the financial crisis, the degree of co-movement decreased reflecting a stronger anchoring during the Great Moderation period. However, in a recent policy paper, Barlevy et al. (2021) updated the data and the main analysis of Dräger and Lamla (2018) and report, as shown in Figure 3, that since 2020, after a long period trending towards more anchored expectations, this trend has been broken in recent years.

The inflation spike beginning at the end of 2021 and continuing in 2022 re-emphasized the relevance of having anchored inflation expectations. Dräger et al. (2022a) investigate the extent to which information about the current inflation surge transmits to short- and long-run inflation expectations. While Coibion et al. (2022b) find in a low inflation regime that inflation news reduce expectations, Dräger et al. (2022a) show that inflation news, in an environment with rising inflation pressure, has the opposite effect and increases expectations.

Reis (2021) provides a new angle to de-anchoring episodes in past decades, highlighting the relevance of appropriate measurement and timely availability of expectations data for policy deci-sions. Based on financial market prices, professional forecasters and cross-sectional distributions of consumer surveys, he measures shifts in the inflation anchor. Reis (2021) demonstrates evidence for a drifting anchor already between 1967 and 1970, well before the end of Bretton Woods or the oil price shocks, and hereby underlines the role of de-anchoring in expectations in leading to the Great

Inflation in the US. Being unable to observe the de-anchoring of expectations, policymakers did not respond and hence did not prevent this loss.

As already indicated in the introduction, the anchoring of inflation expectations might be linked to certain drivers. A prominent example is inflation experience, convincingly demonstrated in Malmendier and Nagel (2016). Using the Michigan Survey of Consumers data and comparing the inflation expectations of younger and older cohorts, they show that these cohorts have different expectations that are linked to their inflation experience. Another example is trust in central banks. Lamla et al. (2019) show, based on survey data on consumers for nine countries, that losing trust in the central banks' price stability objective leads to significant deviations of inflation expectations from the inflation target and, hence, to a de-anchoring of inflation expectations. Under certain conditions, i.e., close to the ELB, losing trust in the central bank leads even to a co-existence of inflationary and deflationary bias, making the steering of expectations and appropriate communication an even more challenging task for a central bank.

3.4 Preferences, narratives and expectations

Modeling expectations and testing the consistency of consumers expectations with macroeconomic models has produced exciting results and more insights from this line of research is expected in the coming years. Several researches have started to shed light on the line of thinking behind consumers' macroeconomic expectations measured in surveys. This line of research thus allows for the possibility that different people might have the same level expectations, but may assess them differently according to their different preferences and, consequently, may act differently on their expectations or weight scenarios differently.

For instance, Andre et al. (2022) document a substantial heterogeneity in narratives about the drivers of higher inflation rates after the recent surge in inflation. Narratives are elicited using open-ended text questions in which respondents explain why they think inflation recently increased to 6.2 percent in the U.S. These differences in narratives ultimately lead to different inflation expectations. Narratives are also different across respondent groups: While consumers, managers and experts all perceive supply side factors driving inflation, experts more strongly highlight fiscal and monetary policy decisions as demand-side factors, whereas consumers and firms focus more strongly on generic narratives about the COVID-19 pandemic or policy mismanagement. Similarly, Andre et al. (2022) study people's subjective models of the macroeconomy. The authors show that there are large differences in average beliefs between households and experts. Part of this disagreement seems to arise because respondents think of different propagation channels of the shocks, in particular demand- versus supply-side mechanisms.

Dräger et al. (2022b) investigate the relationship between consumers macroeconomic expectations and their preferences. They measure whether consumers that are expecting similar inflation or interest rater agree on their assessment thereof, e.g. deem it too high, too low or appropriate. If consumers are good forecasters and agree on a certain economic outcome, but have different preferences for inflation and interest rates this could have substantial implications for their own decisions and ultimately for monetary policy transmission. Using the Bundesbank Online Panel of

Figure 4: Inflation Preferences and Inflation Expectations
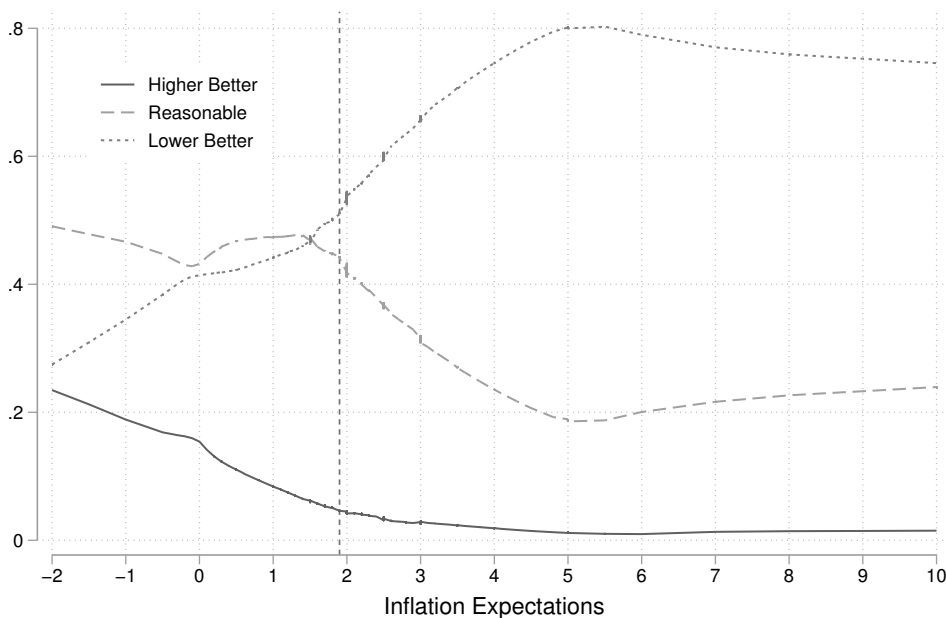
Notes: Figure taken from Dräger et al. (2022b). The lines show smoothed shares of respondents thinking future inflation should be higher/will be appropriate/should be lower across individual levels of inflation expectations.

Households, Dräger et al. (2022b) document a substantial heterogeneity in terms of macroeconomic preferences. For instance, Figure 4 documents that only 49 percent of consumers expecting inflation in the range between 1.5 and 2 percent think that this rate will be appropriate. The authors show that this observed heterogeneity is related to household characteristics, such as risk preferences, and can explain saving and spending decisions.

While this part of the literature is still being developed, these studies already show convincingly that aspects such as preferences or economic narratives seem to be drivers of consumers' macroeconomic expectations and also relevant for the link between expectations and economic choices by consumers.

3.5 Central Bank Communication

We already discussed that guiding or anchoring expectations is important for central banks. Central bank communication is an important tool in this regard. While communication effects are already well understood in terms of movements in exchange rates, stock markets and bond markets, there has been only scarce evidence with respect to the general public. The citations at the start of this paper underline the relevance of communication with consumers from the central bank's perspective. However, as noted by Haldane and McMahon (2018) and Ehrmann and Wabitsch (2022), the central bank faces two challenges when communicating with the general public: First, it must be able to reach the public, i.e. generate sufficient attention to its message. Second, given that con-

sumers perceive the message, it must be understood and trusted such that consumers adjust their macroeconomic expectations in the desired direction.[17]

The first margin, generating the attention of consumers to central bank communication efforts, seems the harder challenge in practice and is also more difficult to evaluate, as this would require the use of field experiments. As pointed out, *inter alia*, by Haldane and McMahon (2018) and Candia et al. (2021), both consumers and firm managers tend to be inattentive to inflation or monetary policy, at least in times of low and stable inflation rates. Nevertheless, central banks around the globe are testing new ways of reaching the public, using "layered communication" addressed at specific non-experts audiences such as school pupils, podcasts, citizen's panels, Twitter or other social media or more exotic forms like the rap songs on inflation stability produced by the Bank of Jamaica.[18] The large variety in innovative communication means tested by central banks around the world raises the hope that some of these may inspire field studies in the future to measure their impact of generating the attention of the general public.

In an event study around press conferences after meetings of the Federal Open Market Committee (FOMC) of the Fed, Lamla and Vinogradov (2019) survey consumers' expectations on inflation and interest rates shortly before and after the press conferences. Thereby, the authors measure both margins of central bank communication jointly: 1) Do consumers report hearing more news about monetary policy in the days after the press conference compared to the days before? 2) Do consumers surveyed after the press conference give different estimates of current inflation or different inflation forecasts? The authors find no statistically significant effect of the press conferences on consumers' expectations and perceptions across the whole sample. This suggests that the press conferences are ineffective in steering consumers' average expectations directly. However, the authors do find that the press conferences generated attention in the sense that after press conferences, consumers are more likely to report that they observed news about monetary policy. Consumers who report that they have received news about monetary policy, have in turn more accurate inflation perceptions and expectations and with that can form better decisions. Fiore et al. (2021) follow the approach of Lamla and Vinogradov (2019) and analyze the effects of FOMC announcements using the Survey of Consumer Expectations data from the New York Fed between 2013-2019. Similar to Lamla and Vinogradov (2019), they find only muted effects of FOMC announcements on inflation expectations, even in response to the most relevant meetings of the FOMC. Notably, they document effects on expectations for interest rates on savings, particularly for consumers with high financial and numerical literacy. Again relying on tracking consumers at a daily frequency, Lewis et al. (2020) analyze the effect of monetary policy news on household consumer sentiment reflecting economic conditions at the time of the survey. Using an indicator for monetary policy shocks they show that a positive monetary shock has negative effects on economic sentiment. Lamla and Vinogradov (2021) test the effects of announcements of the Bank of England on inflation expectations and perceptions and can confirm the results established for the Federal Reserve. Again, while announcements have little direct effects on expectations and perceptions, they do induce greater news receptions about

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[17]For an overview of the developments regarding central bank communication, see also the speech by Mary C. Daly in February 2022, "This Time Is Different...Because We All Are" or the literature survey by Blinder et al. (2023).

[18]See https://www.youtube.com/watch?v=UqDvv-1X3ms.

monetary policy for the public, which in turn lead to more accurate inflation perceptions and expectations. The reason for the improvement in perceptions and expectations is that consumers receive more correct news and announcements reach people that have been inattentive and not actively searching for news on monetary policy. Interestingly, news received via social media do not improve perceptions and expectations.

Overall, the results from those event studies suggest that central bank communication can influence consumers' macroeconomic expectations, once it is able to raise their attention. The media information channel may be an important multiplier in this regard, as the different media outlets disseminate the information given during the press conference to a wide audience. That the information channel matters for the level of inflation perceptions and expectations has been highlighted also by Conrad et al. (2022) using the Bundesbank Panel of Households. The role of the media for consumers' inflation perceptions and expectations is also analyzed in the studies by Dräger (2015) or Lamla and Lein (2014, 2015), where the authors find that media reports about inflation may improve the forecast accuracy of consumers' inflation expectations, but the effects tend to be small. Dräger and Nghiem (2021) show that consumers who recall recent news about inflation or monetary policy, react more strongly to their inflation or interest rate expectations when deciding about current consumption. Relatedly, Dräger et al. (2016) document that a higher volume of media news about monetary policy coincides with a larger share of consumers' macroeconomic expectations that correctly distinguish between real and nominal values or that are consistent with a Taylor-type rule.

However, there is also evidence of asymmetric effects of positive vs. negative media news on inflation: As shown in Lamla and Lein (2014), media reports with a negative tone may drive a wedge between consumers' and professional forecasters' inflation expectations. Similarly, consumers that recall hearing news about high or rising prices, tight credit conditions or high unemployment are less likely to report macroeconomic expectations that are in line with a Phillips curve or a Taylor rule relationship (Dräger et al., 2016). If the media are more likely to report news with a negative tone, the media channel could thus introduce a bias in the effect of central bank communication on consumers' expectations.

The second margin of central bank communication is analyzed in a growing literature using survey experiments with information treatments in a quasi-laboratory setting (random control trials, RCTs). These studies aim at identifying the causal effect of these information treatments on macroeconomic expectations and study whether communication has different effects in different macroeconomic environments, for different groups among consumers or depending on other confounding factors. By showing the information explicitly to survey participants, their attention is ensured and, thus, only the second margin of communication is tested. Coibion et al. (2022b) test in a survey experiment how different types of information from the central bank or the media affect consumers' inflation expectations. The authors run the experiment on a large sample of households from the Kilts-Nielsen Consumer Panel in 2018 in an environment with low and stable inflation. Survey participants are provided with news on, for instance, current inflation, the inflation target, the FOMC inflation projection, the most recent FOMC statement or media coverage of the most

recent FOMC statement. Respondents receiving quantitative information about current inflation, the inflation target or the inflation projection immediately adjust their inflation expectations in the direction of the given information. Interestingly, survey respondents treated with the full FOMC statement revise their expectations by a large amount, whereas those treated with the media article related to the statement show a minor adjustment only. Overall, the authors report that the treatment effects are rather short-lived and dissipate after six months, but nevertheless lead to changes in consumers' spending decisions. This suggests that the expectations channel may work, but the effects discovered so far are small and not persistent. Apart from trying to steer inflation expectations directly by providing information on current or future inflation, the expectations channel may also provide information on the path of interest rates with the aim of moving either nominal rate perceptions or inflation expectations and, thus, affecting the real rate. This type of information is typically provided in forward guidance statements by central banks. Coibion et al. (2020a) evaluate the effect of different forward guidance type statements on U.S. consumers. While standard forward guidance about the nominal interest rate leads to offsetting effects on interest rate perceptions and inflation expectations, information about mortgage rates is found to only affect nominal interest rate perceptions and, thereby, the real rate. This suggests that consumers react differently to forward guidance than financial market participants. Both studies by Coibion et al. (2022b) and Coibion et al. (2020a) report that consumers who update their expectations after receiving information, change also their reported spending or saving plans. This result is confirmed using data from the Netherlands (Coibion et al., 2022a).

Overall, how well does an active steering of expectations work in a stable inflation environment? Coibion et al. (2020b) review the evidence for firm managers and consumers and caution against using inflation expectations as a policy tool. As pointed out above, while there is evidence that consumers do react to central bank communication in survey experiments, in event studies we observe only muted effects on expectations at best. Hence, consumers are largely inattentive to central bank communication, so that using the expectations channel as an active monetary policy tool could prove to be challenging. Coibion et al. (2020b) suggest several strategies that might help to pierce the "veil of inattention" (p. 18): Communication with simple, repeated messages might be beneficial to increase attention in the general public. Moreover, direct communication with the target audience, which might be a subgroup of the complete population, would ensure that the message is not diffused by information transmitters such as the media, who tend to report more negative news (Hamilton, 2004) and who are not necessarily followed by consumers. As pointed out in the literature survey by Candia et al. (2020), focusing communication on desired outcomes and taking into account local conditions for different target audiences would be helpful in this regard.

The expectations channel is also relevant in times of rising inflation rates, when central bank communication might be used to anchor expectations, and thus prevent and inflation spiral through rising expectations. Dräger et al. (2022a) thus test in an environment with a strong increase in inflation at the end of 2021, which type of expectations best works to mitigate a spillover to inflation expectations. In a survey experiment with German consumers in the Bundesbank Online Panel of Households, all respondents are informed about current inflation compared to inflation one year

ago, thus pointing them towards the inflation surge. Without any further information, this causes a significant upward shift in both short- and long-run expectations, which could lead to a de-anchoring of expectations. However, providing additional numerical information about inflation forecasts that are below the current rate is successful in mitigating this effect and may lead respondents to even reduce their expectations. By contrast, information from a textual statement by the president of ECB stating that the inflation surge will be temporary is less successful in stabilizing expectations.

Overall, the evidence that central bank communication causally affects consumers' macroeconomic expectations is rather mixed. If attention to the information is drawn, studies find significant effects on consumers' forecast accuracy. Nevertheless, the information effects are often small and might decay rapidly (Coibion et al., 2022b).

4 Conclusion and Outlook

In this overview article, we discuss the importance of measuring consumers' macroeconomic expectations in a timely and accurate fashion as well as their relevance for understanding macroeconomic relationships and their implications for the expectations channel of monetary policy.

We highlight the challenges of collecting survey data on consumers' expectations of macroeconomic variables. Given the importance of consumers in the expectations channel of monetary policy, researches as well as policy makers now agree on the relevance of reliable data sources for measuring consumer expectations. Consequently, we observe a greater effort in setting up new surveys and tracking expectations on a higher frequency. In addition, we observe a greater availability of existing data to external researchers. These efforts will lead to new insights and a better understanding of consumers' macroeconomic expectations. Therefore, we would like to encourage particularly policymakers to strengthen their efforts and use their financial resources to collect more data on consumers' macroeconomic expectations and continue the cooperation with external researches. This includes making surveys more flexible by allowing for RCTs or additional survey questions.[19] Research on the macroeconomic expectations by firm managers is so far still less developed, owing in large parts to scarce measures of firm managers' expectations. Existing evidence suggests that firm managers' expectations are closer to those by consumers than to those by experts, in particular regarding their attention to inflation and monetary policy (Coibion et al., 2018; Candia et al., 2021). Recently, new surveys on firms' macroeconomic expectations have been initiated, such as the Bundesbank Survey on the Expectations of Firms[20] or the US New Survey of Firms' Expectations[21], which will be funded by the Federal Reserve Bank of Cleveland in the future. This demonstrates the importance that central banks attach to measuring firms' expectations alongside consumers' and gives hope for fruitful research on their formation in the future.

Regarding the research on consumers' macroeconomic expectations, we observe that the change in monetary policy communication towards targeting consumers' expectations has coincided with

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[19]A noteworthy example is the current Bundesbank approach to regularly issue a call of interest for researchers to submit proposals to be implemented in the Bundesbank Online Panel of Households.

[20]See https://www.bundesbank.de/en/bundesbank/research/survey-on-firms.

[21]See http://firm-expectations.org/index.html.

greater dynamics in research using microdata from surveys on consumer expectations. Some of those studies confirm evidence already established using aggregate data, but some reveal unexpected results or even challenge conventional views. Examples would be, for instance, the substantial and persistent deviation of expectations from realized values, the low share of people understanding core economic relationship or the muted and fast-fading response of expectations to information about monetary policy announcements. Consequently, there are many open questions and challenges to address in future research.

While a lot has been learned about the anchoring of expectations using survey expectations data in addition to data from financial markets, many aspects require further attention. For instance, it remains unclear how the anchoring of expectations should be measured and when deviations from a definition of fully anchored expectations should be addressed. Besides, the horizon of expectations matters: Should we focus on a horizon of one year or is the 10-year horizon better suited? Furthermore, it is unclear how to improve and solidify the anchor. How do we build up trust in the central bank? Is communication enough or do we need actions to underline the commitment to fight inflation?

The surveyed research articles show a large degree of heterogeneity in consumers' macroeconomic expectations also with respect to their consistency with standard concepts in macroeconomic theory. Even if the correlations are in line with the concepts on average, we observe a large degree of heterogeneity among consumers, which is related to their financial and economic literacy. Consequently, we need to explore more what lies behind consumers' macroeconomic forecasts in terms of their line of thinking about policy and economic outcomes. Evaluating additional layers of the expectation formation process such as the role of narratives or preferences thus allows to uncover new and important aspects of economic decision-making with great implication for policy.

In general, central bank communication offers a lot of potential for future research. We need to explore how we can actively reach and inform more consumers as we are currently able to do. The main question remains how large parts of the population, who are inattentive and poorly informed about monetary policy issues, might be better reached by central bank communication efforts. More generally, welfare might be improved by increasing literacy on financial and monetary policy topics in the population, for instance via more specific schooling in this area, thus enabling consumers to take better informed financial and economic decisions (Lusardi and Mitchell, 2014; Haldane et al., 2020).

Reflecting on all the aspects covered in this survey article, we are happy to acknowledge a substantial knowledge gain due to the availability and the use of detailed microdata on consumer expectations. Nevertheless, much is still unknown, which gives plenty of room for new and exiting avenues for future research.

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