WORKING paper

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Measuring Households' Inflation Expectations in the Euro Area: The Effect of Panel Conditioning[1]

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ABSTRACT

This paper documents how inflation expectations as reported by households in the European Central Bank's Consumer Expectations Survey vary with the tenure of survey respondents. Inflation expectations are significantly lower after some months of repeated participation in the survey, by about 2 percentage points after one year. Panel conditioning effects are much stronger if households are initially less attentive to inflation. We also document that these negative effects could be partly due to survey fatigue increasing with tenure. Finally, we find that the panel conditioning effects are not specific to inflation: they are also strong for other macroeconomic variables such as unemployment but they are not significant for households' perceptions of their own consumption or income growth.

Keywords: Consumer Expectations Survey, Inflation, Survey Methods

JEL classification: D83, D84, E31

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NON-TECHNICAL SUMMARY

Households' inflation expectations play a key role in macroeconomic dynamics, not only because they influence saving and consumption decisions, but also because they serve as an important gauge of central bank credibility. In the euro area, the European Central Bank's Consumer Expectations Survey (ECB-CES) provides benchmark indicators of households' inflation expectations. However, measuring these expectations is challenging. Unlike professional forecasters, households tend to be less informed about inflation, making their responses particularly sensitive to the framing and design of the questionnaire. A key feature of the ECB-CES is that it allows respondents to participate repeatedly, enabling researchers to track how the expectations of the same individuals evolve over time. Yet repeated participation may itself influence responses by prompting participants to acquire information or become more familiar with the concept of inflation. This phenomenon is commonly referred to as learning through survey or panel conditioning which is particularly relevant when the objective is to measure households' expectations as spontaneous answers to the survey. This is especially crucial when assessing the anchoring of inflation expectations or testing theories of expectation formation since any systematic bias introduced by repeated survey participation could distort the interpretation of results. In this paper, we estimate the extent of panel conditioning effects using data from the ECB-CES.

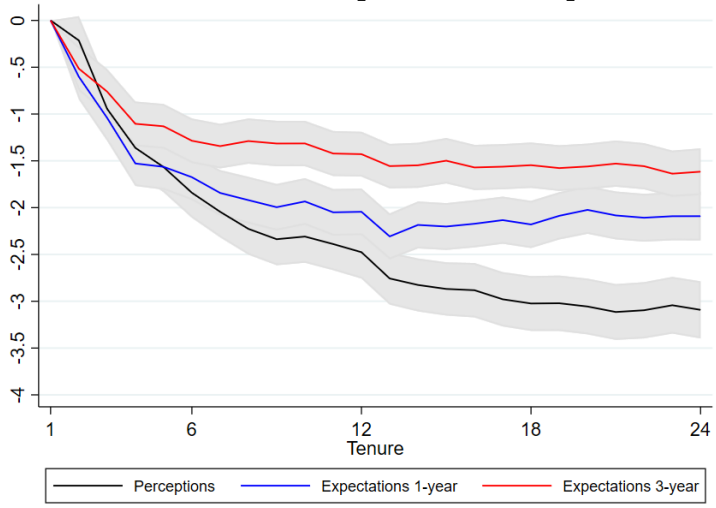
This survey has several distinctive features that make it well suited for this analysis. First, respondents can participate up to 24 times (i.e. months) in the survey, which is much more than in other comparable surveys. Second, the ECB-CES collects a wide range of quantitative expectations, covering not only aggregate inflation but also other macroeconomic variables such as unemployment, as well as household-level variables like income and consumption growth. Third, the survey is large in scale, conducted monthly across 11 different euro area countries, involving about 20,000 households. Finally, it covers the entire inflation cycle from 2020 to 2024, providing sufficient time variation to identify panel conditioning effects on inflation expectations.

Using more than 950,000 monthly responses from about 100,000 unique participants in the ECB-CES between 2020 and 2024, we show that, all else being equal, households report lower inflation perceptions and lower inflation expectations when they participate in the survey for several consecutive months (Figure 1). This panel conditioning effect becomes significant from the second survey participation, with its magnitude increasing rapidly over subsequent waves before stabilizing at its maximum (in absolute terms). After 12 consecutive participations in the ECB-CES, one-year inflation expectations are, on average, about 2 percentage points lower than at the first interview. Beyond this point, the panel conditioning effect remains stable up to the maximum participation duration. A similar pattern is observed for long-term inflation expectations, although the magnitude of the effect is smaller. When accounting for these tenure effects, aggregate indicators of inflation expectations are, on average, higher than those computed from the raw data, although the two remain highly correlated.

We find that tenure effects are stronger when households initially report very high inflation expectations and that repeated participation leads to less rounding in responses and greater reported certainty. Panel conditioning effects also appear more pronounced among respondents with lower initial attention levels. These findings suggest that households tend to provide more consistent responses over time as they gain experience with the survey. However, only about half of the observed panel conditioning effects can be attributed to improved forecasting performance. Repeated participation may also reduce engagement and lead to less accurate responses. We also document that tenure effects are not specific to inflation but are also obtained for other macroeconomic variables, such as unemployment

or economic growth. Panel conditioning effects are much smaller for household-specific variables, such as income or consumption.

Figure 1. Estimates of tenure effects on perceived and expected inflation (in pp)



Notes: the figure plots tenure effects for perceived inflation (black), 1-year expected inflation (blue) and 3-year expected inflation (red). After 12 participations in the survey (tenure=12), households report on average 2 pp lower 1-year expectations than at their first participation. Shaded areas indicate 95% confidence intervals. Source: ECB Consumer Expectations Survey, authors' calculations.

La mesure des anticipations d'inflation des ménages de la zone euro : l'effet du « conditionnement au panel »

RÉSUMÉ

Cet article étudie comment les anticipations d'inflation des ménages collectées dans l'enquête Consumer Expectations Survey de la Banque centrale européenne évoluent en fonction de la durée de participation à l'enquête. Les anticipations d'inflation sont en moyenne inférieures de 2 points de pourcentage après un an de participation à l'enquête. Les effets de conditionnement au panel sont particulièrement marqués chez les ménages qui étaient initialement peu attentifs à l'inflation. Nous montrons que ces effets pourraient s'expliquer en partie par une lassitude croissante vis-à-vis de l'enquête après plusieurs participations. Enfin, nous constatons que les effets de conditionnement au panel ne sont pas spécifiques à l'inflation et sont également à l'œuvre pour d'autres variables macroéconomiques comme le chômage. En revanche, ils ne sont pas significatifs pour les perceptions des ménages sur leur propre consommation ou la croissance de leurs revenus.

Mots-clés : Consumer Expectations Survey, Inflation, Méthodologie d'enquête

Codes JEL : D83, D84, E31

Introduction

Households' inflation expectations play a key role in macroeconomic dynamics, not only because they influence saving and consumption decisions, but also because they serve as an important gauge of central bank credibility. In the euro area, the European Central Bank's Consumer Expectations Survey (ECB-CES) provides benchmark indicators of households' inflation expectations.[1] However, measuring these expectations is challenging. Unlike professional forecasters, households tend to be less informed about inflation, making their responses particularly sensitive to the framing and design of the questionnaire, as well as to the financial incentives provided (see for instance Armantier et al. (2013)). A key feature of the ECB-CES is that it allows respondents to participate repeatedly, enabling researchers to track how the expectations of the same individuals evolve over time. Yet repeated participation may itself influence responses by prompting participants to acquire information or become more familiar with the concept of inflation. This phenomenon is commonly referred as learning through survey or panel conditioning which is particularly relevant when the objective is to measure households' expectations as spontaneous answers to the survey. This is especially crucial when assessing the anchoring of inflation expectations or testing theories of expectation formation since any systematic bias introduced by repeated survey participation could distort the interpretation of results. In this paper, we estimate the extent of panel conditioning effects using data from the ECB-CES.

This survey has several distinctive features that make it well suited for this analysis. First, respondents can participate up to 24 times in the survey, which is more than in the FRBNY-SCE (12 times), the Michigan Survey (2 times), or the European Commission (EC) consumer survey (only a few times).[2] Second, the ECB-CES collects a wide range of quantitative expectations, covering not only aggregate inflation but also other macroeconomic variables such as unemployment, as well as household-level variables like income and consumption growth. Third, the survey is large in scale, conducted monthly across 11 different euro area countries, involving about 19,000 households. Finally, it covers the entire inflation cycle from 2020 to 2024, providing sufficient time variation to

[1] Since its launch in 2020, this survey has been regularly cited in ECB speeches and is also closely followed by ECB watchers and financial markets. This survey has also been widely used to investigate various research questions, among others Weber et al. (2025) on inflation attention, Georgarakos and Kenny (2022) on consumption behavior during Covid, Coibion et al. (2024) or Marenčák and Nghiem (2025) on the link between inflation expectations and consumption decisions and Ferreira and Pica (2024) on household perceptions of demand and supply shocks.

[2] The EC survey is the most comparable survey in the euro area. Since the survey is conducted at the country level, the panel dimension of the survey can vary from a country to another. Respondents can participate 3 times in the French survey (Andrade et al., 2023) or in the Finnish survey (before 2000) (D'Acunto et al., 2022) but only once in many other countries.

identify panel conditioning effects on inflation expectations.

Using more than 950,000 monthly responses from about 100,000 unique participants in the ECB-CES between 2020 and 2024, we show that, all else equal, households report lower inflation perceptions and lower inflation expectations when they participate in the survey for several consecutive months. This panel conditioning effect becomes significant from the second survey participation, with its magnitude increasing rapidly over subsequent waves before stabilizing at its maximum (in absolute terms). After 12 consecutive participations in the ECB-CES, one-year inflation expectations are, on average, about 2 percentage points (pp) lower than at the first interview. Beyond this point, the panel conditioning effect remains stable up to the maximum participation duration. A similar pattern is observed for long-term inflation expectations, although the magnitude of the effect is smaller. When accounting for these tenure effects, aggregate indicators of inflation expectations are, on average, higher than those computed from the raw data, although the two remain highly correlated.

We find that tenure effects are stronger when households initially report very high inflation expectations (typically above 10%). In addition, repeated participation leads to less rounding in responses and greater reported certainty. Panel conditioning effects also appear more pronounced among respondents with lower initial attention levels. These findings suggest that households tend to provide more consistent responses over time as they gain experience with the survey.

However, only about half of the observed panel conditioning effects can be attributed to improved forecasting performance. Repeated participation may also reduce engagement and lead to less accurate responses. For example, households are more likely to report that prices will remain stable and tend to use fewer bins when answering probabilistic questions, both of which could be associated with reduced response effort and shorter completion times.

One possible explanation for the strong tenure effects observed for inflation expectations is that households initially have limited knowledge about inflation. Through repeated participation in the survey, they may learn more about inflation than about other macroeconomic variables, such as unemployment or economic growth, which might be more familiar to them. However, we also find that tenure effects are significant for both unemployment and growth expectations. With repeated participation, households tend to revise their unemployment forecasts downward and their growth expectations upward. In other words, after several months of panel participation, they become more optimistic about the economic outlook: they expect lower inflation, lower unemployment, and higher economic growth.

One possible explanation for these patterns is that households may pay less attention to macroe-

conomic conditions than to their own economic situation. When examining panel conditioning effects on household-specific variables, such as income or consumption, we find no significant impact of repeated participation. Moreover, the magnitude of these effects is considerably smaller than those observed for macroeconomic variables.

Our main contribution is to provide, for the first time, estimates of panel conditioning effects on inflation expectations based on the euro area ECB-CES survey.[3] Our work builds closely on Kim and Binder (2023), who estimate that US households participating in the Survey of Consumer Expectations (SCE) by the Federal Reserve Bank of New York (FRBNY) (FRBNY-SCE) reduce their inflation expectations by an average of 2.6pp after 12 months of participation. Our estimates are slightly smaller but comparable, and as in Kim and Binder (2023), we find that panel conditioning effects emerge only after several months of survey participation.[4] Mitchell et al. (2025) also show that probabilistic questions in the SCE are more prone to panel conditioning effects than point estimates, with long-tenure households producing forecasts with less uncertainty on average. Similarly, we find that households respond differently to the probabilistic questions in the ECB-CES, using fewer bins to answer, which suggests greater certainty.[5] Finally, Kraemer et al. (2024) find evidence of panel conditioning in the GESIS Panel, where highly experienced respondents tend to provide less thoughtful answers by speeding through the questionnaire.[6] Our results similarly suggest that panel conditioning effects may partly stem from households opting for simpler responses— such as reporting "0" for inflation expectations or using only one bin for probabilistic answers — potentially reducing the time spent on the survey.

Our second contribution is to extend the analysis of panel conditioning effects to other quantitative questions in the survey. While Kim and Binder (2023) provide some evidence for additional questions in the FRBNY-SCE, most of their analysis focuses on qualitative answers or price-related variables. In contrast, the ECB-CES includes a broader set of economic indicators, covering macroeconomic variables such as unemployment and economic growth, as well as household-specific variables like income and consumption. We show that tenure effects are not unique to inflation expectations but are also significant for real macroeconomic variables. By comparison,

[3]For the euro area, relying solely on the French subset of the CES survey over 2020–2021, Gautier and Montornès (2022) also find a significant panel conditioning effect, while D'Acunto et al. (2024) suggest its presence using the full euro-area survey, motivating our analysis.

[4]In a different context, Bellemare et al. (2020) find panel conditioning effects using quarterly data from the Bank of Canada CSCE.

[5]Clements (2021) provides further evidence of panel conditioning effects in the Survey of Professional Forecasters, showing that repeated exposure to forecasting exercises reduces reported uncertainty.

[6]The GESIS Panel is a bi-monthly survey conducted in Germany, covering a wide range of socio-economic topics.

panel conditioning effects for household-level variables - such as income and consumption - are smaller in magnitude and less systematic.

The remainder of this paper is structured as follows. Section 1 describes the ECB-CES panel data, the survey methodology, and our estimation strategy. In Section 2, we document evidence of tenure effects for inflation variables. Section 3 investigates how attention and uncertainty can explain tenure effects. Section 4 compares tenure effects for other macro variables and for household-specific variables like households' income and consumption growth. Section 5 concludes.

1 Measuring Panel Conditioning Effects on ECB-CES Data

This section describes the ECB-CES micro-data and how we identify the panel conditioning effects.

1.1 Data

The ECB-CES is a monthly, representative household survey with a rotating panel structure (ECB, 2024). Launched in April 2020, it initially covered six countries: Germany, France, Italy, Spain, the Netherlands, and Belgium. In April 2022, five additional countries were included—Austria, Finland, Greece, Ireland, and Portugal. Our sample spans from April 2020 to December 2024. The number of households surveyed varies by country: initially, around 2,000 households were surveyed in each of the four main euro-area countries, increasing to approximately 3,000 households in 2024. For the other seven countries, about 1,000 households are surveyed monthly. Overall, by December 2024, roughly 19,000 distinct households participated each month. For comparison, the FRBNY-SCE surveys approximately 1,300 US households monthly. In total, our sample comprises over 950,000 responses from just over 105,000 unique participants.

The methodology of the ECB-CES closely follows that of the FRBNY-SCE.[7] The ECB survey is conducted online and collects data on a broad range of topics including inflation, housing and credit, income and consumption, labor market conditions, and economic growth, along with background information such as gender, age, and education.

The inflation module includes questions on perceived inflation, 1-year ahead expectations, and 3-year ahead expectations. Households are asked to report their views on *"changes in the general level of prices for goods and services in the country [they] currently live in."* Importantly, the questions

[7] See Appendix A for more details. Similar surveys have also been implemented in Canada (Bellemare et al., 2020), Germany (Beckmann and Schmidt, 2020), and Italy (Guglielminetti and Rondinelli, 2024).

refer to national price developments rather than euro area-wide inflation, which may result in country-specific variation, particularly relevant during periods of heightened inflation dispersion within the euro area.

Inflation perceptions and expectations are elicited using multiple formats: qualitative questions about the direction of price changes, quantitative point estimates, and probabilistic responses.[8] The exact wording of the questions is provided in Appendix B. All questions are translated into the national languages of the participating euro-area countries.

The ECB-CES follows a rotating panel design, whereby households exiting the survey are continuously replaced by new participants. Each month, approximately 10% of the sample consists of new entrants. Most respondents participate in multiple survey waves. Initially, there was no strict limit on the maximum tenure of respondents — defined as the total number of survey waves in which an individual has participated, including non-consecutive participation. However, the ECB's methodological guidelines later introduced a *"target maximum length of participation"* of 24 completed waves, not necessarily consecutive. In addition, respondents who exceed 36 months since their first participation are removed from the panel.[9] Figure 1 presents the distribution of observations by tenure (left panel) and by maximum tenure (right panel). Panel (a) reveals a sharp decline in the number of observations as tenure increases, indicating that many households participate for only a limited number of waves. The right panel shows the distribution of maximum tenure, which decreases gradually but features a noticeable spike at 24 months, which is consistent with the ECB's guideline of a target maximum participation length. A small share of respondents (approximately 5%) continue beyond 24 months, with a secondary spike at 31 months.

1.2 Estimation Strategy

To estimate the tenure effects in the ECB-CES data, we rely on a standard linear panel regression:

$$y_{i(s)t} = \sum_{s=2}^{24} \beta_s \tau_s + \gamma X_i + \lambda_t + \mu_c + \lambda_t \times \mu_c + \epsilon_{it} \tag{1}$$

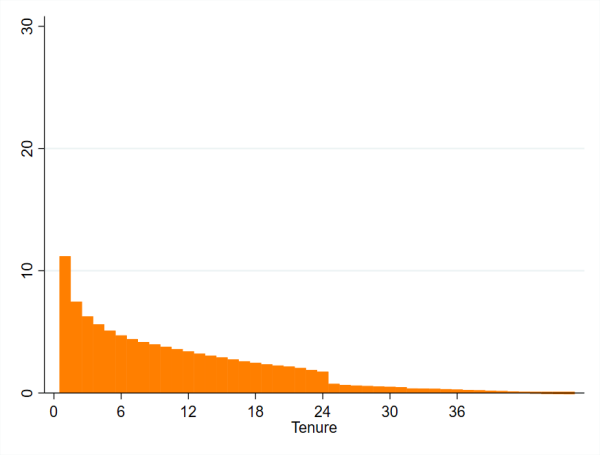
where the dependent variable $y_{i(s)t}$ is the quantitative answer (in our baseline exercises, the one-year inflation expectation answer) of respondent i (with tenure s) at date t (month-year), τ_s is a dummy variable for tenure s (between 2 and 24, 1 being the first participation and the reference

[8] Appendix Figure A.1 shows the average point estimates for perceived and expected inflation at the 1- and 3-year horizons, along with actual HICP inflation in the euro area.

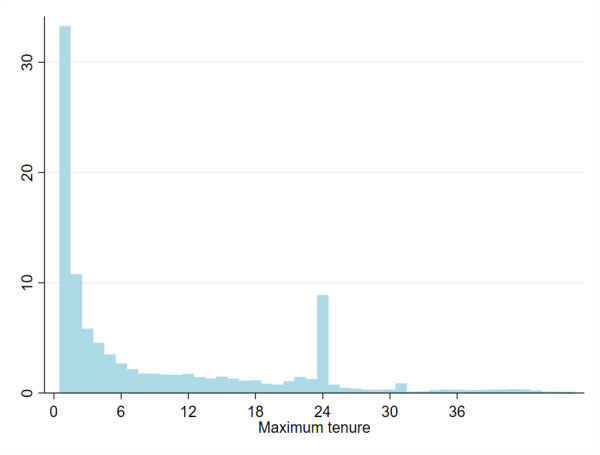
[9] https://www.ecb.europa.eu/stats/ecb_surveys/consumer_exp_survey/shared/pdf/CES_methodological_guide.en.pdf

Figure 1: Distribution of survey tenure

(a) % of observations by tenure



(b) % of respondents by maximum tenure



Notes: Panel (a) - the figure plots the % of observations by tenure time (in months) using all observations of the survey over the period April 2020 - December 2024. Panel (b) - the figure plots the distribution of maximum tenure (in months) across households, based on the maximum number of months each household participated in the survey between April 2020 and December 2024.

Source: ECB Consumer Expectations Survey, authors' calculations.

modality in our regression) and β_s are the parameters of interest measuring by how much the average answer given at tenure s differs from the average answer given at first participation ($s = 1$). We include household-specific variables (X_i) such as sex, age, education, income, financial knowledge (self-assessment) and trust attitudes, but also time-fixed effects (λ_t) interacted with country dummy variables (μ_c), to control for any country-specific time variation (for example, country-level inflation), ϵ_{it} is an error term. In our empirical analysis, the inflation variables are winsorized at the 2^{nd} and 98^{th} percentiles to mitigate the influence of extreme values.[10]

As highlighted in Kim and Binder (2023), panel attrition could lead to a sample selection issue when we estimate the tenure effect. In Appendix Table A.1, we provide detailed results on the determinants of panel attrition: male, older participants, lower-income respondents are more likely to stay longer in the survey panel. To control for potential sample selection bias, we adopt a strategy similar to that proposed by Kim and Binder (2023). In our baseline analysis, we estimate tenure effects using only respondents who participated in the survey 24 times which is the theoretical maximum duration of participation. This restriction reduces the estimation sample but still

[10]This winsorization is the same as the one used for the calculation of the ECB-CES aggregate results published by the ECB.

retains approximately 200,000 survey responses, corresponding to about 10% of all respondents over the sample period.

We then conduct a series of robustness checks. First, we re-estimate the tenure effects using the full sample of responses, restricting only to individuals whose maximum tenure does not exceed 24 waves. Second, we examine subsamples of respondents grouped by their maximum tenure—namely, between 2 and 6 months, 7 and 12 months, 13 and 23 months, and more than 24 months, to assess whether our baseline results are specific to those who completed exactly 24 waves and also to test the sensitivity of the results to the maximum tenure definition.[11] Third, we investigate whether alternative treatments of outliers influence our findings. Finally, we estimate models with alternative fixed-effects specifications, either omitting time fixed effects or including individual fixed effects, to test the robustness of our baseline estimates.[12]

2 Panel Conditioning Effects on Inflation Expectations

In this section, we provide baseline estimations of tenure effects for inflation perceptions and (short- and long-term) expectations.

2.1 Average Tenure Effects

Figure 2 shows the estimates of β_s, which quantify how average responses systematically deviate (in percentage points) at each tenure s compared to the baseline at first participation ($s = 1$). We estimate tenure effects for point estimates of inflation perceptions and inflation expectations at both 1-year and 3-year horizons. For all three inflation measures, we find large, statistically significant, and persistent panel conditioning effects.

Following the first wave, inflation expectations at both horizons are revised downward by approximately 0.5pp. For inflation perceptions, tenure effects become apparent from the third wave onward. By the sixth wave ($s = 6$), tenure effects reach roughly -1.5pp for both perceptions and 1-year expectations, and around -1pp for 3-year expectations. The effect continues to grow in absolute value for perceptions and 1-year expectations over tenure time. After one year of

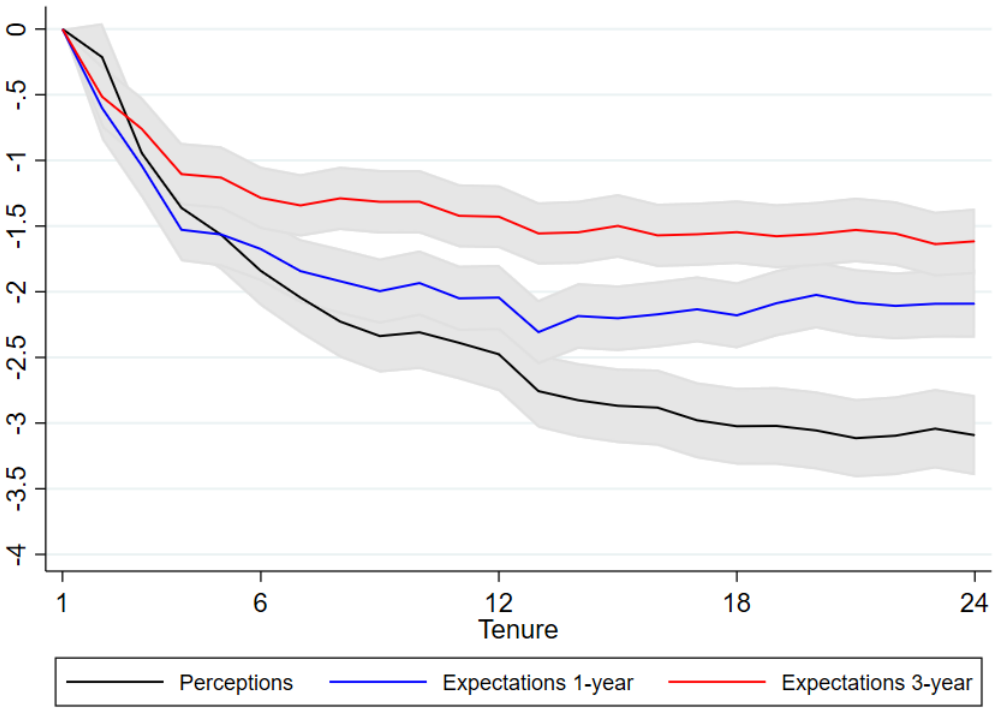
[11] We use intervals of maximum tenure to ensure a sufficient number of observations in each group for reliable estimation.

[12] In our baseline exercise, we do not include individual fixed effects because our empirical strategy relies on estimating the tenure effect only for households having completed the survey 24 times, which substantially reduces the influence of unobservable characteristics and the heterogeneity across households; controlling for observable characteristics makes the estimation much more parsimonious.

participation, the tenure effect on 1-year expectations stabilizes between -2 and -2.5pp, while the effect on perceptions reaches a peak of approximately -3pp after 18 waves. In contrast, the effect on 3-year expectations stabilizes earlier, around -1.5pp after $s = 6$, which may reflect the generally lower average level of long-term inflation expectations.

These results are consistent with those reported by Kim and Binder (2023) for the FRBNY-SCE in the United States. The overall shape of the tenure-effect profile is similar across the two surveys, and the magnitude of the effects observed in the ECB-CES is of comparable order.

Figure 2: Estimates of tenure effects on perceived and expected inflation (in pp)



Notes: this figure plots estimates β_s from the baseline regression equation (1) where the endogenous variables are perceived inflation (black line), 1-year expected inflation (blue line) and 3-year expected inflation (red line). The sample is restricted to respondents who participate in exactly 24 waves of the survey. Observations are winsorized at the 2^{nd} and 98^{th} percentiles within each survey round. Shaded areas indicate 95% confidence intervals.
Source: ECB Consumer Expectations Survey, all waves pooled, authors' calculations.

The results of the robustness analysis for one-year inflation expectations are presented in the Appendix Figures A.2 and A.3. Panel (a) of Figure A.2 shows that alternative definitions of maximum tenure yield similar estimates of tenure effect during the first six months. However, beyond $s = 6$, the tenure effects tend to be stronger when the maximum tenure duration is longer. This

finding suggests that tenure effects are robustly estimated within the first 6 months of participation, but that sample selection and endogeneity related to maximum tenure may influence the estimates at longer tenures. Panel (b) shows that an alternative treatment of outliers does not alter our conclusions. When using the full dataset of responses without any treatment of outliers, the estimated tenure effect is slightly larger in absolute terms. Applying trimming instead of winsorizing reduces the tenure effect by approximately 0.5pp. Estimating a Huber regression would lower more substantially the tenure effect but it would remain sizable at about 1 pp. Overall, large answers seem to play a role but they cannot fully account for the large tenure effects. Figure A.3 shows that individual fixed effects play a limited role in our estimation but the introduction of time-fixed effects affects more strongly our results (in particular, tenure effects are smaller in absolute values if we only include individual fixed effects and no time fixed effects). Ignoring time-fixed effects makes harder to distinguish tenure effects from average time variation of expectations over our sample period which are pretty large (due to large variation in inflation over our sample period and also dispersion in country-specific inflation rates).

2.2 Heterogeneity of the tenure effects

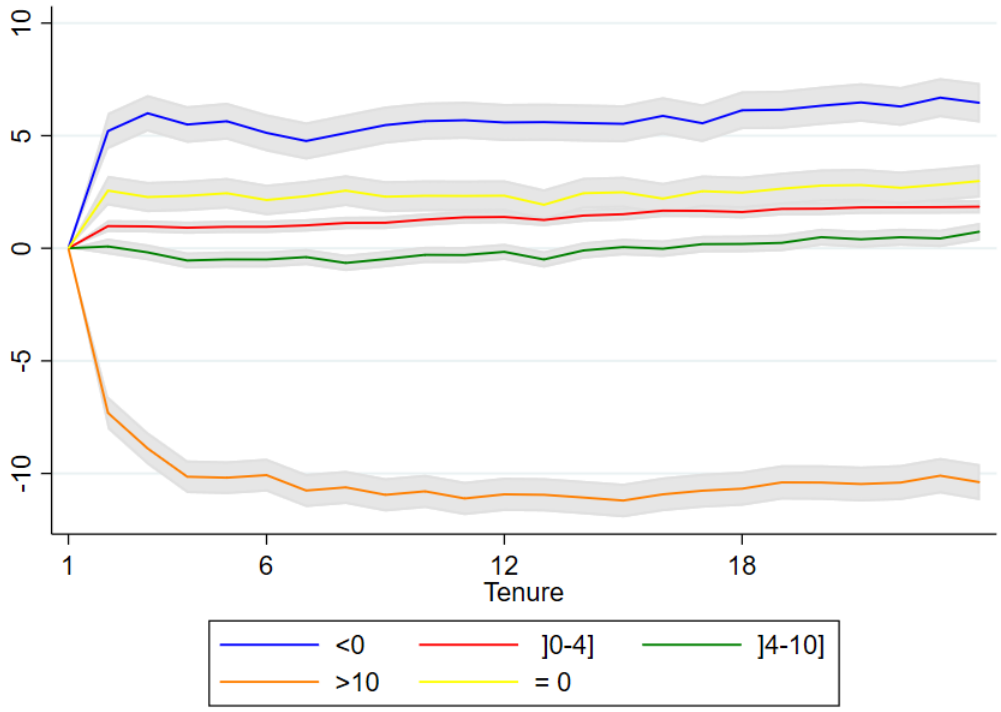
Looking at the heterogeneity of tenure effects among respondents, we first investigate the extent to which the tenure effect varies across the distribution of initial responses.

Figure 3 plots the tenure effects according to the level of the initial survey response.[13] We observe large tenure effects when the initial response exceeds 10%, which represents about 15% of all initial answers, indicating that the effect is stronger for respondents who start with high inflation expectations. For initial responses between 4% and 10%, the tenure effect is also negative and statistically significant during the first months, but its magnitude is considerably smaller. Overall, the average negative tenure effect appears to be primarily driven by households entering the survey with high initial inflation expectations. In contrast, the tenure effects are positive for households entering with expectations lower or equal than 4%, in particular for respondents who gave a negative initial answer. Again, this suggests that households giving initially negative answers provide more consistent answers after the first interview.

This heterogeneity of tenure effects according to the initial answer given to the survey translates into large differences of tenure effects across household categories. We estimate the tenure effects by household category by interacting the tenure effects with different dummy variables D_i capturing differences in gender, age, education, country or income.

[13] Appendix Figure A.4 shows the distribution of initial answers.

Figure 3: Tenure effects (in pp) on expected inflation by initial point estimate of 1-year inflation expectation



Notes: The figure displays the estimated tenure effects (β_s from the baseline regression equation (1)) on one-year inflation expectations conditional on the initial point estimate provided by each respondent. Respondents are grouped based on the level of their initial expectation (less than 0% (blue line), equal to 0% (yellow line), between 0 and 4% (red line), between 4 and 10% (green line) 10% or more (yellow line)), and separate tenure effects are estimated for each of the 4 groups. The sample is restricted to respondents who participate in exactly 24 waves of the survey. Observations are winsorized at the 2^{nd} and 98^{th} percentiles within each survey round. Shaded areas indicate 95% confidence intervals. Source: ECB Consumer Expectations Survey, all waves pooled, authors' calculations.

Overall, we find significant differences in tenure effects across household categories (Appendix Figure A.5). The largest difference is obtained between men and women: women exhibit stronger tenure effects than men. Tenure effects are also much stronger for households at the bottom quintile of the income distribution. Differences are smaller by age or education. Tenure effects are smaller for highly educated and older households. Overall, the tenure effects are larger for household categories with, on average, higher inflation expectations.

Finally, we provide results estimated at the country level for the six countries of the euro area which have been covered by the survey since the beginning (Germany, France, Italy, Spain, the Netherlands and Belgium) (Appendix Figure A.6). We find significant tenure effects for the six

countries, they are somewhat stronger in Spain and Italy than for the four other countries covered.

2.3 Implications for Measuring Aggregate Inflation Expectation

Answering the survey in a repeated way significantly affects inflation responses of households. This might blur the reading of aggregate indicators since they will reflect these tenure effects which are specific to households participating repeatedly in the survey and might be less representative of the general population. To assess how much tenure effects can affect aggregate indicators, we compute a corrected series accounting for the panel conditioning. To do so, for every individual with tenure s in our sample, we calculate a counterfactual inflation expectation ($\tilde{y}$) as the difference between the raw answer (y) and the estimated average tenure effect ($\hat{\beta}_s$):

$$\tilde{y}_{i(s)t} = y_{i(s)t} - \hat{\beta}_s \tag{2}$$

for $s \in 1, \ldots, 24$.

Figure 4 plots the actual average 1-year inflation expectation (similar to the one published by the ECB) and the average of expectations once we have controlled for tenure effects.[14] We also plot the average answer given by new participants in the survey, whose answers are, by construction, not contaminated by tenure effects.[15] This aggregate measure could be considered as an alternative way to assess the impact of tenure effects on aggregate indicators without estimating the tenure effects.[16]

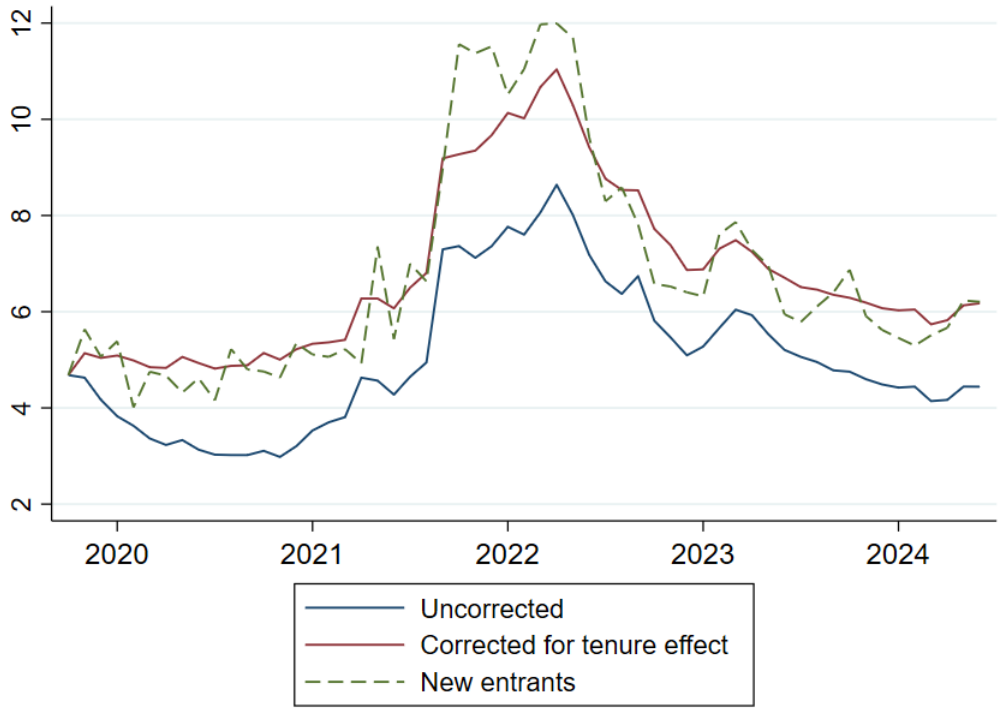
Three results emerge from this comparison. First, as expected, there is a systematic negative gap between the uncorrected series and the series correcting for tenure effects. This gap reflects the fact that many respondents participate several times in the survey, and they have on average lower expectations. Another result is that the series controlling for average tenure effects is rather well correlated with the uncorrected series. This is due to the fact that there is only little variation over time of the household tenure composition. The correlation is, however, weaker at the beginning of the survey (between 2020 and 2021) since all respondents were new at the first interview and the tenure effect increased progressively over the first year of the survey, leading to a mechanical

[14] The time series computed from the raw data is close to the one released by the ECB.

[15] Coibion and Gorodnichenko (2025) report a similar comparison by computing the average responses using only answers from new entrants to the FRBNY-SCE survey. They also find a systematic gap between this reconstructed series and the series released by the FRBNY.

[16] One caveat is of course that there might be a sample selection since characteristics of new entrants might differ considerably from those of other households.

Figure 4: Average 1-year inflation expectations with and without controlling for tenure effects (in %)



Notes: This figure plots the weighted average of one-year inflation expectations over time under three different approaches for correcting or not tenure effects. "Uncorrected" plots the average of all answers computed by date without any correction. "Corrected for tenure effects" plots the average of all answers corrected for the estimated tenure effects. "New entrants" plots the average of answers given by households participating in the survey for the first time. Observations are winsorized at the 2^{nd} and 98^{th} percentiles within each survey round.
Source: ECB Consumer Expectations Survey, authors' calculations.

decrease in the average inflation expectation.[17] Finally, the average expectation of new entrants is close to the corrected series but is more volatile and possibly less precise because the number of new entrants is much smaller than the full sample.

3 Investigating Possible Determinants of Tenure Effects

Tenure effects can generally be explained by the tendency of households with initially high inflation expectations to become more attentive or to engage in greater information search as they

[17] In Appendix, Figure A.7 shows that this difference was much stronger for the median expectation.

participate in additional survey waves. Repeated participation may help households improve their inflation forecasts and respond with greater certainty. However, repeated participation in the survey can also result in declining engagement and reduced response accuracy. In this section, we explore how tenure effects are related to households' attention, information acquisition, and subjective uncertainty.

3.1 Attention to inflation

As they participate in additional survey waves, households with initially high expectations may become more attentive or engage in greater information gathering. This increased focus of households could lead to a reassessment and subsequent revisions of their inflation expectations. To investigate the role of attention in driving tenure effects, we rely on a measure of inflation attention defined as the difference between households' perceived inflation and actual inflation, following Coibion et al. (2018). Households whose perceived inflation is closer to the actual inflation rate are considered more attentive. A key advantage of the ECB-CES is that it collects data not only on inflation expectations but also on inflation perceptions, enabling us to construct this attention measure. Importantly, inflation varied significantly over the period under study, so more attentive households are not simply those reporting lower perceived inflation, as it might be the case in low-inflation environments. Furthermore, cross-country variation in inflation within the euro area provides additional identifying variation in attention levels at any given point in time, which helps to better isolate tenure effects by attention level.

Our attention measure is computed at the household level as the difference between perceived inflation and actual inflation in a given country when the household enters the survey. Like Coibion et al. (2018), we consider that a given household is attentive to inflation when this difference in absolute value is lower than 2pp.[18]

Figure 5 plots the estimation results for 1-year inflation expectations when we consider separately households who are defined as initially attentive or as initially inattentive. We find that tenure effects are close to zero and statistically insignificant for attentive households, whereas inattentive households exhibit much larger tenure effects, about -3pp after six months of participation.[19] This is consistent with the idea that less attentive respondents revise their inflation

[18] In Appendix, Figure A.8 plots the share of attentive households over our sample period. On average, this share is close to 40% over the sample period with some time variation: the proportion of attentive households is lower than the sample average over the period 2022-2024 and quite higher than the sample average between 2020 and 2021.

[19] We also find that the probability of being attentive to inflation increases with tenure by about 5 pp (Appendix Figure A.9).

expectations more, likely because they also report higher initial inflation perceptions.[20]

The type of device used to complete the survey may also influence the respondent's level of attention. Figure A.10 in the Appendix also plots tenure effects according to the type of device used to answer the survey (smartphone versus computer). We find that the tenure effect is approximately 1pp lower for respondents using a computer, compared to those using a smartphone or other devices. This suggests that respondents using devices that facilitate easier information access or a more focused survey experience tend to exhibit smaller revisions in their expectations over time.

3.2 Forecast Error

The less attentive households are, the more they tend to revise their inflation expectations. Repeated participation in the survey may therefore help households form better or more informed inflation forecasts. To assess whether this improved forecasting ability holds, we estimate tenure effects on forecast errors, measured at the household level as the absolute difference between expected inflation and the actual inflation observed one year later in the respondent's country.[21]

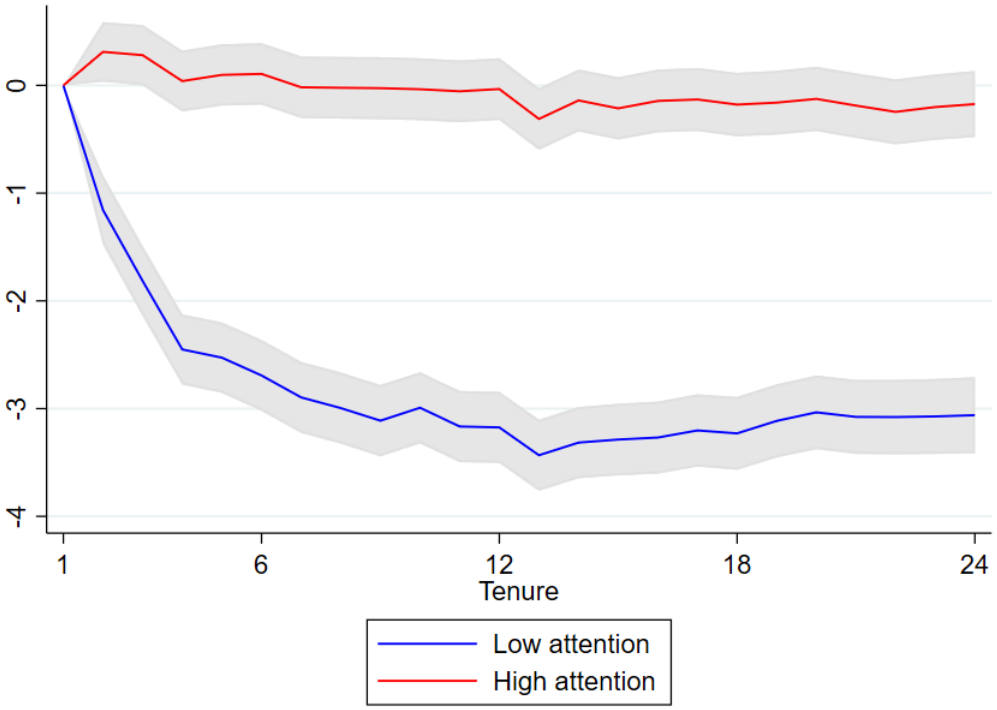
Figure 6 plots the results. We do find that the forecast error declines with tenure (about -1pp after 24 months of tenure), suggesting that households provide more accurate inflation forecasts after repeated participation in the survey. However, the tenure effects estimated on inflation expectations are substantially larger in absolute value than those estimated on forecast errors. If these effects simply reflected improved forecasting, we would expect similar magnitudes for both measures. The fact that tenure effects are larger for expectations suggests that they do not only capture improved accuracy. Instead, part of the observed decline in inflation expectations likely reflects a systematic downward bias unrelated to actual inflation, which in turn worsens forecast accuracy as households continue to participate in the survey.

Overall, we find that only about half of the tenure effects estimated on inflation expectations can be attributed to improved forecasting performance by households. The remaining gap between the tenure effects on absolute forecast errors and those on inflation expectations appears to stem from households reporting systematically lower inflation expectations, regardless of ac-

[20] Korenok et al. (2023) and Weber et al. (2025) show that attention to inflation is endogenous and tends to increase when inflation is high. When we examine how the effect of attention on tenure effects varies depending on whether inflation was high or low at the time of first participation, we find that tenure effects are strong and significant for inattentive households in both inflation regimes. Tenure effects are yet somewhat stronger for inattentive households during the high-inflation period (Appendix Figure A.11).

[21] Figure A.12 in Appendix plots the average forecast error over the sample period.

Figure 5: Tenure effects (in pp) on 1-year inflation expectations by initial level of attention



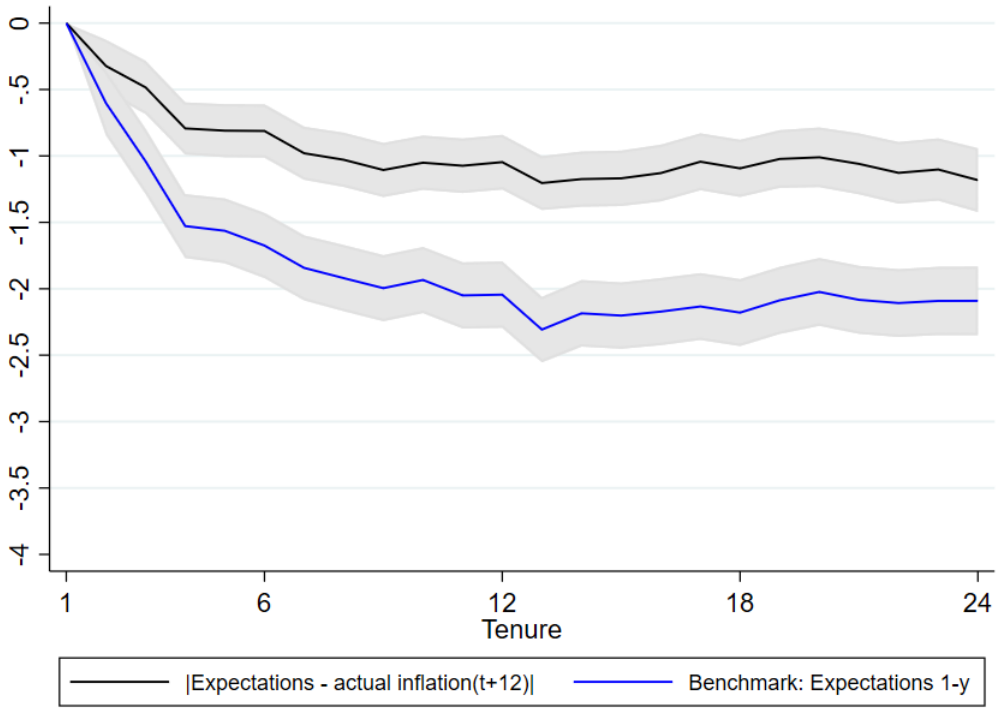
Notes: This figure reports the panel conditioning effect on one-year inflation expectations for households classified as "attentive" and "inattentive" based on their initial survey participation. A household is defined as attentive if the absolute difference between its perceived inflation and the actual inflation at the time of first participation is less than 2 percentage points. The sample is restricted to respondents who participate in exactly 24 waves of the survey. Observations are winsorized at the 2^{nd} and 98^{th} percentiles within each survey round. Shaded areas indicate 95% confidence intervals.

Source: ECB Consumer Expectations Survey, authors' calculations.

tual inflation outcomes.[22] Taken together, these results indicate that a significant portion of the observed tenure effect may actually reflect a deterioration in forecast quality over time, possibly due to declining attention to inflation or survey fatigue among respondents.

[22] Appendix Figure A.13 presents results by initial attention to inflation. We find that negative tenure effects on forecast errors are concentrated among 'inattentive' households. However, these effects are smaller than those observed for inflation expectations for the same 'inattentive' households, suggesting that the large negative tenure effects among 'inattentive' households cannot be fully explained by improved forecast accuracy.

Figure 6: Tenure effects (in pp) on 1-year inflation forecast errors and on 1-year inflation expectations



Notes: The figure displays the estimated tenure effects (β_s from the baseline regression equation (1)) on 1-year inflation forecast error (black line) and 1-year inflation expectations (blue line). The forecast error is calculated as the absolute difference between the respondent's 1-year inflation expectation reported at date t and the actual HICP inflation in the respondent's country 12 months after the survey date ($t + 12$). The sample is restricted to respondents who participate in exactly 24 waves of the survey. Observations are winsorized at the 2^{nd} and 98^{th} percentiles within each survey round. Shaded areas indicate 95% confidence intervals.
Source: ECB Consumer Expectations Survey, all waves pooled, authors' calculations.

3.3 Uncertainty

Households are generally not well informed about official inflation figures published by statistical offices, and their expectations of future inflation tend to exhibit considerable uncertainty. However, repeated participation in the same survey appears to reduce this uncertainty, as households become more confident in their responses over time (Kim and Binder, 2023, Mitchell et al., 2025).

Providing a rounded number can signal greater uncertainty compared to giving a more precise response (Binder, 2017). Therefore, examining how the likelihood of rounding changes with repeated participation can offer insights into how uncertainty evolves with tenure. Figure 7, panel

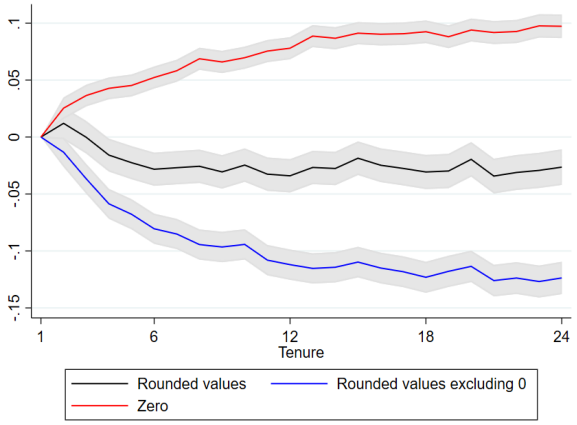
(a), shows that the probability of giving a rounded answer declines slightly with tenure, by about 5pp. In particular, the share of households reporting non-zero rounded values drops sharply as tenure increases. These findings suggest that repeated participation may reduce uncertainty, with more households giving precise answers over time.

However, we also find that households become more likely to report "0" inflation over time: the share of respondents expecting zero inflation increases by about 10pp at the maximum tenure of 24 months. This pattern may partly reflect the interaction between questionnaire design and tenure effects. In the ECB-CES, respondents are first asked a qualitative question about expected price developments - whether prices will increase, remain stable, or decrease. If a respondent answers that they expect prices to remain exactly the same, they are not required to provide a numerical response; instead, a quantitative value of "0" inflation is automatically recorded. This feature of the questionnaire, which resembles the design of the European Commission consumer survey (Andrade et al., 2023), may thus contribute to the growing share of "0" inflation answers among long-tenure participants. This survey design may encourage "speed-through" behavior, where respondents expedite survey completion by selecting neutral or default options. In particular, choosing the qualitative response "prices will remain exactly the same" allows respondents to skip the numerical question, automatically assigning a "0" inflation expectation. When we estimate our benchmark regression using the qualitative question on inflation expectations as endogenous variable, we find that the likelihood of selecting "exactly the same" increases with tenure (see Figure A.14 in the Appendix). This pattern could reflect declining engagement over time, with respondents spending less time on the survey rather than becoming more confident in their views. This behavioral response may also help explain why we observe larger tenure effects on one-year inflation expectations than on forecast errors: the increase in "0" responses mechanically lowers the average expected inflation without necessarily improving the forecasting accuracy. Figure A.15 in the Appendix plots the estimated tenure effects on absolute forecast errors and inflation expectations when "0" responses are excluded. The tenure effects on forecast errors are more closely aligned with those on inflation expectations than in our benchmark case, suggesting that '0' responses contribute more to the observed tenure effects than to the reduction in forecast errors over tenure. The increase in the share of '0' responses with tenure does not reflect learning effects or any improvement in households' ability to forecast inflation more accurately but is more likely indicative of survey fatigue.

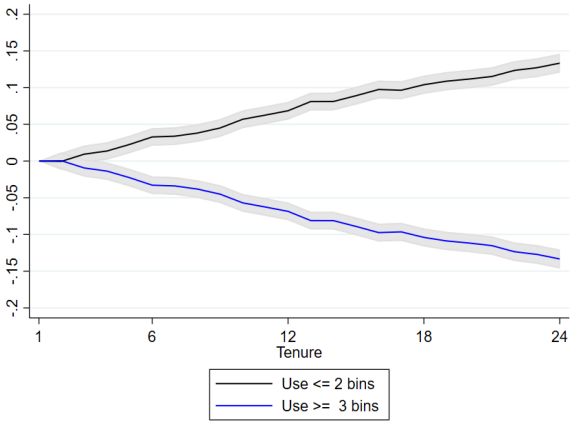
Figure 7 panel (b) plots the estimation results using an alternative uncertainty measure built from the probabilistic question. We find that the share of households using 3 or more bins to answer to the probabilistic question lowers sharply with tenure (-10 pp after 24 months) whereas,

Figure 7: Tenure effects on the probability to report rounded 1-year inflation expectation (point estimate) and on the probability to use bins in the probabilistic question

(a) Rounding of point estimates



(b) Use of bins in the probabilistic question



Notes: The figure displays the estimated tenure effects (β_s from the baseline regression equation (1)) on various binary variables. Panel (a) reports estimates from three separate regressions, each using a different binary outcome variable: black line: the binary variable equals 1 if the household reports a rounded value for the 1-year expected inflation (point estimate); blue line: the binary variable equals 1 if the household reports a rounded value different from 0 for the 1-year expected inflation (point estimate); red line: the binary variable equals 1 if the household reports a value of 0 for the 1-year expected inflation (point estimate). Panel (b) reports estimates from two separate regressions, each using a different binary outcome variable; black line: the binary variable equals 1 if the household uses 2 bins or less to answer to the probabilistic question; blue line: the binary variable equals 1 if the household uses 3 bins or more to answer to the probabilistic question. The sample is restricted to respondents who participate in exactly 24 waves of the survey. Observations are winsorized at the 2^{nd} and 98^{th} percentiles within each survey round. Shaded areas indicate 95% confidence intervals.

Source: ECB Consumer Expectations Survey, authors' calculations.

symmetrically, the share of respondents filling 2 or less bins with a non-zero probability increases with tenure. Mitchell et al. (2025) report similar evidence from the FRBNY-SCE data.[23] This result could be consistent with less uncertain answers but it could also be explained by households putting less effort in responding to the survey.[24]

Overall, our results suggest that households become more certain in their responses over time.

[23] Figure A.16 in the Appendix also shows that the gap between the point estimate and the mean expectation implied by the probabilistic questions narrows with tenure, suggesting that households' responses become more internally consistent over time.

[24] This type of survey fatigue is also more likely to appear when the questionnaire is rather long and cover many topics, as documented by Galesic and Bosnjak (2009).

However, this increased certainty could reflect not only a better understanding of the economic concepts covered in the survey, but also signs of growing survey fatigue. On one hand, repeated participation may enhance familiarity with inflation-related topics, leading to answers that are more aligned with actual inflation. On the other hand, greater familiarity with the questionnaire structure may encourage respondents to put less effort into answering, potentially reducing response accuracy (Brave et al., 2024). Disentangling genuine learning or tenure effects from confounding factors like survey fatigue is challenging in our setting. Nevertheless, we find that approximately half of the estimated tenure effects cannot be explained by improvements in forecasting performance, suggesting that reduced engagement may play a significant role.

4 Panel Conditioning on Other Outcomes

To what extent are tenure effects specific to inflation? One possibility is that such effects are particularly pronounced for inflation because it is a macroeconomic concept that is less familiar and less well understood by households compared to variables like unemployment or GDP growth. Another explanation is that tenure effects are generally stronger for macroeconomic variables, which households tend to monitor less closely than personal economic indicators such as income or consumption. The ECB-CES provides a unique opportunity to test these hypotheses, as it collects a wide range of quantitative responses on both macroeconomic and household-level variables. In this section, we examine the presence and magnitude of tenure effects across various quantitative questions in the ECB-CES, distinguishing between macro- and microeconomic indicators.

4.1 Tenure Effects on Other Macro Quantitative Variables

One key advantage of the ECB-CES is that it collects households' quantitative assessments not only of inflation, but also of other macroeconomic variables such as unemployment and economic growth.[25] This broader coverage enables us to investigate whether the tenure effects observed for inflation also extend to other macroeconomic indicators. Specifically, the ECB-CES includes questions on households' perceptions of the current unemployment rate, their expectations for the unemployment rate one year ahead, and their expectations for economic growth.[26]

A first key finding is that households systematically overestimate the unemployment rate and underestimate economic growth. Appendix Figure A.17 illustrates this by comparing the average

[25] Kim and Binder (2023) report tenure-related results for qualitative changes in the unemployment rate.

[26] The exact wording of the questions is provided in Appendix B.

perceived and expected unemployment rates with the actual euro area unemployment rate. The figure shows a large and persistent positive gap: both the perceived and expected unemployment rates exceed the actual rate, although they tend to move together over time. On average, the overestimation of the unemployment rate is approximately 5pp. Similarly, the average expectation of economic growth has been consistently below zero since 2022 whereas the actual GDP growth was more often positive than negative over the sample period. The underestimation is smaller than the one obtained for inflation but it is systematic after the Covid period.

This systematic overestimation of unemployment and underestimation of economic growth suggests that households are not necessarily more attentive to real variables than to nominal ones, as their perceptions are biased for both. Furthermore, households tend to exhibit a pessimistic bias regarding real variables, similar to the pessimism observed in their inflation expectations.

Figure 8 displays the tenure effects on expectations of the unemployment rate and economic growth. We find significant tenure effects for both variables. For the unemployment rate, the tenure effect after 12 months is even larger than that observed for inflation, amounting to about -3pp for both perceptions and 1-year expectations. The pattern over tenure shows substantial revisions within the first several months, stabilizing near its maximum effect after 12 months. In contrast, tenure effects for economic growth are positive but smaller in magnitude. The upward adjustment in growth expectations is more gradual, remaining insignificant or barely significant up to 9 months and then steadily increasing to approximately 1pp after 20 months. This smaller and more gradual tenure effect for economic growth suggests that households may be relatively better informed about economic growth than about the unemployment rate.

Overall, these tenure effects also suggest that households have also more optimistic views on the real economy when they participate several times in the survey. They also tend to provide more consistent and less biased views, and this pattern is very similar to the one obtained for inflation. These results suggest that the tenure effects are not specific to the inflation variables.

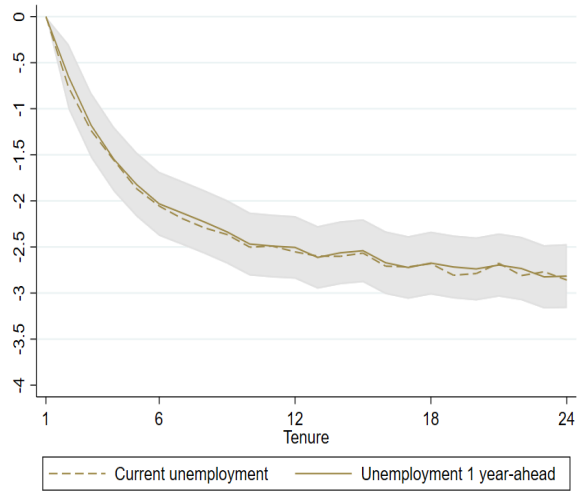
4.2 Tenure Effects on Microeconomic Variables

One possible explanation for the significant tenure effects observed on macroeconomic variables is that such variables are generally less familiar to households compared to their own household-specific indicators like income or consumption. The ECB-CES also asks households quantitative questions regarding the expected growth of their own income, as well as their perceived and expected consumption growth.[27]

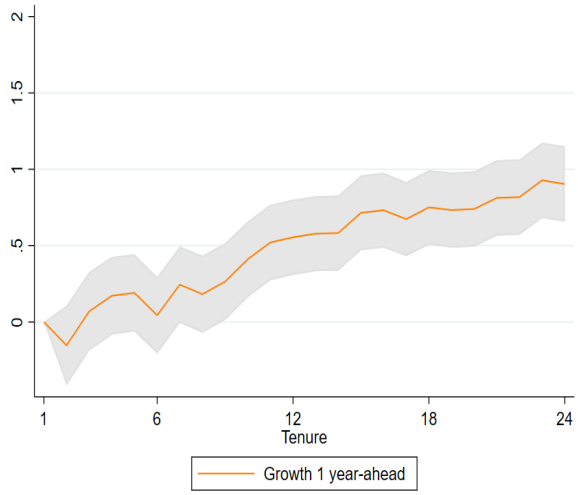
[27] See Appendix B for the exact wording of questions.

Figure 8: Tenure effects (in pp) on perceived and expected unemployment and on the expected economic growth

(a) Unemployment rate



(b) Economic growth



Notes: The figure displays the estimated tenure effects (β_s from the baseline regression equation (1)) on perceived and 1-year expected unemployment rates (Panel (a)) and on 1-year expected economic growth (Panel (b)). The sample is restricted to respondents who participate in exactly 24 waves of the survey. Observations are winsorized at the 2^{nd} and 98^{th} percentiles within each survey round. Shaded areas indicate 95% confidence intervals.
Source: ECB Consumer Expectations Survey, authors' calculations.

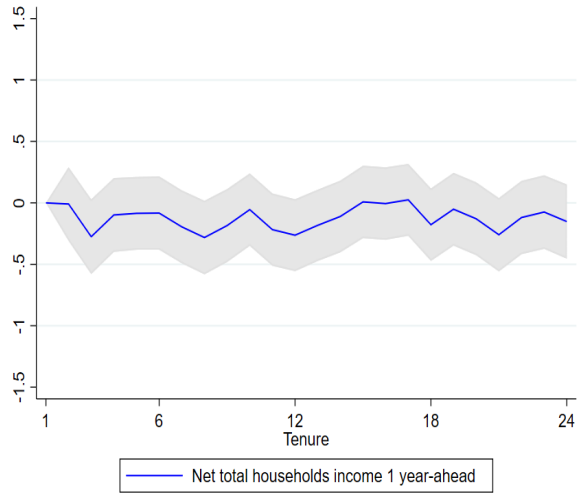
In Appendix Figure A.17, we compare the average answers of households with the corresponding aggregate variables for the euro area (i.e. the annual growth rate of the disposable income and final consumption from the national accounts). Contrary to the macro variables, we do not find any systematic bias in the answers but we also find that the correlation between the actual and perceived variables is weaker.

Figure 9 reports the estimated tenure effects associated with income and consumption variables. For income, we find no significant effect for all tenures. For both expected and perceived growth of spending consumption, we find negative tenure effects, they are however rather small and only significant after 6 months of participation in the survey.

Overall, these results suggest that households are more attentive or informed about variables reflecting their own economic situation than about the macro variables in particular inflation or unemployment.

Figure 9: Tenure effects (in pp) on households' expected income growth, and on perceived and expected consumption growth.

(a) 1-year expected growth of net income



(b) Perceived and 1-year expected growth of spending consumption

Notes: This figure shows the estimated tenure effects (β_s from the baseline regression equation (1)) on three household-specific variables: 1-year expected income growth, perceived consumption growth, and 1-year expected consumption growth. The sample is restricted to respondents who participate in exactly 24 waves of the survey. Observations are winsorized at the 2^{nd} and 98^{th} percentiles within each survey round. Shaded areas indicate 95% confidence intervals. Source: ECB Consumer Expectations Survey, authors' calculations.

5 Conclusion

Repeated participation in the ECB-CES affects the answers of households to the survey. In particular, we find substantial tenure effects for inflation expectations, which is consistent with previous findings of Kim and Binder (2023) obtained on FRBNY-SCE data for the United States. In both surveys, the tenure effect is estimated to reduce one-year inflation expectations by approximately 2pp after one year of survey participation. Taking into account those tenure effects would lead to a higher level of aggregate inflation expectation but its evolution over time would be similar to the one obtained from data not corrected for tenure effects.

Several mechanisms contribute to the tenure effects. Increased attention, as households voluntarily search for information after their first survey wave, improves accuracy by aligning expectations with new information. A priming effect, resulting from repeated exposure to similar questions, encourages respondents to provide more consistent answers by refining or correcting

their previous responses. In particular, we find that tenure effects are stronger when the initial answer was above 10%. We also find that answers of households are more certain: they report less frequently rounding numbers and use fewer bins when answering to the probabilistic question. However, these findings could also be consistent with less engagement from households in their participation in the survey. We show that one half of tenure effects cannot be attributed to a better forecast performance. Households are more likely to report systematic lower inflation expectations without any link with actual inflation variation. In particular, they tend to report more frequently that prices will be stable and then do not have to answer to the quantitative answer, which might reduce the time spent answering the questionnaire. Repeated participation can lead to survey fatigue, with respondents providing less thoughtful answers over time, which may deteriorate the overall accuracy of their responses.

The tenure effect is crucial when comparing different surveys, such as the ECB-CES and the European Commission consumer survey, or the FRBNY-SCE and the Michigan Survey of Consumers. Differences in methodology, sampling, and question design can increase or decrease the effect of tenure. Recognizing and adjusting surveys for tenure effects is important to improve survey design, to interpret time series, and to ensure accurate comparisons across surveys. Our finding underscores the significant influence of repeated survey participation on household responses, not only for inflation expectations but also for other macroeconomic expectations.

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Online Appendix – Measuring Households' Inflation Expectations in the Euro Area: the Effect of Panel Conditioning

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(Not for publication)

July 21, 2025

A The ECB Consumer Expectations Survey

The Consumer Expectations Survey[28] is conducted by the European Central Bank in 11 euro-area countries, including Germany, France, Italy, Spain, the Netherlands, Belgium, Austria, Portugal, Finland, Ireland, and Greece. The survey started in 2020 for the first six countries and expanded in 2022 to include the remaining five. In each country surveyed, the questionnaires are standardized in terms of structure, and modes of data collection. The questions are formulated in a similar way with only minor adjustments for translation. It is administered online and nearly 19,000 households are surveyed every month.

The methodology for this survey aligns closely with the one of the FRBNY-SCE. The questions are categorized into three main types: (1) qualitative questions similar to those used in other consumer surveys (e.g., "What do you think will happen to prices in general over the next 12 months?"), (2) quantitative questions requesting point estimates, such as expected inflation rates over the next year, and (3) questions eliciting respondents' probability distributions for their forecasts. The survey also collects detailed demographic and socioeconomic information — including income, age, gender, region, and educational attainment — which enables the analysis of responses across different household groups.

The survey design employs a combination of probability and non-probability sampling methods. For the probability sample, recruitment is conducted via telephone using random digit dialing. In contrast, the non-probability samples are recruited and surveyed exclusively online. These samples are drawn primarily from existing online access panels, but also include newly recruited participants with limited prior experience in survey participation. Some of these new recruits are identified through targeted advertising campaigns on social media platforms. To enhance representativeness within the non-probability component of the ECB-CES panel, quotas based on age, gender, and region are applied.

The survey covers a broad range of topics, including consumption, labor markets, housing, and credit. Beyond the core monthly questionnaire (approximately 20 minutes in total, averaging 20 seconds per question), there are also extended quarterly and annual modules with more detailed questions consumption, employment, and credit.

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

B Sample questionnaire

This section provides details of the questions from the CES questionnaire used in the paper.[29]

- **Prices and Inflation**

1. **Qualitative Question:** The question addresses expectations about the general price level in the country of residence 12 months ahead. Respondents are asked:

   Looking ahead to 12 months from now, what do you think will happen to prices in general? We are interested in even very small changes.

   - Prices will increase a lot
   - Prices will decrease a lot
   - Prices will increase a little
   - Prices will decrease a little
   - Prices will be exactly the same

2. **Quantitative Question** (Price change estimation in percentage terms): The question captures respondents' best guess of how much prices will change in percentage terms 12 months from now. The input is a numeric value that can include up to one decimal place.

   How much higher (lower) do you think prices in general will be 12 months from now in the country you currently live in? Please give your best guess of the change in percentage terms. You can provide a number up to one decimal place. ___%

3. **Probabilistic Question** (Distribution of Price Change Expectations): This question asks respondents to allocate 100 points across ten possible price change scenarios 12 months from now. The scenarios range from significant increases (12% or more) to significant decreases (12% or more). The points indicate the likelihood of each scenario.

   Now we would like you to think about how much prices in general in the country you currently live in are likely to change in 12 months from now. We realise that this question may take a little more effort.

[29] https://www.ecb.europa.eu/stats/ecb_surveys/consumer_exp_survey/shared/pdf/CES_sample_questionnaire.en.pdf

Below you see 10 possible ways in which prices could change. Please distribute 100 points among them, to indicate how likely you think it is that each price change will happen. The sum of the points you allocate should total to 100.
You can allocate points by typing a percentage in each box. (Note that your answers should sum to 100 – if your sum exceeds 100, you should first decrease the points again in one option before you can add points in another).

Percent Change	
Increase by 12% or more	___%
Increase by 8% to less than 12%	___%
Increase by 4% to less than 8%	___%
Increase by 2% to less than 4%	___%
Increase by 0% to less than 2%	___%
Decrease by 0% to less than 2%	___%
Decrease by 2% to less than 4%	___%
Decrease by 4% to less than 8%	___%
Decrease by 8% to less than 12%	___%
Decrease by 12% or more	___%
The total points should sum to	100

- **Other aggregate variables**

  What do you think is the current unemployment rate in the country you currently live in? Please give your best guess in percentage terms.

  What do you think will be the unemployment rate 12 months from now in the country you currently live in? Please give your best guess in percentage terms.

  During the next 12 months, by how much do you think the economy will grow (shrink)? Please give your best guess of the expected change in percentage terms. You can provide a number up to one decimal place. During the next 12 months, I expect the economy to grow (shrink) by xx.x %

- **Households' own variables**

  By about what percent do you expect the total net income of your household to increase (decrease)? Please give your best guess of the expected change in percentage terms. You

can provide a number up to one decimal place. During the next 12 months, I expect the total net income of my household to increase (decrease) by xx.x%

How much higher (lower) do you think your household spending is now compared with 12 months ago? Please give your best guess of the change in percentage terms. You can provide a number up to one decimal place xx.x%

By what percent do you expect your household spending on all goods and services to change during the next 12 months compared with your spending in the past 12 months? Even very small changes in the amount your household will spend are of interest. Please give your best guess of the change in percentage terms.

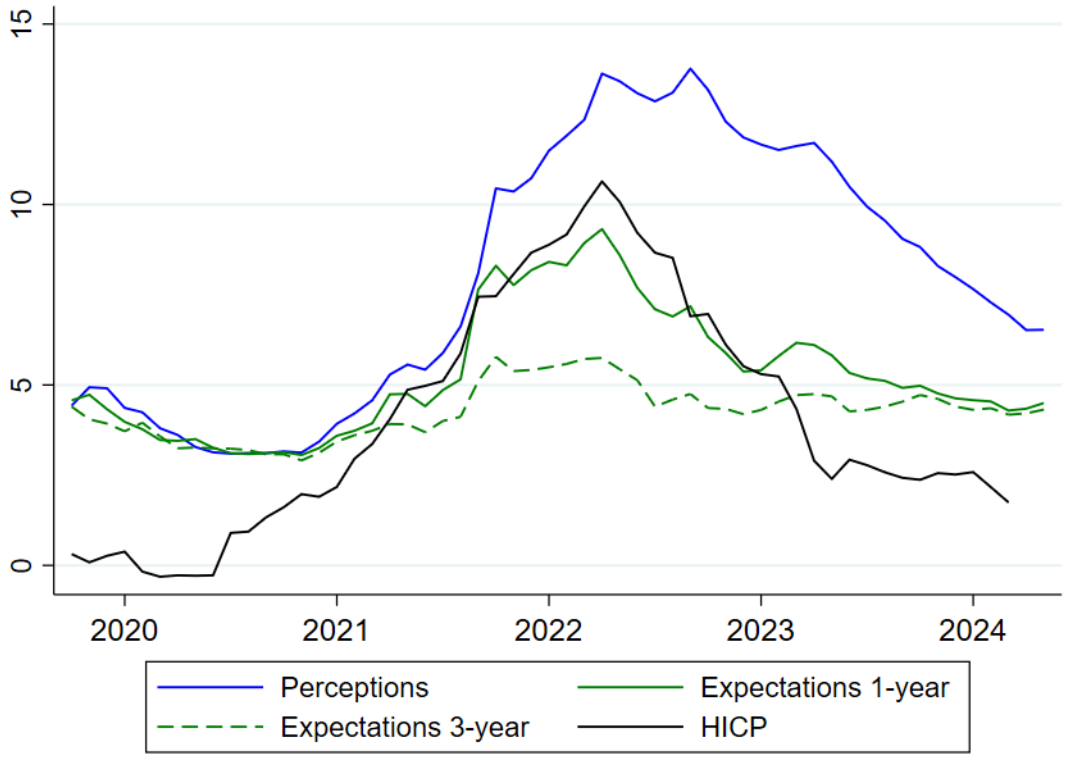
C Additional Tables and Figures

Table A.1: Distribution of household characteristics by tenure (in %)

Tenure (months)	**1**	**6**	**12**	**18**	**24**
Gender					
Men	46.3	50.3	51.3	50.7	49.8
Women	53.7	49.6	48.7	49.3	50.2
Age					
18-34 years	30.1	21.3	21.0	20.8	19.8
35-49 years	41.3	44.1	44.8	45.7	46.2
+ 50 years	28.6	34.6	34.2	33.5	34.00
Education					
Primary	11.9	11.6	11.5	11.4	11.2
Secondary	34.7	32.6	32.9	33.2	32.7
Tertiary	53.4	55.8	55.6	55.4	56.1
Income					
Quintile 1	20.7	19.6	20.4	21.3	22.4
Quintile 2	19.7	19.5	20.2	19.9	20.7
Quintile 3	18.7	19.4	20.1	20.5	20.4
Quintile 4	19.4	20.4	19.7	19.2	18.8
Quintile 5	21.5	21.2	19.7	19.1	17.7

Notes: The table reports the demographic and socioeconomic characteristics of households categorized by their tenure in the survey. Each column corresponds to a different tenure duration. For each characteristic within a given tenure category, the percentages sum to 100% across rows. The sample is restricted to respondents who participate in the survey between 1 to 24 waves.
Source: ECB Consumer Expectations Survey, authors' calculations.

Figure A.1: Households' perceived and expected inflation (average) vs. actual HICP inflation in the euro area)

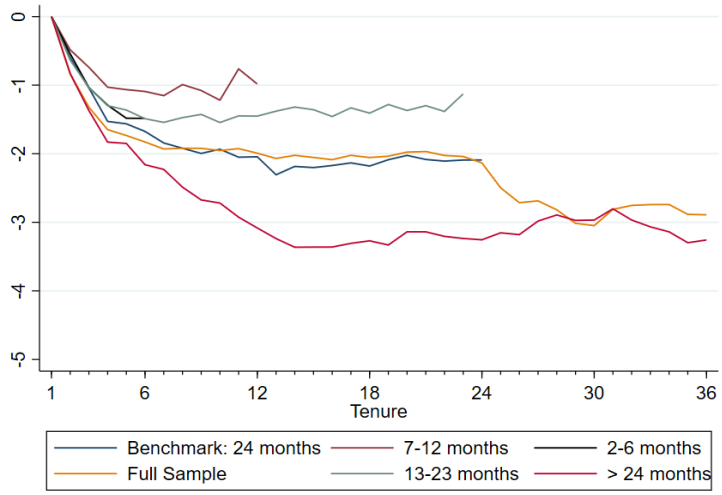


Note: This figure plots the unweighted average of perceived inflation, one-year and three-year inflation expectations over time compared with euro-area actual HICP inflation (y-o-y growth in %). Survey observations are winsorized at the 2^{nd} and 98^{th} percentiles within each survey round.

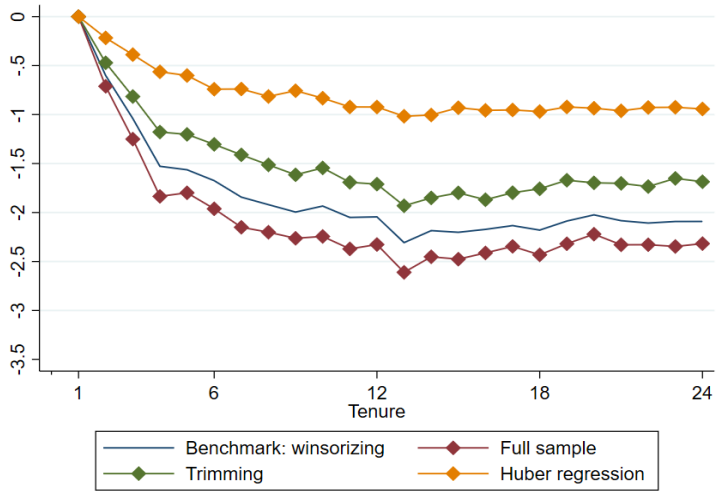
Source: Eurostat HICP, ECB Consumer Expectations Survey, authors' calculations.

Figure A.2: Tenure effects (in pp) on 1-year ahead inflation expectations: role of sample selection and of outliers

(a) Sample selection: maximum tenure

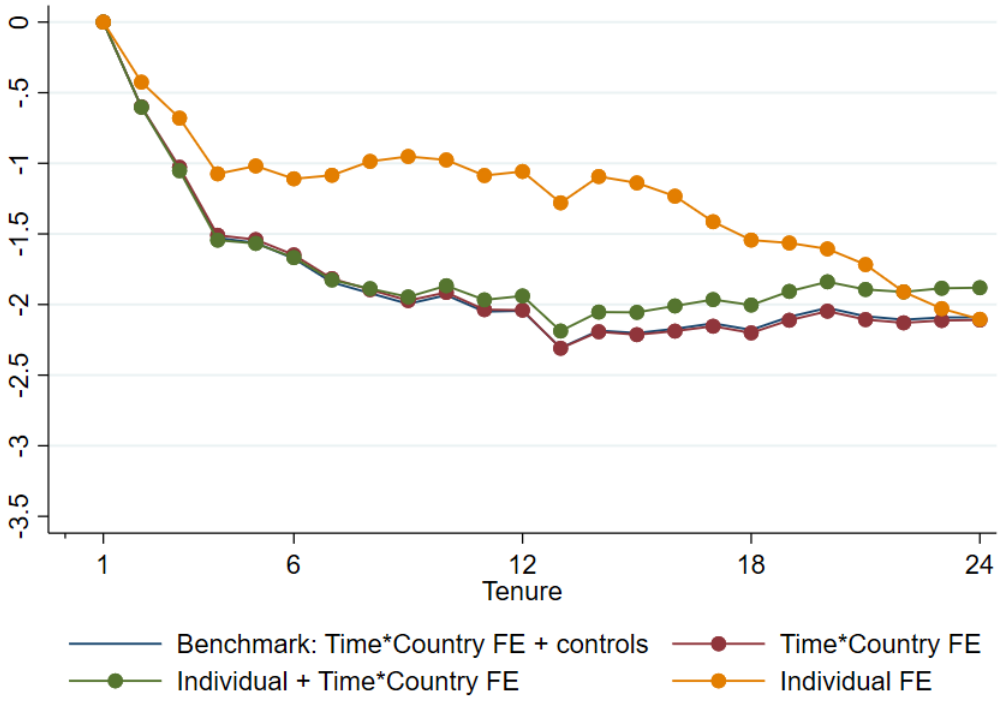


(b) Outliers



Notes: The figure displays the estimated tenure effects (β_s from the baseline regression equation (1)) on one-year inflation expectations. Panel (a) presents results based on different sample selections according to respondents' maximum tenure. Panel (b) shows results under various assumptions for trimming outliers (in our benchmark case, observations are winsorized at the 2^{nd} and 98^{th} percentiles of the distribution within each wave of the survey. 'Trimming' refers to excluding observations outside these percentiles. 'Full sample' uses all observations without any outlier adjustment. 'Huber regression' reports results from a robust regression estimated on the full data set, using the Stata package rreg. The sample is restricted to respondents who participate in exactly 24 waves of the survey.
Source: ECB Consumer Expectations Survey, authors' calculations.

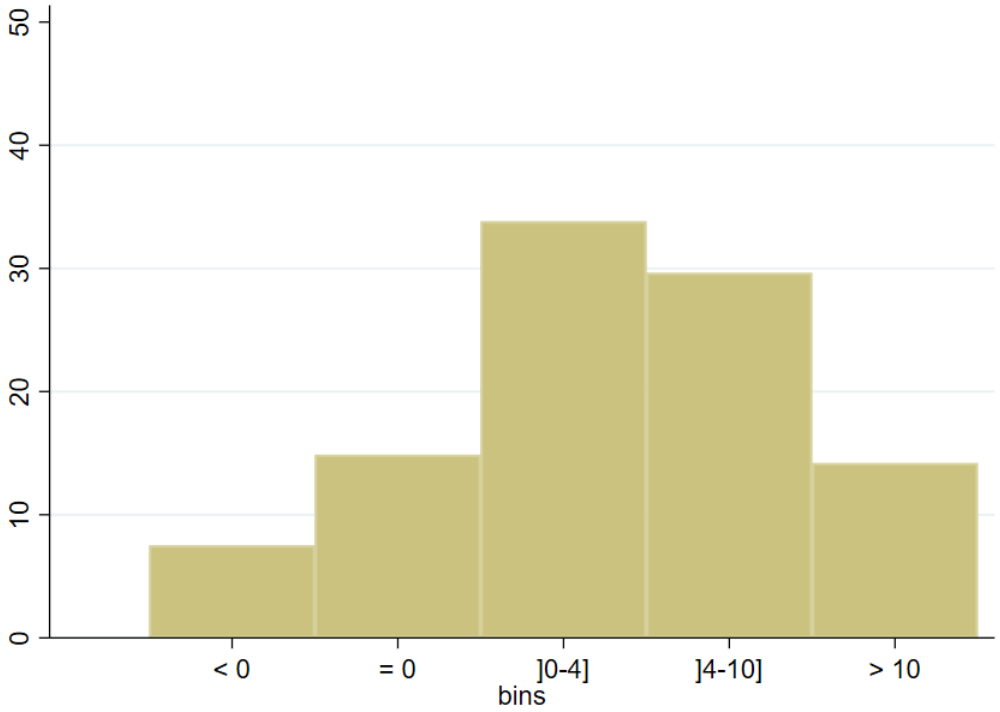
Figure A.3: Tenure effects (in pp) on 1-year ahead inflation expectations - alternative specifications



Note: The figure displays the estimated tenure effects (β_s from the baseline regression equation (1)) on one-year inflation expectations across various model specifications. The benchmark estimation includes household observable characteristics and time-by-country fixed effects. "Time*Country FE" includes only time-by-country fixed effects. "Individual + Time*Country FE" includes both household fixed effects and time-by-country fixed effects. "Individual FE" includes only household fixed effects. The sample is restricted to respondents who participate in exactly 24 waves of the survey. Observations are winsorized at the 2^{nd} and 98^{th} percentiles of the distribution within each wave of the survey.

Source: ECB Consumer Expectations Survey, authors' calculations.

Figure A.4: Distribution of initial inflation expectations (% of respondents)

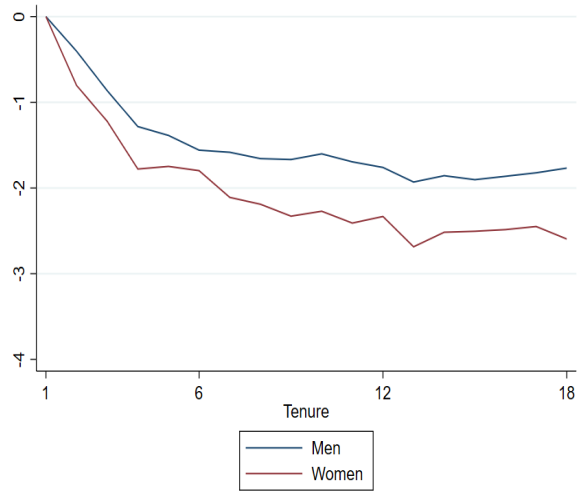


Notes: This figure shows the distribution of households' initial one-year ahead inflation expectations at their first participation in the survey. We have grouped answers into 5 bins: less than 0%, exactly 0% (prices will be exactly the same), between 0 and 4%, between 4 and 10% and more than 10%.

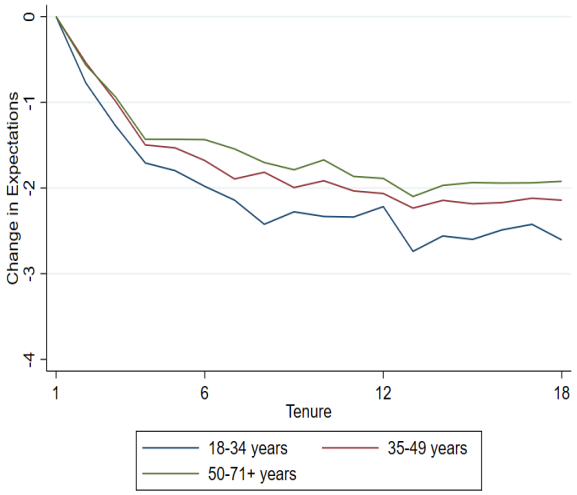
Source: ECB Consumer Expectations Survey, authors' calculations.

Figure A.5: Tenure effects (in pp) on 1-year inflation expectations: heterogeneity across household groups

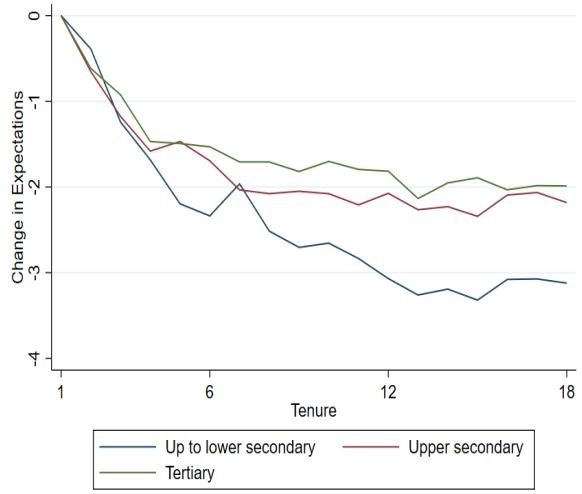
(a) By sex



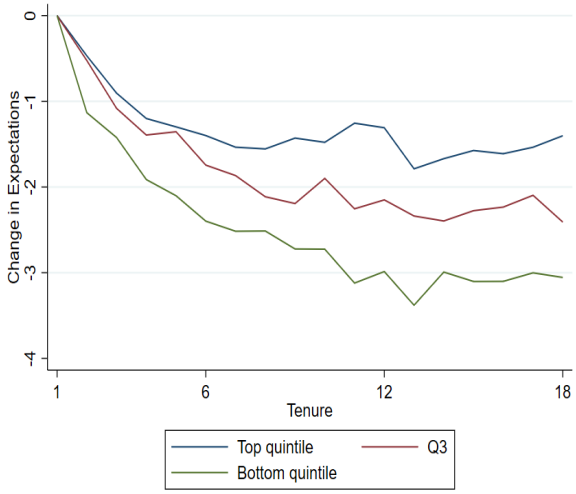
(b) By age



(c) By education



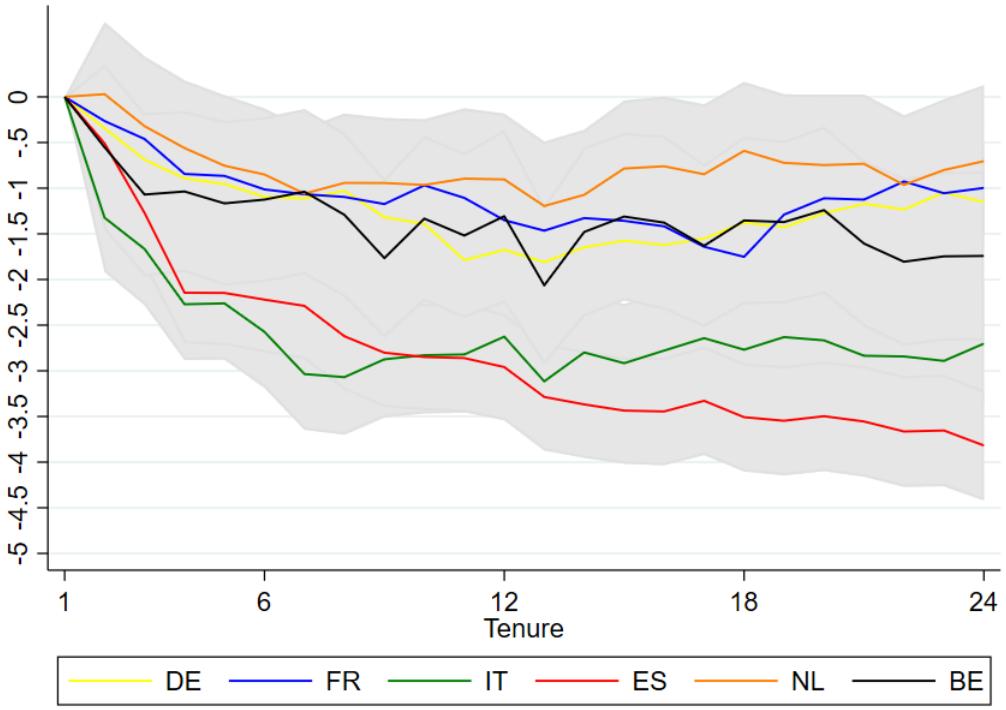
(d) By income



Notes: The figure displays the estimated tenure effects (β_s from the baseline regression equation (1)) on one-year inflation expectations for different groups of households (by sex, age, education, income). The sample is restricted to respondents who participate in exactly 24 waves of the survey. Observations are winsorized at the 2^{nd} and 98^{th} percentiles of the distribution within each wave of the survey.

Source: ECB Consumer Expectations Survey, authors' calculations.

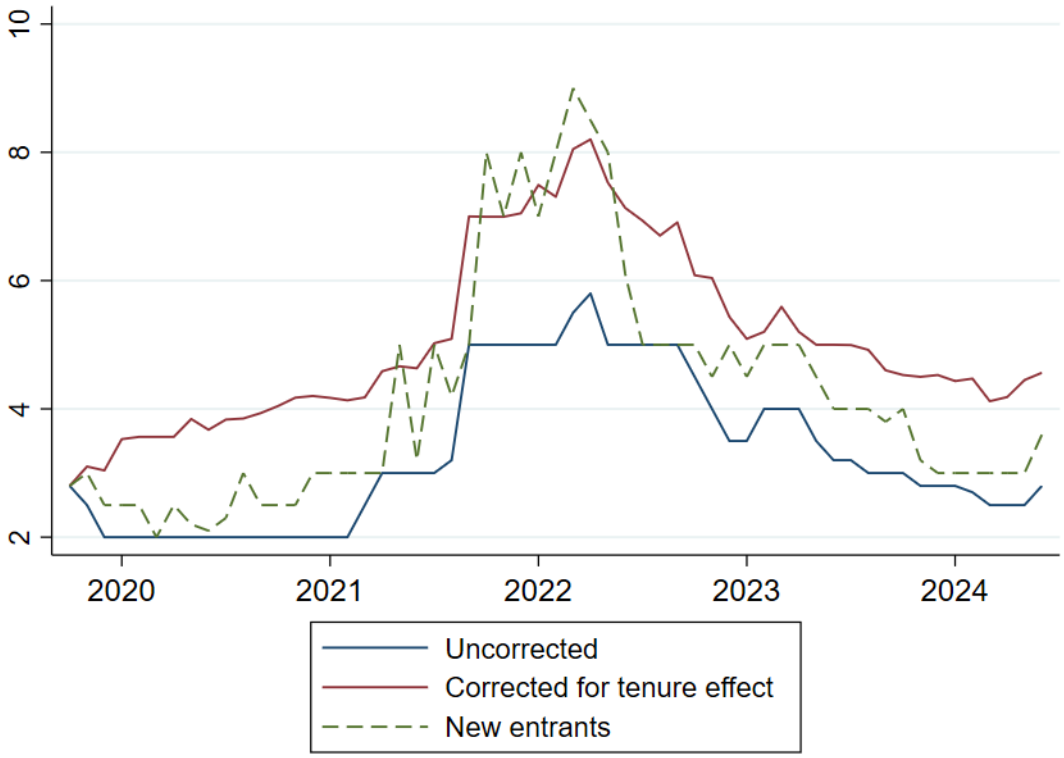
Figure A.6: Tenure effects (in pp) on 1-year inflation expectations: country heterogeneity



Notes: The figure displays the estimated tenure effects (β_s from the baseline regression equation (1)) on one-year inflation expectations by country. The sample is restricted to respondents who participate in exactly 24 waves of the survey. Observations are winsorized at the 2^{nd} and 98^{th} percentiles of the distribution within each wave of the survey. The shaded area corresponds to 95% confidence intervals.

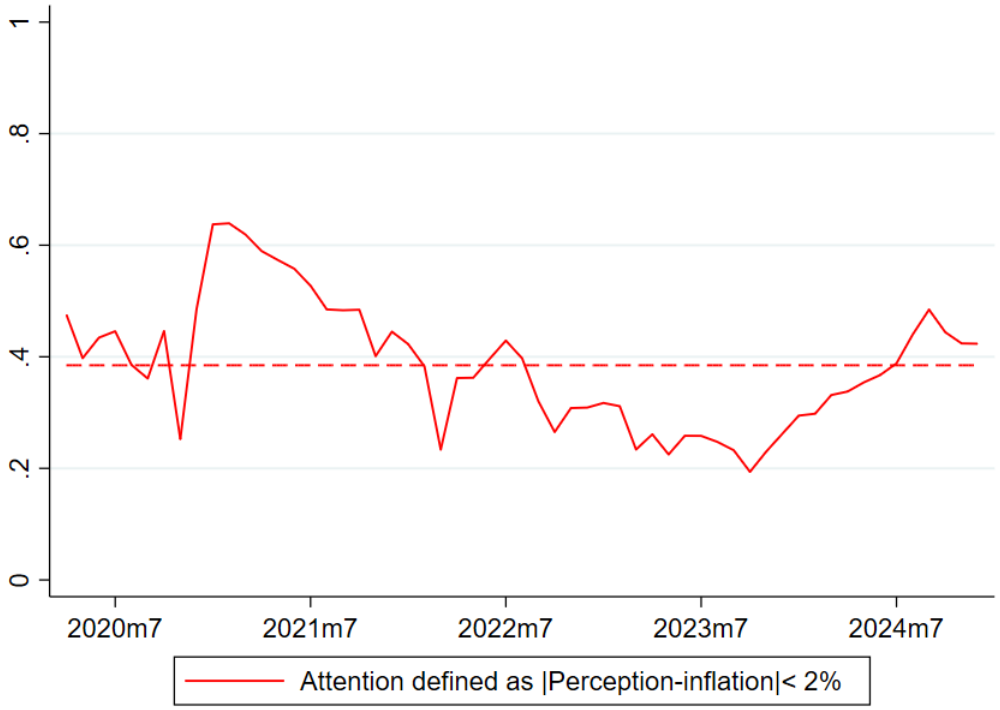
Source: ECB Consumer Expectations Survey, authors' calculations.

Figure A.7: Median 1-year inflation expectations with and without controlling for tenure effects (in %)



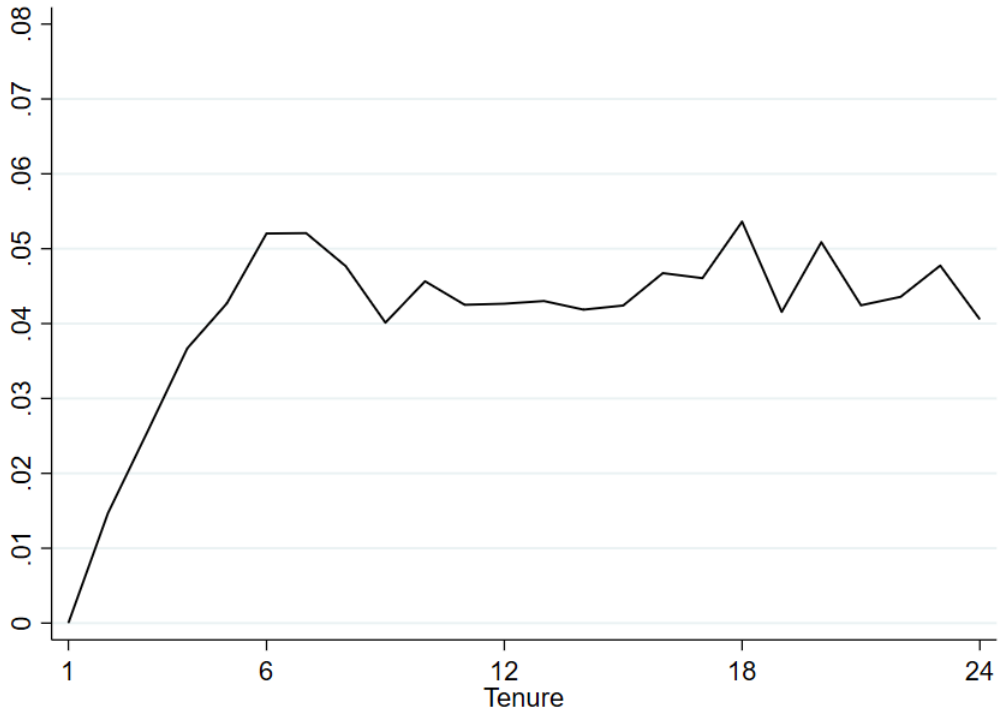
Note: This figure plots the weighted median of one-year inflation expectations over time under three different approaches for correcting or not tenure effects. "Uncorrected" plots the median of all answers computed by date without any correction. "Corrected for tenure effects" plots the median of all answers corrected for the estimated tenure effects. "New entrants" plots the median of answers given by households participating in the survey for the first time. Observations are winsorized at the 2^{nd} and 98^{th} percentiles within each survey round.
Source: ECB Consumer Expectations Survey, authors' calculations.

Figure A.8: Proportion of "attentive" households over time



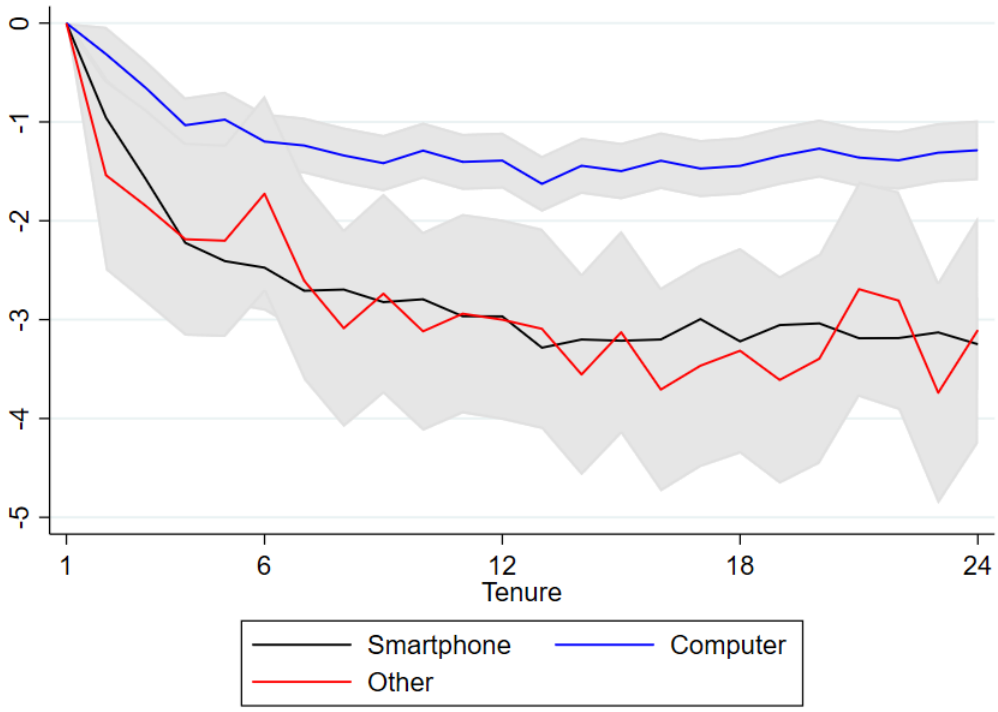
Notes: The figure plots the share of households being classified as "attentive" to inflation over time. Households are classified as attentive to inflation if their inflation perception is close to actual inflation. We compute a dummy variable which is equal to 1 if $|\pi^p_{ct} - \pi_{ct}| < 2\%$ where π^p_{ct} is the perceived inflation of a given household in country c and the actual inflation in country c. The red dashed line corresponds to the average of this proportion over the full sample period (which is close to 40%). The sample is restricted to respondents who participate in exactly 24 waves of the survey. Observations are winsorized at the 2^{nd} and 98^{th} percentiles within each survey round.
Source: ECB Consumer Expectations Survey, authors' calculations.

Figure A.9: Tenure effects (in pp) on the probability for households to become attentive to inflation



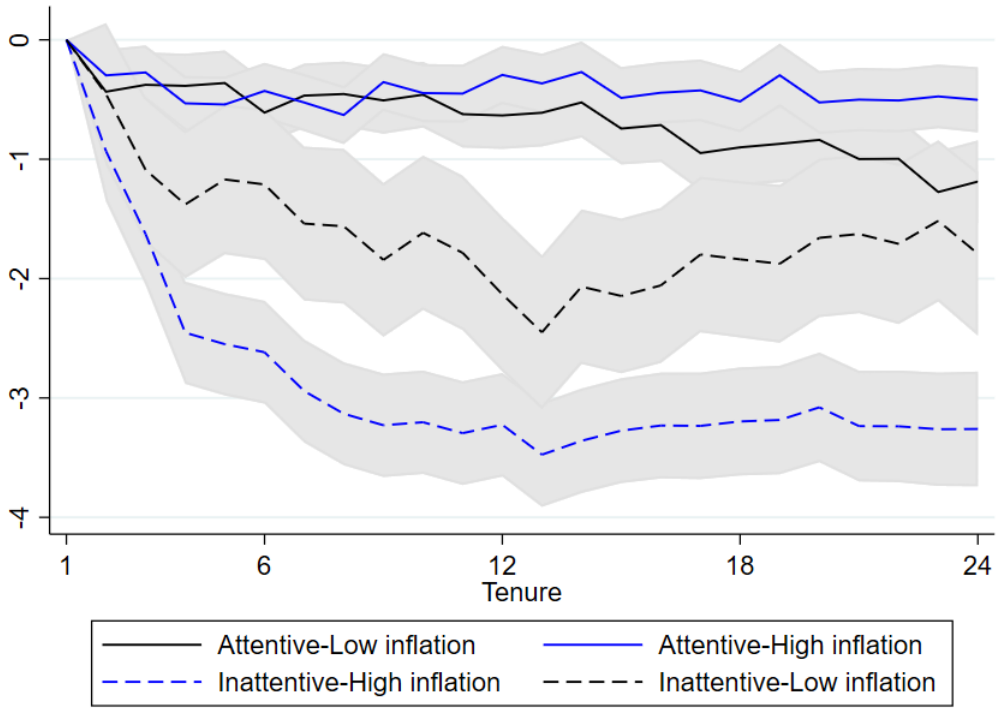
Notes: The figure displays the estimated tenure effects (β_s from the baseline regression equation (1)) on the dummy variable "attentive to inflation". This dummy variable is equal to 1 if $|\pi^p_{ct} - \pi_{ct}| < 2\%$ where π^p_t is the perceived inflation of a given household in country c and the actual inflation in country c. The sample is restricted to respondents who participate in exactly 24 waves of the survey. Observations are winsorized at the 2^{nd} and 98^{th} percentiles within each survey round. Source: ECB Consumer Expectations Survey, all waves pooled, authors' calculations.

Figure A.10: Tenure effects (in pp) on 1-year ahead inflation expectations by survey response device



Notes: The figure displays the estimated tenure effects (β_s from the baseline regression equation (1)) on one-year inflation expectations by the device used to answer the survey (e.g., computer, smartphone, or other). The sample is restricted to respondents who participate in exactly 24 waves of the survey. Observations are winsorized at the 2^{nd} and 98^{th} percentiles of the distribution within each wave of the survey.
Source: ECB Consumer Expectations Survey, authors' calculations.

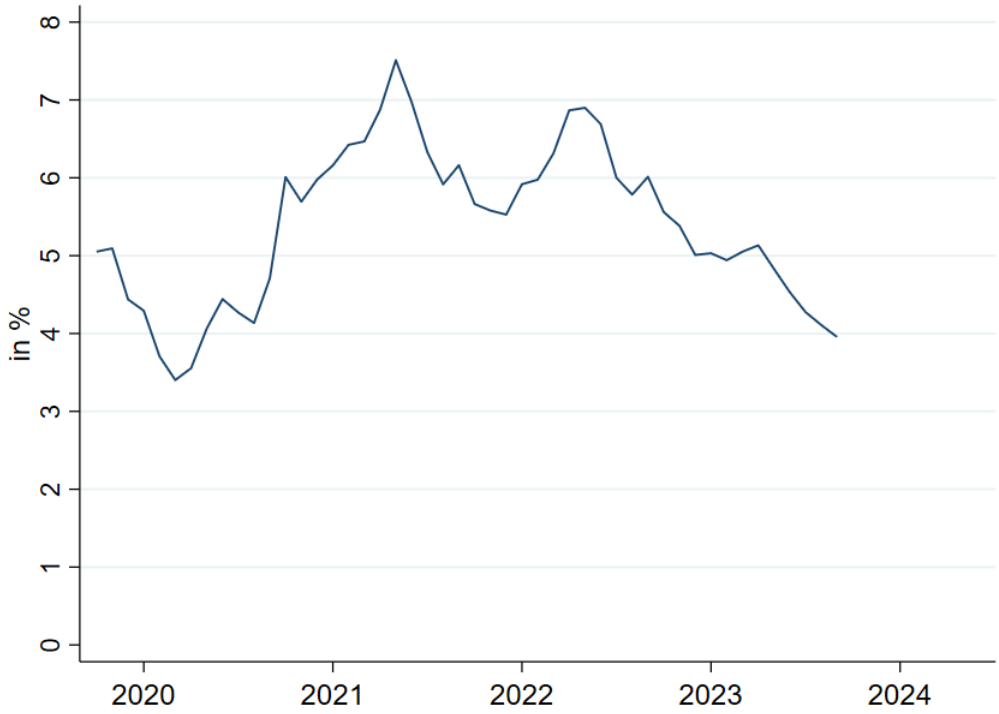
Figure A.11: Role of attention on tenure effects on 1-year inflation expectations - High vs. Low Inflation Periods



Notes: The figure displays the estimated tenure effects (β_s from the baseline regression equation (1)) on one-year inflation expectation by level of initial attention to inflation and by periods of inflation. We use a dummy variable "attentive to inflation" which is equal to 1 if $|\pi^p_{ct} - \pi_{ct}| < 2\%$ where π^p_t is the perceived inflation of a given household in country c and the actual inflation in country c. "High inflation" is defined as $\pi_t > 3\%$. The sample is restricted to respondents who participate in exactly 24 waves of the survey. Observations are winsorized at the 2^{nd} and 98^{th} percentiles within each survey round.

Source: ECB Consumer Expectations Survey, authors' calculations.

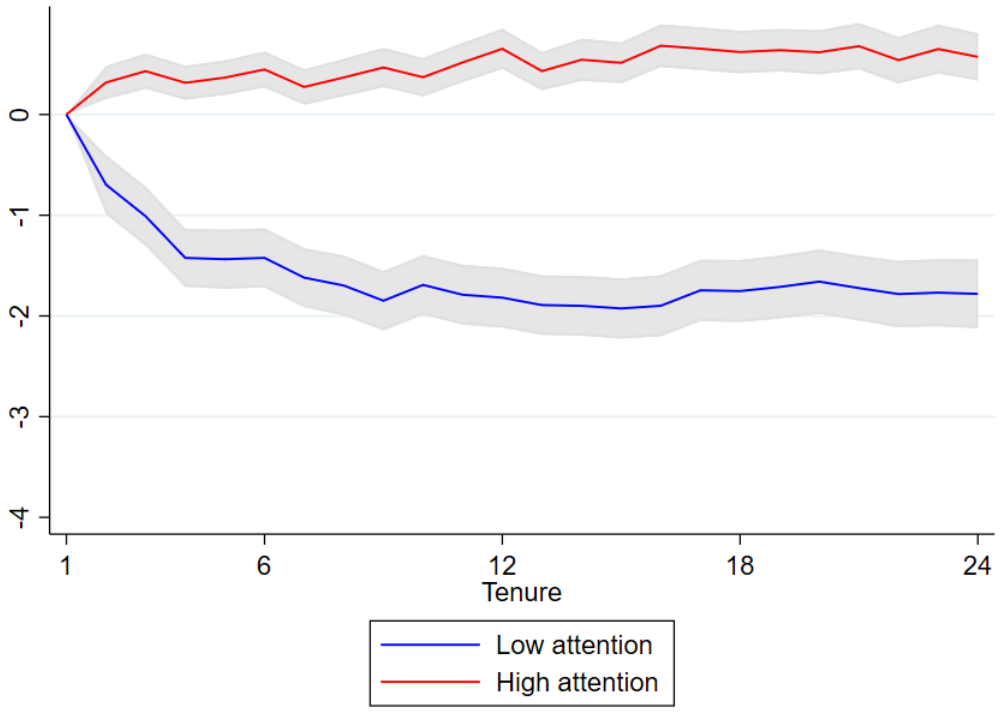
Figure A.12: Average absolute forecast error between expectations and actual inflation (in pp)



Notes: This figure reports the average absolute forecast error defined as the absolute difference between households' one-year-ahead inflation expectations and the actual HICP inflation observed 12 months later in the respondent's country.

Source: ECB Consumer Expectations Survey, authors' calculations.

Figure A.13: Tenure effects (in pp) on 1-year inflation forecast error: the role of inflation attention

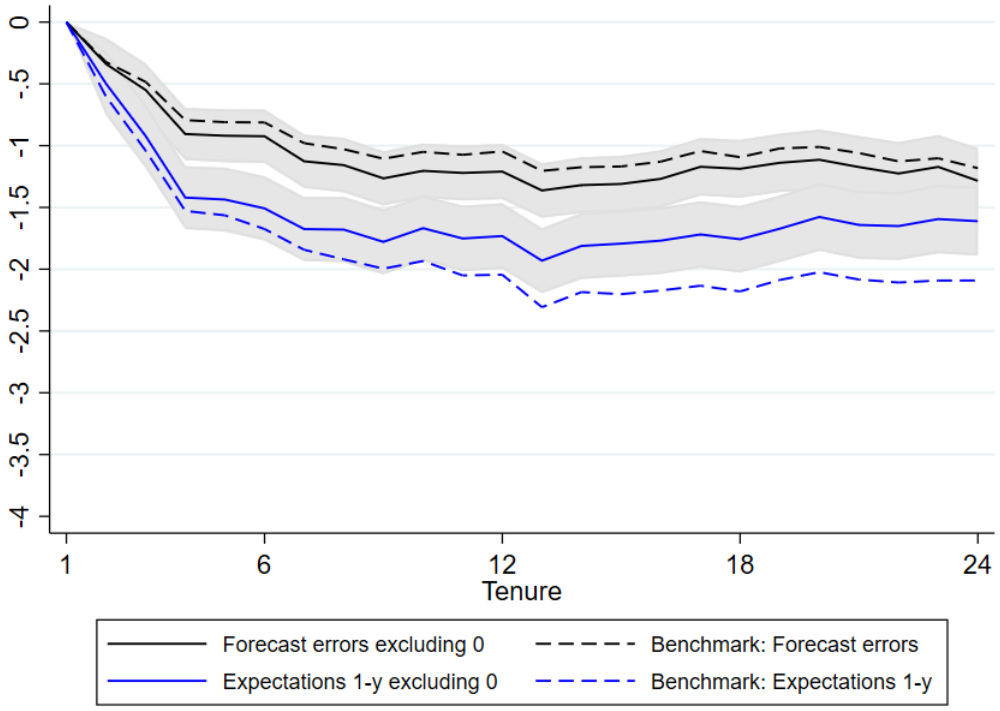


Notes: The figure displays the estimated tenure effects (β_s from the baseline regression equation (1)) on one-year inflation forecast error (eg the absolute difference between households' one-year-ahead inflation expectations and the actual HICP inflation observed 12 months later in the respondent's country) for households attentive or not to inflation. To define households attentive to inflation, we compute a dummy variable which is equal to 1 if $|\pi^p_{ct} - \pi_{ct}| < 2\%$ where π^p_t is the perceived inflation of a given household in country c and the actual inflation in country c. The sample is restricted to respondents who participate in exactly 24 waves of the survey. Observations are winsorized at the 2^{nd} and 98^{th} percentiles within each survey round. Source: ECB Consumer Expectations Survey, all waves pooled, authors' calculations.

Figure A.14: Tenure effects (in pp) on qualitative inflation expectation answers

Notes: The figure displays the estimated tenure effects (β_s from the baseline regression equation (1)) on the different categories of the qualitative question on 1-year expected inflation (prices will decrease/stay the same/increase). The sample is restricted to respondents who participate in exactly 24 waves of the survey. Source: ECB Consumer Expectations Survey, all waves pooled, authors' calculations.

Figure A.15: Tenure effects (in pp) on 1-year inflation forecast errors, on 1-year inflation expectations excluding expectations equal to 0 and their benchmarks



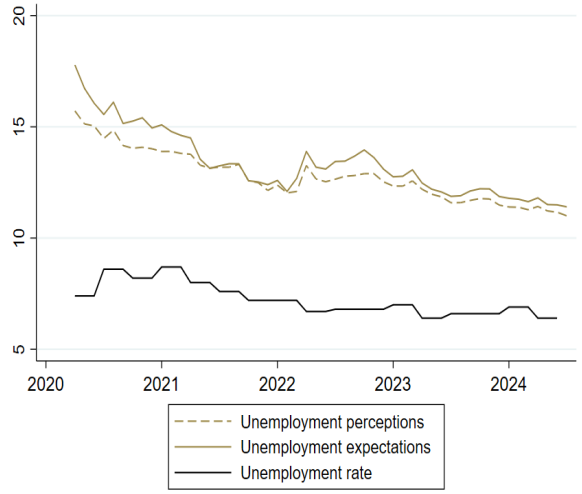
Notes: The figure displays the estimated tenure effects (β_s from the baseline regression equation (1)) on 1-year inflation forecast error excluding expectations equal to 0 (solid black line), 1-year inflation expectations excluding expectations equal to 0 (solid blue line). Dashed lines plot our benchmark estimates obtained from the full estimation sample (i.e. including "0"). The forecast error is calculated as the absolute difference between the respondent's 1-year inflation expectation reported at date t and the actual HICP inflation in the respondent's country 12 months after the survey date ($t + 12$). The sample is restricted to respondents who participate in exactly 24 waves of the survey. Observations are winsorized at the 2^{nd} and 98^{th} percentiles within each survey round. Shaded areas indicate 95% confidence intervals. Source: ECB Consumer Expectations Survey, all waves pooled, authors' calculations.

Figure A.16: Tenure effects (in pp) on the difference between 1-year inflation expectation point estimate and the implied average from the probabilistic question

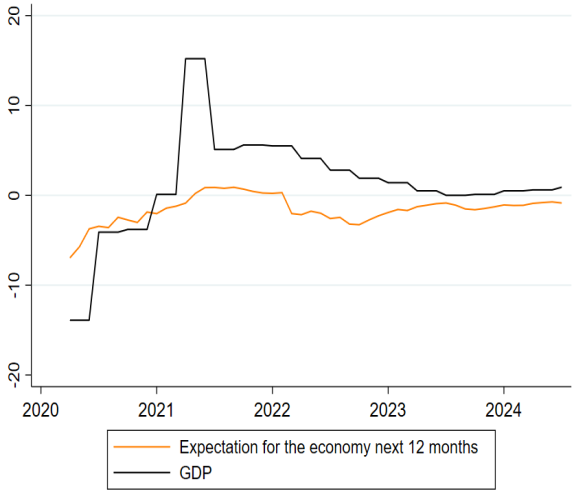
Notes: The figure displays the estimated tenure effects (β_s from the baseline regression equation (1)) on the difference between 1-year inflation expectation point estimate and the implied average from the probabilistic question. The sample is restricted to respondents who participate in exactly 24 waves of the survey. Observations are winsorized at the 2^{nd} and 98^{th} percentiles within each survey round.
Source: ECB Consumer Expectations Survey, authors' calculations.

Figure A.17: Survey average expectations vs. aggregate statistics in the euro area

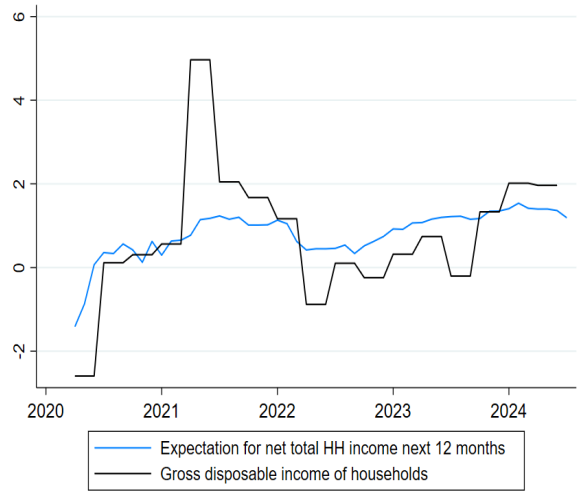
(a) Unemployment rate (in %)



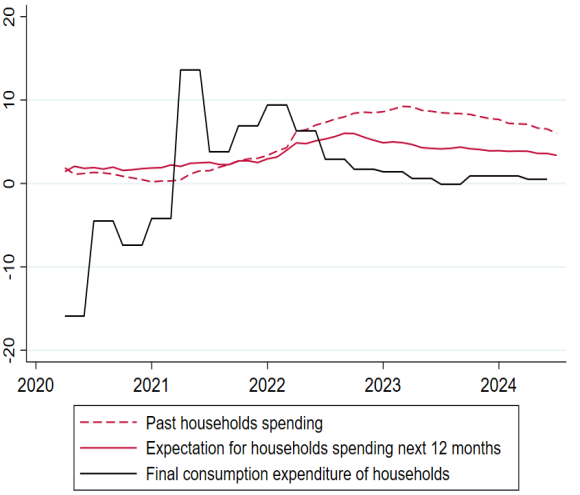
(b) Economic activity (y-o-y growth rate, in %)



(c) Household net income (y-o-y growth rate, in %)



(d) Spending expenditures (y-o-y growth rate, in %)



Notes: The figure plots the weighted average over time of survey answers to various questions on unemployment (perception and 1-year expectation), economic activity (1- year expectation), expectation of net household income, and past and expected households spendings. We also plot comaprable aggregate variables: euro area unemployment rate, EA GDP y-o-y growth rate, y-o-y growth rate of gross disposable income of households and y-o-y growth rate of final consumption of households in the euro area. We use the full sample of answers over the ful sample period. Observations are winsorized at the 2^{nd} and 98^{th} percentiles within each survey round.

Source: ECB Consumer Expectations Survey, Eurostat Labor Force Survey and National Accounts, authors' calculations.