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The Hidden Heterogeneity of Inflation and Interest Rate Expectations: The Role of Preferences

Abstract

We study consumers' preferences on expected inflation and interest rates. Preferences are measured by asking survey respondents whether they view the expected levels of inflation or interest rates as appropriate for the economy, or whether they would prefer higher or lower levels. For a given level of expectations, we observe substantial heterogeneity in these macroeconomic preferences: Consumers with the same inflation or interest rate expectations can differently assess whether they view this level as appropriate for the economy, or not. However, the ratio of those who think inflation is reasonable is the highest for the group that expects inflation rate of about 1%. The relationship between preferences and underlying expectations remains remarkably robust across different inflation regimes. Overall, macroeconomic preferences co-vary with socio-demographic characteristics like income and education, but are not related to individuals' net wealth position. They correlate with risk preferences and with trust in the central bank: More risk-loving respondents or those with strong trust in the ECB's ability to realize price stability are less likely to prefer lower inflation or higher interest rates than the expected levels.

JEL-Codes: E310, E520, E580, D840.

Keywords: macroeconomic expectations, monetary policy perceptions, inflation and interest rate preferences, risk preferences, survey microdata.

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1 Introduction

It has been well established that macroeconomic expectations by economic agents are formed heterogeneously.[1] However, both the economic and the psychology literature stress that when forming expectations, agents also form preferences about the same variables.[2] While, for example, Dohmen et al. (2011) and Ericson and Laibson (2019) detail the role of risk or time preferences for financial investment choices, preferences about macroeconomic outcomes have so far been largely neglected as a source of heterogeneity in expectations. Consequently, little is known about preferences on expected inflation or interest rates. For example, if consumers state that they expect 5% inflation for the next year, it is unclear whether they think expected inflation lower or higher then 5% would be appropriate for the economy. In fact, the second order approximation of the utility function—that is commonly used as an objective function for optimal monetary policy prescriptions—may have households' preferred levels of inflation, output gap, and interest rates as the target rates. Thus, it may be of interest for policy makers to know and understand households' preferences for those variables.

To investigate the role of preferences, we rely on the new Survey on Consumer Expectations within the Bundesbank Online Panel of Households (BOP-HH) for the time period 2019-22. We focus on preferences on inflation and interest rates. Preferences are captured by asking consumers whether they think the expected level of inflation or interest rates is appropriate for the economy, or whether they think it is too high or too low. We show that preferences correlate with the expectations of inflation or interest rates. Controlling for a set of socio-demographic characteristics, respondents who prefer lower (higher) inflation in the future, report higher (lower) inflation expectations than those who think inflation will be appropriate. The same result holds also for the relation between interest rate preferences and expectations. Interestingly, the highest share of respondents voicing that inflation is appropriate is observed for those who forecast inflation rate of about 1%—that is lower than the inflation target of the ECB.

Our second finding, however, identifies what we dub the 'hidden heterogeneity' in macroeconomic expectations: Consumers with the *same* level of inflation or interest rate expectations may express very different preferences about whether that is an appropriate level or not, and thereby can disagree, e.g., about the appropriate stance of monetary policy. Even though actual inflation in our sample changed from low levels in 2019, to close to zero inflation in 2020, to rising levels in 2021 and finally to high levels in 2022, the relationship between preferences and macroeconomic expectations remains remarkably stable and robust over time.

Our third finding explores the channels that may explain macroeconomic preferences. Controlling for both inflation and interest rate expectations, we evaluate whether preferences co-move with demographic characteristics, with respondents' net wealth position, their risk preferences or their trust in the central bank. We find that preferences co-move with demographic factors like education

[1] For a recent survey on the formation of inflation expectations and their effect on economic decisions, see Coibion et al. (2020).

[2] In the social psychology literature—specifically in attribution theory—it has been long established how people form preferences and how they justify them. See, e.g., Jones and Nisbett (1972) and Tversky and Kahneman (1973).

and income, where the relationship may change over time as respondents adjust both their expectations and their preferences to the changing inflation environment. While we find little evidence that individuals' net wealth position influences their preferences regarding the expected levels of inflation or interest rates are appropriate for the economy, we do find evidence that risk preferences co-move with macroeconomic preferences. However, this co-movement seems weaker in the current inflation regime. Finally, trust in the central bank price stability objective also correlates with consumers' view of whether a given level of expected inflation or interest rates will be appropriate for the economy, or not.

Preferences over inflation or interest rates have so far received only little attention in the literature on macroeconomic expectation formation. In an early survey conducted in the US, Germany, and Brazil, Shiller (1996) studies preferences and opinions regarding inflation. Concerns about inflation are often related to worries about a decline in the standard of living, and are connected to concerns with respect to national prestige or trust in public institutions. Recently, Michelacci and Paciello (2020) study preferences regarding a potential trade-off between inflation and interest rates in the UK. The authors show that preferences are inversely linked to expectations and argue that this is consistent with expectation formation under Knightian uncertainty and thus provide empirical evidence for the mechanism outlined in ambiguity aversion models with Knightian uncertainty (Gilboa and Schmeidler, 1989; Sargent and Hansen, 2001; Epstein and Schneider, 2003; Maccheroni et al., 2006; Strzalecki, 2011). They also find that changes in inflation expectations due to preferences affect consumption and saving decisions in a quantitatively similar way to the component of expected inflation that is not related to preferences.

More generally, our paper relates to the literature explaining the heterogeneity of macroeconomic expectations across socio-demographic groups. Earlier contributions by Jonung (1981), Bryan and Venkatu (2001) and Pfajfar and Santoro (2009) demonstrate higher levels of both perceived and expected inflation for women, low education, and low income groups, with a u-shaped effect of age where young and old respondents have higher expectations than middle-age respondents. This pattern is highly prevalent in many different surveys across both different countries and time spans. More recent approaches by D'Acunto et al. (2022) and D'Acunto et al. (2022) provide evidence that the gender differences in inflation expectations can be traced back to differences in daily grocery shopping experiences (as hypothesized in Jonung, 1981) and that they spill over into gender differences in expectations on other macroeconomic variables. Moreover, Ehrmann et al. (2017) demonstrate that consumers' attitudes like optimism or pessimism regarding the economic outlook influence also the level of inflation expectations, while D'Acunto et al. (2019) show that cognitive abilities play an important role. Finally, personal inflation experience can explain some of the differences in inflation expectations across age cohorts (Malmendier and Nagel, 2016) and across different political systems, e.g., the Western part of Germany and the former German Democratic Republic (GDR) in the East of Germany before 1989 (Goldfayn-Frank and Wohlfahrt, 2020). Andre et al. (2021) show that narratives about why and how inflation is changing differ strongly between experts, on the one hand, and households or managers, on the other hand.

2 Theoretical Motivation

In this section, we present a formalization of how we think about macroeconomic preferences in our study. Woodford (2003) shows that a central bank that pursues an optimal monetary policy should minimize the following loss function that is derived by taking the second-order approximation of the representative household's utility function:

$$- E_t \sum_{i=0}^{\infty} \beta^i \left[\left(\pi_{t+i} - \pi^T \right)^2 + \lambda \left(y_{t+i} - y^* \right)^2 \right], \tag{1}$$

where $E_t \left(\pi_{t+i} - \pi^T \right)$ is the expected deviation of inflation from the inflation target π^T (assumed to be zero in many models) and $E_t \left(y_{t+i} - y^* \right)$ is the expected deviation of the output gap from the steady-state output gap, defined as the deviation of steady-state output from the efficient, flexible price steady-state.

But in practice, the central bank may assume the following loss function that incorporates the heterogeneity in expectations and preferences, as there are in fact N heterogeneous consumers who may differ both in terms of their expectations and their preferences:

$$\sum_{n=1}^{N} \frac{1}{N} \left[-E_t^n \sum_{i=0}^{\infty} \beta^i \left[\left(\pi_{t+i} - \pi_n^T \right)^2 + \lambda \left(y_{t+i} - y_n^* \right)^2 + \delta \left(i_{t+i} - i_n^T \right)^2 \right] \right], \tag{2}$$

The term inside the outer brackets refers to the loss function of an individual n that depends on individual expectations E_t^n, which may deviate from the model's efficient benchmark, as well as on individual preferences about the targets for inflation π_n^T, the output gap y_n^* and nominal interest rates i_n^T. Note that we include a term for the deviation of the expected nominal rate from a preferred target value, $E_t^n \left(i_{t+i} - i_n^T \right)$, which is not included in the standard New Keynesian model. The motivation for including it is, for instance, that households may be concerned about the return on their portfolio or the stability of a public pension scheme.[3]

Under the assumption that the central bank utilizes a loss function of the form in eq. (2), the cross-sectional distribution of consumers' individual preferences for the inflation target π_n^T and the nominal interest rate target i_n^T is of key importance to evaluate policy actions and prescriptions.[4]

We use survey data to measure these preferences qualitatively and relative to individual expectations of inflation and nominal interest rates. Specifically, we approximate the cross-sectional distribution of $E_t^n \left(\pi_{t+i} - \pi_n^T \right)$ and $E_t^n \left(i_{t+i} - i_n^T \right)$ for a forecast-horizon of 12 months. Individual consumers' macroeconomic preferences are thus measured by asking survey participants whether they think the expected levels of inflation and interest rates will be appropriate for the economy (implying $E_t^n \pi_{t+12} = \pi_n^T$ and $E_t^n i_{t+12} = i_n^T$) or whether they think higher or lower inflation/interest rates would be better (implying $E_t^n \pi_{t+12} \lessgtr \pi_n^T$ and $E_t^n i_{t+12} \lessgtr i_n^T$).

[3] Some central bank may also have mandates, like the Federal Reserve, to maintain moderate long-run interest rates.

[4] We focus on the expected deviation of inflation and nominal interest rates from individual-specific targets as a starting point and leave an analysis of $E_t^n \left(y_{t+i} - y_n^* \right)$ for future research.

3 Data

Our research question is evaluated using the new Survey on Consumer Expectations within the Bundesbank Online Panel of Households (BOP-HH). The survey is representative of the German population. Each wave includes between 2,000-4,500 respondents with a rotating panel component.[5] Our questions about macroeconomic preferences are included in four waves in 2019, 2020, 2021 and 2022.

Our questions were included in the first BOP-HH wave in April 2019 (inflation preferences) and in the second BOP-HH wave in May 2019 (interest rate preferences). The waves included 2009 participants in the first wave and 2052 in the second wave, with about 1,000 respondents participating in both waves.[6] We then repeated our main questions in BOP-HH wave 6 in June 2020 with 2021 participants, in BOP-HH wave 21 in September 2021 with 3,274 participants, and in BOP-HH wave 30 in June 2022 with 4,460 participants.

The BOP-HH core questionnaire asks about consumers' macroeconomic expectations, housing market expectations and housing choices, current and planned spending and saving choices, as well as a large range of socio-demographic characteristics.

Following the question on point estimates for inflation 12 months ahead, we ask about preferences on expected inflation (variable names for the empirical analysis in brackets):

1. Do you think the average level of inflation you expect for the next 12 months will be more or less appropriate for the German economy, or do you think a higher or lower inflation rate would be better?[7]

   (a) Higher inflation than expected would be better (*d_infl_highbetter*)

   (b) Inflation will be more or less appropriate (*d_infl_reason*)

   (c) Lower inflation than expected would be better (*d_infl_lowbetter*)

Similarly, we ask about preferences on the expected level of nominal interest rates following the question on point estimates for expected saving rates in the next 12 months:

[5] For further details of the survey including the full questionnaires, please check https://www.bundesbank.de/en/bundesbank/research/survey-on-consumer-expectations.

[6] The regression analysis in section 4.3 uses data from the May 2019 wave only. We assume that inflation preferences did not change between April-May 2019 and include the inflation preferences of those respondents who participated in both waves.

[7] Note that the questions in the first waves in 2019 did not specifically ask respondents to think about the appropriateness for the German economy. In the next wave in 2020, we therefore differentiated between preferences regarding respondents' *personal situation* or regarding the *German economy as a whole*. We also asked a randomly chosen subset of respondents about both their personal and their economy-wide views on inflation or interest rates. This allows us to test whether respondents differ in their preferences depending on whether they are explicitly asked to think about their own personal situation or the macroeconomic situation. As shown in Tables A.1-A.2 in the appendix, respondents generally gave the same preferences when asked about their personal situation and the economy. Figure A.1 shows that the relationship between preferences for the economy and individuals' inflation expectations resembles that measured in the 2019 waves. We therefore assume that preferences from the 2019 waves are regarding the German economy. For waves in 2020, 2021 and 2022, we use only data on preferences where we specifically asked about preferences regarding the German economy.

4. Do you think the average level of interest rates you expect for the next 12 months will be more or less appropriate for the German economy, or do you think a higher or lower interest rate would be better?

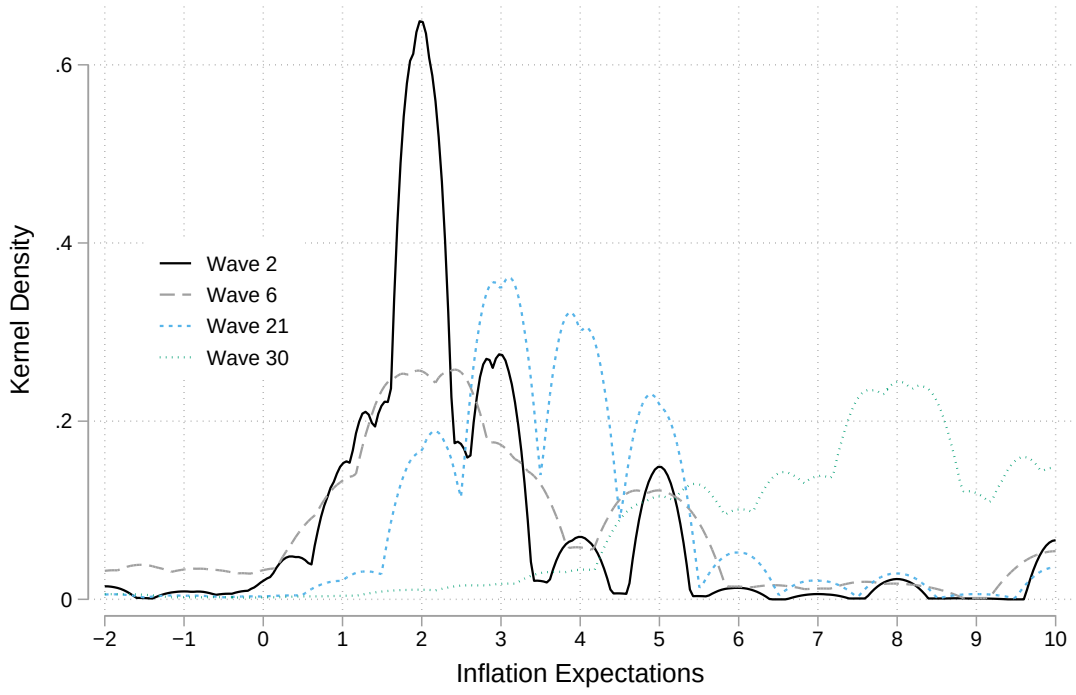
   (a) Higher interest rate than expected would be better (*d_int_highbetter*)

   (b) The interest rate will be more or less appropriate (*d_int_reason*)

   (c) Lower interest rate than expected would be better (*d_int_lowbetter*)

Note that our sample comprises different inflation regimes:[8] The inflation environment in April-May 2019 showed actual inflation rates close to or below target with year-on-year HICP inflation at 2.0% in April 2019 and at 1.4% in May 2019.[9] In 2020, inflation rates in Germany fell during the recession caused by the COVID-19 pandemic and were measured at 0.9% in June 2020 before entering into the deflation area from August 2020 onwards. In mid-2021, German inflation started to increase above the target rate of 2% due to catch-up effects after the lockdown period and to ongoing supply chain difficulties and was measured at 4.1% in September 2021. After the invasion of Ukraine in February 2022, inflation again increased strongly due to price shocks in energy and food markets and was measured at 7.6% in June 2022. As shown in Figure 1, the distribution of consumers' inflation expectations regarding inflation 12 months between the waves also shifted considerably to the right.

Figure 1: Distribution of Inflation Expectations 12 Months ahead across Waves



[8] Monthly year-on-year changes in the consumer price index from the German Statistical Office, see https://www.destatis.de/EN/Themes/Economy/Prices/Consumer-Price-Index/_node.html.

[9] The temporary increase in inflation in April 2019 was driven by a price hike in holiday-packages during Easter.

In our analysis, we further control for quantitative point forecasts for the next 12 months regarding consumer price inflation (π^e) and the average savings rate ($i^e_{savings}$). In order to avoid an effect from extreme outliers, inflation expectations are truncated in the range between -5% and +25%.

Socio-demographic controls comprise a dummy variable for being male (*d_male*), age, three income groups (*inc_low* – monthly net income below or equal 1.000 €, *inc_middle* – monthly net income between 1.000 € and 3.000 € and *inc_high* – monthly net income above 3.000 €), four education groups (*edu_haupt* – lowest highschool level in Germany (Hauptschule), *edu_real* – medium highschool level in Germany (Realschule), *edu_abi* – highest highschool level in Germany enabling to study at a university (Abitur), *edu_uni* – university degree), four work categories (*d_fulltime* – working full time, *d_parttime* – working part time, *d_noemploy* – no employment (voluntary or involuntary), *d_retired* – retired) and a dummy for having lived in the GDR (German Democratic Republic in the Eastern part of Germany) before 1989 (*d_east1989*).

We evaluate additional channels that might influence macroeconomic preferences for inflation or interest rates. The first channel is respondent's net wealth position. This is approximated by a dummy for owning a house (available in all waves) and by dummy variables for reporting positive overall net wealth and for owning a mortgage (available in the 2021, 2022 waves). A second channel is respondents' reported willingness to take risks in general as a proxy for their risk preferences, where respondents may answer on a scale from 0 ('not willing to take any risks') to 10 ('very willing to take risks') (available in the 2020 and the 2022 waves).[10] Finally, a third channel is respondents' trust in the ECB's ability to deliver price stability (measured on a scale from 0 'no trust at all' to 10 'completely trust') and their degree of being worried about current inflation (measured on a scale from 1 'not worried at all' to 5 'very worried') that were both measured only in the 2022 wave.

4 Results

4.1 Summary Statistics: The Hidden Heterogeneity of Expectations due to Preferences

Table 1 shows a cross-tabulation of consumers' inflation and interest rate preferences. From this table, we observe that the largest share of households across all four waves (45.6%) expresses that inflation should be lower than they expect and interest rates should be higher. This would be consistent with a Taylor rule or with a preference for lower real rates.[11] Across all waves, 28.7% of the surveyed households feel expected inflation will be appropriate for the economy and 26.7% have the same opinion regarding interest rates. However, only 9.6% of households in our sample think that both inflation and interest rates will be at appropriate levels. Hence, our sample has

[10] The question on risk preferences was included in the May 2020 wave, whereas our questions on macroeconomic preferences were measured in the following June 2020 wave. Again, we assume that risk preferences stayed constant between May-June 2020 and include answers in the June 2020 wave for those respondents who participated in both waves.

[11] For analysis of whether the expectations data is consistent with the Taylor rule see Carvalho and Nechio (2014) and Dräger et al. (2016).

many consumers who feel that inflation or interest rates should be different from the levels that they currently expect.

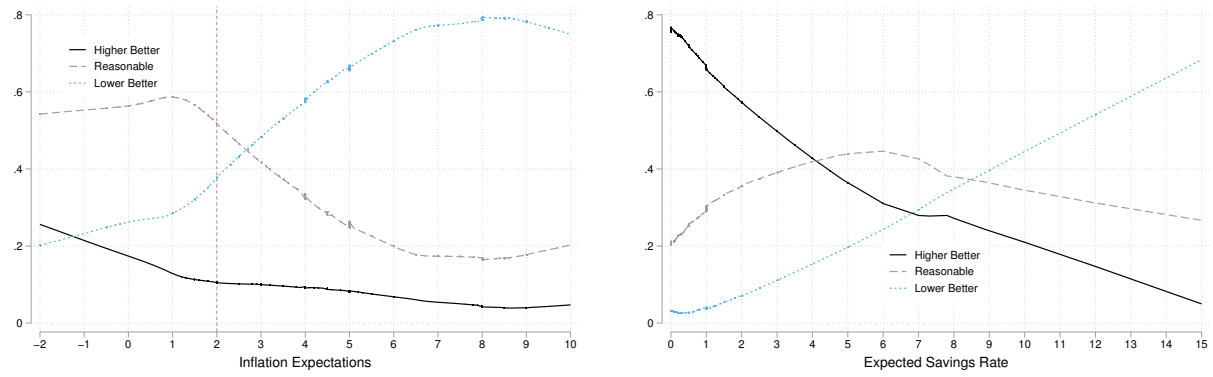
Table 1: Preferences on Expected Inflation and Expected Interest Rate

	Expected interest rate			
Expected inflation	higher better %	reasonable %	lower better %	Total %
higher better	5.6	1.9	0.4	7.8
reasonable	18.3	9.6	0.8	28.7
lower better	45.6	15.2	2.6	63.5
Total	69.5	26.7	3.8	100.0

Note: Bundesbank Online Panel of Households (BOP-HH), wave 2, 6, 21 & 30.

As a next step, we explore our variables of interest visually by plotting the preferences against the levels of the underlying expectations. Figure 2 plots preferences against macroeconomic expectations. To help with the interpretation, we smooth the individual observations using a Lowess smoother. As we can see, there is a substantial heterogeneity in preferences. First, in Figure 1(a) we plot the share of people believing that inflation will be reasonable, should be higher, or should be lower against their own expected inflation rate 12 months ahead. This visualizes the heterogeneity of preferences of respondents sharing the same inflation point forecast. The vertical line at 2% inflation marks the official inflation target by the ECB.[12]

Figure 2: Preferences on Inflation and Interest Rates Across Level Expectations



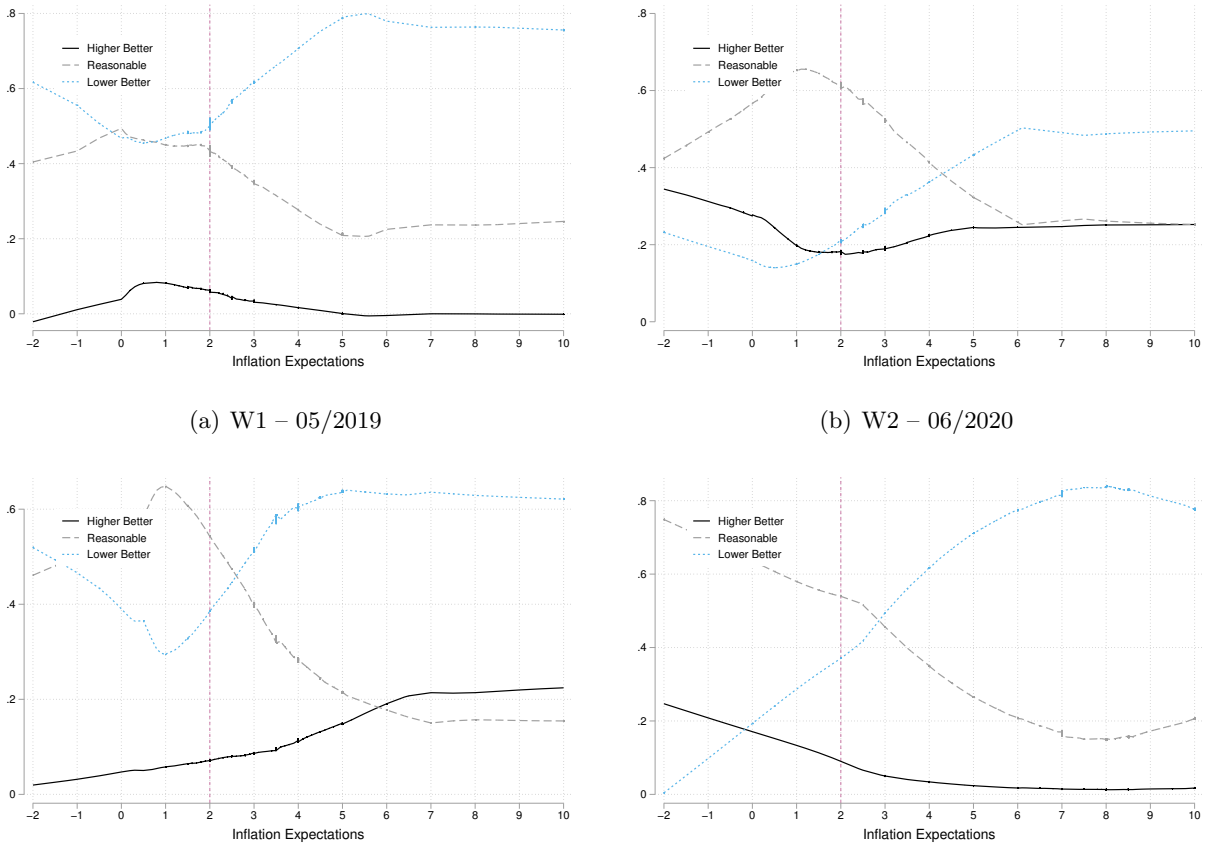
(a) Inflation Preferences and Inflation Expectations

(b) Interest Preferences and Savings Rate Expectations

Even when considering inflation expectations that are in line with the ECB's target, we observe that only about 50% of the respondents believe that this expected level of inflation is appropriate. From the remaining 50%, most people believe that this expected level of inflation is too high. This reflects a substantial degree of hidden heterogeneity within point expectations that would otherwise

[12]The ECB inflation target was changed from "close to, but under 2%" to a symmetric target of 2% after the strategy review in July 2021.

Figure 3: Inflation Preferences and Inflation Expectations: Individual Waves



(a) W1 – 05/2019

(b) W2 – 06/2020

(c) W3 – 09/2021

(d) W4 – 06/2022

be considered as anchored at the inflation target, emphasizing the importance of considering these underlying preferences. Interestingly, the maximum share of respondents thinking that expected inflation will be reasonable is observed for an expected inflation of 1%, thus significantly below the official target. For inflation expectations above the announced inflation target of the ECB, we observe that the share of people believing inflation will be reasonable substantially declines, while the share of households believing inflation will be too high sharply increases. At levels of expected inflation around 7% and higher, the share of respondents thinking inflation will be too high reaches about 80% and stays relatively constant also for higher expected inflation levels. Strikingly, as we move to expected inflation levels below 2%, the share of respondents believing that these low expected inflation rates are appropriate remains high at about 50%, while the share of households believing inflation should be higher rises only up to levels of around 30% and the share believing inflation should be lower remains high at around 20%. Hence, there exists a substantial fraction of consumers who do not think that very low inflation or even deflation is harmful; they would prefer even lower inflation rates.[13]

[13]However, as inflation increases in the 2021 and 2022 waves, only very few respondents give inflation forecasts in this low inflation area.

Figure 2(b) plots the preferences on future interest rates against the level of individual interest expectations. The share of respondents thinking expected interest rates will be appropriate is highest for expected rates around 5-7%. Preferences for higher interest rates fall with rising levels in expected rates and *vice versa* for preferences of lower rates. Again, there is a substantial and persistent heterogeneity of preferences conditional on having the same level expectations across the whole spectrum of expectations. This is what we term the 'hidden heterogeneity' in inflation and interest rate expectations.

Figure 3 plots the relationship between preferences on future inflation against inflation forecasts for the different waves in our data. Even though the four waves were conducted in very different inflation regimes, we observe that the relationship between inflation preferences and expectations stays surprisingly robust: The share of respondents preferring lower inflation reaches a high plateau at expected inflation in the range from 5-7%. The share of respondents thinking that expected inflation will be reasonable for the economy is largest at forecasts in the range from 0-1% (with the exception of the last wave in the high inflation regime, where the share is highest for the very few respondents forecasting negative or very small rates). The share of respondents preferring higher inflation is low in all waves, even in the deflation wave of 2020, where it is only marginally higher, but relatively constant across expectation levels at around 20%. In all four waves, we observe considerable heterogeneity in preferences for given levels of expectations.

4.2 Relationship between Macroeconomic Preferences and Expectations

Preferences about expected inflation and interest rates correlate with expectations of those variables, as can be seen already from the figures above. To formally show that, we employ a regression analysis regarding the relationship between preferences and expectations. Results are shown in Table 2. Consumers preferring lower inflation give significantly higher inflation forecasts than those who think inflation will be appropriate. Across all four waves, this group expects two percentage points higher inflation on average than those who think expected inflation will be appropriate for the economy. Of course, the causality could also be reversed: Consumers expecting particularly high inflation are more likely to think inflation should be lower than they expect. We find similar correlations between interest rate preferences and expectations of future savings rates. Interestingly, interest rate preferences also correlate with inflation expectations: Consumers who would prefer higher interest rates than expected tend to forecast higher inflation than those who think interest rates will be appropriate. In line with the results in Michelacci and Paciello (2020), we thus find evidence that preferences correlate with expectations.

4.3 Variation in Macroeconomic Preferences

So far, we have shown that preferences on future inflation and interest rates can be highly heterogeneous at the same level of expectations and that the relationship between macroeconomic expectations and macroeconomic preferences stays relatively constant across very different inflation regimes.

Table 2: Macroeconomic Expectations and Preferences

	π^e	$i^e_{savings}$
d_inf_lowbetter	2.023***	-0.085
	(0.150)	(0.071)
d_inf_highbetter	0.430	-0.116
	(0.283)	(0.149)
d_int_lowbetter	0.151	1.243**
	(0.436)	(0.487)
d_int_highbetter	-0.354**	-0.556***
	(0.159)	(0.074)
Constant	4.958***	1.289***
Demographic Controls	Yes	Yes
N	8856	8856
Adj. R^2	0.072	0.050

Note: Bundesbank Online Panel of Households (BOP-HH), wave 2, 6, 21 & 30. OLS estimations with population weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

But how do preferences co-vary with individual characteristics once we control for their co-movement with inflation and interest rate expectations? In this section, we aim to characterize the variation in macroeconomic preferences that is not related to variation in expectations. We focus on preferences for lower inflation and for higher interest rates throughout the section, since those are the preferences that are stated most frequently across the waves.

We evaluate different channels that could be hypothesized to shape macroeconomic preferences: First, preferences on future inflation and interest rates may be related to consumers' understanding of macroeconomic relationships, i.e., their economic literacy and in particular their understanding of monetary policy. We hypothesize that this might correlate with consumers' income or education. Second, even though we ask respondents specifically to think about inflation and interest rates that would be appropriate for the German economy as a whole, their individual net wealth position might still influence the stated preferences. For instance, consumers owning a mortgage or consumers with positive net wealth positions may think differently about the level of inflation or interest rates that would be appropriate than hand-to-mouth consumers that neither pay interest on large debt, nor are able to save. Third, respondents' macroeconomic preferences could correlate with their risk preferences, where we hypothesize that more risk-loving respondents may be less inflation-averse (for a given level of expected inflation) and more prone to invest in stocks, rather than save in savings accounts. Finally, preferences on future inflation and interest rates could correlate in the degree of trust that the central bank will deliver on its price stability objective, where we hypothesize that those with a higher trust for a given level of expectations might be less prone to think inflation should be lower or interest rates should be higher.

Tables 3-4 evaluate the correlation of inflation and interest rate preferences with a large set of demographic control variables. In all estimations, we control for individual inflation and interest

rate expectations. The first columns of Tables 3-4 show estimation results for all four waves jointly and include wave fixed effects. To evaluate whether the effects change across inflation regimes, the remaining four columns show results for the individual waves.

As shown in Table 3, over the full sample and controlling for inflation and interest rate expectations, preferences for lower inflation vary across education groups. Respondents with medium education are more likely to state inflation should be lower than the level they expect than those with low education, while those with a university degree are less likely to do so. This surprising result can be explained by evaluating results from the individual waves: In the 2019 wave, when inflation was low, better educated respondents where less likely to say inflation should be lower than they expected compared to respondents with low education. The sign of this correlation changes, however, as inflation starts to increase in the 2021 and 2022 waves. With high inflation in 2022, better educated respondents are *more likely* to say inflation should be lower than the value they expect. This effect is not significant for university educated respondents, however, possibly because it is masked by a strong positive correlation with high income.

Preferences for future interest rates correlate with personal income, education, and with being retired in the full sample, see Table 4. Higher income groups are more likely to state interest rates should be higher than the level they expect (again controlling for inflation and interest rate expectations), while highly educated or retired respondents are less likely to have this preference. The correlation with income seems to be independent of the inflation regime. This could imply that respondents who are more likely to be able to save relative to the low income group, may think also of their individual preference for higher interest rates on those savings when answering the question. By contrast, the correlation with education changes between the first wave in 2019 and the last wave in 2022. While highly educated respondents are more likely to state interest rates should be higher than expected than the low education reference group in 2019, they are less likely to do so in 2022, possibly because their expectations anticipate the ECB interest rates hikes that started in July 2022.

After evaluating how macroeconomic preferences co-move with demographic characteristics when controlling for expectations, we next evaluate the other potential channels. The results are summarized in Tables 5-6. We report results from estimations including the full set of demographic controls shown in Tables 3-4, inflation and interest rate expectations and wave fixed effects, to which we add individual measures for the channels. As before, the first column shows estimation results for the full sample, and further columns give results for individual waves that included the additional control variable.[14]

The results in Table 5 show that individuals' net wealth position is essentially uncorrelated with their preference for lower inflation, once we control for demographics and macroeconomic expectations. The only exception is a marginally significant correlation with owning a mortgage

[14] As can be seen in Tables 3-4, not all characteristics were available in all waves. The exception is the last wave in June 2022. For this wave, we estimated horse race regressions, shown in Tables A.3-A.4 in the appendix. When we include all regressors jointly, trust in the ECB and concerns about current inflation correlate significantly with a preference for lower inflation (in addition to potential effects from socio-demographic characteristics and level expectations). Preferences for higher interest rates correlate negatively with owning a house and trust in the ECB, but marginally significantly and positively with having positive net wealth.

Table 3: Preferences for Lower Inflation and Demographic Characteristics

	Full sample	First wave 05/2019	Second wave 06/2020	Third wave 09/2021	Fourth wave 06/2022
d_male	0.013	-0.031	-0.016	0.036	0.007
	(0.015)	(0.039)	(0.034)	(0.028)	(0.022)
age	-0.001	-0.003	-0.007***	-0.000	0.001
	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
inc_middle	0.073	-0.032	-0.086	-0.004	0.265***
	(0.060)	(0.102)	(0.089)	(0.087)	(0.094)
inc_high	0.056	-0.113	-0.165*	-0.025	0.287***
	(0.059)	(0.102)	(0.089)	(0.086)	(0.092)
*east*1989	0.003	0.163***	0.036	0.034	-0.057**
	(0.020)	(0.052)	(0.044)	(0.035)	(0.028)
edu_real	0.066***	-0.095**	-0.003	0.068*	0.099***
	(0.019)	(0.047)	(0.042)	(0.036)	(0.029)
edu_abi	0.072***	0.044	-0.092	0.037	0.108***
	(0.022)	(0.064)	(0.059)	(0.046)	(0.034)
edu_uni	-0.034*	-0.193***	0.005	-0.046	0.010
	(0.019)	(0.055)	(0.056)	(0.039)	(0.028)
d_parttime	0.039*	-0.010	0.021	0.049	0.040
	(0.022)	(0.065)	(0.053)	(0.043)	(0.032)
d_noemploy	0.022	0.093	0.078	-0.076	0.048
	(0.034)	(0.068)	(0.108)	(0.099)	(0.079)
d_retired	0.016	-0.014	0.143***	-0.013	0.002
	(0.024)	(0.075)	(0.051)	(0.041)	(0.033)
N	8684	804	1195	2817	3868
Pseudo R^2	0.088	0.069	0.082	0.013	0.044
Wave FE	Yes	No	No	No	No
Control for π^e & i^e	Yes	Yes	Yes	Yes	Yes

Note: Bundesbank Online Panel of Households (BOP-HH), wave 2, 6, 21 & 30. Average marginal effects for the likelihood of reporting that inflation rates should be lower are reported from estimations with population weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Preferences for Higher Interest Rates and Demographic Characteristics

	Full sample	First wave 05/2019	Second wave 06/2020	Third wave 09/2021	Fourth wave 06/2022
d_male	-0.025*	-0.012	-0.041	-0.050**	-0.028
	(0.013)	(0.026)	(0.036)	(0.023)	(0.023)
age	0.001*	0.003**	-0.001	0.002	0.002
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
inc_middle	0.140***	0.125*	-0.030	0.008	0.368***
	(0.047)	(0.072)	(0.127)	(0.065)	(0.139)
inc_high	0.139***	0.130*	-0.033	0.005	0.358***
	(0.046)	(0.071)	(0.128)	(0.064)	(0.138)
*east*1989	0.000	0.036	-0.005	-0.029	0.003
	(0.018)	(0.035)	(0.046)	(0.030)	(0.028)
edu_real	0.000	0.033	-0.033	0.004	0.010
	(0.017)	(0.031)	(0.044)	(0.032)	(0.029)
edu_abi	-0.004	0.170***	-0.085	-0.019	0.024
	(0.019)	(0.044)	(0.055)	(0.040)	(0.035)
edu_uni	-0.053***	0.085**	-0.068	-0.047	-0.093***
	(0.016)	(0.037)	(0.051)	(0.034)	(0.029)
d_parttime	-0.003	0.005	-0.025	0.038	-0.064*
	(0.021)	(0.043)	(0.060)	(0.036)	(0.034)
d_noemploy	0.019	-0.013	0.018	-0.041	-0.158
	(0.031)	(0.048)	(0.133)	(0.084)	(0.103)
d_retired	-0.050**	0.055	-0.021	-0.066*	-0.098***
	(0.021)	(0.053)	(0.055)	(0.034)	(0.036)
N	9463	1603	1191	2812	3857
Pseudo R^2	0.029	0.032	0.020	0.023	0.062
Wave FE	Yes	No	No	No	No
Control for π^e & i^e	Yes	Yes	Yes	Yes	Yes

Note: Bundesbank Online Panel of Households (BOP-HH), wave 2, 6, 21 & 30. Average marginal effects for the likelihood of reporting that interest rates should be higher are reported from estimations with population weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

in the 2022 wave: With very high inflation, respondents seem more inclined to realize the positive effect of inflation on the value of their mortgage and are, thus, somewhat less likely to say inflation should be lower (for the German economy) than the level they expect.

Moreover, we find that more risk-loving respondents are less likely to think that inflation should be lower, while controlling for their level expectations. This effect is robust across waves and significant in the 2020 wave with very low inflationand marginally missing significance in the 2022 wave with very high inflation. Moreover, preferences for lower inflation correlate with trust in the ECB's price stability objective and with concerns about inflation. In the 2022 wave with very high inflation, respondents reporting a high level in the ECB's ability to deliver price stability are less likely to say inflation should be lower than expected than respondents with similar expectations, but a lower level of trust. This finding demonstrates that trust (confidence) in the central bank's price stability objective correlates not only with level inflation expectations (Christelis et al., 2020, Lamla et al., 2019), but also affects how consumers view these expectations relative to their preferred level of inflation. Not surprisingly, concern about inflation correlates with a stronger preference for lower inflation.

Similar to our results for inflation preferences, Table 6 also shows little evidence that preferences on future interest rates correlate with individuals' net wealth position. We only find a marginally negative correlation with owning a house, which is, however, only significant in the full sample. This suggests, that those owning a house, who may have to refinance their mortgage in the future, are less likely to report a preference for higher interest rates (for the German economy). In line with our results in Table 5, we also find in Table 6 that interest rate preferences correlate with risk preferences, while controlling for demographics and expectations. More risk-loving individuals are thus less likely to prefer interest rates to be higher than expected, perhaps because they are more prone to invest into stocks. Interestingly, interest rate preferences also correlate with trust in the ECB's price stability objective: With very high inflation in 2022, individuals with higher trust in the ECB's ability to deliver price stability are less likely to prefer higher interest rates than they expect. This indicates that trust in the central bank's price stability objective cannot only stabilize both inflation expectations and preferences thereof, but also helps to convince consumers that the monetary policy by the central bank is appropriate.

Table 5: Preferences for Lower Inflation: Net Wealth, Risk Preferences and Trust in the Central Bank

	Full sample	First wave 05/2019	Second wave 06/2020	Third wave 09/2021	Fourth wave 06/2022
Owning a house	-0.013	-0.056	-0.018	-0.014	0.012
	(0.016)	(0.039)	(0.034)	(0.028)	(0.023)
N	8679	803	1195	2816	3865
Pseudo R^2	0.088	0.070	0.082	0.013	0.044
Owning a mortgage	-0.025			0.072	-0.044*
	(0.024)			(0.054)	(0.025)
N	6685			2817	3868
Pseudo R^2	0.054			0.014	0.046
Positive net wealth	-0.012			-0.033	0.004
	(0.026)			(0.032)	(0.043)
N	5687			2662	3025
Pseudo R^2	0.044			0.013	0.038
Risk preference	-0.010**		-0.022*		-0.008
	(0.005)		(0.011)		(0.005)
N	4461		593		3868
Pseudo R^2	0.123		0.097		0.045
Trust in the ECB	-0.011**				-0.011**
	(0.004)				(0.004)
Concern about high inflation	0.046***				0.046***
	(0.013)				(0.013)
N	3844				3844
Pseudo R^2	0.058				0.058
Wave FE	Yes	No	No	No	No
Demogr. Controls	Yes	Yes	Yes	Yes	Yes
Control for π^e & i^e	Yes	Yes	Yes	Yes	Yes

Note: Bundesbank Online Panel of Households (BOP-HH), wave 2, 6, 21 & 30. Average marginal effects for the likelihood of reporting that inflation rates should be lower are reported from estimations with population weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 6: Preferences for Higher Interest Rates: Net Wealth, Risk Preferences and Trust in the Central Bank

	Full sample	First wave 05/2019	Second wave 06/2020	Third wave 09/2021	Fourth wave 06/2022
Owning a house	-0.023*	-0.002	-0.040	0.002	-0.037
	(0.014)	(0.026)	(0.036)	(0.024)	(0.024)
N	9458	1602	1191	2811	3854
Pseudo R^2	0.030	0.032	0.021	0.023	0.063
Owning a mortgage	0.014			-0.005	0.011
	(0.022)			(0.044)	(0.025)
N	6669			2812	3857
Pseudo R^2	0.045			0.023	0.063
Positive net wealth	0.025			0.016	0.036
	(0.024)			(0.028)	(0.041)
N	5677			2657	3020
Pseudo R^2	0.043			0.024	0.065
Risk preference	-0.009**		-0.017		-0.009*
	(0.005)		(0.012)		(0.005)
N	4454		597		3857
Pseudo R^2	0.049		0.033		0.064
Trust in the ECB	-0.021***				-0.021***
	(0.005)				(0.005)
Concern about high inflation	0.013				0.013
	(0.014)				(0.014)
N	3833				3833
Pseudo R^2	0.072				0.072
Wave FE	Yes	No	No	No	No
Demogr. Controls	Yes	Yes	Yes	Yes	Yes
Control for π^e & i^e	Yes	Yes	Yes	Yes	Yes

Note: Bundesbank Online Panel of Households (BOP-HH), wave 2, 6, 21 & 30. Average marginal effects for the likelihood of reporting that interest rates should be higher are reported from estimations with population weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

5 Conclusion

In this paper, we focus on preferences on expected inflation and interest rates in the period between 2019-2022 that was characterized by both, very low as well as high inflation. Using a new consumer survey dataset, the Bundesbank Online Panel of Households, we ask participants whether they think the level of inflation or interest rates they expect will be appropriate for the German economy, or whether they would prefer higher or lower inflation/interest rates. These macroeconomic preferences are also important for central banking, as they would be reflected in a central bank's loss function when it is derived as approximations of the utility functions of heterogeneous consumers. This information could importantly shape prescriptions of optimal control exercises if readily available to central banks.

Even though actual inflation in Germany went from low levels in 2019, to close to zero in 2020, to rising and high levels in 2021 and 2022, we find that the relationship between preferences and the underlying macroeconomic expectations stays remarkably robust. Notably, the highest share of respondents thinking inflation will be reasonable is found for those that expect inflation of about 1%. Respondents expecting higher inflation are more likely to think inflation in the economy should be lower (and *vice versa*), while those expecting higher interest rates are less likely to state that interest rates in the economy should be lower. However, for a given level of inflation or interest rate expectations, there always exists heterogeneity in preferences: Particularly in the range of expected inflation between 1%-7%, we find that consumers can disagree strongly on whether these levels of expected inflation are appropriate for the economy or not.

Evaluating different channels that may shape these macroeconomic preferences, while controlling for macroeconomic expectations, we show that they are linked to with education and income. Particularly in the case of inflation preferences, this relationship changes across inflation regimes. This suggests that with rising inflation better-informed respondents adjusted not only their level expectations, but also their view on whether the expected level is appropriate for the economy or not. It seems consistent to adjust the view on macroeconomic variables if they change considerably.

While individuals' net wealth position seems to have little impact on their macroeconomic preferences, we find that these co-move with individuals' risk preferences and with trust in the central bank. For given macroeconomic expectations, these personal characteristics thus seem to influence whether consumers think the level of inflation or interest rates they expect will be appropriate for the economy, or not.

Overall, our results demonstrate that macroeconomic preferences for a certain level of inflation remain the same, but at the same time individuals might switch their their voiced preference regarding inflation/interest rates if the rates start to move substantially. For optimal monetary policy to maximize households' utility, it might thus be helpful to monitor also these macroeconomic preferences, particularly the observed heterogeneity, with the aim of convincing the general public that the central bank's targets and actions are indeed appropriate for the economy. The correlation with trust in the central bank's price stability objective suggests that this might be a useful channel to stabilize both macroeconomic expectations and preferences.

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6 Appendix

6.1 Controlling for Differences in Preferences Regarding the Personal Situation and Regarding the German Economy

Table A.1: Preferences on Expected Inflation: Personal vs. Economy-Wide

Expected inflation, personal preferences	**Expected inflation, preferences regarding the German economy** higher better %	reasonable %	lower better %	Total %
higher better %	9.2	2.0	1.2	12.5
reasonable %	4.3	41.4	3.5	49.2
lower better %	4.7	6.6	27.0	38.3
Total %	18.2	50.0	31.8	100.0

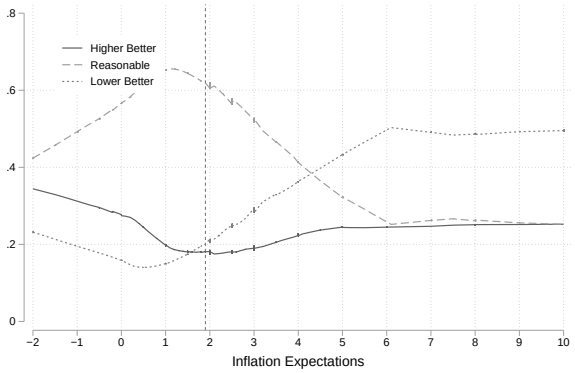
Note: Bundesbank Online Panel of Households (BOP-HH), sixth wave.

Table A.2: Preferences on Expected Interest Rates: Personal vs. Economy-Wide

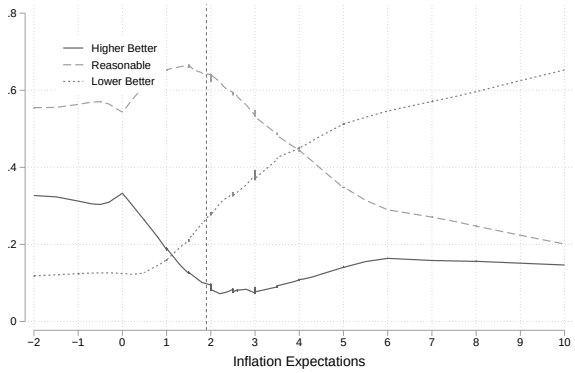
Expected interest rate, personal preferences	**Expected interest rates, preferences regarding the German economy** higher better %	reasonable %	lower better %	Total %
higher better %	51.6	38.0	3.2	92.8
reasonable %	0.8	5.0	0.8	6.6
lower better %	0.0	0.0	0.6	0.6
Total %	52.4	43.0	4.6	100.0

Note: Bundesbank Online Panel of Households (BOP-HH), sixth wave.

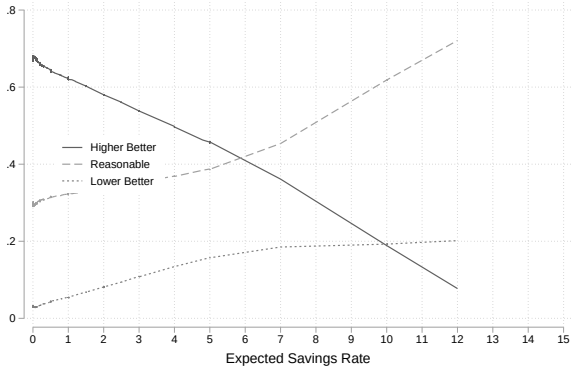
Figure A.1: The Hidden Heterogeneity: Personal vs. Economy-Wide Preferences



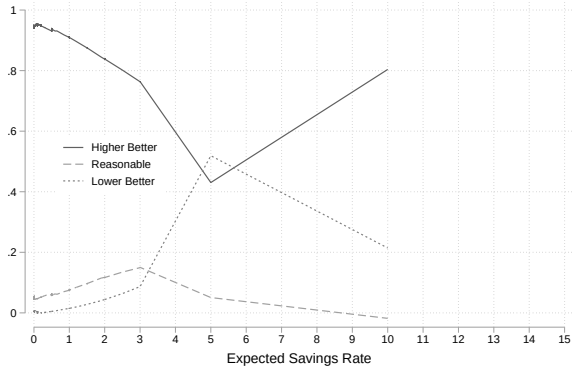
(e) Inflation Preferences Economy and Inflation Expectations



(f) Inflation Preferences Personal and Inflation Expectations



(g) Interest Preferences Economy and Savings Rate Expectations



(h) Interest Preferences Personal and Savings Rate Expectations

6.2 Further Results and Robustness Checks

Table A.3: Preferences for Lower Inflation: Horse Race of Characteristics in Wave 4 (06/2022)

	Fourth wave 06/2022	Fourth wave 06/2022	Fourth wave 06/2022
Owning a house	-0.004		-0.004
	(0.025)		(0.025)
Owning a mortgage	-0.017		-0.017
	(0.104)		(0.099)
Positive net wealth	0.006		0.017
	(0.043)		(0.042)
Risk preference		-0.006	-0.007
		(0.005)	(0.006)
Trust in the ECB		-0.011**	-0.014***
		(0.004)	(0.005)
Concern about high inflation		0.045***	0.047***
		(0.013)	(0.015)
N	3023	3844	3007
Pseudo R^2	0.038	0.058	0.055
Demogr. Controls	Yes	Yes	Yes
Control for π^e & i^e	Yes	Yes	Yes

Note: Bundesbank Online Panel of Households (BOP-HH), wave 30. Average marginal effects for the likelihood of reporting that inflation should be lower are reported from estimations with population weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A.4: Preferences for Higher Interest Rates: Horse Race of Characteristics in Wave 4 (06/2022)

	Fourth wave 06/2022	Fourth wave 06/2022	Fourth wave 06/2022
Owning a house	-0.080***		-0.075***
	(0.026)		(0.026)
Owning a mortgage	0.021		0.019
	(0.086)		(0.083)
Positive net wealth	0.066		0.069*
	(0.041)		(0.041)
Risk preference		-0.007	-0.006
		(0.005)	(0.005)
Trust in the ECB		-0.021***	-0.025***
		(0.005)	(0.005)
Concern about high inflation		0.012	0.011
		(0.014)	(0.015)
N	3018	3833	3002
Pseudo R^2	0.070	0.073	0.085
Demogr. Controls	Yes	Yes	Yes
Control for π^e & i^e	Yes	Yes	Yes

Note: Bundesbank Online Panel of Households (BOP-HH), wave 30. Average marginal effects for the likelihood of reporting that interest rates should be higher are reported from estimations with population weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1