The Hidden Heterogeneity of Inflation Expectations and its Implications

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Abstract

Using a new consumer survey dataset, we document a new dimension of heterogeneity in inflation expectations that has implications for consumption and saving decisions as well as monetary policy transmission. We show that German households with the same inflation expectations differently assess whether the level of expected inflation and of nominal interest rates is appropriate or too high/too low. The 'hidden heterogeneity' in expectations stemming from these opinions is related to demographic characteristics and affects current and planned spending in addition to the Euler equation effect of the perceived real interest rate. Furthermore, these differences in opinions affect German households differently depending on whether they are renters or homeowners.

Keywords: Macroeconomic expectations, monetary policy perceptions, survey microdata.

JEL classification: E31, E52, E58, D84.

1   Introduction

In recent years, a large literature has developed that focuses on the formation of consumers' macroeconomic expectations. Phenomena such as the tendency of consumers to overestimate actual inflation or patterns in forecast accuracy across socio-demographic groups have been widely observed across different surveys and countries (Jonung, 1981; Bryan and Venkatu, 2001; Coibion and Gorodnichenko, 2015). Several papers have shown that inflation expectations are formed heterogeneously and document that these heterogeneous expectations have implications for consumption and saving decisions (Bachmann et al., 2015; Duca et al., 2018; Dräger and Nghiem, 2020).[1]

In this paper, we present new evidence regarding the relevance of opinions on expected future economic developments. Specifically, we show that even households with the same inflation expectations can have very different opinions about the appropriate level of inflation and interest rates, and thereby about the right stance of monetary policy. This heterogeneity has implications for the transmission channel of monetary policy. While in the economics profession opinions have so far been somewhat neglected as a source of heterogeneity, in the social psychology literature – specificly in attribution theory – it has been long established how people form opinions and how they justify them. Jones and Nisbett (1972) and Tversky and Kahneman (1973) report findings that people tend to view their own behavior as reflecting the changing demands of their environment.[2] This provides some understanding how opinions could also matter for economic decisions. It would not be surprising to see that consumers in our survey 'act' on their opinions and actually make spending decisions based on their opinions.

We first detail the 'hidden heterogeneity' in expectations using the Bundesbank Online Pilot Survey on Consumer Expectations. Overall, the majority of consumers believe that expected inflation is too high and expected interest rates are too low. Remarkably, even consumers with inflation expectations that are well within the ECB's target inflation rate of close to, but under 2%, differ substantially in their opinions of whether this is an appropriate level of inflation. Specifically, for consumers with inflation expectations between 1.5% and 2%, about 49% believe that expected inflation is appropriate, 46% think it should be lower and 5% think it should be higher. Strikingly, even among consumers who expect deflation in the next year, about 30% would still prefer lower inflation. Generally, a large share of German households believes that inflation is too high. We observe similar heterogeneity also for consumers' opinions regarding the stance of monetary policy, i.e., future interest rates.

We further document that these differences in attitudes result in some heterogeneity in households' consumption and savings profiles, even for consumers who share similar inflation expectations. This implies an additional channel of monetary policy transmission via the attitudes of households in addition to the effect of inflation expectations on spending via the real interest rate. We find that when households perceive higher real rates, they postpone part of their spending on durable goods. This effect is in line with the theory, namely the intertemporal substitution effect in the

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

[2]They also report that people think that the behavior of others is trait dominated.

consumption Euler equation. Interestingly, the negative effect of perceived rates is only significant for consumers with inflation expectations in line with the ECB target, i.e., between 1.5% and 2%. Furthermore, those who believe interest rates should be lower in the future, are de facto acting as if (nominal) interest rates – and thus real interest rates – are already lower, as they have significantly higher durable goods spending and also a higher negative elasticity with respect to real rates. Interestingly, the effect of attitudes is not only relevant for current spending decisions, but also affects future planned spending on durable goods in a way which is consistent with theory. Distinguishing further between homeowners and renters, we find opposing effects of preferring lower inflation on current durable goods spending: Homeowners report lower current spending when they think inflation should be lower (in line with an Euler equation), while renters report higher durable goods spending.

Our paper relates to the literature explaining the heterogeneity of 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. (2019) and D'Acunto et al. (2019) demonstrate that the gender differences in inflation expectations can be traced 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, 2019).

Our paper is related also to a growing literature evaluating the link between survey inflation expectations and household spending decisions. Assuming consumers are following an Euler equation, one would expect a positive effect from higher inflation expectations on current spending via its effect on the real rate, which could become particularly important when nominal interest rates are at the zero lower bound. While Bachmann et al. (2015) and Burke and Ozdagli (2013) find little evidence of a significant link between inflation expectations and consumers' reported readiness to spend (or actual spending) on durables in the US, Crump et al. (2015) report a positive relation between consumption growth and inflation expectations of US consumers in the Survey of Consumer Expectations (SCE) conducted at the New York Fed. Other studies on European and Japanese households find significantly positive links between household inflation expectations and (intended or actual) spending on both durables and non-durables (Ichiue and Nishiguchi, 2015; D'Acunto et al., 2016; Duca et al., 2018; Vellekoop and Wiederholt, 2018; Dräger and Nghiem, 2020).

The remainder of the paper is organized as follows: Section 2 explains the data we use, while Section 3 discusses our results. Section 4 concludes.

2 Data

Our research question is evaluated using a new survey dataset coming from the Bundesbank Online Pilot Survey on Consumer Expectations, which was fielded on a representative sample of German households in three waves from April 2019 to June 2019. Overall, the dataset includes 6653 observations, with 2009 participants in the first wave, 2052 in the second wave and 2592 in the third wave. In addition, the survey includes a panel component, as about 500 respondents participated in all three waves, 500 in wave 1 and 2, 500 in wave 2 and 3 and 500 in wave 1 and 3. For our analysis, we use mainly the first and second wave of the dataset and thus have about 1000 participants with responses in both waves.

The Bundesbank Online Pilot Survey on Consumer Expectations 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. We add the following questions to the core questionnaire. First, after the question on point estimates for inflation 12 months ahead, we ask about opinions on the expected level of inflation (included in the first wave):

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

    (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 opinions on the expected level of nominal interest rates after the question on point estimates for expected saving rates in the next 12 months (included in the second wave):

2. Do you think the average level of interest rates you expect for the next 12 months will be more or less appropriate, 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 ($d\_int\_lowbetter$)

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

Socio-demographic controls comprise a dummy variables for being male (d_male), age, three income groups (inc_low – monthly net income below or equal $1.000\,\mathord{\in}$, inc_middle – monthly net income between $1.000\,\mathord{\in}$ and $3.000\,\mathord{\in}$ and inc_high – monthly net income above $3.000\,\mathord{\in}$), 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), three work categories ($d\_fulltime$ – working full time, $d\_parttime$ – working part time, $d\_noemploy$ – no employment (voluntary or involuntary), $d\_retired$ – retired), a dummy for owning a house ($d\_ownhouse$), a dummy for being a renter ($d\_renthouse$) and a dummy for having lived in the GDR (German Democratic Republic in the Eastern part of Germany) before 1989 ($d\_east1989$).

Finally, we evaluate implications of opinions on inflation and interest rates for spending and saving decisions. These include levels of spending in the previous month on durables (c^{dur}), consumption goods (c^{cons}), housing (rent or mortgage payments, c^{house}) and saving ($saving$), all measured in Euros. We use log levels and truncate the highest 5% in order to exclude unreasonable values. The fact that the survey asks to report actual spending in Euros represent an important advantage over surveys measuring only consumers' readiness to spend. Spending plans are measured with qualitative questions asking for plans to spend/save more/about the same/less on the same categories in the next 12 months. We define dummy variables for those planning to spend more on durables ($c^{dur,e}$), consumption goods ($c^{cons,e}$), housing ($c^{house,e}$) and saving ($saving^{e}$).

3   Results

3.1   Summary Statistics: The Hidden Heterogeneity of Expectations

Table 1 shows a cross-tabulation of our variables of interest. From this table we observe that the majority of households (43%) express that inflation should be lower and interest rates should be higher. This would be consistent with a Taylor rule. 38% of the surveyed population feel inflation will be at a reasonable level and 16.8% have the same opinion regarding interest rates. However, only 7.4% of our sample think that both inflation and interest rates will be at appropriate levels. Hence, our sample has many individuals who feel that inflation as well as interest rates should be different from the levels that they currently expect. The majority opinion on interest rates is perhaps not surprising, given that the main refinancing rate was zero for a protracted period of time when the respondent were surveyed. The views that inflation should be lower, at a time with very moderate price movements, could be explained by the overall negative attitude towards inflation in Germany.

As a next step, we explore our variables of interest visually by plotting the opinions against the levels of the underlying expectations. Figure 1 plots various opinions 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 of opinions. First, in Figure 1(a) we plot the share of people believing that inflation will be reasonable, should be higher or should be

Table 1: **Opinions on Expected inflation and Expected Interest Rate**

	Expected interest rate			
Expected inflation	higher better	reasonable	lower better	Total
	%	%	%	%
higher better	3.4	1.2	0.2	4.8
reasonable	28.9	7.4	1.9	38.3
lower better	43.0	8.1	5.8	56.9
Total	75.3	16.8	7.9	100.0

lower against their own expected inflation rate in 12 months. This visualizes the heterogeneity of opinions of respondents sharing the same inflation point forecast.

Figure 1: Opinions and Expectations
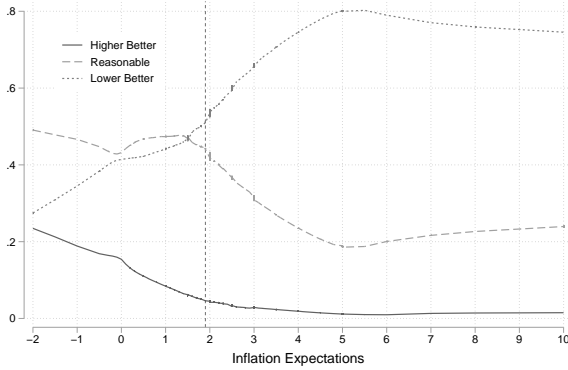
(a) Inflation Opinions and Inflation Expectations
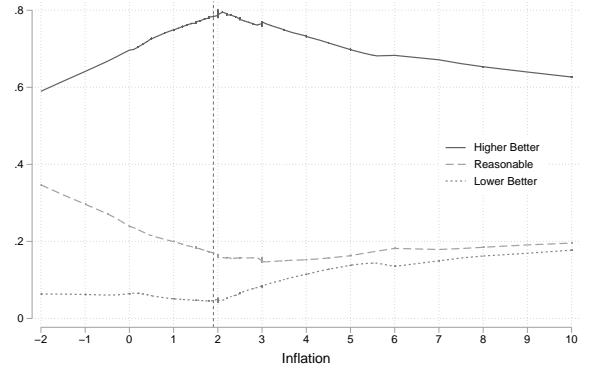
(b) Interest Rate Opinions and Inflation Expectations
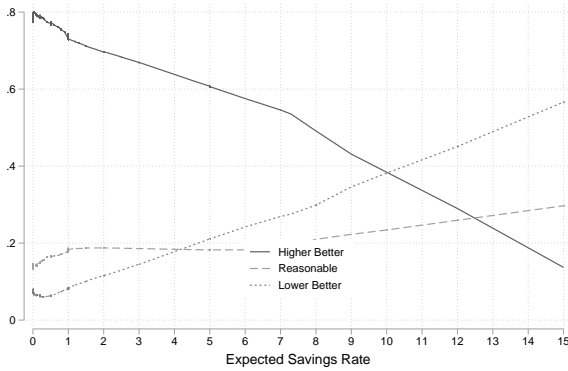
(c) Opinions and Savings Rate Expectations
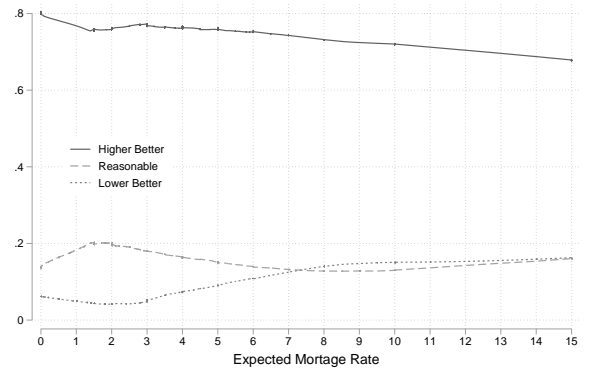
(d) Opinions and Mortgage Rate Expectations

Even when considering inflation expectations that are in line the ECB's mandate, i.e., lying between 1.5-2%, 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 level of inflation is too high. This reflects a substantial degree of hidden heterogeneity within point expectations that would otherwise be considered as anchored at the inflation target, emphasizing the

importance of considering these underlying opinions. 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. Both movements are as one would expect. Strikingly, as we move to expected inflation levels below 1.5%, 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 around 20% and the share believing inflation should be lower remains high around 30%. Hence, there exists a substantial fraction of consumers who do not think that very low inflation or even deflation is harmful or who would prefer even lower inflation rates. This likely implies either a lack of understanding of the economic problems related to missing the inflation target from below or a preference for target inflation to be lower than its current level.

Figure 1(b) plots the opinions on future interest rates against the level of individual inflation expectations. We find a peak in the share of consumers preferring higher interest rates for those with inflation expectations around the inflation target, while the share thinking interest rates are appropriate increases when inflation expectations are very low. In Figures 1(d) and 1(c), we replicate Figure 1(a) for expectations on interest rates (saving rates and mortgage rates). The main message remains the same. There is a substantial and persistent heterogeneity of opinions 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. The shares remain relatively constant across levels of mortgage rate expectations, while the share of those preferring higher interest rates declines with higher savings interest rate expectations.

3.2   Identifying the Hidden Heterogeneity

In Figure 1 in the previous section, we show that there exists a large degree of 'hidden heterogeneity' in opinions about future inflation and interest rates for consumers sharing the same expectations. This is true even when inflation expectations are 'anchored', i.e., close to the announced inflation target. In this section, we aim to characterize this heterogeneity in opinions according to demographic variables as well as macroeconomic expectations.

All models estimate the likelihood of choosing either opinion category using probit models with population weights. The estimation output tables report marginal effects evaluated at the sample mean. Quantitative interest rate expectations are truncated to be lower than 25%. Models for inflation opinions with demographic characteristics are estimated using the first wave only when this question was included into the questionnaire. The second wave contains the questions regarding interest rate opinions as well as quantitative interest rate expectations. Therefore, we matched consumers in the first wave who answered questions on inflation expectations to their answers in the second wave and use the second wave for all models including either interest rate opinions or macroeconomic expectations.[3]

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[3]Given that there is only a gap of one month between those survey waves, economic and personal conditions should not have changed substantially.

Table 2 shows the role of demographic characteristics on the likelihood of responding that inflation should be lower, is appropriate or should be higher, respectively. In the first three columns we report the effects for the full range of quantitative inflation expectations. The second three columns use only the responses of those consumers who expect either deflation or very low inflation rates below 1.5% in the next 12 months. The third block shows effects for responses in the 'inflation target zone', i.e., between 1.5% and 2%, while the last three columns use only high inflation expectations above 2%.

In the full sample, consumers are more likely to think expected inflation is appropriate or should be higher and less likely to think it should be lower if they are male, in the high income group, have a university degree or own their home. The reverse is true for respondents who are unemployed or out of the labor market. Interestingly, consumers who lived in the GDR prior to 1989 are also significantly more likely to think that inflation should be lower, and less likely to view expected inflation as appropriate. This is in line with recent findings in Goldfayn-Frank and Wohlfahrt (2019). Overall, it thus seems that the demographic groups who typically report higher inflation forecasts with lower forecast accuracy are also more likely to think that inflation rates should be lower.[4] This is corroborated by our results in Table A.1 in the appendix, which shows that consumers with higher inflation expectations are more likely to view expected inflation as too high, rather than appropriate or too low.

However, when we distinguish between different ranges of inflation expectations, the results in Table 2 suggest that most of the demographic heterogeneity in inflation opinions actually takes place within the 'inflation target zone' $1.5 \leq \pi^e \leq 2$, where inflation expectations are both relatively homogeneous and close to the official inflation target of the ECB. Thus, even when inflation expectations seem anchored, there is considerable underlying heterogeneity with respect to the opinions of consumers regarding these expectations: The differences in opinions across gender, income, education and for those having lived in Eastern Germany before 1989 are mostly significant only in the 'inflation target zone', where the marginal effects are often higher than for the overall sample. By contrast, only few demographic effects remain significant when inflation expectations lie below 1.5% or above 2%.

Next, in Table 3 we evaluate the heterogeneity across opinions on future interest rates. Overall, consumers in the second wave are more likely to think that interest rates should be higher, i.e., less likely to think interest rates are appropriate or should be lower, with rising age and in the higher income and education groups. Hence, those groups of the population who typically save more than average are also more likely to prefer higher interest rates. Interestingly, consumers who own their home are also less likely to prefer lower interest rates and more likely to think they are reasonable. Again, we observe considerable heterogeneity in these demographic effects when restricting the range of inflation forecasts: The view that higher income groups who save more would generally prefer higher interest rates only holds for those consumers with relatively high inflation expectations above 2%. By contrast, those with inflation expectations in the 'inflation target zone' $1.5 \leq \pi^e \leq 2$ and

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[4]Inflation expectations are typically found to be higher/less accurate for females as well as low education and low income groups. This finding is highly robust across different time periods and different country surveys, see for instance, Jonung (1981); Bryan and Venkatu (2001); Pfajfar and Santoro (2009).

higher income are more likely to state that interest rates should be lower. Finally, consumers with relatively low inflation expectations below 1.5% seem to prefer higher interest rates more when their income is low, rather than middle or high.

Finally, Tables A.1-A.2 in the appendix evaluate the heterogeneity in opinions on future inflation and interest rates across different levels of inflation and interest rate expectations, while controlling for demographic effects. With rising inflation expectations, consumers are more likely to view inflation as too high, and less likely to think it is appropriate or should be higher. Not surprisingly, this effect is extinguished by restricting inflation expectations in the 'inflation target zone' between 1.5% and 2%. The heterogeneity among inflation opinions in this range is thus not driven by the level of inflation expectations as already indicated in Figure 1(a). Moreover, there is some evidence that consumers with higher mortgage rate expectations are more likely to think inflation should be lower and less likely to think it is appropriate or should be higher. This effect remains also in the 'inflation target zone.'

Evaluating interest rate opinions in Table A.2 in appendix, we find no effects of inflation expectations. Instead, as expected, consumers are more likely to prefer lower interest rates, and less likely to think they should be higher, if they have higher savings or mortgage rate expectations. This relation does not differ significantly between the full sample and the 'inflation target zone,' suggesting that inflation and interest rate opinions are formed somewhat independently.

3.3 Implications for Spending on Durable Goods and for Saving

So far we have identified a new dimension of heterogeneity of inflation expectations which is related to the perceptions of whether inflation and interest rates are expected to be at an appropriate level. This 'hidden heterogeneity' is present even for similar levels of inflation expectations. In this section, we assess whether this hidden heterogeneity also has implications for consumption and savings decisions. One nice feature of our dataset is that it asks for both the level of expenditures/saving in € in the past month and whether households intend to spend/save more/less/about the same over the next 12 months. The survey asks for the € amount of spending on durable goods, consumer goods, clothes and shoes, leisure activities, transport costs, services, vacation, housing costs, and financial reserves (savings). We will focus on a selection of expenditures in this section: Intuitively, durable good purchases should be more sensitive to interest rates than most other purchases, as their frequency is lower and they may be credit-financed. Thus, they are particularly interesting to study. Also the amount of savings may be important for the type of heterogeneity that we study in this paper.

In all estimations, we control for demographic characteristics, where income plays a crucial role (these results are omitted, but available on request). In line with the Euler equation model of consumption, we additionally control for (perceived) real interest rates on savings, defined as $r^e_{savings} = i^e_{savings} - \pi^e$ and for planned spending in the models for current spending (or current

Table 2: Opinions about Future Inflation

	Full sample			$-5 \leq \pi^e < 1.5$			$1.5 \leq \pi^e \leq 2$			$2 < \pi^e \leq 25$		
	inf _lowbetter	inf _reason	inf _highbetter	inf _lowbetter	inf _reason	inf _highbetter	inf _lowbetter	inf _reason	inf _highbetter	inf _lowbetter	inf _reason	inf _highbetter
d_male	-0.084***	0.049*	0.039***	-0.079	0.003	0.086**	-0.083**	0.040	0.053***	-0.038	0.032	0.007
	(0.027)	(0.027)	(0.012)	(0.067)	(0.069)	(0.038)	(0.042)	(0.042)	(0.019)	(0.038)	(0.037)	(0.012)
age	-0.002	0.002	0.001	-0.003	0.004	-0.001	-0.003	0.001	0.002*	-0.002	0.002	0.001
	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)
inc_middle	-0.065	0.096	-0.024	0.406**	-0.241	-0.118	-0.256*	0.218	0.305***	-0.082	0.109	-0.016
	(0.081)	(0.083)	(0.032)	(0.179)	(0.203)	(0.097)	(0.139)	(0.140)	(0.055)	(0.102)	(0.105)	(0.025)
inc_high	-0.143*	0.178**	-0.028	0.369**	-0.187	-0.137	-0.323**	0.278**	0.310***	-0.154	0.193*	-0.029
	(0.082)	(0.084)	(0.033)	(0.182)	(0.205)	(0.098)	(0.140)	(0.141)	(0.056)	(0.106)	(0.108)	(0.026)
d_east1989	0.132***	-0.140***	0.006	0.011	-0.070	0.058	0.198***	-0.187***	-0.017	0.101**	-0.103**	0.000
	(0.036)	(0.035)	(0.014)	(0.090)	(0.092)	(0.042)	(0.051)	(0.052)	(0.022)	(0.051)	(0.050)	(0.015)
d_edu_real	-0.048	0.040	0.010	0.077	-0.082	0.008	-0.074	0.058	0.018	-0.043	0.041	0.002
	(0.034)	(0.033)	(0.016)	(0.080)	(0.081)	(0.053)	(0.051)	(0.052)	(0.020)	(0.048)	(0.046)	(0.016)
d_edu_abi	-0.075	0.062	0.015	-0.085	0.086	0.018	-0.153**	0.139**	0.012	0.052	-0.073	0.019
	(0.047)	(0.047)	(0.019)	(0.133)	(0.132)	(0.071)	(0.068)	(0.068)	(0.025)	(0.067)	(0.066)	(0.019)
d_edu_uni	-0.197***	0.155***	0.039**	-0.051	-0.031	0.080	-0.289***	0.268***	0.019	-0.079	0.040	0.035*
	(0.039)	(0.038)	(0.016)	(0.092)	(0.093)	(0.050)	(0.057)	(0.057)	(0.021)	(0.059)	(0.058)	(0.018)
d_parttime	0.051	-0.042	-0.010	0.065	-0.033	-0.017	0.009	-0.004	-0.022	0.019	-0.020	0.004
	(0.046)	(0.046)	(0.019)	(0.116)	(0.123)	(0.067)	(0.078)	(0.078)	(0.033)	(0.060)	(0.059)	(0.016)
d_noemploy	0.121**	-0.100*	-0.025**	0.152	-0.130	-0.041	0.052	-0.054	0.002	0.109*	-0.091	-0.016
	(0.052)	(0.052)	(0.012)	(0.121)	(0.129)	(0.036)	(0.080)	(0.081)	(0.013)	(0.065)	(0.063)	(0.011)
d_retired	-0.049	0.051	0.002	0.091	-0.068	-0.029	-0.029	0.049	-0.023	-0.058	0.060	0.001
	(0.058)	(0.058)	(0.014)	(0.144)	(0.149)	(0.052)	(0.088)	(0.089)	(0.019)	(0.074)	(0.071)	(0.015)
d_ownhouse	-0.046*	0.050*	-0.004	-0.212***	0.171***	0.049	-0.037	0.062	-0.026*	0.050	-0.041	-0.008
	(0.028)	(0.027)	(0.011)	(0.063)	(0.066)	(0.037)	(0.042)	(0.042)	(0.016)	(0.040)	(0.039)	(0.011)
N	1515	1515	1515	267	267	267	669	669	669	579	579	579
χ^2	100.097	82.074	32.355	26.807	16.819	28.257	69.038	59.393	874.729	20.979	22.191	17.571
Pseudo R^2	0.055	0.047	0.054	0.083	0.052	0.146	0.089	0.076	0.086	0.030	0.032	0.064

Note: Bundesbank Online Pilot Survey on Consumer Expectations, first wave. Average marginal effects for the likelihood of reporting that inflation should be lower/is reasonable/should be higher are reported from estimations with population weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3: Opinions about Future Interest Rates

	Full sample			$-5 \leq \pi^e < 1.5$			$1.5 \leq \pi^e \leq 2$			$2 < \pi^e \leq 25$		
	int _lowbetter	int _reason	int _highbetter	int _lowbetter	int _reason	int _highbetter	int _lowbetter	int _reason	int _highbetter	int _lowbetter	int _reason	int _highbetter
d_male	-0.018	0.026	-0.008	0.042	0.060	-0.103	-0.015	0.015	0.001	-0.019	0.012	0.010
	(0.017)	(0.022)	(0.026)	(0.039)	(0.060)	(0.069)	(0.020)	(0.036)	(0.040)	(0.027)	(0.029)	(0.038)
age	-0.003***	0.000	0.003**	-0.002	0.001	0.002	-0.004***	0.001	0.003*	-0.003*	0.001	0.002
	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)	(0.004)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)
inc_middle	-0.069	-0.014	0.114	0.061	1.244***	-0.334**	0.381***	-0.185**	0.134	-0.138**	0.030	0.170*
	(0.045)	(0.056)	(0.072)	(0.062)	(0.190)	(0.166)	(0.079)	(0.092)	(0.110)	(0.068)	(0.083)	(0.099)
inc_high	-0.095**	0.002	0.122*	-0.061	1.331***	-0.290*	0.378***	-0.159*	0.107	-0.155**	0.031	0.182*
	(0.046)	(0.057)	(0.073)	(0.060)	(0.204)	(0.168)	(0.080)	(0.093)	(0.112)	(0.069)	(0.086)	(0.100)
d_east1989	0.004	-0.037	0.032	0.013	0.135*	-0.153*	-0.015	-0.074	0.089*	0.010	-0.046	0.035
	(0.024)	(0.028)	(0.035)	(0.034)	(0.079)	(0.088)	(0.025)	(0.047)	(0.051)	(0.039)	(0.039)	(0.052)
d_edu_real	-0.007	-0.029	0.032	0.052	-0.031	-0.014	-0.023	0.003	0.010	-0.008	-0.054	0.055
	(0.020)	(0.025)	(0.031)	(0.051)	(0.069)	(0.083)	(0.026)	(0.040)	(0.046)	(0.033)	(0.035)	(0.045)
d_edu_abi	-0.086***	-0.092**	0.168***	0.059	-0.119	0.062	-0.086*	-0.125**	0.199***	-0.133**	-0.039	0.151**
	(0.032)	(0.037)	(0.044)	(0.052)	(0.106)	(0.115)	(0.046)	(0.061)	(0.069)	(0.056)	(0.050)	(0.066)
d_edu_uni	-0.042*	-0.056*	0.090**	0.043	-0.099	0.070	-0.061*	-0.055	0.102*	-0.026	-0.029	0.046
	(0.025)	(0.030)	(0.037)	(0.056)	(0.082)	(0.096)	(0.046)	(0.047)	(0.053)	(0.042)	(0.041)	(0.056)
d_parttime	-0.021	0.012	0.006	0.014	-0.006	-0.020	0.020	-0.028	0.008	-0.085*	0.045	0.028
	(0.027)	(0.034)	(0.043)	(0.050)	(0.094)	(0.109)	(0.033)	(0.059)	(0.066)	(0.048)	(0.045)	(0.064)
d_noemploy	0.021	-0.020	-0.013	0.011	0.232	-0.237*	0.022	-0.087	0.050	0.004	-0.009	-0.004
	(0.028)	(0.044)	(0.048)	(0.058)	(0.150)	(0.143)	(0.032)	(0.068)	(0.073)	(0.048)	(0.055)	(0.068)
d_retired	-0.025	-0.030	0.060	-0.021	-0.224	0.226	0.020	0.013	-0.028	-0.040	-0.050	0.093
	(0.033)	(0.047)	(0.053)	(0.072)	(0.170)	(0.171)	(0.035)	(0.074)	(0.079)	(0.055)	(0.059)	(0.074)
d_ownhouse	-0.041**	0.047**	-0.001	0.025	0.208***	-0.214***	-0.033*	-0.006	0.047	-0.063**	0.056*	0.009
	(0.017)	(0.022)	(0.026)	(0.038)	(0.067)	(0.071)	(0.018)	(0.035)	(0.038)	(0.029)	(0.030)	(0.039)
N	1616	1616	1616	211	211	211	665	665	665	740	740	740
χ^2	48.263	22.850	35.252	15.956	325.288	19.918	323.680	16.887	22.455	34.412	15.224	22.855
Pseudo R^2	0.087	0.019	0.026	0.157	0.121	0.096	0.165	0.031	0.042	0.102	0.028	0.034

Note: Bundesbank Online Pilot Survey on Consumer Expectations, second wave. Average marginal effects for the likelihood of reporting that interest rates should be lower/is reasonable/should be higher are reported from estimations with population weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

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spending in the models for planned spending).[5] Our Euler equation estimation extended for opinions thus takes the following form (here the version for durable spending):

$$c_i^{dur} = a_0 + b_1 * c_i^{dur,e} + b_2 * r_{savings,i}^e + c' * X_i^{opinions} + d' * X_i^{controls} + u_i \qquad (1)$$

where c_i^{dur} and $c_i^{dur,e}$ are current and expected durable goods spending of household i, $r_{savings,i}^e$ is the subjective perceived real interest rate, $X_i^{opinions}$ is a vector of dummies for opinions on future inflation and interest rates and $X_i^{controls}$ is a vector of demographic controls. From the theory, we expect $b_1 > 0$ and $b_2 < 0$, whereas the signs of the coefficients in the vector c are not clear ex ante.

Table 4 shows the determinants of the log of spending on durable goods as well as the likelihood to spend more in the next 12 months. In the full sample, we find significantly positive effect of expected spending in some models, but the effect of the perceived real interest rate only becomes significantly negative once we restrict the sample to those respondents with inflation expectations in the range $1.5 \leq \pi^e \leq 2$. This means that when households perceive higher real rates, they postpone part of their spending. Results for the overall sample show that our interest rate and inflation attitudes have a relatively limited role in explaining current spending on durables. However, we find that those who believe that interest rates should be lower, are de facto acting as if *current* (nominal) interest rates – and thus real interest rates – are lower: They have significantly higher durable goods spending compared to the reference group who thinks interest rates are appropriate. The fact that they act as if real interest rates are lower is consistent with research in attribution theory (see, e.g., Jones and Nisbett, 1972), which gives a potential underlying cause for their behavior: If consumers who believe that real interest rates *should* be lower also believe that this view reflects their environment, it seems rational that they take spending decisions as if real rates *are* indeed lower.

Overall, adding opinions to the model increases the explanatory power in particular when adding views on future interest rates, with the adjusted R^2 rising substantially from 0.022 to 0.041. Hence, albeit the rather low level of significance, the marginal contribution of opinions on top of all the control variables is quite substantial.

For the range of inflation expectations in line with the ECB's inflation objective, attitudes matter more for current spending on durables: We find again a positive effect on current durable spending by those who believe that interest rates should be lower. In addition, the effect of thinking interest rates should be lower interacts with consumers' perceived real interest rate: We see that those consumers who think that lower interest rates would be better have a much stronger negative real interest rate elasticity than other households. One potential interpretation of this asymmetry is that consumers are more sensitive to decreases in the real interest rate than to increases. As interest rates often decrease during contractions, this mechanism is in line with what has been shown in models with reference-dependent preferences and loss aversion by Yogo (2008), Rosenblatt-Wisch (2008), and consistent with the model by Santoro et al. (2014). Yogo (2008) shows that

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[5]Estimations with nominal interest rates and inflation expectations entered as separate variables are available upon request. When entering both variables separately, it emerges that the effect of perceived real interest rates is mainly driven by consumers' inflation expectations.

Table 4: Current and Planned Spending on Durables

| | Current Spending (in log € for the previous month) | | | | | | | | | Planned Spending (prob. to spend more, next 12 months) | | | | | | |
| | Full sample | | | | | $1.5 \leq \pi^e \leq 2$ | | | | Full sample | | | | $1.5 \leq \pi^e \leq 2$ | | |
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)
c^{dur}	0.166 (0.103)	0.123 (0.110)	0.036 (0.075)	0.212** (0.103)	0.209** (0.103)	-0.029 (0.145)	-0.004 (0.120)	0.062 (0.145)	0.060 (0.144)	0.021 (0.014)	0.015 (0.014)	0.004 (0.009)	0.027** (0.013)	-0.005 (0.024)	-0.000 (0.016)	0.011 (0.024)
$c^{dur,e}$	-0.014 (0.022)	-0.012 (0.022)	0.002 (0.012)	-0.016 (0.021)	-0.030 (0.036)	-0.036 (0.024)	-0.036* (0.022)	-0.048* (0.026)	-0.047*** (0.018)	0.003 (0.007)	0.001 (0.006)	0.003 (0.004)	0.001 (0.006)	-0.007 (0.009)	0.001 (0.010)	-0.007 (0.008)
$r^e_{savings}$																
d_inf_lowbetter		-0.083 (0.149)		-0.062 (0.145)	-0.075 (0.207)	-0.183 (0.219)		-0.227 (0.213)	0.014 (0.420)		-0.047 (0.034)		-0.042 (0.033)	-0.057 (0.055)		-0.030 (0.051)
d_inf_highbetter		-0.263 (0.370)		-0.260 (0.347)	-0.298 (0.679)	-0.875* (0.459)		-0.842* (0.455)	-1.291 (1.030)		-0.006 (0.060)		-0.003 (0.058)	0.060 (0.080)		0.063 (0.079)
d_int_lowbetter			0.181 (0.245)	0.681** (0.321)	0.656* (0.369)		0.593 (0.417)	1.045** (0.495)	0.250 (0.447)			-0.137** (0.059)	-0.273*** (0.080)		-0.311** (0.123)	-0.596*** (0.194)
d_int_highbetter			0.146 (0.127)	-0.144 (0.171)	-0.091 (0.190)		0.115 (0.186)	-0.297 (0.209)	-0.286 (0.262)			-0.035 (0.031)	-0.043 (0.044)		-0.100* (0.055)	-0.066 (0.081)
$r^e_{savings}$ * d_inf_highbetter					-0.026 (0.369)				-0.279 (0.579)							
$r^e_{savings}$ * d_inf_lowbetter					-0.005 (0.057)				0.230 (0.283)							
$r^e_{savings}$ * d_int_highbetter					0.029 (0.046)				0.000 (0.130)							
$r^e_{savings}$ * d_int_lowbetter					-0.010 (0.078)				-0.986*** (0.279)							
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	379	380	786	379	379	163	317	163	163	379	380	786	379	163	317	163
Adj. R^2	0.022	0.015	0.040	0.041	0.032	0.076	0.079	0.123	0.125							
χ^2										19.972	22.137	29.978	36.036	9.514	18.738	16.691
Pseudo R^2										0.032	0.032	0.028	0.057	0.021	0.047	0.070

Note: Bundesbank Online Pilot Survey on Consumer Expectations, second wave. OLS estimations on log truncated spending with population weights. Average marginal effects for the likelihood of higher spending also from estimations with population weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

during contractions, changes in the real interest rate have a stronger impact on consumption, as the elasticity of intertemporal substitution between current and future consumption increases. Note, however, that the group of consumers who would prefer lower interest rates in the future in our sample is relatively small compared to the group preferring higher interest rates. Nevertheless, the estimated elasticities are large relative to the elasticity with respect to the real rate. In addition to the effect of preferring lower interest rates, we also find a marginally significant negative effect of preferring higher inflation on the level of current durable spending. However, the effect becomes insignificant when adding interaction effects with perceived real rates.[6]

We further check whether there are consistent effects of attitudes also on the likelihood to spend more on durable goods in the next 12 months. The results are reported in the right-hand-side of Table 4, where we show average marginal effects from probit estimations on the likelihood of stating a planned increase in spending. We can see that for both the overall group and for the group with inflation expectations consistent with the ECB's target, the effect of preferring lower interest rates is now negative, implying that these households are less likely to increase their spending on durable goods in the next 12 months. This is again consistent with the Euler equation, suggesting that the intertemporal substitution effect is at work, where households have opted to spend more today and less tomorrow.[7]

In addition, we evaluate implications of the hidden heterogeneity in expectations on current and planned savings. Results are reported in Table 5.[8] While we find strong positive effects of an increase in planned saving on the level of current savings, the real expected savings rate seems to have little impact on the € amount of savings. We find an effect from attitudes mostly for the overall sample: Thinking that lower inflation would be better is negatively correlated with the amount of current savings. This effect vanishes when we restrict inflation expectations to the range between 1.5-2%. In a previous study, Ehrmann et al. (2017) show that consumers who are pessimistic about future economic conditions tend to have higher inflation expectations. Our result extends this finding: Consumers who are pessimistic about future inflation and have non-anchored inflation expectations, save less than consumers who view inflation as appropriate. The likelihood to increase savings in the future (reported in the right-hand-side of Table 5) is largely unaffected

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[6] We further evaluate implications of inflation and interest rate opinions on spending on consumption goods and on housing. The results in Tables A.3-A.4 in the appendix show that opinions affect current consumption spending, but only in the full sample. Here we find positive level and interaction effects of preferring higher inflation, lower interest rates as well as higher interest rates. Hence, the attitudes may reduce the negative impact of perceived real rates on current spending, which becomes insignificant. Moreover, we find a significantly positive effect of preferring lower inflation, and a significantly negative effect of preferring lower interest rates on current housing expenditures.

[7] We further estimate interaction effects between inflation and interest rate opinions and consumers' perceived real interest rate on the likelihood of higher planned spending on durables using the full sample of inflation expectations. Due to the non-linearity of the model, the interaction effects cannot be interpreted directly and are therefore shown graphically in Figure A.1 in the appendix. We find that consumers who would prefer lower inflation show a significantly more positive elasticity of planned spending to their perceived real rate, while the effect becomes marginally negative for consumers who think that interest rates should be lower. The interaction effects for planned saving, consumption and spending on housing are shown in graphs A.2-A.4 in the appendix.

[8] As before, the demographic controls are included (although not reported here). As expected, income has a strong effect, but also age (surprisingly) tends to be significant. Older and richer households save more. Furthermore, complementary to the results on consumption goods spending, males tend to save significantly more than females.

Table 5: Current and Planned Saving

	Current Spending (in log €; for the previous month)									Planned Spending (prob. to spend more, next 12 months)						
	Full sample					$1.5 \le \pi^e \le 2$				Full sample				$1.5 \le \pi^e \le 2$		
saving	0.226*** (0.083)	0.219*** (0.082)	0.257*** (0.055)	0.216** (0.084)	0.208** (0.084)	0.330*** (0.116)	0.305*** (0.087)	0.331*** (0.117)	0.317*** (0.121)	0.062*** (0.024)	0.061** (0.025)	0.072*** (0.016)	0.060*** (0.025)	0.089*** (0.031)	0.073*** (0.021)	0.090*** (0.031)
$saving^e$																
$r^e_{savings}$	0.005 (0.012)	-0.001 (0.012)	-0.001 (0.008)	0.000 (0.012)	-0.013 (0.024)	-0.046 (0.063)	-0.035** (0.016)	-0.037 (0.065)	-0.198 (0.276)	0.008 (0.007)	0.008 (0.007)	-0.001 (0.004)	0.008 (0.006)	0.016 (0.031)	-0.008 (0.007)	0.012 (0.032)
d_inf_lowbetter		-0.282*** (0.085)		-0.285*** (0.087)	-0.197* (0.106)	-0.195 (0.119)		-0.196* (0.119)	-0.221 (0.229)		-0.010 (0.037)		-0.003 (0.037)	0.008 (0.055)		0.009 (0.055)
d_inf_highbetter		0.094 (0.201)		0.089 (0.202)	0.226 (0.486)	-0.045 (0.327)		-0.058 (0.331)	-0.317 (0.669)		-0.043 (0.079)		-0.043 (0.078)	0.041 (0.150)		0.045 (0.148)
d_int_lowbetter			-0.017 (0.128)	-0.050 (0.160)	-0.092 (0.173)		-0.079 (0.232)	-0.110 (0.255)	-0.075 (0.473)			-0.069 (0.058)	-0.190** (0.079)		0.263*** (0.099)	0.066 (0.133)
d_int_highbetter			0.006 (0.077)	0.060 (0.106)	0.039 (0.126)		0.139 (0.120)	0.077 (0.142)	0.361 (0.435)			0.047 (0.034)	-0.031 (0.043)		0.088* (0.052)	-0.011 (0.063)
$r^e_{sav} *$ d_inf_highbetter					0.088 (0.244)				-0.172 (0.454)							
$r^e_{sav} *$ d_inf_lowbetter					0.045 (0.028)				-0.013 (0.146)							
$r^e_{sav} *$ d_int_highbetter					-0.010 (0.033)				0.198 (0.284)							
$r^e_{sav} *$ d_int_lowbetter					-0.039 (0.032)				-0.168 (0.398)							
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	609	610	1220	609	609	264	507	264	264	609	610	1220	609	264	507	264
Adj. R^2	0.145	0.163	0.142	0.162	0.163	0.236	0.171	0.232	0.223							
χ^2										75.024	75.093	86.224	77.524	53.661	53.994	55.484
Pseudo R^2										0.084	0.084	0.051	0.090	0.123	0.075	0.124

Note: Bundesbank Online Pilot Survey on Consumer Expectations, second wave. OLS estimations on log truncated spending with population weights. Average marginal effects for the likelihood of higher spending also from estimations with population weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

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by the expected real interest rate and attitudes regarding inflation and interest rates. The only determinant that consistently enters significantly is the amount of current savings.

3.4 The Effect of Homeownership on Spending on Durable Goods

To further study the role of the heterogeneity in opinions for economic decisions, we check whether opinions have heterogeneous effects across different types of households. In this section we focus on heterogeneity across households that own their house and households that rent. This is potentially an important division across households in particular for Germany, as Germany has one of the largest share of renters among OECD countries (53.6%, Source: OECD Affordable Housing Database 2018) so that renters are not restricted to low income groups. Renters may thus be either net savers saving in assets other than real estate, with their wealth affected positively by an increase in nominal rates, or they are poorer households who are either hand-to-mouth or net debtors. Homeowners, on the other hand, are typically net debtors and their disposable income may be affected by changes in the mortgage rate.[9]

Table 6 shows the determinants of durable good spending for both homeowners and for renters. As these are smaller samples, we rely only on the (remaining) full sample. Homeowners' current spending – contrary to the overall sample – does not depend on their planned consumption. However, we do observe a marginally significant negative effect of their perceived real rate in the model with interaction terms, something that we have only observed for those households that have inflation expectations within the 1.5-2% range before. Moreover, homeowners' durable consumption is not correlated with attitudes towards lower interest rates, but instead we find a negative effect from thinking that inflation should be lower. Regarding the interaction with the perceived real interest rate, we find that homeowner have a higher interest rate sensitivity if they believe that lower interest rates would be better, while the interest rate sensitivity becomes insignificant if they prefer higher interest rates.

Renters, on the other hand, display little interest rate sensitivity when deciding on durable good spending. For renters there is some evidence, like in the overall sample, that those who think that interest rates should be lower are actually spending more on durable goods, thus they are acting as if the real rate is already lower today. We also observe opposite effects of views on inflation for homeowners and renters. Those who think that inflation should be lower – the majority of our sample – show significantly higher durable spending for renters, contrary to the result for homeowners. The asymmetric effect may explain the insignificant effect we find in the full sample. If preferring lower inflation implies that consumers act *as if* inflation was lower in the future, we would expect a negative effect on current spending. Interestingly (not displayed here), the log amount of durable good spending is highly dependent on income for renters, but for homeowners income does not play a significant role. These results suggest that the effect of opinions is also heterogeneous depending on the type of the household, where – one could argue – renters behave more like rule-of-thumb consumers and homeowners' behavior is closer to the one expected by the 'standard' economic theory.

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[9]Note furthermore, that mortgages in Germany are usually fixed-rate mortages for longer periods.

Table 6: Current Spending on Durables for Homeowners and Renters

	Homeowners				Renters			
$c_t^{dur,e}$	-0.001	-0.013	0.001	-0.005	0.152	0.067	0.417*	0.429
	(0.112)	(0.091)	(0.113)	(0.115)	(0.252)	(0.141)	(0.247)	(0.259)
$r_{savings}^e$	-0.020	-0.003	-0.015	-0.150*	0.033	-0.002	0.001	0.517
	(0.029)	(0.014)	(0.025)	(0.086)	(0.059)	(0.030)	(0.058)	(0.460)
d_inf_lowbetter	-0.446***		-0.421***	-0.343	0.674**		0.672**	0.804
	(0.154)		(0.150)	(0.228)	(0.310)		(0.298)	(0.491)
d_inf_highbetter	-0.837		-0.853*	-1.208	0.544		0.537	0.964
	(0.534)		(0.516)	(1.757)	(0.560)		(0.547)	(0.588)
d_int_lowbetter		-0.270	0.423	-0.586		1.043***	1.424***	0.171
		(0.341)	(0.464)	(0.385)		(0.373)	(0.539)	(1.106)
d_int_highbetter		-0.064	-0.273	0.004		0.766***	0.414	-1.140
		(0.140)	(0.176)	(0.276)		(0.254)	(0.444)	(1.029)
$r_{savings}^e * d\_inf\_highbetter$				-0.226				0.262
				(0.841)				(0.421)
$r_{savings}^e * d\_inf\_lowbetter$				0.056				0.050
				(0.071)				(0.192)
$r_{savings}^e * d\_int\_highbetter$				0.155*				-0.643
				(0.087)				(0.460)
$r_{savings}^e * d\_int\_lowbetter$				-0.180**				-0.471
				(0.077)				(0.468)
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	243	504	243	243	115	244	114	114
Adj. R^2	0.064	0.029	0.076	0.095	0.041	0.074	0.126	0.130

Note: Bundesbank Online Pilot Survey on Consumer Expectations, second wave. OLS estimations on log truncated spending with population weights. Average marginal effects for the likelihood of higher spending also from estimations with population weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

4 Conclusion

In this paper, we show that attitudes towards future inflation and interest rates matter for inflation expectations and have implications for consumption spending and saving decisions. We demonstrate this 'hidden heterogeneity' of inflation expectations using a new survey dataset from the Bundesbank Online Pilot Survey of Consumer Expectations, fielded on the German population in 2019. The majority of consumers in our sample thinks inflation should be lower and interest rates should be higher. Remarkably, even if inflation expectations are around the official inflation target of the ECB, still 46% of consumers in our sample think inflation should be lower, and this range remains high at around 30% even when consumers expect deflation in the next year. We document a similar 'hidden heterogeneity' also for opinions about future interest rates. Overall, observing inflation point forecasts close to the target does not seem to be a reliable indicator for thinking that either expected inflation or expected interest rates will be appropriate.

We demonstrate that the observed 'hidden heterogeneity' in inflation and interest rate expectations is related to socio-demographic characteristics. In particular, for consumers with very similar

point forecasts of inflation, differences across gender, income and education are an important driver of diverging views on future inflation. Moreover, we show that the observed heterogeneity in attitudes may have some implications for current and future planned spending and saving decisions, in addition to effects from the level of perceived real rates and from demographic control variables. We also demonstrate that these attitudes affect durable goods spending of different groups of the population heterogeneously.

More generally, we show that also in economics opinions can be an important source of heterogeneity that can have significant implications for economic decisions, like buying a durable good or the amount of savings. This has been previously documented in the social psychology literature. Information about consumers' opinions on future interest rates and inflation expectations together with their level expectations is of great importance for monetary policy makers, as it gives additional insights relevant to the effectiveness of the transmission channel of monetary policy. This was demonstrated when we study the heterogeneity in durable good spending between homeowners and renters. Being able to disentangle attitudes linked to specific expectations allows the central bank to address those concerns more directly and more specifically in their communication and consequently improve monetary policy efficacy.

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Appendix

Table A.1: Opinions about Future Inflation and Macro Expectations

	Full sample			$1.5 \leq \pi^e \leq 2$		
	inf_lowbetter	inf_reason	inf_highbetter	inf_lowbetter	inf_reason	inf_highbetter
π^e	0.019**	-0.015**	-0.012***	0.112	-0.087	-0.029
	(0.008)	(0.008)	(0.005)	(0.138)	(0.138)	(0.050)
$i^e_{savings}$	-0.025**	0.027**	-0.014	-0.023	0.026	-0.008
	(0.011)	(0.011)	(0.011)	(0.019)	(0.019)	(0.022)
$i^e_{mortgage}$	0.018***	-0.015***	-0.004	0.014*	-0.009	-0.009*
	(0.005)	(0.005)	(0.003)	(0.008)	(0.008)	(0.005)
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	867	867	867	378	378	378
χ^2	34.275	25.258	31.168	13.081	7.587	27.202
Pseudo R^2	0.039	0.030	0.112	0.029	0.016	0.093

Note: Bundesbank Online Pilot Survey on Consumer Expectations, second wave. Average marginal effects for the likelihood of reporting that inflation should be lower/is reasonable/should be higher are reported from estimations with population weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A.2: Opinions about Future Interest Rates and Macro Expectations

	Full sample			$1.5 \leq \pi^e \leq 2$		
	int_lowbetter	int_reason	int_highbetter	int_lowbetter	int_reason	int_highbetter
π^e	0.004	-0.005	0.001	0.046	0.009	-0.020
	(0.002)	(0.004)	(0.004)	(0.062)	(0.088)	(0.096)
$i^e_{savings}$	0.006*	0.015***	-0.033***	0.002	0.024***	-0.051***
	(0.003)	(0.006)	(0.007)	(0.004)	(0.008)	(0.018)
$i^e_{mortgage}$	0.008***	-0.004	-0.007**	0.007***	-0.004	-0.007
	(0.002)	(0.003)	(0.003)	(0.002)	(0.005)	(0.005)
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	1772	1772	1772	732	732	732
χ^2	82.870	18.265	62.278	38.231	16.066	27.841
Pseudo R^2	0.106	0.016	0.044	0.194	0.025	0.052

Note: Bundesbank Online Pilot Survey on Consumer Expectations, second wave. Average marginal effects for the likelihood of reporting that interest rates should be lower/is reasonable/should be higher are reported from estimations with population weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A.3: Current and Planned Spending on Consumption Goods

| | Current Spending (in € for the previous month) | | | | | | | | Planned Spending (prob. to spend more, next 12 months) | | | | | |
	Full sample				$1.5 \leq \pi^e \leq 2$				Full sample			$1.5 \leq \pi^e \leq 2$		
c_t^{cons}	0.001 (0.078)	0.065 (0.058)	0.014 (0.077)	0.007 (0.078)	0.035 (0.105)	0.083 (0.083)	0.038 (0.105)	0.036 (0.107)						
$c_t^{cons,e}$									-0.000 (0.017)	0.012 (0.010)	0.003 (0.016)	0.006 (0.026)	0.015 (0.016)	0.006 (0.025)
$r_{savings}^e$	-0.016 (0.012)	-0.009 (0.008)	-0.014 (0.011)	-0.053 (0.035)	0.010 (0.014)	-0.037* (0.019)	0.010 (0.014)	0.006 (0.010)	-0.005 (0.005)	-0.001 (0.003)	-0.006 (0.005)	-0.023*** (0.009)	-0.007 (0.005)	-0.023*** (0.008)
d_inf_lowbetter	-0.089 (0.065)		-0.101 (0.065)	-0.128* (0.076)	-0.079 (0.079)		-0.085 (0.079)	-0.185 (0.155)	-0.023 (0.022)		-0.018 (0.022)	-0.017 (0.036)		-0.015 (0.036)
d_inf_highbetter	0.175* (0.103)		0.171* (0.104)	0.377*** (0.133)	-0.019 (0.134)		-0.018 (0.135)	0.049 (0.196)	-0.025 (0.043)		-0.022 (0.042)	-0.027 (0.049)		-0.027 (0.049)
d_int_lowbetter		0.047 (0.098)	0.202 (0.127)	0.282** (0.142)		-0.018 (0.151)	0.104 (0.222)	-0.002 (0.211)		-0.046 (0.031)	-0.128*** (0.043)		-0.066 (0.044)	-0.048 (0.041)
d_int_highbetter		-0.032 (0.058)	0.117 (0.079)	0.212** (0.094)		-0.083 (0.074)	0.042 (0.094)	0.108 (0.100)		-0.013 (0.017)	-0.030 (0.023)		0.009 (0.023)	-0.015 (0.031)
$r_{savings}^e$ * d_inf_highbetter				0.151* (0.081)				0.047 (0.161)						
$r_{savings}^e$ * d_inf_lowbetter				-0.010 (0.017)				-0.069 (0.097)						
$r_{savings}^e$ * d_int_highbetter				0.057** (0.028)				0.049 (0.035)						
$r_{savings}^e$ * d_int_lowbetter				0.055* (0.030)				-0.135 (0.117)						
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	768	1561	767	767	329	639	328	328	768	1561	767	329	639	328
Adj. R²	0.104	0.133	0.107	0.116	0.126	0.146	0.121	0.114						
χ^2									24.801	41.321	30.865	22.625	17.584	22.985
Pseudo R^2									0.042	0.036	0.054	0.066	0.036	0.068

Note: Bundesbank Online Pilot Survey on Consumer Expectations, second wave. OLS estimations on log truncated spending with population weights. Average marginal effects for the likelihood of higher spending also from estimations with population weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A.4: Current and Planned Spending on Housing

	Current Spending (in € for the previous month)								Planned Spending (prob. to spend more, next 12 months)					
	Full sample				$1.5 \leq \pi^e \leq 2$				Full sample			$1.5 \leq \pi^e \leq 2$		
c_t^{house}	0.086 (0.063)	0.043 (0.043)	0.091 (0.064)	0.096 (0.063)	0.093 (0.094)	0.093 (0.061)	0.097 (0.094)	0.098 (0.094)						
$c_t^{house,e}$									0.028 (0.020)	0.014 (0.013)	0.032 (0.021)	0.037 (0.036)	0.029 (0.019)	0.039 (0.036)
$r_{savings}^e$	0.021** (0.011)	0.001 (0.007)	0.021** (0.010)	0.002 (0.018)	0.015 (0.014)	-0.035 (0.023)	0.009 (0.015)	0.007 (0.009)	-0.006 (0.006)	-0.001 (0.004)	-0.006 (0.006)	-0.008 (0.010)	-0.018** (0.008)	-0.007 (0.010)
$d\_inf\_lowbetter$	0.183*** (0.061)		0.195*** (0.010)	0.187** (0.075)	0.225** (0.089)		0.224** (0.091)	0.208 (0.144)	-0.003 (0.026)		-0.002 (0.026)	0.021 (0.048)		0.024 (0.049)
$d\_inf\_highbetter$	0.161 (0.118)		0.169 (0.115)	0.076 (0.209)	0.023 (0.166)		0.037 (0.161)	-0.163 (0.375)	-0.025 (0.066)		-0.026 (0.066)	-0.106 (0.091)		-0.109 (0.092)
$d\_int\_lowbetter$		0.029 (0.085)	0.047 (0.136)	0.011 (0.134)		-0.168 (0.145)	-0.051 (0.189)	-0.125 (0.221)		-0.053 (0.037)	-0.086* (0.051)		-0.088 (0.070)	-0.027 (0.078)
$d\_int\_highbetter$		-0.119** (0.052)	-0.101 (0.068)	-0.030 (0.084)		-0.202*** (0.070)	-0.170* (0.091)	-0.131 (0.115)		0.019 (0.024)	0.029 (0.033)		0.006 (0.037)	0.024 (0.053)
$r_{savings}^e * d\_inf\_highbetter$				-0.059 (0.115)				-0.135 (0.205)						
$r_{savings}^e * d\_inf\_lowbetter$				-0.003 (0.023)				-0.010 (0.089)						
$r_{savings}^e * d\_int\_highbetter$				0.036 (0.022)				0.024 (0.054)						
$r_{savings}^e * d\_int\_lowbetter$				-0.000 (0.028)				-0.089 (0.158)						
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	736	1503	734	734	322	619	321	321	736	1503	734	322	619	321
Adj. R²	0.112	0.067	0.121	0.124	0.122	0.069	0.123	0.113						
χ²									11.971	35.100	19.448	12.590	32.253	13.231
Pseudo R^2									0.018	0.020	0.025	0.031	0.039	0.033

Note: Bundesbank Online Pilot Survey on Consumer Expectations, second wave. OLS estimations on log truncated spending with population weights. Average marginal effects for the likelihood of higher spending also from estimations with population weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

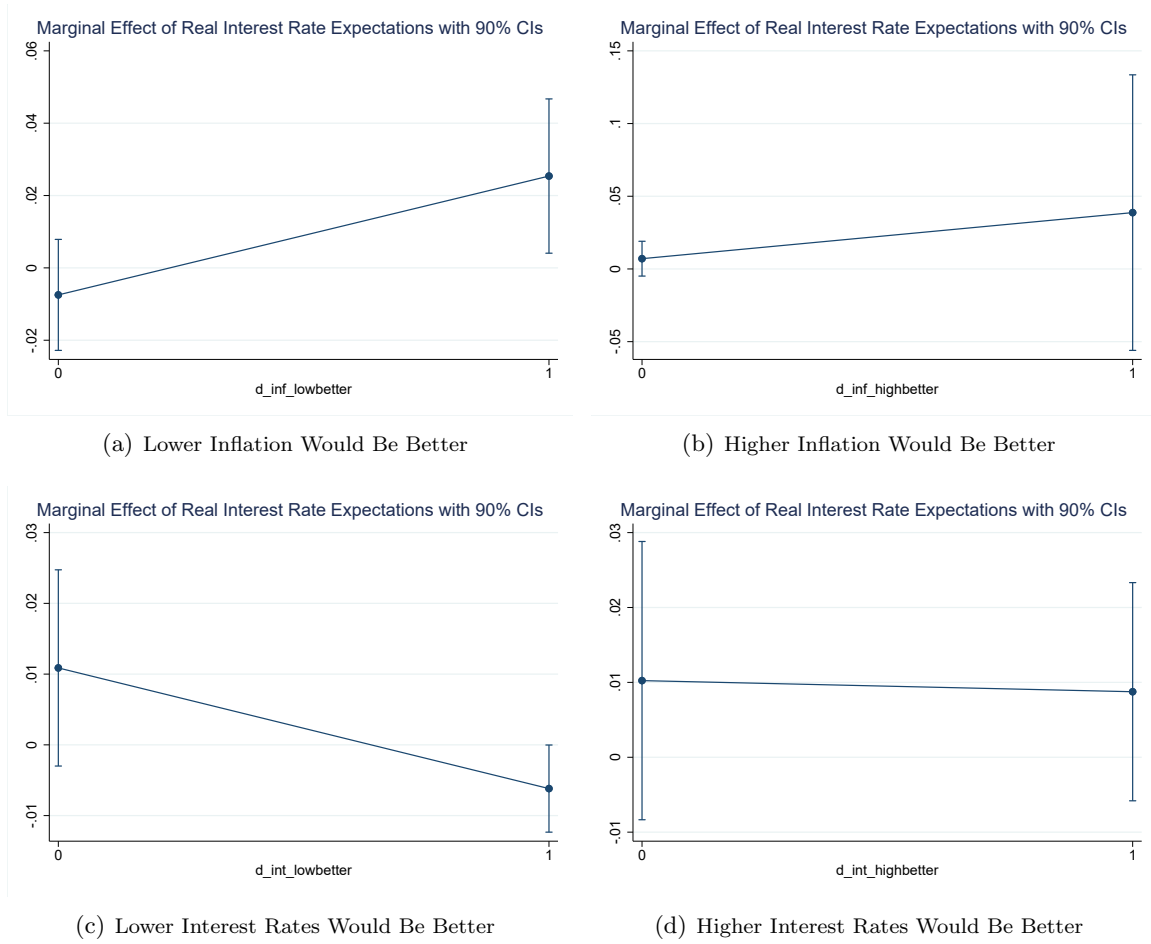Figure A.1: Planned Spending on Durables – Interaction Effects of Real Interest Rate Expectations and Opinions

(a) Lower Inflation Would Be Better

(b) Higher Inflation Would Be Better

(c) Lower Interest Rates Would Be Better

(d) Higher Interest Rates Would Be Better

Figure A.2: Planned Saving – Interaction Effects of Real Interest Rate Expectations and Opinions

(a) Lower Inflation Would Be Better

(b) Higher Inflation Would Be Better

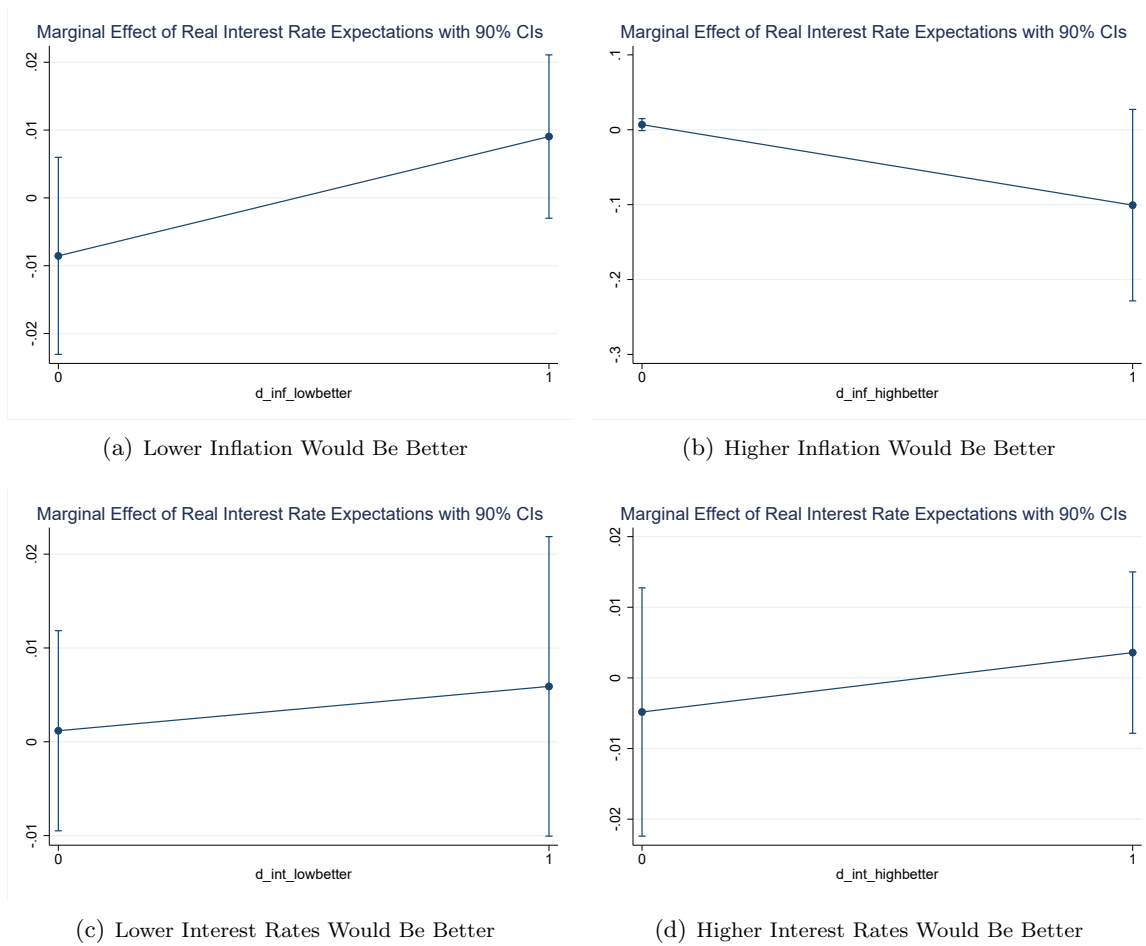(c) Lower Interest Rates Would Be Better

(d) Higher Interest Rates Would Be Better

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Figure A.3: Planned Spending on Consumption Goods – Interaction Effects of Real Interest Rate Expectations and Opinions

(a) Lower Inflation Would Be Better

(b) Higher Inflation Would Be Better

(c) Lower Interest Rates Would Be Better
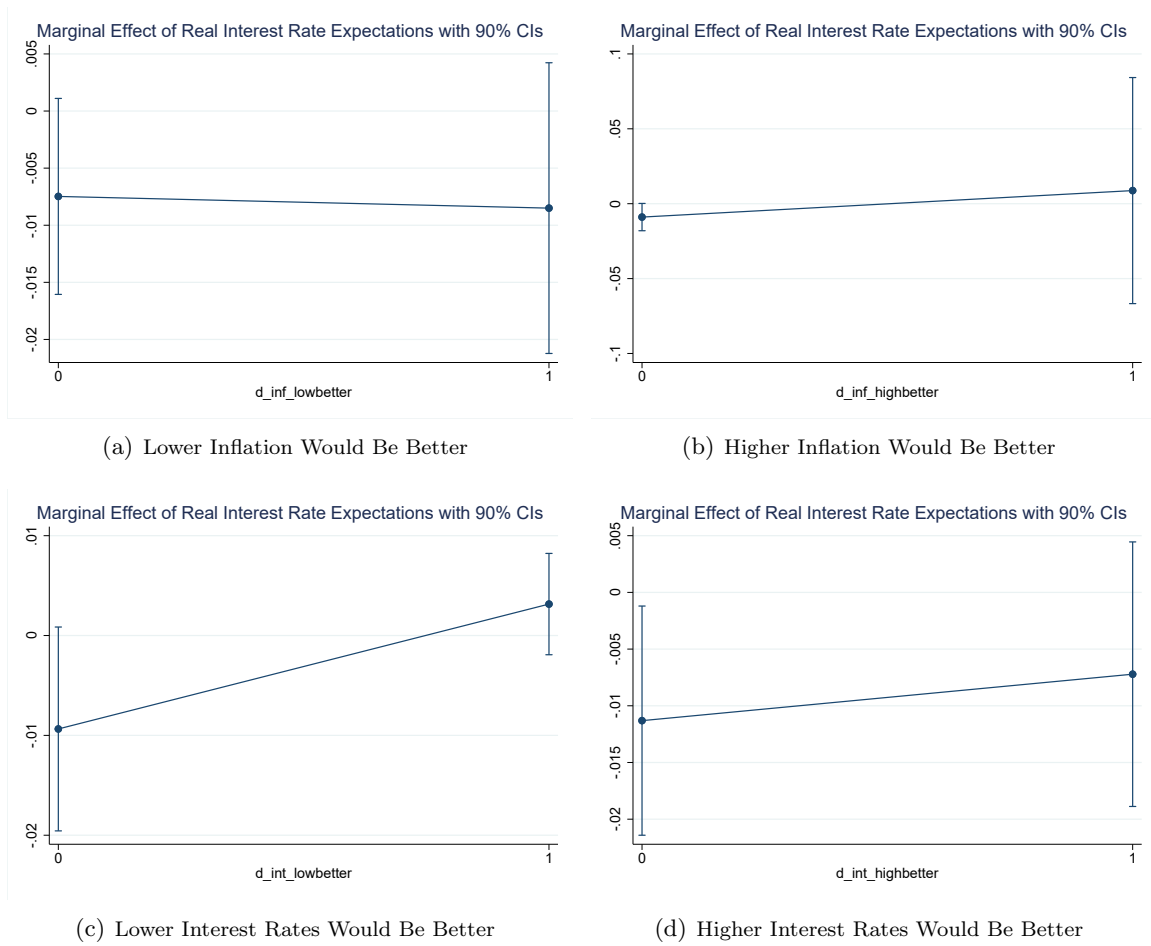
(d) Higher Interest Rates Would Be Better

Figure A.4: Planned Spending on Housing – Interaction Effects of Real Interest Rate Expectations and Opinions

(a) Lower Inflation Would Be Better

(b) Higher Inflation Would Be Better

(c) Lower Interest Rates Would Be Better

(d) Higher Interest Rates Would Be Better