Consumers' Consumption and Saving Plans – Are They Following an Euler Equation?

Lena Dräger*

October 4, 2016

Abstract

Evaluating a new survey dataset of German consumers, we test whether individual consumption and saving plans are formed according to an Euler equation derived from consumption life-cycle models. The results imply that socio-demographic factors impact consumption and saving patterns mostly in line with life-cycle theories, but macroeconomic expectations are more related to actual consumption than to saving. Estimating both consumption and saving Euler equations, the results show that consumers' current consumption behaves mostly in line with the theory: We find evidence of consumption smoothing, since current and planned consumption are positively correlated, while the effect of real interest rates seems to work mainly via a positive link between short-run inflation expectations and current consumption. Nominal interest rate expectations are negatively correlated with current consumption, but the effect is only significant with quantitative expectations. As expected, the effect of perceived real interest rates is most pronounced for consumers' who are active on financial markets. Consumers also smooth their saving patterns, but we find no evidence that either inflation or nominal interest expectations affect current saving. Finally, economic news observed by the consumer generally exacerbate the effects of their interest rate and inflation expectations on current consumption and saving.

Keywords: Euler equation; consumers; macroeconomic expectations; consumption and saving plans; survey micro data.

JEL classification: D12; D14; D84; C83.

*University of Hamburg, Department of Economics, Von-Melle-Park 5, 20146 Hamburg, Germany. Email: Lena.Draeger@wiso.uni-hamburg.de

1 Introduction

In recent years, consumers' macroeconomic expectations have become increasingly important for central banks aiming at guiding and anchoring expectations of the general public. These expectations are usually measured in household survey data. While the literature so far has mainly focused on investigating the expectation formation process of consumers' macroeconomic expectations (e.g. Branch (2004), Coibion and Gorodnichenko (2015a) and Dräger et al. (2016)), an important question remains: Do consumers act on these expectations in their economic decision making? This question is crucial, since central banks implicitly assume that consumers' inflation and interest rate expectations will affect their wage negotiations as well as their consumption and saving decisions and thereby impact on actual inflation.

In light of the recent zero lower bound (ZLB) experience in the US and in European economies, several studies have used micro survey data to test for a link between inflation expectations and consumers' likelihood to consume (Burke and Ozdagli, 2013; Bachmann et al., 2015; Ichiue and Nishiguchi, 2015). The main theoretical hypothesis underlying these studies is that in times of negative shadow interest rates, an increase in expected inflation might help to lower real interest rates, as long as the nominal interest rate stays at zero, and thereby boost consumption and investment.[1] Using the micro data from different consumer survey datasets in the US, both Burke and Ozdagli (2013) and Bachmann et al. (2015) find little evidence of a positive link between consumers' inflation expectations and their consumption expenditure, i.e. their reported "readiness to spend" at the ZLB.[2] In contrast to the US evidence, Ichiue and Nishiguchi (2015) evaluate Japanese micro survey data and report a significantly positive relationship between consumers' actual consumption and expected inflation, while there is an adverse effect on planned consumption.

In this paper, we take the previous analyses one step further and use a new survey micro dataset to evaluate the link between German consumers' consumption and saving decisions and a range of macroeconomic expectations. In order to derive hypotheses from economic theory, we base the analysis on the life-cycle model of consumption resulting in the well-known consumption Euler equation and evaluate whether consumers' current consumption or saving behaviour is affected by future individual consumption/saving plans as well as the individual nominal interest rate and inflation expectations. The analysis is conducted using two cross-sectional waves from a new household survey conducted at the

[1] Note that theoretically also a negative link between inflation expectations and consumption might be possible if the adverse income effect from higher expected inflation dominates over the intertemporal substitution effect or if higher expected inflation is seen as a negative economic indicator, resulting in higher precautionary saving (Shiller, 1997; Bachmann et al., 2015).

[2] Reported "readiness to spend" is taken as a proxy for actual consumption expenditure and measured in several questions in the University of Michigan Survey of Consumers asking whether consumers generally think now is a good or a bad time to spend on durables, cars etc. We term this measure the "consumption climate" to capture the more general assessment in the question.

University of Hamburg. The survey covers a sample representative of the German population and is tailored to obtain detailed information on consumers' current and planned consumption and saving behaviour, as well as a large set of individual macroeconomic expectations and socio-demographic details including consumers' financial literacy and financial risk attitude. Given the cross-sectional nature of our dataset and the qualitative survey questions analysed, we estimate ordered probit models for the likelihood of consumers stating that they have increased their consumption over the previous 12 months, or that they save regularly. The analysis focuses on the marginal effects from planned consumption/saving as well as inflation and interest rate expectations, while controlling for a large set of socio-demographic factors.

Our results give some first evidence in favour of the consumption Euler equation. We find that reported qualitative changes in consumption in the previous 12 months are related positively to consumers' reported planned changes in consumption in the next 12 months. Moreover, consumers' current consumption is significantly positively linked with both their qualitative and their quantitative inflation expectations. Nominal interest rate expectations are generally found to affect current consumption with a negative coefficient, however, this is only significant with quantitative expectations.[3] Overall, it seems that when asked explicitly about their individual current and planned consumption, German consumers do consider future consumption as well as some measure of the real interest rate. This result is interesting due to the ZLB environment in Germany at the time of the survey and the previous contrasting evidence in other studies. Importantly, our results are reversed when instead of actual reported consumption, we evaluate consumers' "readiness to spend" (or the consumption climate), as in Bachmann et al. (2015).

The findings are less clear-cut when we evaluate a similar saving Euler equation: While we also find evidence that current saving behaviour is positively linked to planned changes in saving, it seems that consumers in our survey do not react to either inflation, or interest rate expectations. On the one hand, this surprising result might be linked to the current economic situation in Germany with savings interest rates near the zero lower bound and inflation rates at historically low levels, on the other hand it might point to a more fundamental difference in the way that consumers consider their consumption and saving decisions.

Evaluating the role of financial constraints on households' consumption patterns, we find again evidence in line with theory: Consumers who do not save and might thus be classified as non-Ricardian, hand-to-mouth consumers do not react to their interest rate or inflation expectations, while the effect is strongly significant for households who save in assets traded on financial markets. In addition, we check whether economic news on monetary policy, inflation or fiscal policy issues perceived by the consumer affect their current consumption. These news might be seen as potential "shocks" to consumers' interest rate

[3]Considering that the survey was conducted when interest rates where effectively at the zero lower bound in Germany, perhaps this result is not surprising.

or inflation expectations. We find some asymmetric news effects from positive and negative news which generally work in the same direction as the consumers' macroeconomic expectations.

The present study is related to the literature dealing with a link between household consumption or saving and consumers' macroeconomic expectations. Most of the earlier literature focuses on the impact of consumers' inflation expectations on their consumption behaviour, where, as pointed out by Ichiue and Nishiguchi (2015), the question arises whether the positive link predicted by consumption life-cycle models arises empirically or whether other factors such as wealth effects or precautionary saving motives dominate.

In an early contribution, Juster and Wachtel (1972) use aggregate data from the University of Michigan Survey of Consumers on the index of consumer sentiment, inflation expectations and consumers' evaluation of the consumption climate on durables and cars to explain actual aggregate durables and car purchases in the US. The authors report that higher inflation reduces durables expenditures, but leads to an increase in non-durables and services expenditures, with a slightly negative effect on balance. Bachmann et al. (2015) analyse a longer time span for the US in the University of Michigan Survey of Consumers and report mostly insignificant or even negative links between consumers' inflation expectations and their reported "readiness to spend". Nevertheless, they find a positive link between consumers' assessment of the consumption climate and their inflation expectations for those whose inflation forecasts are relatively accurate. This could suggest that consumers' financial and economic literacy plays a role in this relationship. Similarly, Burke and Ozdagli (2013) evaluate the link of inflation expectations to actual consumer spending on a variety of durable and non-durable goods in a household panel setting covering the ZLB period in the US, and find little robust effects apart from a positive link between short-run inflation expectations and the likelihood of a car purchase. In contrast to the results for the US, Ichiue and Nishiguchi (2015) take advantage of a longer ZLB period in Japan and report robust findings that consumers increase actual consumption, and reduce planned consumption, when they report higher inflation expectations.

Evaluating an earlier European survey dataset outside the ZLB, D'Acunto et al. (2016) report a positive relationship between German consumers' "readiness to spend" on durables and their inflation expectations, while a negative relation emerges regarding their likelihood to save. D'Acunto et al. (2016) further evaluate the impact of an unexpected VAT increase in Germany. Comparing the results with matched households in other European countries, the authors attribute a large increase in "readiness to spend" after the shock to increases in the inflation expectations after the VAT shock. Regarding the impact of further economic expectations on household consumption, Hurd and Rohwedder (2013) estimate the effect of the individual assessment of the likelihood of unemployment on household consumption during the recent Great Recession in the US and report that spending on non-durable goods such as clothing is reduced significantly if households perceive a higher likelihood of unemployment.

On the theoretical front, our analysis relates to the vast literature on consumption life-cycle models and the question whether households smooth their consumption (see Browning and Crossley (2001) for an overview of the empirical literature). In his seminal contribution, the model developed by Friedman (1957) states that rationally forward-looking consumer should consider their "permanent" income over their life-cycle when determining consumption and money demand and choose consumption levels that keep the marginal utility of money constant. This results in predictable patterns of consumption with respect to anticipated changes in income, differences in consumption patterns across socio-demographic groups that differ according to their permanent income and the stage of the life-cycle as well as changes in the opportunity costs of withholding current consumption (or of holding non-interest bearing money) measured by the real interest rate. While in this paper, we do not focus on households' consumption smoothing *per se*, our analysis relates to empirical studies estimating consumption Euler equations. Previous approaches, such as for instance Carroll (2001) and Attanasio and Low (2004), discuss issues related to the estimation of the structural parameters in the Euler equation with GMM instruments for expectational terms. The focus of this paper is different, as we are not interested in quantifying structural parameters, but rather test whether an consumption Euler equation estimated with individual survey expectations and individual expenditure assessment in a micro data setting shows the expected signs and significance of the parameters.

Additionally, our analysis allows to test for implications of the life-cycle model regarding differences in consumption and saving plans across socio-demographic subgroups. Evaluating individual financial expectations in the British Household Panel Survey, for instance Brown and Taylor (2006) report evidence in favour of life-cycle models, as financial expectations differ significantly across age, employment and income groups.

Finally, our analysis relates to the literature on the consistency of consumers' expectations. Studies such as Carvalho and Nechio (2014) and Dräger et al. (2016) test the consistency of several macroeconomic expectations with theoretical concepts such as the Taylor rule, the Phillips curve or the Fisher equation. Somewhat more closely related to our approach, the study by Armantier et al. (2015) compares consumers' elicited survey inflation expectations to their actions in a financially incentivised investment experiment. The authors find that consumers generally act on their expectations in their choices during the experiment. Moreover, individual changes in expectations between two interviews are related to adjusted behaviour also in the experiment, consistent with payoff maximisation. Giamboni et al. (2013) report that Dutch households consistently adjust their consumption after predictable income shocks resulting from overly optimistic or pessimistic income expectations.

The rest of the paper is structured as follows. The theoretical framework for the analysis is described in section 2. Section 3 describes the new survey data set and section 4 presents the empirical results. Finally, section 5 summarises and concludes.

2 Relating Consumers' Consumption and Saving Plans to an Euler Equation

Starting with the seminal contribution in Friedman (1957), theoretical life-cycle models of consumption propose that households aim at smoothing consumption with respect to their permanent income over the life-cycle, thereby choosing consumption so as to keep the marginal utility of money constant over time (Browning and Crossley, 2001). In this model set-up, the Euler equation describes the optimal intertemporal consumption decision of households that aim at maximizing expected utility from consumption and leisure subject to a period budget-constraint. This relation has become an important building block in modern dynamic macro models (Clarida et al., 1999; Galí, 2008). Assuming CRRA utility, the problem may be stated as follows:

$$\max E_0 \sum_{t=0}^{T} \beta^t \left[\frac{C_t^{1-\sigma}}{1-\sigma} - \frac{N_t^{1+\varphi}}{1+\varphi} \right] \tag{1}$$

subject to

$$P_t C_t + Q_t B_t \leq B_{t-1} + W_t N_t - T_t, \forall t \geq 0, \tag{2}$$

where T gives the final period of the consumers' life-cycle horizon, C_t is consumption, N_t is hours worked, P_t is the price of the consumption good, W_t is the nominal wage, B_t represents the quantity of one-period, nominal riskless discount bonds, purchased in t, paying one unit of money at maturity in $t+1$, Q_t is the bond price, and T_t represents lump-sum transfers. Solving the optimization problem and log-linearizing then yields the standard Euler equation in its recursive form:

$$c_t = E_t c_{t+1} - \sigma^{-1} \left(i_t - E_t \pi_{t+1} - \ln \beta \right), \tag{3}$$

where lower case variables denote deviations from steady-state. Expected inflation is then given by $E_t \pi_{t+1}$ and i_t denotes the nominal bond yield, which in equilibrium equals the negative log of the bond price Q_t. In this framework, the marginal rate of substitution between current and future consumption thus equals the opportunity cost of choosing consumption over saving as measured by the real interest rate, adjusted for the household's time preference rate. From the theoretical Euler equation in (3), we hypothesize that current consumption should be positively related to planned consumption and expected inflation, and negatively to (expected) nominal interest rates.

To evaluate whether consumers form their consumption and savings plans in line with the simple Euler equation in (3), we check whether the likelihood to report an increase in current consumption over the past 12 months (as a proxy for c_t) is related to reported qualitative planned consumption changes in the next 12 months (c_t^e), as well as reported nominal interest rate (i_t^e) and inflation (π_t^e) expectations. Note that a small caveat applies:

Since the dataset does not include any information about consumers' current interest rate perceptions i_t or their perception of the current real interest rate, we proxy i_t by their expected interest rate i_{t+1}. We argue that since interest rates are relatively, this is a valid proxy and should not drive our results. Moreover, evaluating the impact of interest rate and inflation expectations separately has the advantage that we can distinguish between two potential channels of real interest rates affecting consumers' consumption and saving.

In order to test for the robustness of our results, we also estimate versions of an Euler equation where planned consumption is proxied with planned changes in durables consumption ($c_t^{e,dur}$) and with consumers' view on the general consumption climate ($c_t^{climate}$).[4] Finally, we estimate an alternative specification of consumers' saving Euler equation, relating changes in their current saving (s_t) to changes in planned saving (s_t^e) or their view on the current saving climate ($s_t^{climate}$), as well as expected interest rates and inflation.

3 Dataset

Within the new Consumer Survey on Expectations, Consumption and Saving conducted at the University of Hamburg, telephone interviews with a representative sample of German households were conducted in two waves. The first wave was interviewed from October 20, 2015 to December 23, 2015 and consists of 313 interviews.[5] The second wave consists only of respondents who were already interviewed in the first wave and agreed to a second interview six months later, resulting in a small panel dimension. This wave consists of 183 interviews, which were conducted between May 12, 2016 and June 29, 2016. We use sample weighted observations in order to ensure the representativeness of our results with respect to the overall population.

The survey includes information on consumers' expectations regarding a range of macroeconomic variables, of which we mainly use information on expected interest rates and inflation in the present analysis. Moreover, consumers are asked in detail about their current and planned consumption and savings. The specific wording of the survey questions on current and planned consumption or saving, as well as the interest rate and inflation expectations is given in the appendix.[6] These questions were phrased similarly to comparable questions in the Bundesbank Panel of Household Finances, the European Commission Joint Harmonized Survey of Consumers and the University of Michigan Survey of Consumers. Finally, the survey includes information on a large range of socio-demographic characteristics that we employ as control variables.

[4] The wording of the survey question on consumers' perception of the general consumption climate is taken from the European Commission Joint Harmonized Survey of Consumers. The question is phrased very closely to a similar question in the University of Michigan Survey of Consumers, see the appendix. This is the question taken as a proxy for current consumption in Bachmann et al. (2015), which they term consumers' "readiness to spend".

[5] The whole survey sample is obtained from both landline and mobile telephone numbers registered in Germany, using the Häder-Gabler approach (Häder et al., 2009).

[6] The complete survey questionnaire (in German) is available from the authors upon request.

Specifically, we account for consumers' sex, their age (including a squared term), a dummy for being married and for cohabiting with a partner (*cohab_partner*)and the number of persons in the household (*no_persons*). Additionally, we control for whether their personal income falls in the lowest category (*inc_l* for income < 1000 € per month), the medium low category (*inc_ml* for 1000 € $\leq$ income < 2000 € per month) or the medium high category (*inc_mh* for 2000 € $\leq$ income < 4000 € per month) with personal incomes above 4000 € per month in the reference category. The employment status is measured in four employment groups: Those that do not work are taken as reference category and compared to consumers in a medium low category (*employ_ml* for those infrequently working or working in so-called mini jobs), a medium high category (*employ_mh* for those working part-time) and a high category (*employ_h* for those working full time). Finally, we measure consumers financial literacy with the three questions proposed in Lusardi and Mitchell (2008), where the index *literacy* measures the number of correct answers, and we account for consumers' financial risk attitude (*risk*) with answers to a qualitative question asking whether they take very high/above average/average/no financial risk in order to earn very high/above average/average/no specified returns.

The survey also records information on consumers' perception of economic news. After asking whether consumers recall any economic news they recently heard, an open question follows asking them what news they recall.[7] The answers are coded into categories, where we distinguish between news with a positive and with a negative tone. This enables us to test for asymmetric news effects. In the regression analysis we test for effects of positive vs negative news on monetary policy, including information on interest rates or currency news (*news_mp_pos* and *news_mp_neg*), inflation (*news_π_pos* and *news_π_neg*), and topics related to fiscal topics such as public debt and taxes (*news_fiscal_pos* and *news_fiscal_neg*).

The economic situation in Germany in December 2015 was characterized by low employment (6.1% unemployment rate) and a booming economy with 2.1% annual growth in real GDP (4^{th} quarter), very low annual inflation at 0.3% and low interest rates near the zero lower bound (1.17% Euro area 10-year government benchmark bond yields and 0.64% on bank deposits redeemable within 3 months in the Euro area). By June 2016, unemployment had fallen further to 5.9% with annual real GDP growth at 3.1% in the second quarter of 2016. Annual inflation in June 2016 was again very low at 0.3%, and interest rates had fallen even further (0.82% Euro area 10-year government benchmark bond yields and 0.54% on bank deposits redeemable within 3 months in the Euro area).[8]

Tables 1 and 2 give an indication of the consistency of consumers' perceived consumption and saving climate and of their planned consumption and saving in this environment. More precisely, we want to check whether consumers in the survey perceive consumption

[7] A similar question is also included in the University if Michigan Survey of Consumers.

[8] Data are from Destatis for the German business cycle data and from the ECB for data on interest rates.

and saving as complementary decisions in the sense that if they state that given the current economic conditions now is a good time to consume, or that they plan to consume more in the next 12 months, they simultaneously think that now is not a good time to save, or that they plan to save less.[9]

Table 1: Consistency of Consumption and Saving Climate

	Saving Climate					
Consumption Climate	1	2	3	4	5	Total
1	24	20	18	7	4	73
	(18.05%)	(12.20%)	(20.93%)	(9.09%)	(33.33%)	(15.47%)
2	13	31	17	23	3	87
	(9.77%)	(18.90%)	(19.77%)	(29.87%)	(25.00%)	(18.43%)
3	96	113	51	47	5	312
	(72.18%)	(68.90%)	(59.30%)	(61.04%)	(41.67%)	(66.10%)
Total	133	164	86	77	12	472
	(100%)	(100%)	(100%)	(100%)	(100%)	(100%)

Note: Answer categories to the consumption climate question are "1 – A bad time", "2 – Neither a good, nor a bad time" and "3 – A bad time". Answer categories to the saving climate question are "1 – A very bad time", "2 – a relatively bad time", "3 – Not a good time", "4 – A relatively good time" and "5 – A very good time".

Table 2: Consistency of Planned Consumption and Planned Saving

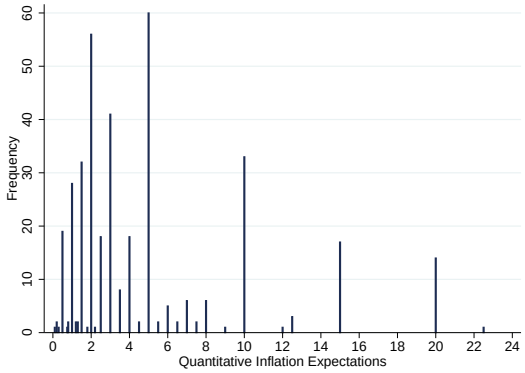
	Planned Saving			
Planned Consumption	1	2	3	Total
1	13	17	14	44
	(13.54%)	(6.23%)	(27.45%)	(10.48%)
2	49	204	29	282
	(51.04%)	(74.73%)	(56.86%)	(67.14%)
3	34	52	8	94
	(35.42%)	(19.05%)	(15.69%)	(22.38%)
Total	96	273	51	420
	(100%)	(100%)	(100%)	(100%)

Note: Answer categories to the planned consumption question are "1 – Considerably lower than in an average year", "2 – About the same" and "3 – Considerably higher than in an average year". Answer categories to the planned saving question are "1 – A lower fraction of income", "2 – About the same fraction" and "3 – A higher fraction of income".

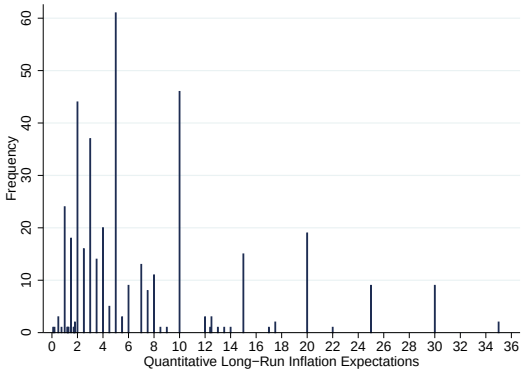
Looking at the total number of answers in both waves in Table 1, we observe that the majority of consumers in our survey think that given the current economic condition, now

[9]Note that planned consumption and saving might be less symmetric than the perception of the current consumption and saving climate, since for instance events such a foreseen increase in income could lead consumers to simultaneously plan increases in both consumption and saving.

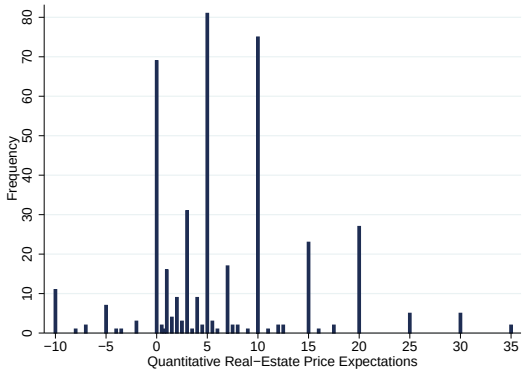
Figure 1: Quantitative Expectations



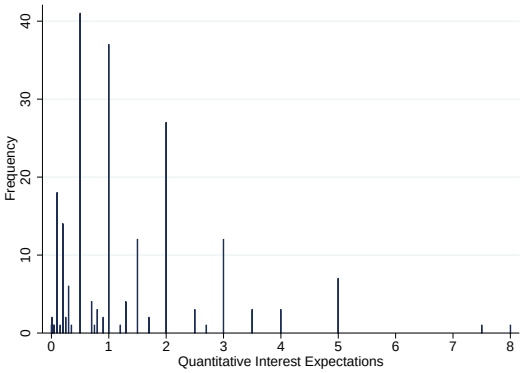
(a) Inflation 1 year ahead



(b) Inflation 5 years ahead



(c) House price inflation



(d) Short-term interest rates

is a good time to purchase durable goods (66.10%), while they state that now is either a bad or a relatively bad time to save ($\frac{133+164}{472} = 62.92\%$). This is plausible considering the very low level of interest rates and the booming economy in Germany in 2015 and 2016. Evaluating the fractions of answers separately, we observe that those consumers reporting a neutral or positive consumption climate (answers 2 and 3) tend to be consistent in the sense that the majority then reports also a neutral or a negative saving climate(answers 2-4 and 1-2, respectively). Nevertheless, there are also significant fractions of answers in the remaining categories. Finally, it seems that those consumers reporting a negative consumption climate (answer 1) seem generally pessimistic and also report a negative saving climate (answers 1-2).

Next, we evaluate the consistency of consumers' plans regarding individual consumption and saving. As shown in Table 2, the majority of consumers in our dataset plan not to adjust their consumption and saving in the next 12 months. Nevertheless, of those stating that they plan to save less in the next 12 months, a clear majority states the intention to either keep consumption constant or to increase it (86.46% overall). Of those stating that they plan to increase their saving in the next 12 months, the majority plans to either decrease consumption or to keep it constant (84.31% overall).

Figure 1 further presents histograms of consumers' quantitative inflation and interest rate expectations collected from both waves, where the data was truncated to exclude the upper and lower 2.5% of the respective distributions in order to exclude extreme outliers. Quantitative expectations in the survey show a right-skewed distribution with a surprisingly large range considering the low-inflation and low-interest-rate environment in Germany at the time of the survey. While the majority of respondents expects price increase between 0-5% and interest rates at 0-2%, there is a large degree of heterogeneity in expectations particularly visible in higher numbers of answers at so-called "focal points" such as multiples of 5. The finding that consumers tend to overestimate inflation in recent years is also frequently found in other surveys (Dräger and Fritsche, 2013; Coibion and Gorodnichenko, 2015b). Note that consumers in our survey tend to have higher long-term inflation expectations, which is consistent with expectations of the expansive monetary policy stance and the booming economy pushing up prices in the near future.

4 Results

In this section, we present empirical estimates explaining consumers' current and planned consumption and saving in an Euler equation setting. Since the dependent variables are of a qualitative categorical nature, all models are estimated as ordered probit models, where we report marginal effects for the likelihood of answering in the highest category. All models are estimated with sample weights and robust standard errors. In order to be able to compare the effects across models, we evaluate all marginal effects at a hypothetical representative consumer, which we take to be male, age 49, living in a three-person household, with medium-low personal income, fully employed and risk-averse to taking financial risks.

4.1 The Role of Socio-Demographic Factors

We start the empirical analysis by evaluating socio-demographic effects on current and planned consumption and saving as well as consumers' perceived consumption and saving climate. The dataset includes a wide variety of socio-demographic characteristics, of which we test the impact of consumers' sex, age, their marital status, whether they are living with a partner, the number of persons in the household, their income and employment status, their financial literacy score as well as their stated attitude to taking financial risks. As shown in Table 3, the results suggest that older consumers state both lower current and planned consumption compared to the previous or next 12 months. This effect is quadratic and increases with higher age. By contrast, older consumers state higher current saving levels, but this effect is reduced with higher age.[10] While higher

[10]Note that the majority of respondents in our sample is middle-aged and below retirement age, with a mean age of 49.

current saving levels of respondents nearing their retirement age might be explained with higher saving for retirement motives in line with predictions from life-cycle models, the lower stated current and planned consumption could indicate that older consumers are less affected by current favourable economic conditions in their consumption patterns. The latter findings constitutes a well-known empirical puzzle in literature testing life-cycle consumption models (Browning and Crossley, 2001).

As would be expected, the results indicate that consumers are somewhat more likely to state increases in current and planned consumption, or perceive a positive consumption climate, if they have a relatively high employment status or income.[11] The results less conclusive regarding consumers' saving plans.

Consumers' financial literacy in our survey affects only consumers' planned consumption significantly, where those scoring high on financial literacy tend to plan reductions in consumption. Interestingly, their stated attitude towards financial risk in our sample only affects their current tendency to save. Those stating that they are more willing to take financial risks in order to gain higher returns seem to have a higher likelihood to report that they save a lot. Hence, it seems that risk attitude is important for consumers' decision to save and, hence, to participate in financial markets (even if we do not control for the riskiness of their financial investment).

4.2 The Role of Macroeconomic Expectations

Next, we evaluate the impact of a larger set of macroeconomic expectations on consumers' current and planned consumption and saving, as well as on their perceived consumption and saving climate. While this exercise has no direct theoretical interpretation, it gives us an indication of how consumers respond to different macroeconomic variables in a larger set than those included in the Euler equation model evaluated in the next section.

The results of a large set of regressions that explain the dependent variable with one macroeconomic expectation variable and a set of demographic controls are summarised in Table 4. The full regression results are delegated to the appendix and may be found in Tables A1-A6. Consumers' current as well as planned consumption seems to be correlated positively with their short-run inflation expectations, as they are more likely to state increases in current consumption compared to last year and in planned consumption in the next year if they expect short–run inflation to increase. This result is interesting because it suggests that consumers act on their inflation expectations when deciding about consumption levels and that the effect goes in the direction suggested by consumption life-cycle models underlying the Euler equation. Moreover, our finding is in line with the results in Ichiue and Nishiguchi (2015) and D'Acunto et al. (2016). In addition, planned

[11] Note that the income categories are evaluated relative to the high income consumers, while the employment categories are relative to the low employment group. This is because most respondents in the survey are fully employed, i.e. in the highest employment category, therefore we leave out the lowest category in order not to loose too many observations.

Table 3: The Role of Socio-Demographic Variables for Consumption and Saving

	Consumption			Saving		
	Current	Planned	Climate	Current	Planned	Climate
sex	0.0483	-0.0220	0.0564	0.0727	-0.0043	0.0173
	(0.0525)	(0.0446)	(0.0447)	(0.0507)	(0.0146)	(0.0455)
age	-0.0167***	-0.0169***	-0.0148**	0.0123**	-0.0027	-0.0010
	(0.0033)	(0.0037)	(0.0059)	(0.0052)	(0.0043)	(0.0079)
age^2	0.0001***	0.0002***	0.0002***	-0.0002***	0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)
married	0.1838**	0.0702	0.0067	-0.0938*	-0.0576	-0.0302
	(0.0794)	(0.0477)	(0.0533)	(0.0551)	(0.0484)	(0.0383)
cohab_partner	-0.1277*	-0.1177***	0.0047	0.0655	0.0557	0.0329
	(0.0765)	(0.0456)	(0.0566)	(0.0505)	(0.0462)	(0.0459)
no_persons	0.0078	0.0202	0.0122	-0.0028	-0.0116	-0.0040
	(0.0211)	(0.0139)	(0.0164)	(0.0168)	(0.0102)	(0.0104)
inc_l	-0.0505	-0.1162*	-0.0773	-0.0161	-0.0187	0.0440
	(0.0887)	(0.0653)	(0.0934)	(0.0679)	(0.0310)	(0.0628)
inc_ml	-0.0058	-0.0160	-0.1553**	0.1005	-0.0587	0.1214*
	(0.0721)	(0.0544)	(0.0767)	(0.0704)	(0.0463)	(0.0677)
inc_mh	0.0831	-0.0250	-0.0283	0.0022	-0.0203	-0.0099
	(0.0615)	(0.0422)	(0.0649)	(0.0587)	(0.0272)	(0.0500)
employ_ml	-0.1761	-0.0669	0.0731	-0.0588	0.0745	-0.0206
	(0.1418)	(0.0908)	(0.0821)	(0.1054)	(0.0663)	(0.0578)
employ_mh	0.0612	0.1603***	0.2256***	-0.1265**	-0.0311	-0.1060*
	(0.0690)	(0.0496)	(0.0753)	(0.0549)	(0.0246)	(0.0640)
employ_h	0.1014	0.0269	0.0415	-0.0793*	-0.0250	-0.0456
	(0.0679)	(0.0449)	(0.0755)	(0.0445)	(0.0174)	(0.0577)
literacy	0.0300	-0.0539**	0.0079	0.0440	0.0049	0.0062
	(0.0339)	(0.0240)	(0.0284)	(0.0294)	(0.0110)	(0.0216)
risk	-0.0371	-0.0429	0.0395	0.1587***	-0.0087	0.0205
	(0.0424)	(0.0264)	(0.0415)	(0.0480)	(0.0163)	(0.0269)
N	295	294	291	294	266	292
χ^2	40.738	33.014	27.061	37.172	43.823	30.432
Pseudo R^2	0.074	0.085	0.117	0.146	0.096	0.046

Note: Marginal effects for the probability of answering in the highest category are reported from weighted estimations and evaluated at a hypothetical representative consumer. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

consumption in our dataset is correlated positively with expected quantitative house price inflation ($\pi^{e,house}_{quant,t}$), somewhat in contrast to Ichiue and Nishiguchi (2015).

While our results evaluating consumers' reported current and planned actual consumption go in the opposite direction to the findings in Bachmann et al. (2015), we also find a negative correlation between quantitative long-run inflation expectations ($\pi^{e,5yrs}_{quant,t}$)

Table 4: The Role of Macroeconomic Expectations for Consumption and Saving

	Consumption			Saving		
	Current	Planned	Climate	Current	Planned	Climate
$\pi^{e,1yr}_{qual,t}$	+	+			−	
$\pi^{e,5yrs}_{qual,t}$				+	−	
$\pi^{e,house}_{qual,t}$						
$i^{e}_{qual,t}$					+	
$stocks^{e}_{qual,t}$						
$y^{e}_{qual,t}$				+		
$u^{e}_{qual,t}$			−			
$\pi^{e,1yr}_{quant,t}$						
$\pi^{e,5yrs}_{quant,t}$			−			
$\pi^{e,house}_{quant,t}$		+			−	
$i^{e}_{quant,t}$	−		−			

Note: Summary of estimation results of regressions of one macroeconomic expectations variable and demographic controls und consumption and saving variables, where "+" denotes a significant positive effect, "-"- a significant negative effect. The full estimation results are in the appendix in Tables A1-A6.

and the reported "readiness to spend", or consumption climate. In that sense, our results suggest that perhaps the perceived consumption climate is not an accurate proxy when evaluating the impact of consumers' inflation expectations on their consumption choices. Finally, we find that consumers are likely to rate the consumption climate lower if they report higher unemployment expectations ($u^{e}_{qual,t}$) or higher quantitative interest rate expectations ($i^{e}_{quant,t}$).

Regarding the relation between consumers' saving plans and their macroeconomic expectations, our results suggest a positive correlation between consumers' long-run inflation expectations ($\pi^{e,5yrs}_{qual,t}$) as well as their expectations regarding the economic situation in general ($y^{e}_{qual,t}$) and their current saving behaviour. As might be expected, planned saving levels are negatively affected by both short- and long-run inflation expectations, but positively by expected interest rates ($i^{e}_{qual,t}$). Finally, we find that the perceived saving climate is not significantly influenced by any macroeconomic expectations variables in the survey.

4.3 Estimation of a Consumption Euler Equation

Next, we test whether consumers' consumption level in the past 12 months relative to an average year was decided in line with a consumption Euler equation as in equation (3). Under our hypothesis, current consumption should react positively to expected future consumption, negatively to expected nominal interest rates and positively to expected inflation.

The results are presented in Table 5. All models include a range of demographic control variables and report marginal effects from ordered probit models for the likelihood of consumers answering "total expenditures in the past 12 months were considerably higher than in an average year". We test a number of variants of the consumption Euler equation, where we proxy expected consumption with consumers' reported planned change in consumption, the planned change in the consumption of durable goods and their perceived consumption climate. Additionally, we estimate a set of models with qualitative interest rate and inflation expectations, as well as models with quantitative expectations. Note that the sample size drops considerably when we estimate models with quantitative expectations, since only relatively few consumers answered the question on their quantitative interest rate expectations.

Overall, the results give some support to the hypothesis that consumers' consumption pattern may indeed be related to life-cycle models of consumption captured in the Euler equation. We find that consumers are more likely to report above-average consumption in the past 12 months, if they expect to increase their consumption also in the coming 12 months, thus supporting the hypothesis of consumption smoothing. Interestingly, the effect of planned consumption of durables or the consumption climate is not significant. Nominal interest rate expectations are estimated to have a negative impact on the likelihood of reporting above-average consumption, however, the effect is only significant in the models with quantitative expectations. By contrast, we find highly significant positive effects of both qualitative and quantitative inflation expectations in line with the theoretical model. Considering that interest rates were effectively at the zero lower bound at the time of the survey, this gives some indication that perhaps consumers implicitly consider negative shadow interest rate and thereby the positive effect of an increase in expected inflation on the real interest rate. Taken together, our results are more in line with those in Ichiue and Nishiguchi (2015) and D'Acunto et al. (2016), but stand in contrast to the findings by (Burke and Ozdagli, 2013) and Bachmann et al. (2015).

Table 5: Consumption Euler Equation

	Qualitative Expectations				Quantitative Expectations			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
c_t^e	0.1895***			0.2091***	0.0406			0.0390
	(0.0645)			(0.0795)	(0.0854)			(0.0653)
$c_t^{e,dur}$		0.0342				0.0477		
		(0.0376)				(0.0545)		
$c_t^{climate}$			0.0660				0.0966	
			(0.0444)				(0.0618)	
$i_{qual,t}^e$	-0.0535	-0.0545	-0.0548	-0.0525				
	(0.0436)	(0.0443)	(0.0414)	(0.0450)				
$\pi_{qual,t}^{e,1yr}$	0.0871***	0.0981***	0.1023***					
	(0.0225)	(0.0262)	(0.0296)					
$\pi_{qual,t}^{e,house}$				0.0037				
				(0.0232)				
$i_{quant,t}^e$					-0.0888*	-0.1029**	-0.0885**	-0.0483*
					(0.0457)	(0.0474)	(0.0414)	(0.0293)
$\pi_{quant,t}^{e,1yr}$					0.0185*	0.0203*	0.0180*	
					(0.0104)	(0.0115)	(0.0108)	
$\pi_{quant,t}^{e,house}$								-0.0003
								(0.0038)
N	355	356	347	351	117	117	117	127
χ^2	45.092	41.358	46.823	48.464	43.636	46.868	37.779	35.457
Pseudo R^2	0.143	0.107	0.111	0.117	0.291	0.297	0.305	0.225
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Marginal effects for the probability of answering in the highest category are reported from weighted estimations and evaluated at a hypothetical representative consumer. Models with quantitative expectations are truncated to exclude the lower and upper 2.5% of the distribution. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 6: Saving Euler Equation

	Qualitative Expectations			Quantitative Expectations		
	(1)	(2)	(3)	(4)	(5)	(6)
s_t^e	0.0676*		0.0791*	0.0415		0.0450
	(0.0364)		(0.0413)	(0.0367)		(0.0358)
$s_t^{climate}$		0.0638***			0.0404***	
		(0.0176)			(0.0150)	
$i_{qual,t}^e$	0.0125	0.0225	0.0093			
	(0.0380)	(0.0274)	(0.0437)			
$\pi_{qual,t}^{e,1yr}$	0.0424	0.0191				
	(0.0291)	(0.0208)				
$\pi_{qual,t}^{e,house}$			0.0332*			
			(0.0177)			
$i_{quant,t}^e$				0.0133	0.0165	0.0240
				(0.0197)	(0.0118)	(0.0201)
$\pi_{quant,t}^{e,1yr}$				0.0003	-0.0016	
				(0.0053)	(0.0036)	
$\pi_{quant,t}^{e,house}$						0.0030
						(0.0031)
N	312	351	309	108	115	112
χ^2	27.849	35.637	23.970	18.875	33.921	19.225
Pseudo R^2	0.068	0.126	0.063	0.117	0.214	0.111
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes

Note: Marginal effects for the probability of answering in the highest category are reported from weighted estimations and evaluated at a hypothetical representative consumer. Models with quantitative expectations are truncated to exclude the lower and upper 2.5% of the distribution. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

We also consider a second model that we term the "saving Euler equation". This model provides a further test of consumers' consistency in the sense that we check whether their reported saving decisions are symmetrically affected by planned saving, and their nominal interest rate and inflation expectations.[12] As shown in Table 6, the results suggest that current saving is positively related to future planned saving (as well as the saving climate), implying that consumers smooth both their consumption and their saving levels over time. However, we find no significant impact of either nominal interest rate expectations or inflation expectations on current saving, the only exception being a marginally significant positive effect of qualitative house price expectations. In line with

[12]Note that a small caveat applies: The question on current saving is not formulated relative to an average year, as in the case of current consumption, but is stated as a general question on consumers' current level of saving. However, since saving patterns tend to be persistent, we argue that this is a valid proxy.

our results of the previous section, it thus seems that macroeconomic expectations affect consumers' consumption behaviour more than their saving.

4.4 The Effect of Financial Constraints and News

In this section, we elaborate on the role of financial constraints and economic news observed by the consumer for her consumption and saving behaviour.

Whether consumers are financially constrained or able to participate in financial markets plays an important role for the estimation of consumption Euler equations. According to life-cycle models of consumption, agents will smooth consumption over their life-cycle by saving and dissaving in financial markets, which gives the effect of the real interest rate on current consumption in the Euler equation. Therefore, we expect that consumers excluded from financial markets do not react to real interest rates in their current consumption decision. Instead, they consume only out of current income and are often termed in New-Keynesian models as non-Ricardian, hand-to-mouth or rule-of-thumb consumers. By contrast, those participating in financial markets should face the trade-off between current and future consumption, i.e. saving and hence react to their perception of real interest rates.

Table 7: The Role of Financial Constraints and Financial Market Participation

	Financially Constrained (1)	Participating in Financial Markets (2)	With a Mortgage (3)
c_t^e	0.1319*	0.0943	0.0231
	(0.0729)	(0.0677)	(0.0403)
$i_{qual,t}^e$	0.0330	-0.0874*	-0.0010
	(0.0210)	(0.0495)	(0.0265)
$\pi_{qual,t}^e$	0.0103	0.1055***	0.0100
	(0.0143)	(0.0277)	(0.0207)
N	56	199	98
χ^2	30.776	30.539	17.044
Pseudo R^2	0.483	0.203	0.113
Demographic Controls	Yes	Yes	Yes

Note: Marginal effects for the probability of answering in the highest category are reported from weighted estimations and evaluated at a hypothetical representative consumer. Models with quantitative expectations are truncated to exclude the lower and upper 2.5% of the distribution. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 7 presents the results from estimations of the consumption Euler equation in equation (3) with qualitative inflation and interest expectations, where we distinguish between consumers that are financially constrained, those that are participating in finan-

cial markets and those who took a mortgage to finance their housing.[13] We term those consumers "financially constrained" who answered in the survey that they do not save and thus assume that these are non-Ricardian, hand-to-mouth consumers. The second group, consumers participating in financial markets, is defined as those answering that they save either in bonds, stocks, life insurance or some form of private pension fund. Finally, we aim at differentiating between those consumers saving on financial markets and those that save by paying off a large credit (usually at a bank) by estimating the relation separately for those consumers who own a mortgage.

The results in Table 7 indeed suggest that there are differences between financially constrained and non-constrained consumers. While we find no significant effect of nominal interest rate or inflation expectations on current consumption with households that do not save, the effect is significant and has the correct sign for the group of consumers active in financial markets. Interestingly, this is not the case for those paying off a mortgage, implying that there are indeed differences also between different forms of saving. Finally, the positive link between planned and current consumption for financially constrained households suggests that they also smooth consumption to some degree, possibly due to habit formation.

Next, we evaluate the role of news in an Euler equation setting, where we distinguish between positive and negative news on monetary policy and inflation on the one hand, and the fiscal stance on the other hand. While the former type of news could be viewed as a potential "shock" to consumers' perception of the real interest rate, the latter type might be a "shock" to current consumption in the form of a demand shock. Negative news about monetary policy in the survey include mainly negative aspects of the ultra-expansionary monetary policy during the financial and Euro crisis, such as future inflation worries or negative effects of low interest rates for savers. Consequently, positive monetary policy news relate to the positive effects of the current policy, such as perceived boosts in credit supply and aggregate demand. Negative news about inflation are generally news observed about rising prices, also for particular goods or sectors. Positive news are consequently news about falling prices, for instance the positive impact of falling prices for crude materials for the German industry. Finally, negative fiscal news include news about rising taxes or high public debt levels, while positive news are for instance news about an increase in public income from taxes.

[13] We do not estimate this with quantitative expectations, since this would result in too few observations.

Table 8: The Euler Equation and News

	Consumption Euler Eq.				Saving Euler Eq.			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
c_t^e	0.1781***	0.0971	0.2257***	0.0814				
	(0.0654)	(0.1066)	(0.0827)	(0.0966)				
s_t^e					0.1630**	0.1135**	0.1208*	0.0737
					(0.0698)	(0.0579)	(0.0636)	(0.0462)
$i_{qual,t}^e$	-0.0464		-0.0635		0.0547		0.0542	
	(0.0463)		(0.0443)		(0.0378)		(0.0334)	
$\pi_{qual,t}^e$	0.0605**		0.0742**		0.0273		0.0023	
	(0.0247)		(0.0294)		(0.0248)		(0.0265)	
$i_{quant,t}^e$		-0.1261*		-0.1143*		0.0060		0.0204
		(0.0677)		(0.0621)		(0.0304)		(0.0224)
$\pi_{quant,t}^e$		0.0146		0.0152		0.0006		-0.0007
		(0.0174)		(0.0175)		(0.0111)		(0.0092)
$news\_mp\_pos$	-0.0078	-0.2976			-0.0049	-0.0999		
	(0.1484)	(0.1856)			(0.1497)	(0.1484)		
$news\_mp\_neg$	0.2502**	0.3084*			0.0967	0.3521*		
	(0.1207)	(0.1768)			(0.1129)	(0.2021)		
$news\_\pi\_pos$	-0.5131**	–			0.4939**	–		
	(0.2356)				(0.2495)			
$news\_\pi\_neg$	0.2785*	0.1726			-0.0002	-0.1954		
	(0.1441)	(0.1724)			(0.1317)	(0.1543)		
$news\_fiscal\_pos$			-0.2411	-0.3133*			-0.0038	0.0911
			(0.1637)	(0.1779)			(0.1166)	(0.0939)
$news\_fiscal\_neg$			0.0795	0.0849			0.0528	1.0394**
			(0.1428)	(0.1487)			(0.0932)	(0.4473)
N	255	84	255	84	231	79	231	79
χ^2	49.615	45.588	36.788	–	48.701	446.099	43.640	–
Pseudo R^2	0.191	0.423	0.151	0.401	0.168	0.285	0.127	0.277
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Marginal effects for the probability of answering in the highest category are reported from weighted estimations and evaluated at a hypothetical representative consumer. Models with quantitative expectations are truncated to exclude the lower and upper 2.5% of the distribution. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The results are summarized in Table 8. First, we observe that our results from the previous section overall remain robust when we add additional news effects. In addition, there are significant asymmetric news effects. For instance, positive news about falling prices have a negative impact on consumers' current consumption plans, while negative news on rising prices show a positive effect. While this might at first be surprising, it could be that the news correlate strongly with consumers' general perceptions and expectations of inflation, thus reinforcing the negative link between expected inflation and current consumption.[14] Interestingly, the effect of inflation news is somewhat reversed in the saving Euler equation, where we find a positive effect from news on falling prices on current saving.

Monetary policy news in the survey seem to affect consumers' consumption and saving plans mainly via the perceived negative effects of the current expansionary monetary policy stance, which are linked to consumers' planning higher current consumption as well as saving. While the former effect may be interpreted as substitution from saving to consumption due to the low-interest-rate environment, the latter impact on saving is hard to explain and only marginally significant.

Finally, we find that positive news on the fiscal stance are linked with lower current consumption, while negative news lead to higher current saving. While the former negative effect on consumption is again hard to explain, the latter effect on saving is important in terms of significance and size of the coefficient. Overall, it might be that consumers expect positive fiscal news such as tax reductions to be realised only in the future with an adverse effect on current consumption, but view negative fiscal news as a clear sign to save more, for instance for retirement funds.

4.5 Robustness Checks

This section contains robustness checks, where we estimate the consumption and saving Euler equations in their baseline specifications separately for the first and the second wave of the survey, see Table 9 and 10. Additionally, we can control for individual changes in expectations, since the second wave consists of a sub-group of respondents from the first wave.

[14] Note that we have to exclude the positive news on inflation in the models with quantitative expectations because there are too few observations.

Table 9: Robustness Checks Consumption Euler Equation

	First Wave		Second Wave		Individual Differences	
	(1)	(2)	(3)	(4)	(5)	(6)
c_t^e	0.1637**	0.0135	0.1184	0.1785		
	(0.0667)	(0.1187)	(0.0768)	(0.1940)		
$i_{qual,t}^e$	-0.0306		-0.0837*			
	(0.0512)		(0.0481)			
$\pi_{qual,t}^{e,1yr}$	0.0824***		0.0719**			
	(0.0249)		(0.0345)			
$i_{quant,t}^e$		-0.1453		-0.1282*		
		(0.0978)		(0.0726)		
$\pi_{quant,t}^{e,1yr}$		0.0238		0.0023		
		(0.0155)		(0.0210)		
Δc_t^e					0.0003	-0.0034
					(0.0006)	(0.0084)
$\Delta i_{qual,t}^e$					0.0002	
					(0.0005)	
$\Delta \pi_{qual,t}^{e,1yr}$					0.0002	
					(0.0003)	
$\Delta i_{quant,t}^e$						0.0021
						(0.0054)
$\Delta \pi_{quant,t}^{e,1yr}$						-0.0002
						(0.0004)
N	262	57	93	60	171	112
χ^2	40.111	28.860	–	–	14.456	13.548
Pseudo R^2	0.154	0.390	0.365	0.352	0.113	0.134
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes

Note: Marginal effects for the probability of answering in the highest category are reported from weighted estimations and evaluated at a hypothetical representative consumer. Models with quantitative expectations are truncated to exclude the lower and upper 2.5% of the distribution. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Regarding the consumption Euler equation estimations, the positive impact from expected inflation stays robust across the two waves, while the negative nominal interest rate effect becomes significant only in the second wave and the positive effect of expected consumption is significant only in the first wave. Nevertheless, the signs of the estimated coefficients are consistent across the waves. A similar picture arises for the saving Euler equation, where for both the effects of planned saving and qualitative expectations the signs are the same across the waves, but significances vary. In addition, there is a strongly significant positive impact of quantitative interest rate expectations in the first wave, which is insignificant and negatively signed in the second wave.

Table 10: Robustness Checks Saving Euler Equation

	First Wave		Second Wave		Individual Differences	
	(1)	(2)	(3)	(4)	(5)	(6)
s_t^e	0.1477**	0.0706	0.0630	0.1144		
	(0.0591)	(0.0472)	(0.0427)	(0.0917)		
$i_{qual,t}^e$	0.0186		0.0192			
	(0.0539)		(0.0311)			
$\pi_{qual,t}^{e,1yr}$	0.0464		0.0472**			
	(0.0394)		(0.0205)			
$i_{quant,t}^e$		0.0440**		-0.0606		
		(0.0207)		(0.0411)		
$\pi_{quant,t}^{e,1yr}$		-0.0046		0.0105		
		(0.0049)		(0.0116)		
Δs_t^e					0.0000	-0.0003
					(0.0005)	(0.0008)
$\Delta i_{qual,t}^e$					0.0005	
					(0.0011)	
$\Delta \pi_{qual,t}^{e,1yr}$					-0.0000	
					(0.0003)	
$\Delta i_{quant,t}^e$						-0.0003
						(0.0007)
$\Delta \pi_{quant,t}^{e,1yr}$						-0.0000
						(0.0001)
N	232	55	80	53	143	95
χ^2	24.288	13.048	415.473	383.445	15.429	11.155
Pseudo R^2	0.076	0.254	0.309	0.438	0.088	0.112
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes

Note: Marginal effects for the probability of answering in the highest category are reported from weighted estimations and evaluated at a hypothetical representative consumer. Models with quantitative expectations are truncated to exclude the lower and upper 2.5% of the distribution. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

If we estimate the relation in individual differences, coefficients in both models become very small and insignificant, suggesting that there is not enough meaningful individual variation between the waves.

5 Conclusion

In this paper, we evaluate a new survey dataset of German consumers with respect to their consumption and saving plans. Framing the analysis in the Euler equation resulting from consumers' optimal consumption allocation in a life-cycle model, the theory predicts that reported current consumption (saving) depends positively on expected consump-

tion (saving), as well as negatively (positively) on nominal interest rates and positively (negatively) on expected inflation.

The results suggest that German consumers surveyed in two waves at the end of 2015 and in mid-2016 report consumption paths in line with an Euler equation model: Current consumption depends positively on planned consumption in the next year and is positively correlated with both quantitative and qualitative short-run inflation expectations. Additionally, nominal interest rate expectations are estimated to have a negative correlation with current consumption, albeit only when measured quantitatively. This result might be explained by interest rates being close to the zero lower bound at the time of the survey.

Estimating a similar Euler equation model for consumers' reported saving behaviour reveals a symmetric smoothing effect in the sense that current saving is also positively related to planned saving by individual consumers. However, we find almost no effects from either interest rate or inflation expectations on consumers' saving paths.

In addition, we find that financial constraints of consumers are important for whether the perceived real interest rate affects their consumption. Positive and negative economic news on monetary policy, fiscal policy and inflation perceived by the consumer may have asymmetric effects on current consumption, which generally work in the same direction as interest rate and inflation expectations. Therefore, these news might be interpreted as "shocks" in the Euler equation setting.

Overall, the analysis yields some interesting insights into consumers' decision making regarding their consumption and saving patterns. Macroeconomic expectations matter, at least for consumption, and the effects are in line both with economic theory and with the current German situation of a booming economy with very low inflation and interest rates near the ZLB at the time of the survey. Moreover, the analysis shows that it is important to distinguish between actual consumption paths reported by consumers and their reported "readiness to spend", i.e. the general consumption climate. This could help to explain some of the opposing results regarding the relationship between consumption and inflation expectations in the literature (Burke and Ozdagli, 2013; Bachmann et al., 2015; Ichiue and Nishiguchi, 2015). Additionally, our results could provide evidence in favour of country-specific differences in the relationship between consumption and macroeconomic expectations, since we find similar results to an earlier study using German data from another survey (D'Acunto et al., 2016).

Further research is needed to explore the differences in consumption and saving behaviour that emerge in our analysis. It will be interesting to evaluate the underlying mechanisms driving the different results and to explore whether they are specific to the current zero lower bound environment, or to specific characteristics of German consumers with traditionally have high savings rates, or whether more fundamental reasons drive these differences. So far, we can provide some tentative evidence that economic policy in the current situation might try to exploit the link between macroeconomic expectations

and consumers' actual consumption as well as the perceived consumption climate, but steering private saving in the same manner might be less successful.

6 Acknowledgements

I thank Ulrich Fritsche for the stimulating collaboration within the survey project and the questionnaire design and Olaf Bock, Gianna Eick and the team of the University of Hamburg telephone lab for conducting the survey and providing valuable assistance with the preparation of the dataset. Feedback on the questionnaire from Tobias Schmidt and from the GESIS Leibniz-Institute for Social Sciences as well as funding from the regional branch for Hamburg, Schleswig-Holstein and Mecklenburg-Vorpommern of the Bundesbank is gratefully acknowledged. Sergej Bechtoldt provided very valuable research assistance. All remaining errors are mine.

References

Armantier, O., W. Bruine de Bruin, G. Topa, W. van der Klaauw, and B. Zafar (2015). Inflation Expectations and Behavior: Do Survey Respondents Act on Their Beliefs? *International Economic Review 56*(2), 505–536.

Attanasio, O. P. and H. Low (2004). Estimating Euler equations. *Review of Economic Dynamics 7*, 406–435.

Bachmann, R., T. O. Berg, and E. R. Sims (2015). Inlation expectations and readiness to spend: Cross-sectional evidence. *American Economic Journal: Economic Policy 7*(1), 1–35.

Branch, W. A. (2004). The theory of rationally heterogeneous expectations: Evidence from survey data on inflation expectations. *Economic Journal 114*(497), 592–621.

Brown, S. and K. Taylor (2006). Financial Expectations, Consumption and Saving: A Microeconomic Analysis. *Fiscal Studies 27*(3), 313–338.

Browning, M. and T. Crossley (2001, Summer). The lifecycle model of consumption and saving. *Journal of Economic Perspectives 15*(3), 3–22.

Burke, M. A. and A. Ozdagli (2013). Household Inflation Expectations and Consumer Spending: Evidence from Panel Data. Technical Report 13-25, Federal Reserve Bank of Boston Research Department Working Papers.

Carroll, C. D. (2001, November). Death to the log-linearized consumption euler equation! (and very poor health to the second-order approximation). *Advances in Macroeconomics 1*(1), Article 6.

Carvalho, C. and F. Nechio (2014). Do People Understand Monetary Policy? *Journal of Monetary Economics 66*, 108–123.

Clarida, R., J. Galí, and M. Gertler (1999). The Science of Monetary Policy: A New Keynesian Perspective. *Journal of Economic Literature 37*(4), 1661–1707.

Coibion, O. and Y. Gorodnichenko (2015a). Information rigidity and the expectation formation process: A simple framework and new facts. *American Economic Review 105*(8), 2644–78.

Coibion, O. and Y. Gorodnichenko (2015b). Is the Phillips Curve Alive and Well After All? Inflation Expectations and the Missing Disinflation. *AEJ: Macroeconomics 7*(1), 197–232.

D'Acunto, F., D. Hoang, and M. Weber (2016). Unconventional Fiscal Policy, Inflation Expectations, and Consumption Expenditure. Technical Report 5793, CESifo Working Paper.

Dräger, L. and U. Fritsche (2013). Don't worry, be right! survey wording effects on inflation perceptions and expectations. *Macroeconomics and Finance Series University of Hamburg 8/2013*.

Dräger, L., M. J. Lamla, and D. Pfajfar (2016). Are Survey Expectations Theory-Consistent? The Role of Central Bank Communication and News. *European Economic Review 85*(C), 84–111.

Friedman, M. A. (1957). *A Theory of the Consumption Function*. Princeton University Press.

Galí, J. (2008). *Monetary Policy, Inflation, and the Business Cycle: An Introduction to the New Keynesian Framework*. Princeton University Press.

Giamboni, L., E. Millemaci, and R. J. Waldmann (2013). Evaluating how predictable errors in expected income affect consumption. *Applied Economics 45*(28), 4004–4021.

Häder, S., S. Gabler, and C. Heckel (2009). *Telefonbefragungen über das Mobilfunknetz*, Chapter Stichprobenziehung, Gewichtung und Realisierung, pp. 21–49. Wiesbaden: VS Verlag für Sozialwissenschaften.

Hurd, M. D. and S. Rohwedder (2013). Expectations and Household Spending. Technical Report 2013-300, Michigan Retirement Research Center Research Paper.

Ichiue, H. and S. Nishiguchi (2015). Inflation Expectations and Consumer Spending at the Zero Bound: Micro Evidence. *Economic Inquiry 53*(2), 1086–1107.

Juster, F. T. and P. Wachtel (1972). Inflation and the Consumer. *Brookings Papers on Economic Activity 3*(1), 71–121.

Lusardi, A. and O. J. Mitchell (2008). Planning and Financial Literacy: How Do Women Fare? *American Economic Review 98*(2), 413–417.

Shiller, R. (1997). Why do people dislike inflation? In C. H. Romer and D. H. Romer (Eds.), *Reducing Inflation: Motivation and Strategy*, pp. 13–70. University of Chicago Press.

7 Appendix

7.1 Survey Question Wording

The wording of the survey questions regarding current and planned consumption and saving is as follows:

- (Current Consumption c_t) *"How would you say do your total expenditures in the past 12 months compare to an average year in the past? They were"*
  - Considerably higher
  - About the same
  - Considerably lower
  - Don't know
  - No answer
- (Future Consumption c_t^e) *"How would you say will your total expenditures in the next 12 months compare to an average year in the past? They will be"*
  - Considerably higher
  - About the same
  - Considerably lower
  - Don't know
  - No answer
- (Future Durables Consumption $c_t^{e,dur}$) *"In the next 12 months, do you expect to spend more or less on large purchases such as furniture or electronic devices or such than in an average year in the past?"*
  - A lot more

  - Somewhat more
  - About the same
  - Somewhat less
  - A lot less
  - Don't know
  - No answer

- (Consumption Climate $c_t^{climate}$) *"When looking at the current economic situation, do you think now is a good or an bad time for people to make large purchases such as furniture or electronic devices and so on?"*
  - Now is a good time
  - Neither a good, nor a bad time
  - Now is a bad time
  - Don't know
  - No answer

- (Current Saving s_t) *"Which of the following statements describes your household's current financial situation best?"*
  - We save a lot and regularly
  - We save little
  - We don't save
  - Don't know
  - No answer

- (Future Saving s_t^e) *"When comparing the next 12 months to an average year in the past, will your household save a higher, smaller or the same fraction of its total income?"*
  - A higher fraction
  - About the same fraction
  - A smaller fraction
  - Don't know
  - No answer

- (Saving Climate $s_t^{climate}$) *"When looking at the current economic situation, do you think now is a good or a bad time to save?"*

  - Now is a very good time
  - Now is a relatively good time
  - Now is not a good time
  - Now is a relatively bad time
  - Now is a very bad time
  - Don't know
  - No answer

Regarding the survey questions on consumers' interest rate and inflation expectations, we compare the results with qualitative and quantitative expectations:

- (i_t^{qual}) *"How do you think interest rates on saving accounts on average will develop over the next 12 months? They will"*
  - Increase strongly
  - Increase somewhat
  - Stay about the same
  - Decrease somewhat
  - Decrease strongly
  - Don't know
  - No answer
- (i_t^{quant}) *"What do you think, how high will interest rates on saving accounts be on average over the next 12 months?"*
  - ... Percent
  - Don't know
  - No answer
- (π_t^{qual}) *"How do you think prices in general will develop over the next 12 months compared to the previous 12 months? They will"*
  - Increase more than before
  - Increase at about the same rate
  - Increase less strongly than before
  - Stay about the same
  - Fall
  - Don't know

- No answer

- (π_t^{quant}) *"How many percent do you think prices in general will increase/decrease on average over the next 12 months?"*
  - ... Percent
  - Don't know
  - No answer

7.2 Further Results

Table A1: Current Consumption and Macroeconomic Expectations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
$\pi^{e,1yr}_{qual,t}$	0.0946***										
	(0.0275)										
$\pi^{e,5yrs}_{qual,t}$		-0.0295									
		(0.0356)									
$\pi^{e,house}_{qual,t}$			0.0137								
			(0.0246)								
$i^{e}_{qual,t}$				-0.0469							
				(0.0430)							
$stocks^{e}_{qual,t}$					0.0141						
					(0.0372)						
$y^{e}_{qual,t}$						-0.0250					
						(0.0417)					
$u^{e}_{qual,t}$							0.0303				
							(0.0311)				
$\pi^{e,1yr}_{quant,t}$								0.0062			
								(0.0071)			
$\pi^{e,5yrs}_{quant,t}$									0.0035		
									(0.0042)		
$\pi^{e,house}_{quant,t}$										-0.0008	
										(0.0024)	
$i^{e}_{quant,t}$											-0.0624*
											(0.0337)
N	363	359	360	361	311	362	364	281	302	314	141
χ^2	39.098	29.836	38.031	28.865	20.619	32.452	29.532	25.772	26.616	28.454	32.516
Pseudo R^2 0.097	0.067	0.070	0.067	0.054	0.072	0.069	0.068	0.074	0.091	0.212	
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Marginal effects for the probability of answering in the highest category are reported from weighted estimations and evaluated at a hypothetical representative consumer. Models with quantitative expectations are truncated to exclude the lower and upper 2.5% of the distribution. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A2: Planned Consumption and Macroeconomic Expectations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
$\pi^{e,1yr}_{qual,t}$	0.0465*										
	(0.0256)										
$\pi^{e,5yrs}_{qual,t}$		-0.0080									
		(0.0302)									
$\pi^{e,house}_{qual,t}$			0.0436								
			(0.0276)								
$i^{e}_{qual,t}$				-0.0084							
				(0.0302)							
$stocks^{e}_{qual,t}$					0.0009						
					(0.0310)						
$y^{e}_{qual,t}$						-0.0466					
						(0.0327)					
$u^{e}_{qual,t}$							0.0327				
							(0.0300)				
$\pi^{e,1yr}_{quant,t}$								0.0071			
								(0.0071)			
$\pi^{e,5yrs}_{quant,t}$									0.0021		
									(0.0040)		
$\pi^{e,house}_{quant,t}$										0.0068**	
										(0.0030)	
$i^{e}_{quant,t}$											-0.0138
											(0.0213)
N	362	357	358	358	310	360	362	280	300	313	141
χ^2	19.127	13.920	20.676	13.488	26.332	17.507	15.431	16.011	12.198	21.986	26.008
Pseudo R^2	0.048	0.036	0.049	0.039	0.071	0.049	0.040	0.048	0.039	0.065	0.217
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Marginal effects for the probability of answering in the highest category are reported from weighted estimations and evaluated at a hypothetical representative consumer. Models with quantitative expectations are truncated to exclude the lower and upper 2.5% of the distribution. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A3: Consumption Climate and Macroeconomic Expectations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
$\pi^{e,1yr}_{qual,t}$	-0.0462										
	(0.0329)										
$\pi^{e,5yrs}_{qual,t}$		-0.0235									
		(0.0323)									
$\pi^{e,house}_{qual,t}$			0.0554								
			(0.0450)								
$i^{e}_{qual,t}$				-0.0179							
				(0.0354)							
$stocks^{e}_{qual,t}$					0.0575						
					(0.0394)						
$y^{e}_{qual,t}$						0.0532					
						(0.0475)					
$u^{e}_{qual,t}$							-0.0797*				
							(0.0445)				
$\pi^{e,1yr}_{quant,t}$								-0.0231			
								(0.0145)			
$\pi^{e,5yrs}_{quant,t}$									-0.0118*		
									(0.0069)		
$\pi^{e,house}_{quant,t}$										0.0028	
										(0.0029)	
$i^{e}_{quant,t}$											-0.0767**
											(0.0391)
N	354	350	352	351	304	353	355	276	296	308	139
χ^2	42.973	41.833	44.690	41.522	52.638	50.380	45.696	56.238	52.824	34.943	72.691
Pseudo R^2	0.112	0.106	0.116	0.107	0.184	0.112	0.124	0.167	0.185	0.118	0.301
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Marginal effects for the probability of answering in the highest category are reported from weighted estimations and evaluated at a hypothetical representative consumer. Models with quantitative expectations are truncated to exclude the lower and upper 2.5% of the distribution. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A4: Current Saving and Macroeconomic Expectations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
$\pi^{e,1yr}_{qual,t}$	0.0263										
	(0.0243)										
$\pi^{e,5yrs}_{qual,t}$		0.0426**									
		(0.0192)									
$\pi^{e,house}_{qual,t}$			0.0260								
			(0.0161)								
$i^{e}_{qual,t}$				0.0245							
				(0.0294)							
$stocks^{e}_{qual,t}$					0.0175						
					(0.0165)						
$y^{e}_{qual,t}$						0.0707***					
						(0.0272)					
$u^{e}_{qual,t}$							0.0158				
							(0.0247)				
$\pi^{e,1yr}_{quant,t}$								0.0006			
								(0.0051)			
$\pi^{e,5yrs}_{quant,t}$									0.0026		
									(0.0033)		
$\pi^{e,house}_{quant,t}$										-0.0004	
										(0.0027)	
$i^{e}_{quant,t}$											0.0092
											(0.0133)
N	362	358	359	360	310	361	363	281	302	314	141
χ^2	26.280	29.821	25.096	28.224	37.028	36.053	26.376	25.299	25.569	24.611	28.857
Pseudo R^2	0.078	0.087	0.077	0.088	0.110	0.106	0.076	0.086	0.090	0.088	0.139
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Marginal effects for the probability of answering in the highest category are reported from weighted estimations and evaluated at a hypothetical representative consumer. Models with quantitative expectations are truncated to exclude the lower and upper 2.5% of the distribution. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A5: Planned Saving and Macroeconomic Expectations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
$\pi^{e,1yr}_{qual,t}$	-0.0295**										
	(0.0141)										
$\pi^{e,5yrs}_{qual,t}$		-0.0357**									
		(0.0166)									
$\pi^{e,house}_{qual,t}$			-0.0182								
			(0.0161)								
$i^{e}_{qual,t}$				0.0434*							
				(0.0235)							
$stocks^{e}_{qual,t}$					-0.0094						
					(0.0143)						
$y^{e}_{qual,t}$						-0.0028					
						(0.0195)					
$u^{e}_{qual,t}$							0.0273				
							(0.0183)				
$\pi^{e,1yr}_{quant,t}$								0.0031			
								(0.0039)			
$\pi^{e,5yrs}_{quant,t}$									0.0005		
									(0.0023)		
$\pi^{e,house}_{quant,t}$										-0.0062**	
										(0.0029)	
$i^{e}_{quant,t}$											-0.0144
											(0.0195)
N	320	317	317	317	278	321	321	256	266	277	125
χ^2	29.396	29.775	29.973	25.707	30.652	25.436	27.893	21.887	20.017	30.434	14.289
Pseudo R^2	0.052	0.055	0.053	0.054	0.050	0.046	0.052	0.054	0.050	0.064	0.095
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Marginal effects for the probability of answering in the highest category are reported from weighted estimations and evaluated at a hypothetical representative consumer. Models with quantitative expectations are truncated to exclude the lower and upper 2.5% of the distribution. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A6: Saving Climate and Macroeconomic Expectations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\pi^{e,1yr}_{qual,t}$	0.0084									
	(0.0108)									
$\pi^{e,5yrs}_{qual,t}$		0.0245								
		(0.0182)								
$\pi^{e,house}_{qual,t}$			0.0022							
			(0.0198)							
$i^{e}_{qual,t}$				-0.0033						
				(0.0159)						
$stocks^{e}_{qual,t}$					0.0138					
					(0.0168)					
$y^{e}_{qual,t}$						-0.0022				
						(0.0165)				
$u^{e}_{qual,t}$							-0.0086			
							(0.0193)			
$\pi^{e,1yr}_{quant,t}$								0.0055		
								(0.0038)		
$\pi^{e,5yrs}_{quant,t}$									0.0067	
									(0.0046)	
$\pi^{e,house}_{quant,t}$										0.0011
										(0.0014)
N	358	354	354	356	307	356	358	277	297	309
χ^2	31.127	33.366	33.549	30.126	39.220	31.865	30.369	22.916	20.020	28.894
Pseudo R^2	0.034	0.041	0.034	0.032	0.054	0.033	0.033	0.044	0.075	0.054
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Marginal effects for the probability of answering in the highest category are reported from weighted estimations and evaluated at a hypothetical representative consumer. Models with quantitative expectations are truncated to exclude the lower and upper 2.5% of the distribution. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1