Inflation Expectations and Consumption Expenditure*

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Abstract

We document a positive cross-sectional association between households' inflation expectations and their willingness to purchase durable consumption goods. Households that expect an increase in inflation are 8% more likely to have a positive spending attitude compared to households that expect constant or decreasing inflation. This positive association is higher for more educated, working-age, high-income, and urban households. We establish these facts using novel German micro-data for the period 2000-2013. To obtain identification, we exploit a natural experiment: in November 2005, the German government unexpectedly announced a three-percentage-point increase in value-added tax (VAT) starting in 2007. This shock increased the inflation expectations of German households. Households in other European Union countries, which were not exposed to the VAT shock, serve as counterfactuals in a difference-in-differences identification design. Our findings suggest that fiscal and monetary policy measures that engineer higher inflation expectations may succeed in stimulating consumption expenditure.

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I Introduction

In the current situation, where nominal interest rates are constrained because they can't go below zero, a small increase in expected inflation could be helpful. It would lower real borrowing costs, and encourage spending on big-ticket items like cars, homes and business equipment. Christina Romer (2013)

Can temporarily higher inflation expectations contribute to higher spending on consumption goods? This question has stirred a large debate during the Great Recession, with nominal interest rates constrained by the zero lower bound. Proponents of the thesis argue that temporarily higher inflation expectations may increase aggregate demand, stimulate GDP, and bring the economy back to its steady-state growth path. The positive relationship between inflation expectations and consumption spending should be higher for durable consumption, because households can easily substitute purchases of durable goods over time. Theoretically, this argument hinges on two premises. First, in times of fixed nominal interest rates, an increase in inflation expectations decreases real interest rates (Fisher equation). Second, lower real interest rates reduce savings and stimulate consumption (Euler equation).[1] However, the positive effect of lower real interest rates on consumption depends on assumptions regarding preference. In addition, households use paper money and short-term liquid savings instruments as a medium of exchange. Because inflation is an implicit tax on those assets, it may lower economic activity.[2] Higher inflation expectations may also lead to higher uncertainty, and hence in fact reduce consumption spending via a precautionary-savings channel.[3] Therefore, the sign of the association between households' inflation expectations and their willingness to spend on consumption goods is an empirical question.

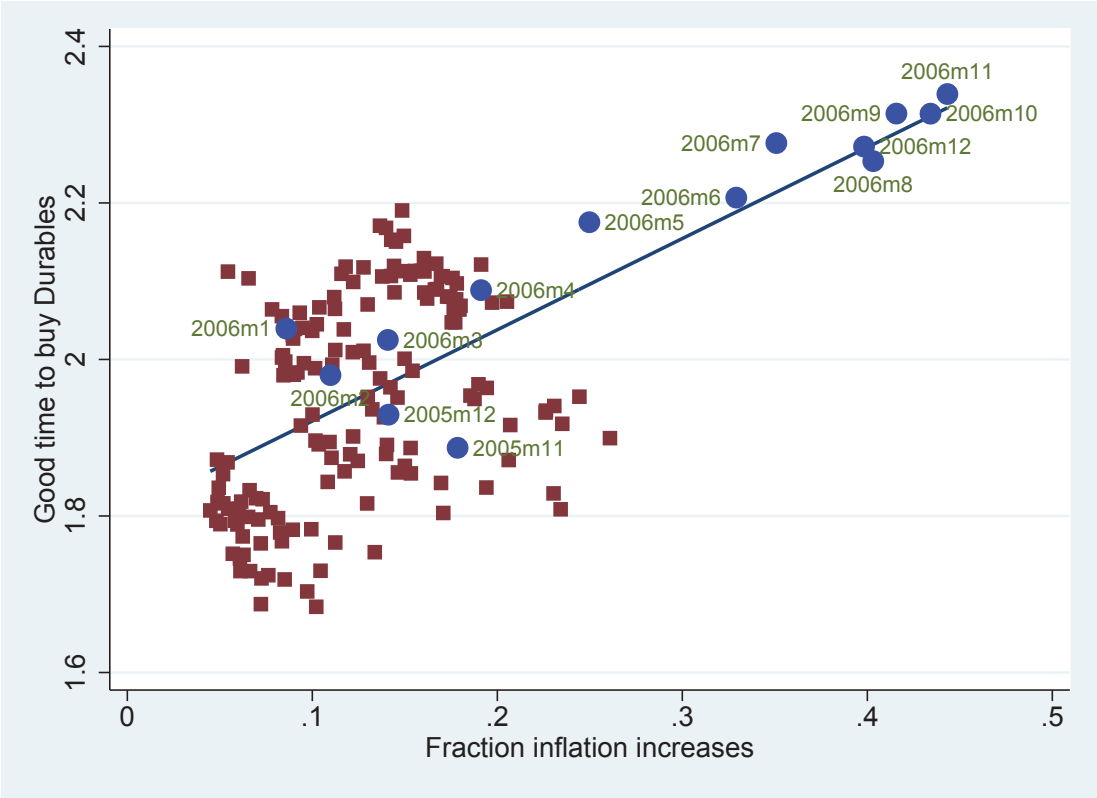
In this paper, we use novel micro data from a survey of German households from January 2000 until December 2013, as well as a unique exogenous shock to German households' inflation expectations, to study the cross-sectional relationship between

[1] Higher inflation expectations may also boost consumption spending through a wealth-redistribution channel, if borrowers have higher marginal propensities to consume out of wealth (Doepke and Schneider (2006) and Mian, Rao, and Sufi (2013)). Rogoff (2011) supports temporary higher inflation to allow under-water households to delever, whereas Krugman (2013) favors higher inflation to increase aggregate demand.

[2] See Aruoba and Schorfheide (2011).

[3] See Taylor (2013), Bloom (2009), and Pástor and Veronesi (2013).

Figure 1: **Readiness to spend on durables and inflation expectations**



This figure plots the average monthly readiness to purchase durables on the y-axis against the average monthly inflation expectation. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to construct these variables. GfK asks a representative sample of 2,000 households whether it is a good time to purchase durables given the current economic conditions. Higher values correspond to better times. GfK also asks how consumer prices will evolve in the next twelve months compared to the previous twelve months. We create a dummy variable that equals 1 when a household expects inflation to increase. The sample period is January 2000 to December 2013 for a total of fourteen years.

inflation expectations and households' readiness to spend on durable consumption goods. Figure 1 shows our main finding. We present a scatter plot of the average monthly willingness to purchase durable goods across surveyed households, against the share of households that expect inflation to increase. The solid line is the slope of a regression of average willingness to purchase durables on the index of inflation expectations. The correlation between inflation expectations and spending attitudes is 0.59 over the full sample.

The blue circles show that inflation expectations and the average willingness to purchase durables increased during 2006. The newly-elected administration between the Christian Democrats and the Social Democrats unexpectedly announced in November 2005 a three-percentage-point increase in the value-added tax (VAT) effective in January

2007. This shock to inflation expectations helps us causally link inflation expectations to the readiness to purchase durable consumption goods in a difference-in-differences identification design. To the best of our knowledge, this is the first paper that exploits a natural experiment, and a difference-in-differences identification strategy, to test for the effect of inflation expectations on the readiness to buy durables.

We employ novel survey data collected by the market research firm GfK on behalf of the European Union to measure consumer confidence in Germany. The survey asks households to pick one of three choices to answer the question on whether it is a good time to purchase durable goods given general economic conditions ("it is neither a good nor a bad time," "it is a bad time," "it is a good time").

In the baseline analysis, we estimate a set of multinomial logit regressions to study the relationship between inflation expectations and willingness to spend in the cross section. The positive association in the scatter plot is a robust feature of the data. Households that expect inflation to increase are on average 8% more likely to declare that it is a good time to buy durable goods for them, compared to households that expect constant or decreasing inflation. This positive association holds when we control for observed household-level heterogeneity with a rich set of demographic variables, as well as for macroeconomic conditions common to all households. Households which expect higher inflation are also less likely to save consistent with our intertemporal substitution results for durable consumption. Households which expect deflation are 4% less likely to have a positive stance towards purchasing durable goods.[4]

To assess the extent to which the association between households' inflation expectations and their reported willingness to purchase durable goods may be causal, we exploit a sudden shock to German households' inflation expectations. The newly-formed German government unexpectedly announced in November 2005 a three-percentage-point increase in the VAT effective January 2007. The VAT increase was legislated to consolidate the federal budget, and was not related to prospective economic conditions, and hence falls into the exogenous tax change category following the nomenclature of Romer and Romer (2010). Indeed, we observe a surge in inflation expectations throughout 2006 which was

[4]Our results are similar if we interpret the three options as an ordered set of choices, and hence use an ordered probit model for estimation, or if we estimate the relationship using ordinary-least squares. See Table A.6 in the online appendix.

specific to Germany compared to other European countries.[5] Feldstein (2002) suggests that pre-announced VAT increases can be a discretionary fiscal policy measure to increase inflation expectations and stimulate private spending.[6] The European Central Bank (ECB) is responsible for monetary policy in the whole Euro area, including Germany, and its mandate is to guarantee price stability for all Euro-membership countries. Importantly, the ECB did not increase nominal rates to offset the increase in inflation expectations in Germany.[7] We use households across European Union countries which were not exposed to the shock to inflation expectations as a control group in a difference-in-differences identification strategy. This strategy confirms our baseline findings and allows us causally to interpret the positive association between inflation expectations and readiness to spend on durable goods.

We then move on to study the heterogeneity in the relationship between inflation expectations and willingness to spend, which is particularly relevant for policy purposes. The association is stronger for survey participants with a college degree, for urban households, for larger households, and for high-income households. The size of the association is similar across age groups, but it drops by 20% for survey participants in retirement age.

The marginal effect of inflation expectations on the propensity to purchase durable goods is constant over time, but more than doubles to 19% during the period after the announcement and before the effectiveness of the VAT increase.

Using cross-sectional micro data to study the relationship between inflation expectations and willingness to spend has several advantages compared to using aggregate time-series data. First, micro data allow us to study the relationship between inflation expectations and readiness to buy durables at the level of the actual decision maker. Second, the granularity of the data allows us to control for factors that may induce a negative relationship between inflation expectations and the purchases of consumption goods, and to study the impact of household heterogeneity. Third, the cross-sectional nature of the data allows us to study the inflation expectations – willingness to spend nexus

[5]Figure 13 shows the evolution of inflation expectations for the European Union (EU) and other EU membership countries.

[6]Feldstein (2002): "This [VAT] tax-induced inflation would give households an incentive to spend sooner rather than waiting until prices are substantially higher."

[7]In the words of the president of the Bundesbank at the time (Weber (2006)): "We know what the effects of the VAT increase are; as is the case for oil prices, we do not consider one-off effects."

across different time periods. Finally, aggregate inflation expectations and consumption expenditure are jointly determined. Household buying intentions, instead, are unlikely to affect aggregate prices, which mitigates reverse-causality concerns.

Two features of the novel German data make them ideal for studying the relationship between households' inflation expectations and their willingness to purchase durable goods. First, the survey asks households about *their* willingness to spend on consumption goods, as opposed to their opinion on whether it is generally a good time to consume *for people* as in the Michigan Survey of Consumer (MSC), which has been used to study similar questions in the United States. Second, we can exploit a unique natural experiment, the unexpected announcement of an increase in VAT in 2005, in a setting where households in other European countries can be used as plausible counterfactuals, because they are not exposed to the increase in VAT, but are exposed to the same shocks to nominal interest rates as German households. This setting is close to the ideal experiment of exogenously increasing households' inflation expectations in times of constant nominal interest rates, and helps us to identify causally the effect of inflation expectations on households' willingness to spend on durable goods.

Our analysis is also subject to a set of shortcomings. First, our survey consists of repeated cross sections of households. We cannot exploit within-household variation in inflation expectations to control for time-invariant unobserved heterogeneity at the household level. The rich set of household demographics, household expectations regarding their personal economic outlook (such as their future employment status and financial conditions), as well as expectations regarding macroeconomic aggregates (such as GDP and unemployment), help alleviate this concern. Second, the survey only elicits a measure of households' readiness to purchase consumption goods, and we do not observe the actual consumption behavior of households ex post. Previous research has shown that households' willingness to spend on durables closely tracks actual consumption expenditure on durable consumption goods,[8] a result that is true also in the German setting (see Figure 10). A third potential shortcoming of our analysis is that the survey only elicits qualitative inflation expectations. However, the qualitative nature of our measure could be an advantage, because Binder (2015) shows that in quantitative surveys, a large share of households bunch their inflation expectations at salient threshold values,

[8]See Bachmann, Berg, and Sims (2015) for evidence in the US.

and they often report implausible values for expected inflation rates.

Moreover, the qualitative measures is particularly helpful when we observe repeated cross sections of households. Consider the following example of two households A and B. Household A has a perception of average inflation of 2%. Household B has a perception of average inflation of 6%. Household A expects that inflation will increase, and therefore thinks it is a good time to purchase durables. Household B expects inflation to decrease, and therefore wants to postpone the purchase of durable goods. Assume further that household A reports in a quantitative survey that it expects inflation during the next twelve months to be 3%, whereas household B replies 5%. If we were to run a cross-sectional regression of the reported willingness to purchase durable goods on the quantitative inflation expectations, and we could not observe within-household inflation expectations over time, we would estimate a negative relationship between inflation expectations and consumption, even though the true underlying relationship is positive.

Our paper provides empirical support for a large and growing theoretical literature that emphasizes the stabilization role of inflation expectations. On the monetary policy side, Krugman (1998), Eggertsson and Woodford (2003), Eggertsson (2006), and Werning (2012) argue that a central bank can stimulate current spending by committing to higher future inflation rates during periods in which the zero lower bound on nominal interest rates binds. On the fiscal policy side, Eggertsson (2011); Christiano, Eichenbaum, and Rebelo (2011); Woodford (2011); and Farhi and Werning (2015) show that inflation expectations can increase fiscal multipliers in standard New Keynesian models in times of a binding zero lower bound on nominal interest rates. From a historical perspective, Romer and Romer (2013) argue that deflation expectations induced by the monetary authority caused the Great Depression, whereas Eggertsson (2008) and Jalil and Rua (2015) suggest that a fiscal and monetary policy mix was successful at engineering higher inflation expectations and spurring the recovery from the Great Depression. From an international perspective, Hausman and Wieland (2014) study the monetary easing of the Bank of Japan together with the expansionary fiscal policy commonly known as "Abenomics." They provide evidence consistent with higher inflation expectations raising consumption and GDP using aggregate time series data.

We also contribute to a recent literature that uses micro-level data to study the relationship between inflation expectations and households' readiness to purchase

consumption goods. Bachmann et al. (2015) start this literature using survey data from the MSC. They find an economically small and statistically insignificant association between households' inflation expectations and their readiness to spend on durable consumption goods. Burke and Ozdagli (2014) confirm these findings using panel survey data from the New York Fed/ RAND-American Life Panel household expectations survey for a period from April 2009 to November 2012. Ichiue and Nishiguchi (2015) find that Japanese households that expect higher inflation plan to decrease their future consumption spending, but have increased their spending in the past. Other papers that use micro survey data from the MSC are Souleles (2004), who studies the rationality of consumer expectations; Piazzesi and Schneider (2009), who study momentum trading in housing markets; Malmendier and Nagel (2009), who show that personal experiences determine inflation expectations; Dräger and Lamla (2013), who study the anchoring of inflation expectations; and Carvalho and Nechio (2014), who document that a set of households form expectations consistent with a Taylor rule. Coibion and Gorodnichenko (2012) study the effect of macroeconomic shocks on forecast errors in the MSC and provide evidence consistent with models of informational rigidities.

Our findings on the delayed adjustment in households' inflation expectation after the announcement of the VAT increase throughout 2006 in Figure 1 and the fact that only 50% of households expected higher inflation during the next twelve month in December 2006, one month before the VAT increase, provide empirical support for deviations from a full-information rational attention benchmark (see Coibion and Gorodnichenko (2012)). Our data can be used to test theories such as limited attention, bounded rationality, or rational inattention in macroeconomics.[9]

We also relate to Cashin and Unayama (2015), who exploit the VAT increase in Japan to estimate the intertemporal elasticity of substitution using micro data from the Japanese Family Income and Expenditure Survey. They do not observe households' inflation expectations.

Finally, the heterogeneity of our findings across demographic groups such as age, income, education, and city-size groups relate our paper to the literature on economic and financial literacy (see, e.g., Campbell (2006) and Lusardi and Mitchell (2011) for recent overviews of the literature).

[9]See e.g., Sims (2010), Woodford (2012), Mackowiak and Wiederholt (2014), and Gabaix (2014).

Increasing the transparency of monetary policy and facilitating the understanding of policy targets by the public are two key aims of the recent monetary policy strategy in the United States. The heterogeneity of our findings across demographic groups, as well as the delayed response in households' inflation expectations to the announced increased in the VAT, suggest that some households might not fully understand the aims of policy changes and interventions. Households' cognitive abilities and inattention to policy changes could also rationalize the differences between our findings and the existing literature. In the MSC, 3% of households expect a deflation of up to 50%, whereas 17% of households expect inflation to increase by more than 9% per year. Households might have a bad understanding of the concept of inflation, which is consistent with recent work by Binder (2015). 48% of households report inflation-expectation magnitudes as multiples of 5, which Binder (2015) interprets as uncertainty about inflation. Controlling for inflation uncertainty, she indeed finds a positive marginal effect of inflation expectations on the readiness to purchase durables for households that report a desire to buy in advance of rising prices. For households with ex-post accurate inflation expectations, which have most likely less uncertainty about inflation, Bachmann et al. (2015) also find a positive association between inflation expectations and readiness to purchase durable goods, consistent with the results of Binder (2015).

II Inflation Expectations and Consumption Expenditure: Theory

Proponents of temporary higher inflation expectations typically argue that higher inflation expectations lead to lower real interest rates (Fisher equation effect). Lower real interest rates stimulate consumption expenditure via intertemporal substitution (Euler equation effect). The substitution effect should be especially strong for durable consumption goods, because they are the most interest-rate sensitive, and the easiest to substitute intertemporally. In this section, we sketch a simple model economy to emphasize the key assumptions necessary for this logic to hold.

The representative household derives flow utility from nondurable consumption, C_t, and the stock of durable consumption, D_t. The stock of durable consumption depreciates at a rate θ, and the representative household discounts future utility by a factor β. Both

θ and β lie between 0 and 1. Households receive a nominal endowment each period of Y_t and enter the period with bond holdings B_t. Bonds earn a nominal gross return of R_t. P_t denotes the price index in period t, which for ease of exposition applies to both durable and nondurable consumption goods. The utility function is additively separable, and households derive flow utility, which is proportional to the stock of durables with a factor of proportionality of 1. Households have CRRA preferences with the same coefficients of relative risk aversion for nondurable consumption and the flow of durable consumption. We abstract from uncertainty. The representative household maximizes

$$\begin{aligned} &\beta^s \sum_{s=0}^{\infty} \left(\frac{C_{t+s}^{1-\gamma}}{1-\gamma} + \frac{D_{t+s}^{1-\gamma}}{1-\gamma} \right) \\ &\text{s.t.} \qquad P_t C_t + P_t \left[D_t - (1-\theta) D_{t-1} \right] + B_{t+1} = Y_t + R_t B_t. \end{aligned}$$

The flow budget constraint states that nominal consumption expenditure for nondurable goods, investments in the stock of durable consumption goods, and bond purchases have to equal the nominal endowment and the payoff from previous-period bond purchases.

Let λ denote the Lagrange multiplier on the household's budget constraint. The first-order conditions for the representative household with respect to nondurable consumption, durable consumption, and bond holdings are given by:

$$C_t^{-\gamma} = \lambda_t P_t \tag{1}$$

$$D_t^{-\gamma} = \lambda_t P_t - \beta \lambda_{t+1} P_{t+1} (1-\theta) \tag{2}$$

$$\lambda_t = \beta \lambda_{t+1} R_{t+1}. \tag{3}$$

Combining the first-order condition for nondurable consumption (equation (1)) with the law of motion for the Lagrange multiplier (equation (3)), we get the familiar intertemporal Euler equation for nondurable consumption goods:

$$\left(\frac{C_{t+1}}{C_t} \right)^{\gamma} = \beta \frac{R_{t+1}}{\pi_{t+1}}, \tag{4}$$

where π_{t+1} denotes price inflation between period t and $t+1$.

Combining all three first-order conditions, we get the intratemporal Euler equation

for the choice between durable and nondurable consumption goods:

$$\left(\frac{C_t}{D_t}\right)^{\gamma} = \left[1 - \frac{\pi_{t+1}}{R_{t+1}}(1-\theta)\right]. \tag{5}$$

We see from equation (4) that higher inflation leads to a drop in consumption growth given fixed nominal interest rates, R_{t+1}, and $\gamma > 0$. We see from equation (5) that under fixed nominal interest rates, $\gamma > 0$, and $\theta < 1$, we also expect an intratemporal substitution from nondurable consumption to durable consumption. We can gain intuition for the intratemporal substitution from equation (2). One unit of the durable consumption good will depreciate to $(1-\theta)$ units in period $t+1$. We will therefore take the future discounted marginal utility of the undepreciated stock of durables into account when we equate the marginal utility of purchasing one more unit of the durable good and its marginal cost. Future marginal utility of one unit of the durable good purchased today increases in the future price level.

Several assumptions are necessary for higher inflation expectations to stimulate consumption expenditure. First, the Fisher equation is only an accounting identity, and does not say anything about equilibrium relationships and adjustments. We have assumed nominal interest rates do not immediately and fully increase to offset increasing inflation expectations. This assumption holds when the economy is constrained by the zero-lower bound on nominal interest rates and in a currency union. Second, we have assumed the shock to inflation expectations only affects current-period marginal utility, and have treated marginal utility of future consumption as given. This assumption implies that shocks to inflation expectations are sufficiently short-lived. Third, we have assumed that changes in inflation do not affect future nominal endowments. In this setup, higher inflation expectations increase the price of future consumption, and the substitution effect increases current-period consumption. Higher inflation leads to a drop in the present discounted value of real endowment, and hence both current and future consumption will decrease. Stickiness of wages can partially justify this assumption. If inflation increases future nominal endowments, then increases in inflation expectations, given fixed nominal interest rates, have similar implications as lower nominal interest rates. An income effect might work against the substitution effect. Empirically, the substitution effect seems to dominate (see Christiano et al. (2005)). Fourth, we abstracted away from uncertainty.

Increases in inflation might lead to increases in uncertainty about fundamentals, and therefore lower consumption via a precautionary-savings channel. Fifth, households might be heterogeneous in their asset positions, their marginal propensities to consume, and have heterogeneous expectations regarding future endowments (see Auclert (2014)). We will therefore allow for differences in expectations regarding future real income in the empirical analysis.

The relationship between inflation expectations and consumption expenditure is theoretically ambiguous and ultimately an empirical question.

III Data

A. Data Sources

We use the confidential micro data underlying the GfK Consumer Climate MAXX survey. GfK conducts the survey on a monthly basis on behalf of the Directorate General for Economic and Financial Affairs (DG ECFIN) of the European Union to measure consumer confidence and households' spending and savings attitudes in Germany. The goal of the survey is to provide household-level information for comparing business cycles across European Union member countries. In Germany, GfK asks a representative sample of 2,000 households questions about general economic expectations, income expectations, and willingness to buy consumption goods. The aim is to build a synthetic measure of the monthly consumer climate in Germany. The survey consists of repeated cross sections of households. The company verifies the representativeness of the sample on a regular basis. GfK is Germany's largest market research institute, and it operates across most European countries, being the fourth-largest market research institute in the world. We obtained access to the confidential household-level data for the period starting in January 2000 and ending in December 2013, for a total of fourteen years. This period includes substantial time-series variation in macroeconomic fundamentals, two major recessions, and an unexpected increase in the German VAT in 2007. This shock is crucial to help us assess the extent to which the association between inflation expectations and willingness

to spend on consumption goods is causal.[10]

We use the answers to the following two questions in the survey to construct the main variables in our baseline analysis:

Question 8 *Given the current economic situation, do you think it's a good time to buy larger items such as furniture, electronic items, etc.?*

Households can answer, "It's neither a good nor a bad time," "No, it's a bad time," or "Yes, it's a good time."

Question 3 *How will consumer prices evolve during the next twelve months compared to the previous twelve months?*

Households can answer, "Prices will increase more," "Prices will increase by the same," "Prices will increase less," "Prices will stay the same," or "Prices will decrease."

To get a measure of inflation increases, we create a dummy variable that equals 1 when households answer, "Prices will increase more." Households' inflation expectations are highly correlated with their perception of past inflation (see Jonung (1981)). Hence, we will also use survey question 2 in our baseline analysis to disentangle the effects of inflation expectations from inflation perceptions:

Question 2 *What is your perception on how consumer prices evolved during the last twelve months?*

Households can answer, "Prices increased substantially," "Prices increased somewhat," "Prices increased slightly," "Prices remained about the same," or "Prices decreased."

The online appendix contains the original survey and a translation to English.

We also use additional questions regarding expectations on general economic variables, expectations regarding personal income or unemployment, and a rich set of socio-demographics from the GfK survey. For robustness tests, we also assembled data for macroeconomic aggregates, such as official GDP and unemployment numbers from the German statistical office (DeStatis), nominal interest rates, the value of the German stock index DAX, and measures of European and German policy uncertainty from Baker, Bloom, and Davis (2014). The online appendix describes in detail the data sources and variable definitions.

[10]We use similar data from the harmonized surveys of DG ECFIN for several European Union membership countries in section V to create a matching estimator. We discuss the data in more detail in the online appendix.

B. Descriptive Statistics

Table 1 contains some basic descriptive statistics. 20% of households report that it is a good time to buy durables. 24% report that it is a bad time to purchase durables. More than 50% are indifferent, and think that it is neither a good nor a bad time to buy durables. 14% of households expect inflation to increase in the next twelve months. More than 80% of respondents think that prices in the previous twelve months increased substantially, somewhat, or slightly, with equal proportions for each answer. Only 13% think that prices remained the same, and essentially nobody reports that prices decreased.

The sample is balanced between women and men. The majority of respondents have a high school degree but no college education.[11] The mean household's size is 2.5, the majority of households live in cities with less than 50,000 inhabitants, and roughly 75% of households have a monthly net income of less than EUR 1,500.

Panel C reports statistics for households' personal expectations. Most households report that their financial situation has not changed in the last twelve months, and they expect the same for their future financial situation. Most households either do not save at all or only a little, and expect a constant or slightly increasing unemployment rate.

Panel D reports statistics for macroeconomic aggregates. The inflation rate averaged around 1.6% per year, and the average unemployment rate was slightly below 8%. The average level of the DAX stock index was 5,840 points, with an average annual volatility of 22.79%. Industrial production growth averaged around 1.6% per year, and the average oil price was $63.

Figure 2 plots the monthly time series of the dummy variable for inflation increases averaged across households and the monthly average willingness to buy durable goods. Higher values correspond to higher spending propensities. Expected inflation increases hover around the time-series mean at the beginning of the sample, and then spike mid-2001, before dropping below mean levels until the end of 2005. 2006 contains a sharp increase in expected inflation, with a subsequent drop and two minor spikes in mid-2007 and 2008. The series fluctuates around its mean value for the rest of the sample. The propensity to purchase durables starts at the average level before dropping below the mean in 2001. The series increases slightly before increasing more sharply in 2006. The

[11] The majority of respondents went to either Hauptschule or Realschule, and only 8% of households have a college degree.

increase reverts in 2007 before the series starts trending upward at the end of 2008.

The top-left panel of Figure 3 plots the time series of the harmonized German CPI inflation rate in percent at an annual rate. The inflation rate is around 1.5% at the beginning of the sample and increases to 2.8% in May 2001 before it drops to 0.6% in May 2003. Then, inflation fluctuates between 1% and 2% until the end of 2006. At the beginning of 2007, the annualized inflation rate is 1.7%, and increases to 3.2% as of November 2007. Inflation remains high and above its sample mean until October 2008, before we see short periods of negative inflation in July and September 2009. After 2009, inflation slowly increases, and is above 1% in March 2010.

Inflation expectations in the GfK survey lead actual inflation, especially during the period between the announcement of the exogenous VAT increase in November 2005 and the effectiveness of the tax increase in January 2007. We discuss the relation between inflation expectations and actual inflation, willingness to purchase durables and actual purchases, and related issues in more detail in Section VII.

IV Inflation Expectations and Consumption Expenditure: Baseline Analysis

A. Econometric Model

Our outcome variable of interest, households' readiness to purchase durable goods, derives from the discrete choices in the survey questions. The survey does not elicit a continuous measure of the readiness to spend, and hence regressing the outcome on inflation expectations in an ordinary least-square specification would bias our estimated coefficients. Hence, we model the response probabilities for the choices in the survey in a multinomial logit model.

We assume the answer to the question on the readiness to spend is a random variable representing the underlying population. The random variable may take three values, $y \in \{0, 1, 2\}$. 0 denotes that it is neither a good nor a bad time to purchase durable goods; 1 denotes that it is a bad time to purchase durable goods, and 2 denotes that it is a good time to purchase durable goods.

We define the response probabilities as $P(y = t|X)$, where $t = 0, 1, 2$, and X is

a $N \times K$ vector where N is the number of survey participants. The first element of X is a unit vector, and the other $K-1$ columns represent a rich set of household-level observables, including demographics and expectations. The set of observables X allows us to control for heterogeneity across households, and hence reduces concerns that unobserved heterogeneity correlated with inflation expectations may drive any results.

We assume the distribution of the response probabilities is

$$P(y=t|X) = \frac{e^{X\beta_t}}{1+\sum_{z=1,2} e^{X\beta_z}}, \tag{6}$$

for $t = 1, 2$ and β_t is a $K \times 1$ vector of coefficients. The response probability for the case $y = 0$ is determined, because the three probabilities must sum to unity

$$P(y=0|X) = \frac{1}{1+\sum_{z=1,2} e^{X\beta_z}}. \tag{7}$$

Equations (6) and (7) summarize our multinomial logit model. We estimate the model via maximum likelihood to obtain the vector β_t of coefficients for $t = 1, 2$, and set the category $y = 0$ as the baseline response. The β_t coefficients allow us to estimate the relative odds of an outcome for a change in the covariate of interest with respect to the base outcome.

For ease of interpretation, we compute the marginal effects of changes in the covariates on the probability that households choose any of three answers in the survey.

We exploit the fact that the response probability for $t = 0, 1, 2$ to a change in covariate x ∈ X is given by

$$P(y=t|x) = \frac{e^{x'\beta_{tx}}}{\sum_{z=0,1,2} e^{x'\beta_{zx}}}. \tag{8}$$

For the case of approximately continuous covariates, we can compute the marginal effect of each covariate x on the response probability as the derivative of $P(y = t|x)$ with respect to x

$$\frac{\partial P(y=t|x)}{\partial x} = P(y=t|x)\left[\beta_{tx} - \sum_{z=0,1,2} P(y=z|x)\beta_{zx}\right], \tag{9}$$

for $z = 0, 1, 2$. For discrete covariates, we determine the marginal effects by predicting

the response probabilities for the potential values of the covariates, and compute the average across predicted probabilities. In all tables, we report the estimated marginal effects in Equation 9 for each covariate of interest.

B. Baseline Estimation

Table 2 reports the average marginal effects for our baseline multinomial logit regression. We cluster standard errors at the quarter level, which results in 56 clusters. In the first two columns, the inflation increase dummy is the only explanatory variable. Column (1) reports the marginal effect of the inflation increase dummy on the likelihood that households respond, "it's a bad time to buy durables," whereas column (2) reports the marginal effect on the likelihood that households reply, "it's a good time to buy durables." We see that both marginal effects are positive and statistically significant. Economically, the marginal effect in column (2) implies that households that expect inflation to increase over the next twelve months are on average 6.2% more likely to answer, "it's a good time to buy durables" compared to households that expect constant or decreasing inflation. Surprisingly, households with higher inflation expectations are also more likely to have a more negative propensity to consume durables compared to households that expect constant or decreasing inflation. This result disappears once we control for expectations about the households' future economic conditions. We interpret this finding below.

The perception of past inflation shapes households' expectation of future inflation (see Jonung (1981) and Driver and Windram (2007)). Household heterogeneity in the perception of past inflation might partially drive the surprising positive marginal effect of inflation increases on the likelihood of answering, "it's a bad time to buy durables." We indeed find in columns (3) and (4) that past inflation perceptions lower the marginal effect of inflation increases on the negative consumption propensity. Inflation perceptions increase the marginal effect for the likelihood that households have a positive attitude toward buying durables. High perceptions of past inflation decrease the marginal propensity to consume durables, whereas they increase consumers' negative attitude toward buying durables.

Increases in inflation expectations might increase uncertainty about the future, and lead to higher savings via a precautionary-savings channel. Past inflation perceptions negatively affect marginal propensities to consume, which hints towards the importance

of anchoring inflation expectations. Higher inflation expectations might raise consumption spending today, but might lower consumption spending next year. The average marginal effects of past inflation perceptions in columns (3) and (4) are consistent with this interpretation.

We derive the theoretical relationship between inflation expectations and consumption expenditures in Section II. This relationship holds at the household level and, under suitable assumptions, also at the aggregate level (see, e.g., Attanasio and Weber (1993)). Households differ, however, in their purchasing propensity. Household characteristics determining purchasing propensities and households' inflation expectations might be systematically related. Hence, it is important to keep those characteristics constant in order to identify an effect of inflation expectations on spending attitudes.

Attanasio and Weber (1993) study the relationship between real interest rates and consumption growth and find "excess sensitivity" of consumption growth to labor income in aggregate data. They argue that young households might be borrowing-constrained and, therefore, adjust consumption to changes in labor income. Excess sensitivity disappears once they control for a rich set of demographics such as family size, education, and employment in cohort data. They justify their empirical model theoretically by means of cohort-specific taste shocks.

Households' economic outlook can also affect the relationship between inflation expectations and their willingness to purchase durable goods. Imagine households systematically differ in their degree of optimism and pessimism about life in general. Households of type A have a positive outlook and expect good times ahead. Type-A households might therefore expect low inflation but high growth, and hence answer that it is a good time to buy durables. Households of type B might expect high inflation and low growth, and hence answer that it is a bad time to purchase durables. If we ran a cross-sectional regression of spending attitudes on inflation expectations without controlling for the type of household, we would estimate a negative coefficient.

Some households might be "bullish" about the economy in general and have some form of Phillips curve in mind when forming expectations. Those types of households might expect high GDP growth, which then causes high inflation.

Table 2 adds a rich set of demographics (columns (5) and (6)), expectations about personal and macroeconomic variables (columns (7) and (8)), and contemporaneous

macroeconomic variables (columns (9) and (10)). Adding demographics has little impact on the statistical significance and economic magnitude of the effect of inflation increases on the willingness to purchase durables (columns (5) and (6)). Controlling for households' expectations regarding their own prospects or future macroeconomic variables increases the marginal effect of the inflation increase dummy on the "good time" outcome. Instead, adding the controls changes the sign of marginal effect on the "bad time" outcome. Economically, households that expect inflation to increase are on average 8.9% more likely to have positive spending attitudes compared to households that expect constant or decreasing inflation. Perceptions of high past inflation lower the propensity to purchase durables, which is consistent with an intertemporal substitution channel. Adding contemporaneous macroeconomic variables in columns (9) and (10) does not affect these findings.[12]

Households' expectations appear important for the inflation-expectations–willingness-to-buy nexus. Table 3 studies the effect of those expectations on this nexus in more detail. Columns (1) to (4) split the sample of respondents based on their GDP growth outlook for the next year, using the median answer as cutoff. Columns (5) to (8) split the sample based on households' expectations regarding aggregate unemployment during the following twelve months.[13] Columns (1), (2), (5), and (6) run the baseline multinomial logit specification only on households with a positive economic outlook, whereas columns (3), (4), (7), and (8) run the baseline analysis only on households with a negative economic outlook. Households that expect inflation to increase are 6%-8% more likely to be positively tempered toward buying durables compared to households that expect constant or decreasing inflation (even columns). Interestingly, the positive marginal effect of inflation expectations on replying, "it's a bad time to buy durables" is solely driven by those households that have a negative economic outlook for the following year (columns (3) and (7) vs. columns (1) and (5)). The differential effect of inflation expectations on households' willingness to purchase by household expectations hints at the importance of heterogeneity for macroeconomics. The effect of past inflation perceptions is again consistent with the intertemporal substitution channel.

[12]Table A.1 in the appendix reports marginal effects for all control variables.

[13]The discrete nature of the survey with five possible answers results in unbalanced samples when we use the median answer as the cutoff. Results are virtually identical when we assign households with median expectations to the sample with a positive economic outlook (see Table A.3).

V Inflation Expectations and Consumption Expenditure: Identification

A. Exogenous Shock to Inflation Expectations

The richness of the GfK micro-data has many desirable features. However, we cannot rule out that demand shocks result in movements along the supply curve, and hence in a positive relation between *realized* aggregate consumption and prices. Because we study the relationship between *expected* inflation and willingness to purchase durable consumption goods at the household level, it is unclear how demand shocks might affect inflation expectations and the propensity to consume. Ideally, we would want to exploit an exogenous shock to inflation expectations that does not affect households' willingness to purchase durable goods through channels different from inflation expectations. We attempt to get as close as possible to such an ideal shock by following the narrative approach of Romer and Romer (2010).

The newly-formed German government unexpectedly announced in November 2005 a three-percentage-point increase in the VAT effective January 2007. The narrative records show that the VAT increase was not legislated for reasons related to economic conditions, but to consolidate the federal budget.[14] We discuss the narrative record and the historical context in detail in Section VII.

The announcement of the VAT increase is an unexpected shock to German households' inflation expectations and should result in higher consumption expenditure as long as nominal interest rates do not increase sufficiently to leave real rates constant. Germany is part of the Euro currency area, and the ECB is responsible for monetary policy and price stability in the whole currency union. The ECB did not see the need to tighten monetary policy to accommodate the increase in inflation expectations in Germany. Figure A.6 in the online appendix shows that nominal borrowing rates faced by households for consumption loans fluctuated between 5.9% and 7.1% in 2006 and 2007. The rate was 6.7% in January 2006 and 6.4% in December 2007.[15]

[14] A VAT increase in a fixed-nominal-rates environment resembles the unconventional fiscal policies to stimulate spending described in Correia, Farhi, Nicolini, and Teles (2013).

[15] Moreover, we will show below a difference-in-difference estimation using only households in countries that belong to the European Monetary Union as control group, and hence are exposed to the same nominal interest rates as German households.

The VAT shock alone does not allow us to estimate causally the effect of inflation expectations on consumption expenditures, because all German households were exposed to the same shock. To obtain identification, we miss a counterfactual, that is, a group of households which was not affected by the shock but was *ex-ante* comparable to German households based on observables.

B. Difference-in-Differences Approach

The European Commission conducts harmonized surveys on representative cross sections of households in all European Union member countries, to determine consumer confidence and business cycle dynamics.

We obtained access to the confidential micro-data for four countries (France, Sweden, and the United Kingdom) through national statistical offices and GfK subsidiaries.[16] We use the households interviewed in those three countries to construct our control group. This control group represents a viable counterfactual to the evolution of inflation expectations and readiness to consume by Germans as long as the dynamics of inflation expectations and readiness to consume were similar to those of German households before the shock. We provide evidence to support this identifying assumption below.

Our identification strategy is a difference-in-differences approach: we compare the readiness to purchase durables by German households with that of households in other European countries, before and after the VAT shock, which only affected the inflation expectations of German households.

We estimate the Average Treatment Effect (ATE) of the VAT tax shock on the readiness to purchase durables as

$$(\overline{Dur}_{German,post} - \overline{Dur}_{German,pre}) - (\overline{Dur}_{foreign,post} - \overline{Dur}_{foreign,pre}), \tag{10}$$

where $\overline{Dur}_{German,post}$ is the average readiness to purchase durable goods by German households after the announcement of the VAT increase, $\overline{Dur}_{German,pre}$ is the average readiness to purchase durables goods by German households before the announcement of the VAT increase, and $\overline{Dur}_{foreign,post}$ and $\overline{Dur}_{foreign,pre}$ are the analogous averages for foreign households not exposed to the VAT shock. We match foreign households to

[16]The online appendix contains details of the data sources and the surveys used in national language.

German household with a nearest-neighbor algorithm that minimizes the difference on a set of observables.

C. Matching German and Foreign Households

The difference-in-differences strategy in equation (10) requires the construction of a control group of households that constitute a valid counterfactual for the set of treated German households. We use the pool of foreign households interviewed in the same months as German households to construct our control group.

An identifying assumption is that our control group behaves similarly to German households *before* the announcement of the VAT increase, the *parallel-trends assumption*. If this assumption holds, we can interpret the evolution of inflation expectations and consumption behavior of the matched households *after* the announcement of the VAT increase as a valid counterfactual to the evolution of inflation expectations and consumption behavior of German households absent the VAT shock.

The top panels of Figure 4 and Figure 5 provide graphical evidence that foreign households indeed represent a valid control group for German households. The trends in inflation expectations and purchasing propensities are parallel for German and foreign households before the announcement of the VAT increase (November 2005), even before matching German and foreign households based on demographics. Starting in January 2006 – twelve months before the effectiveness of the VAT increase – both the inflation expectations and willingness to buy durable goods of German households start to increase substantially and depart from the trends for foreign households. The bottom panels of Figure 4 and Figure 5 show that the similarity of pre-shock trends is even more pronounced when we only use French households as control group. This similarity is important, because France and Germany are both part of the Euro area, and hence, they are exposed to the same monetary policy. They share a common border and are structurally similar.

We perform a matching exercise to generate the control group: we match each German household for each month in our sample with a household in another country, interviewed in the same month, with similar demographic characteristics from the harmonized survey. We match households based on the propensity score to be in the treatment group, which we estimate with a logit regression of the treatment indicator on the following five observables: gender, age group, education group, income group, and

social status.[17] In Figure 6, we propose graphical evidence on the number of households across 40 bins of the distribution of the propensity score for the treatment group (red) and the control group (blue). We see that for both groups, households are distributed across the full range of the propensity score.

In our baseline specification, we match each German household in each month with its nearest neighbor from the available pool of foreign households.[18] Our samples are repeated cross sections, and we cannot track German and matched foreign households before and after the shock. We perform a second level of matching, which pairs up similar households interviewed before and after the shock separately within the German and the foreign survey waves.

We formally test whether households' characteristics are balanced after performing the nearest-neighbor matching. In Table 4, we report the mean of the observables we use for the matching exercise for households in the control and the treated pool as of June 2005, our baseline month before the VAT tax increase announcement. The third and fourth columns of Table 4 report the t-statistics and p-values for two-sided t-tests whose null hypothesis is that the means across the two groups are equal. For all five matching variables, we cannot reject the null at any plausible level of significance. In the bottom line of Table 4, we report the number of households that fall in the common support of the treated and control groups in June 2005, which is 1,431 and 5,108.

Before moving on to the estimation of the ATE in the difference-in-difference setting, we also verify that the positive association between inflation expectations and consumption expenditure holds true when we look at the households in each of the foreign countries separately. In Table 5, each column reports the marginal effect of the dummy for higher inflation expectations on the willingness to spend on durables from the same multinomial-logit specification as in the main analysis with German households. The association is positive and statistically significant for the UK, France, and Sweden, and the size of the association is similar across countries.

[17] We show in subsection VI below that age, income, and education are the strongest determinants of cross-sectional heterogeneity in the relation between households' inflation expectations and their consumption behavior. We can use four age groups (16-34; 35-49; 50-65; 65+), three education groups (primary education or below, secondary education, above secondary education), four quartiles of income for each wave in each country, and three social status categories.

[18] All the results are virtually identical if we perform the monthly matching using a group of control households for each German household, and we minimize the difference in observables of the German household and the group of foreign households.

D. Causal Effect of VAT shock on Readiness to Spend

We run a set of cross-sectional regressions on the matched sample of German and foreign households before and after the VAT shock to estimate the average treatment effect of the VAT shock in equation (10). We set the reference month before the VAT shock to June 2005, and we change the end month across regressions.[19]

We estimate the following specification:

$$\Delta Dur_{i,06/2005\to m} = \alpha + \beta_m \times VATshock_i + \Delta X'_{i,06/2005\to m} \times \gamma + \epsilon_i, \tag{11}$$

where $\Delta Dur_{i,06/2005\to m}$ is the difference in the willingness to spend on durable goods between month m and June 2005, $VATshock_i$ is an indicator which equals 1 if the household was exposed to the VAT shock, β_m captures the effect of the VAT shock on the willingness to buy durables for household i in month m, and $\Delta X'_{i,06/2005\to m}$ is the difference in a set of observables between month m and the baseline month.[20] We use the same indicator i for matched households interviewed in different months to economize on notation.

Figure 7 plots the coefficient β_m (solid line) of equation (11) for each month m from July 2005 to December 2007, and the 95% confidence intervals (dashed line). There is no difference in the readiness to spend on durable goods between German households and matched foreign households before the announcement of the VAT increase in November 2005. Starting in December 2005, right after the announcement, the effect of the VAT shock on the willingness of German households to purchase durable goods compared to matched foreign households is positive and statistically different from zero: German households are 3.8 percentage points (s.e. 1.5 percentage points) more likely to declare that it is a good time to purchase durable goods after the announcement compared to before, and compared to the matched foreign households. The effect increases in magnitude throughout 2006 and peaks at 34 percentage points in November 2006. The average treatment effect drops to zero in January 2007 once VAT increases and higher inflation materializes.

[19] All the results are similar if we use any another month before the announcement of the VAT increase in November 2005.

[20] Note that the indicator $VATshock$ coincides with a dummy variable that equals 1 if the household is German.

Figure 7 shows that the VAT shock has a strong and positive effect on the willingness of German households to purchase durable goods after the announcement and before the increase took effect, even after controlling for the purchasing propensities of similar households not exposed to the shock in a difference-in-differences setting. Interestingly, we do not detect any reversal of the positive effect of the VAT shock on the willingness to purchase durable goods after January 2007.

VI Inflation Expectations and Consumption Expenditure: Heterogeneity

A. Household Heterogeneity

Empirically, household heterogeneity seems relevant for the magnitude of the marginal effect of inflation expectations on consumption expenditure (see Table 3). We study the effect of household demographics on the marginal effect to broaden our understanding of the inflation expectations-consumption expenditure nexus.

We first look at heterogeneous effects by education. Germany has a three-tier school system. German pupils choose their secondary education track after four years of primary school. *Hauptschule* offers 9 years of basic education, *Realschule* offers 10, whereas *Gymnasium* typically finishes after 13 years with A levels, which is the required degree to enter university. Table 6 studies the relationship between inflation expectations and the willingness to spend on durables separately for household heads with different levels of education. When their highest level of education is a *Hauptschule* degree, households that expect inflation to increase are 6.9% more likely to have a positive stance toward buying durables compared to households that expect constant or decreasing inflation (column (2)). This marginal effect increases with education, and is more than 60% larger for households that hold a college degree (columns (4), (6), (8)). When they expect higher inflation, households with college degrees are 3.9% less likely to reply that it is a bad time to buy durables (column (7)). This negative marginal effect decreases in absolute value with lower education and is actually slightly positive—though not statistically significant—for the least-educated (columns (5), (3), (1)). The positive effect of education on the inflation expectations–readiness to spend nexus suggests that policies

aimed at engineering higher inflation expectations to stimulate consumption might have redistributive effects. Policy makers might consider educating households about their aims and targets to guarantee that households will behave according to the policy aims when setting their consumption and savings decisions.

Malmendier and Nagel (2009) show that the same inflation experiences shape inflation expectations differently for younger and older individuals. We find that the effect of inflation increases on willingness to buy durables is constant across age groups except for those aged 65 and older. Retirees have different time-use and consumption patterns compared to the working-age population, and might differ in their inflation experiences (see Aguiar and Hurst (2005)). Retirees typically also have nominal pensions in Germany, hold few real assets, and have lower human capital compared to someone in the labor force. Households of age 14 to 65 that expect inflation to increase are 9% more likely to buy durables compared to households that expect inflation to stay constant or decrease (Table 7, columns (2), (4), (6), (8)). This marginal effect is about 20% lower for households in retirement age (column (10)).

Moreover, city size, marital status, and household size might affect the willingness to spend on durables through channels different from inflation expectations, such as financial and economic literacy (see Lusardi and Mitchell (2011) and references therein). Table 8 shows that households living in rural areas have a lower average marginal effect of inflation increases on their propensity to spend compared to households living in large cities. Households that expect inflation to increase and that live in cities with fewer than 2,000 inhabitants have a 5.8% higher likelihood of answering, "It's a good time to buy durables" (column (2)). This marginal effect increases to 8.5% for households in cities with up to 100,000 inhabitants (columns (4) and (6)), and is more than 10% for households living in cities with more than 100,000 inhabitants. In Table 9, richer survey participants with a monthly net income above EUR 2,500 possess a 15% to 20% higher marginal effect of inflation increases on the likelihood to reply, 'It's a good time to buy durables" (column (6)) compared to survey participants with less than EUR 2,500 monthly net income (columns (2) and (4)).

Table 10 studies the effects of financial constraints on the relationship between inflation expectations and willingness to consume. Some households might think it is a good time to purchase durables in times of high inflation, but they might be

hand-to-mouth consumers and might not be able to substitute their consumption across time periods (see Campbell and Mankiw (1989)). The effect of hand-to-mouth consumers might be less strong in our setup as we only study the reported willingness to purchase durables rather than actual spending. Constrained households might be unable to substitute purchases across time periods, but might still answer that it is a good time to purchase. Following the logic of Zeldes (1989), we split the sample in households which report that they currently save or save a lot, and households which report that they dis-save or take on debt. Table 10 shows that the marginal effect of higher inflation expectations is about 40% larger for households which are unconstrained compared to hand-to-mouth consumers.

B. Effect over Time

Households may perceive that it is a favorable time to purchase durable goods for several reasons, including low prices, expected price increases, low nominal interest rates, generally good economic times, or prosperous times for the household. If increases in inflation expectations, and hence higher prices, are indeed the main mechanism through which households increase their consumption expenditures, we should see a stronger effect of inflation expectations on households' willingness to buy durables in 2006. The motive to purchase durable goods because of higher future prices and lower real interest rates is likely to be more important and salient in a period when VAT will increase compared to other reasons. We therefore expect to find a larger marginal effect of inflation expectations on purchasing propensities in 2006.

Figure 1 shows that inflation expectations and the average propensity to purchase durables are especially high in 2006. Table 11 studies this relationship using micro data to control for household characteristics and expectations. During the period November 2005 to December 2006, households that expect inflation to increase are 19% more likely to have a positive spending attitude, which is more than double the baseline marginal effect. Expected increases in inflation decrease the likelihood of replying, "It's a bad time to buy durables" by 6% compared to constant or decreasing inflation expectations. Our baseline findings continue to hold when we exclude the period November 2005 to December 2006 (see columns (3) and (4)). We do not find different marginal effects when we study the time period of the European financial debt crisis in columns (5) and (6).

Figure 8 shows that the increase in the marginal effect is contained to the period between November 2005 and December 2006, which alleviates concerns that aggregate demand shocks, or other unobservables, might drive our results.

The temporal buildup of inflation expectations during 2006 (see Figure 1) indicates that some households may be inattentive to policy announcements, as they only adjusted their expectations after the media covered the consequences of the VAT increase in greater detail.[21] This finding leaves scope for increased policy transparency and the fostering of financial and economic literacy to help households understand the implications of monetary and fiscal policies on inflation, consumption, and savings. Indeed, policy makers seem to be aware of these challenges.[22]

C. Additional Results

The online appendix reports additional results and robustness checks. Results are quantitatively and statistically similar when we split the sample based on expectations regarding households' own financial situation, instead of the expectations regarding GDP and aggregate unemployment; when we estimate models with dummy-variable specifications for past inflation perceptions and expected inflation; when we estimate a linear probability or an ordered probit model; when we add month and year fixed effects; and when we exclude past inflation perception from the set of covariates. We also show that households that expect inflation to increase are on average more likely to say that it is a bad time to save compared to households that expect constant or decreasing inflation. GfK also asks households on a quarterly basis whether they want to spend more, the same amount, or less in the next twelve months compared to the previous twelve months for various categories of consumption. We find that households which expect inflation to increase want to spend more on cars, furniture, appliances, and renovations to their house. We do not find any significant differences in the nexus of inflation expectations and willingness to spend on durables for male versus female or households with or without children, or households of different size. We find similar marginal effects for single, couple, married, and divorced households. Renters have a slightly higher marginal effect than

[21] See Menz and Poppitz (2013) for media coverage of inflation in Germany media during this time period.

[22] Bernanke (2010): "Improving the public's understanding of the central bank's policy strategy reduces economic and financial uncertainty and helps households and firms make more-informed decisions."

house- or apartment-owners. The full-time employed have a higher marginal effect than the part-time employed and unemployed.

VII Discussion

In section 2, we document that households with higher inflation expectations are more willing to purchase durable goods. The answer to the question we posed at the beginning of the paper might, therefore, be an affirmative yes: temporarily higher inflation expectations could indeed stimulate current consumption spending. There are, however, a few important points to discuss before we can infer any policy recommendations from our analysis.

Willingness to spend versus actual spending: We are ultimately interested in how inflation expectations transmit to the *actual* consumption behavior of households. Our survey does not ask for actual consumption behavior, but only reports the willingness to purchase durable goods. Figure 10 shows that the index of aggregate reported readiness to purchase durable goods based on the answers of our representative sample, and realized real durable consumption growth at the quarterly frequency in Germany, track each other closely.[23] Figure 11 is a scatter plot of the cyclical components of log real durable consumption and the aggregate index. We use a Hodrick-Prescott filter with smoothing parameter λ of 1,600 to extract the cyclical component. Again, the two variables are positively related with a correlation of 0.46. The reported willingness to purchase has potential advantages compared to measures of actual expenditures elicited with surveys. Actual spending data in surveys typically contains noise, because survey participants might not recall their actual purchases, or they might overstate their purchases of visible products such as cars and understate the consumption of "sin" products, such as tobacco and alcohol (see Hurd and Rohwedder (2012) and Atkinson and Micklewright (1983)). In addition, households' true willingness to purchase durable goods because of rising prices might not result in actual purchases if households have recently bought a car, refrigerator, etc. Looking at actual household spending might therefore introduce noise. Studying the reaction of the willingness to spend to higher inflation expectations, however, neglects

[23] We use the end-of-quarter value of the aggregate index to construct a quarterly series. We get similar results if we plot the average within a quarter or use the first or second monthly observation within a quarter.

potential adjustment costs to the stock of durables, and it might make us overestimate the actual effect. These concerns are alleviated by the fact that the reported willingness to purchase and actual purchases track each other closely.[24]

Durable consumption versus aggregate demand: Academics and policy makers typically advocate temporarily higher inflation expectations during a liquidity trap to stimulate aggregate demand. The ultimate aim is to bring the economy back to its long-run steady-state growth path. We document that households with higher inflation expectations are more willing to purchase durable goods, but we do not observe whether households cut back on other components of consumption. In addition, higher inflation might be associated with higher inflation uncertainty (see Ball (1992)), which may bring firms to lower investment. Cashin (2015) documents that spending by Japanese households on non-durable goods and durable goods are complements during the period after the announcement and before the effectiveness of an increase in the consumption tax rate in Japan. Evidence for aggregate real GDP growth (Figure 12) suggests that higher inflation expectations might have indeed increased aggregate demand, because real GDP growth increased from 1.6% in the last quarter of 2005 to 4.38% in the last quarter of 2006.

Temporary versus permanent increases in inflation expectations: We focus our discussion on temporary increases of inflation expectations to stimulate aggregate demand. Some economists have suggested *unexpectedly* increasing inflation to "inflate away" government debt and delever household balance sheets. Blanchard, Dell'Ariccia, and Mauro (2010) and Ball (2013), on the contrary, recommend permanently higher inflation *targets* to lower the probability of hitting the zero-lower bound on nominal interest rates. Our evidence does not speak to the positive or negative effects of permanently higher inflation targets, whether expected or unexpected, on welfare. Hilscher, Raviv, and Reis (2014) suggest that unexpected higher inflation is unlikely to lower real debt significantly. Mishkin (2011) argues that the occurrence of zero lower bound periods is too rare to justify the cost of higher inflation. Findings by Gorodnichenko and Weber (2013); Weber (2015); and D'Acunto, Liu, Pflueger, and Weber (2015) suggest substantial costs of nominal price adjustment. Ultimately, Coibion, Gorodnichenko, and Wieland (2012) derive the optimal inflation rate in a New Keynesian model with infrequent

[24]Cashin (2015) observes actual spending of Japanese households before the increase in the consumption tax rate. He indeed finds larger spending on durable goods.

occurrences at the zero lower bound and conclude that the welfare-optimal inflation rate is below 2%.

Temporary versus permanent increases in aggregate demand: We document a positive cross-sectional association between households' inflation expectations and their reported willingness to spend, which is reflected in aggregate real durable consumption growth. Our survey evidence does not speak to the persistence of the increase in spending. The higher purchasing propensity before the increase in VAT during 2006 might reflect pull-forward effects (see also Mian and Sufi (2012) and Green et al. (2014)). Pull-forward effects would be consistent with the substitution effect we model in Section II, but they might result in lower consumption expenditure once the higher tax rate is in effect. We indeed see lower real durable consumption growth, and lower readiness to purchase durables, during the first quarters of 2007 (see Figure 10). Figure 7 shows that the VAT shock has a strong and positive effect on the willingness of German households to purchase durable goods after the announcement and before the increase in VAT took effect. German households behave similarly in their purchasing propensities to matched foreign households not exposed to the shock before the announcement of the VAT increase but also *after* the actual increase. The drop in reported willingness to purchase durable goods we observe in January 2007 might therefore just be a reversion to normal. We also do not observe a stark drop in real GDP growth in the first quarter of 2007 (see Figure 12). In New Keynesian models, temporary increases in inflation expectations during a liquidity trap are typically required to "jumpstart the economy," and to converge back to the steady state growth pass. Our findings are consistent with this argument.

Fiscal versus monetary policy: Many theory models rely on monetary policy to engineer higher inflation expectations. Our survey data do not allow us to identify the origin of the cross-sectional heterogeneity in inflation expectations. When we use the unexpected increase in VAT as a shock to inflation expectations, we can trace the cause of higher inflation expectations back to fiscal policy. Our findings might therefore not speak to the effects of higher inflation expectations induced by monetary policy. Our baseline findings hold when we exclude the period after the announcement and before the effectiveness of the VAT increase, which alleviates those considerations.

Discretionary fiscal policy is often rejected as a tool for business cycle stabilization. Implementation lags; larger permanent deficits resulting in higher long-term interest

rates and distortionary future taxes; or higher marginal propensities to save out of a temporary tax cut, i.e., lower (old) Keynesian multipliers; make it a less desirable policy tool compared to conventional monetary policy.[25] At the same time, a growing literature stresses the use of fiscal policy to stimulate demand in times when conventional monetary policy is less effective. Farhi and Werning (2015) show theoretically that fiscal multipliers are large and above 1 during a liquidity trap. The central mechanism in their paper is that government purchases lead to higher inflation, lower real interest rates, and, therefore, more consumption today. Feldstein (2002) stressed already earlier that discretionary fiscal policy does not have to rely on questionable income effects but could fully operate through an intertemporal substitution channel by inducing higher inflation expectations and hence higher consumer spending.

Increases in inflation expectations in good versus bad times: Policy makers and economists typically recommend temporary higher inflation expectations to stimulate higher spending during times of idle demand, when the economy is in a liquidity trap. The basic argument for higher expected inflation to induce higher spending relies on nominal interest rates not moving sufficiently to offset the increase in inflation expectations (see Section II). We saw in section 2 that this was true during the VAT experiment of 2006. In addition, we show that the positive inflation expectation–readiness to spend nexus also holds during other times. We conjecture larger marginal effects of inflation expectations on the propensity to consume during times of idle demand and slack resources. The preferred policy tools to stimulate inflation expectations might differ, though. We do not read our evidence as suggestive that consumption taxes should be raised during a liquidity trap. Evidence from Japan suggests that a VAT increase during a liquidity trap might result in a drop in aggregate demand subsequent to the increase (see Hausman and Wieland (2014)). Binding borrowing constraints might deter households from spending during a liquidity trap. We indeed find a smaller marginal effect of inflation expectations on spending attitudes for hand-to-mouth consumers who do not save (see Table 10). The difference in the marginal effect between unconstrained and constrained households is economically small, though.

The case of Germany: We believe that our findings are directly applicable to the case of the United States as both Germany and the United States are major industrialized

[25]See Ramey (2011) and Parker (2011) for recent reviews on the size and measurement of fiscal multipliers.

economies in the Western World. The major advantages of using data from Germany is that our survey asks households directly whether they believe it is a good time to buy durables rather than for *people in general* as in the MSF. In addition, asking for quantitative inflation expectations leads to several problems and biases against finding any relationship between inflation expectations and households' willingness to purchase consumption goods (see also discussion in Section I). Once researchers control for those shortcomings or condition on households with ex-post accurate inflation expectations, they also find a positive relationship between households' inflation expectation and the reported willingness to purchase durables (see Binder (2015) Table 6 Panel D and Bachmann et al. (2015) Table 5). Evidence for Japan also hints towards a positive relationship between inflation expectations and consumption expenditure (Hausman and Wieland (2014)).

Inflation expectations. Professional forecasters versus households and firms: Economists and the media often focus on the forecasts of professionals such as the Survey of Professional Forecasters in the United States and the Euro Zone, or the ZEW Financial Market Survey, which focuses on Germany and interviews 300 to 350 experts working in banks, insurance, and investment companies. Coibion and Gorodnichenko (2015) and Coibion, Gorodnichenko, and Saten (2014) show that inflation forecasts of households and firms differ substantially from inflation expectations of professional forecasters and financial-market-implied inflation forecasts. They argue that this difference can explain the missing disinflation in the United States. Most firms in the United States and Germany are small and medium-sized enterprises without professional economic forecasters in house, and form expectations similarly to households. The investment decisions of firms and the consumption decisions of households ultimately determine the aggregate response of GDP to temporary increases in inflation expectations. In Figure 3, the overall CPI inflation rate, the inflation rate excluding food and energy, and the inflation rate for durable goods all increased sharply in 2007. Figure 9 documents that the standardized one-year lagged inflation expectations index and the realized durable inflation rate track each other closely, and have a time series correlation of 65.37%. Professionals, on the contrary, did not adjust their forecasts for inflation during 2006 (see Appendix Figures A.2, A.3, and A.4 for inflation forecasts for Germany from Concensus Economics, the ZEW Financial Market Survey, and the ECB Survey of

Professional Forecasters for the Euro Zone inflation rate). This finding is consistent with Coibion and Gorodnichenko (2015) for the US: households increased their inflation expectations substantially at the beginning of the recent financial crisis, whereas the inflation expectations of professional forecasters were well anchored and barely moved.

Tax burden and wealth effects: In Section V, we argue that the VAT increase was justified by a need to balance the governmental budget. Economists often favor consumption taxes, because they are less distortionary than income taxes. One might argue that the German government raised indirect taxes to lower distortionary direct taxes. Our baseline effect might, therefore, not be driven by a substitution effect, but by a wealth effect. The narrative record clearly speaks against this interpretation (see discussion below). To show directly that the VAT increase was used to increase the tax base, we first show that the total tax to GDP ratio in Germany increased from 34.5% in 2006 to 34.9% in 2007, and the ratio of VAT to GDP from 6.2% to 6.8% (columns (1) and (2) of Table A.15).[26] We then calculate the ratio of tax to GDP under the assumption that the total revenue from VAT is consistent with the average VAT to GDP ratio across the years 2000 to 2006. In column (6), we see that the hypothetical total tax-to-GDP ratio is 34.37%, which implies that other sources of tax income might also have increased. We might, therefore, expect a negative wealth effect, and our marginal effect estimates are likely conservative estimates of the substitution effect.

Reduced and full VAT tax: All services and products in Germany are subject to a value-added tax which is part of the European VAT system. The general tax rate was 16% until December 2006 and increased to 19% in 2007. A reduced rate of 7% applies to many convenience goods such as food, books, or flowers. The reduced rate has been unchanged since 1983. Rent, services for non-profit organizations, and medical expenses are not subject to VAT.

VAT increase as a shock to inflation: Prices in Germany are typically tax-inclusive, i.e., posted prices are gross prices including value-added tax. Many convenience goods are only subject to a reduced VAT. If the VAT increase of 2007 indeed led to an increase in inflation, we should observe an immediate rise in inflation for durable goods which are subject to full VAT, whereas we should see a smaller response for non-durable inflation. The lower left panel of Figure 3 shows an immediate increase in durable-good

[26] We thank Ľuboš Pástor for suggesting this test.

inflation, which remained high and increased throughout 2007. On the contrary, the lower-right panel shows a constant non-durable-good inflation rate during 2007. Figure 13 plots inflation expectations for the European Union (EU), Germany, and several other EU membership countries. We observe an increase in inflation expectations immediately after the announcement of the VAT increase in Germany in November 2005 with high inflation expectations throughout 2006. Neither the European Union as a whole or any of the individual membership countries, including direct neighbor countries such as France or Austria, exhibits an increase in inflation expectations throughout 2006. Feldstein (2002) also proposes a pre-announced VAT increase as a discretionary fiscal policy tool to increase inflation expectations with the ultimate aim to stimulate consumption.

Identification versus Policy Implications: To interpret our effects causally, we have to control for household characteristics and expectations, which determine purchasing behavior and are correlated with inflation expectations. Policy makers confronted with the decision to engineer higher inflation expectations cannot condition on demographics and idiosyncratic expectations of households. Our findings hold in the aggregate (see Figure 1), without controlling for additional covariates (see Table 2), and following an exogenous shock to inflation expectations (see Table 11). Thus, we believe that our findings have direct policy relevance and policy makers should take them into account when facing the decision of raising inflation expectations.

Election promises during the 2005 campaign and reality: The Christian Democrats (CDU) under the leadership of Mrs. Merkel campaigned to increase VAT by 2% to lower non-wage labor costs (see CDU (2005) page 14). The Social Democrats strongly opposed an increase in VAT and instead favored an increase in income tax by 3% for top income earners (see SPD (2005) page 39). The Greens and Liberals also strongly opposed an increase in VAT. The Liberals, for example, promised to decrease the general tax burden by EUR 19bn. The 2005 general election was a close election. A few days before the election, most polling institutes predicted a victory of a coalition between Christian Democrats and Liberals by a tight margin. Eleven days before the election, the polling institute Infratest Dimap predicted a vote share of 41% for the Christian Democrats, 34% for the Social Democrats, 8.5% for the Left, 7% for the Greens, and 6.5% for the Liberals.[27] In the actual election on September 18, 2005, the Christian Democrats

[27]See: http://www.infratest-dimap.de/en/umfragen-analysen/bundesweit/sonntagsfrage/

gained 35.2% electoral support, the Social Democrats 34.2%, the Liberals 9.8%, the Left 8.7%, and the Greens 8.1%. Neither the Christian Democrats nor the Social Democrats were able to form a "small" coalition with their preferred coalition partner (Liberals and Greens, respectively). Finally, the Christian Democrats and Social Democrats formed a "grand" coalition and decided to increase VAT by 3%, lower non-wage labor costs by 1%, and use the additional tax revenue to consolidate the federal budget. The opposition parties and popular press claimed election fraud and criticized the new administration fiercely. The online appendix contains press clippings commenting on the VAT policy of the coalition (see Section III of the online appendix).

While the Christian Democrats campaigned to increase VAT by 2% to lower indirect taxes, all other parties strongly opposed raising VAT, including their preferred coalition partner, the Liberals. At the same time, the outcome of the election was unclear until the actual election. A VAT increase by 3% for fiscal consolidation was therefore certainly unexpected. Figure 2 is direct evidence that households did not expect higher inflation: households' inflation expectation did not increase until December 2005 after the new administration announced their plans to increase VAT.

VIII Concluding Remarks

We document a positive cross-sectional association between households' inflation expectations and their willingness to purchase durable consumption goods using novel German survey data. Households that expect inflation to increase are 8% more likely to have a positive attitude toward buying durable consumption goods than households that expect constant or decreasing inflation. For identification, we use the unexpected announcement of a VAT increase in 2005 as an exogenous shock to the inflation expectations of German households. We exploit households in other European countries to construct a control group for the treated German households in a difference-in-differences setting. Our difference-in-differences estimator confirms the baseline finding.

The positive effect of inflation expectations on households' propensity to purchase durable goods is stronger for more educated households, working-age households, high-income households, and urban households. Our findings provide empirical support for the conventional wisdom that temporarily higher inflation expectations can stir consumption

expenditure when nominal interest rates are constrained by the zero-lower bound.

Two features of the novel German survey data make them ideal for studying the relationship between households' inflation expectations and their readiness to purchase durable consumption goods. First, households are asked explicitly about their own willingness to purchase durable consumption goods, as opposed to their opinion on whether now is generally a good time for *people* to buy, as in similar surveys in the United States. Second, the German setting allows us to exploit a unique natural experiment, that is, the unexpected announcement of an increase in VAT in 2005. This shock is close to the ideal experiment of exogenously increasing households' inflation expectations, and helps with the identification of the effect of inflation expectations on households' willingness to spend on durable goods.

Interestingly, the effect of inflation expectations on consumption behavior builds up during 2006 even though the VAT increase was announced in November 2005. The temporal buildup suggests that some households may have been inattentive to policy announcements, and only reacted after the media covered the consequences of the VAT increase in greater detail as the effective date of the increase approached. Understanding the causes of such a delayed reaction to fiscal and monetary policy announcements, and the ways governments and central banks may reduce this delay, are interesting avenues for future research.

Our findings have a set of policy implications. The heterogeneous effect across households and the delayed response in 2006 suggest the transmission of policies to actual behavior may be hindered by the inability of households to understand the consequences of those interventions. Increased policy transparency and higher financial and economic literacy could help households understand the implications of monetary and fiscal policies for inflation, consumption, and savings.

The delayed response in households' inflation expectations suggests an important avenue for future research. Studies could examine which household characteristics, such as limited attention or cognitive abilities, hinder households from updating expectations about future realizations of macroeconomic variables. These characteristics may represent major impediments to the transmission of economic and monetary policies that target households' consumption and savings behaviors, and might result in unintended consequences such as the redistribution of wealth.

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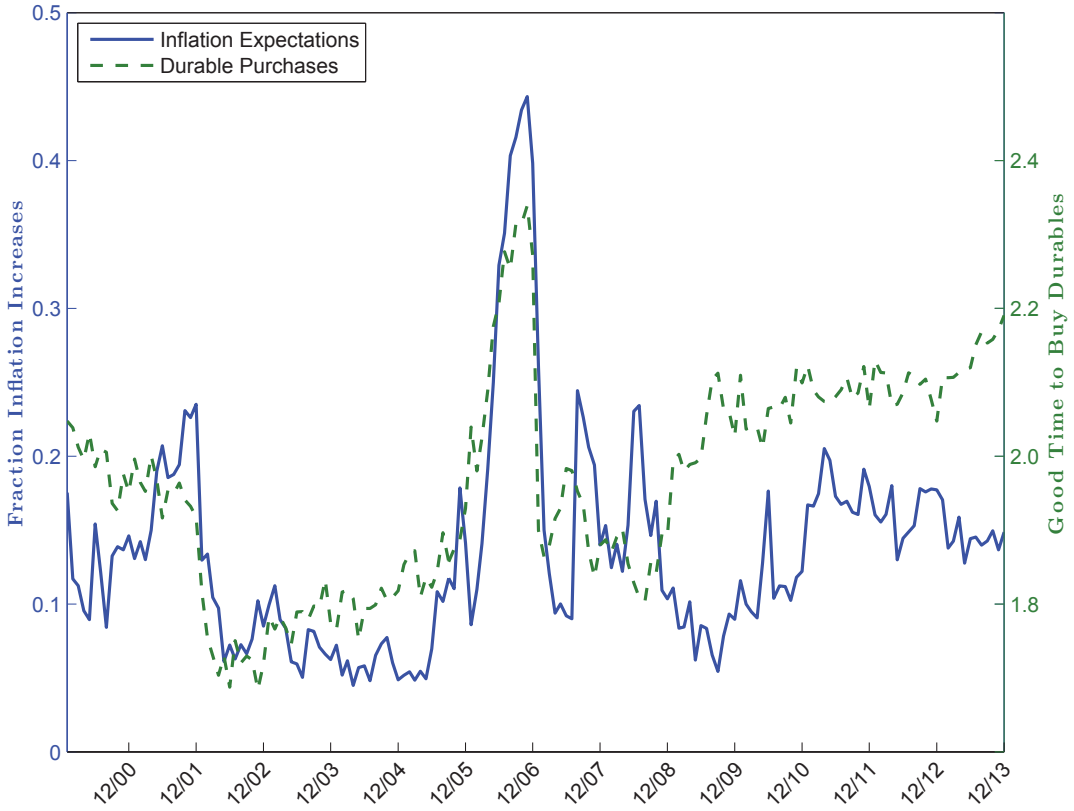
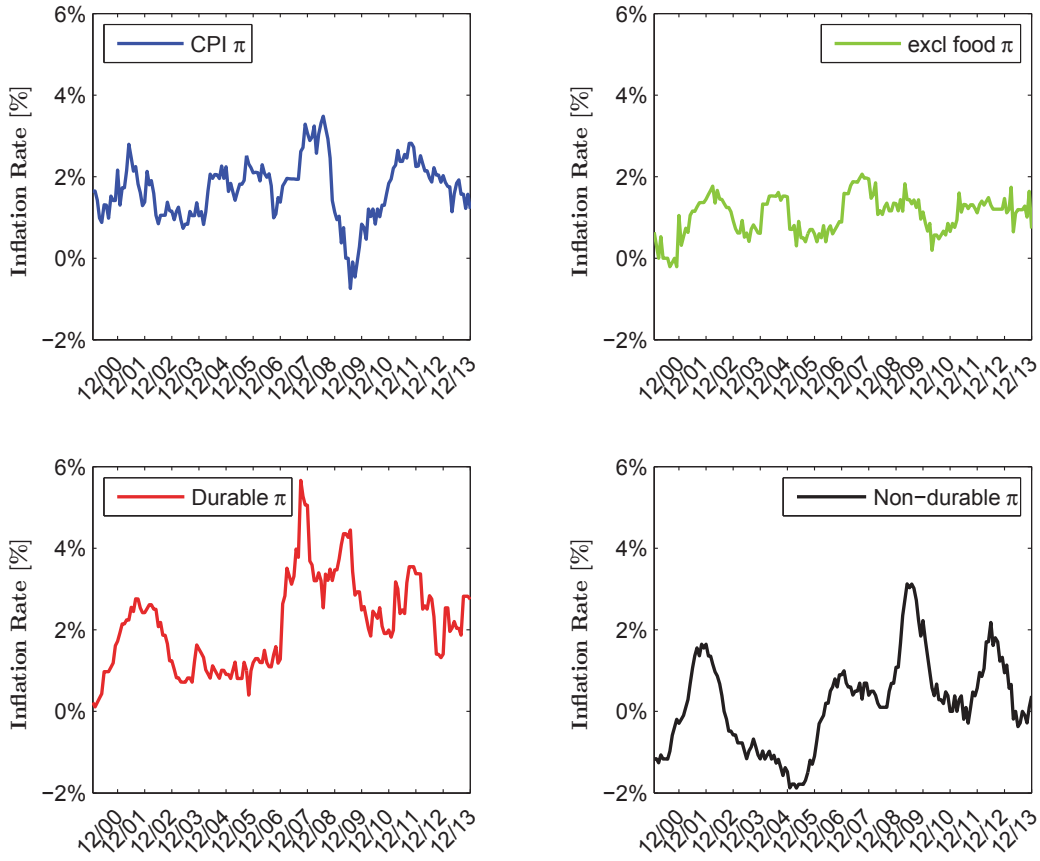
Figure 2: **Expected Increase in Inflation and average Readiness to Spend on Durables**



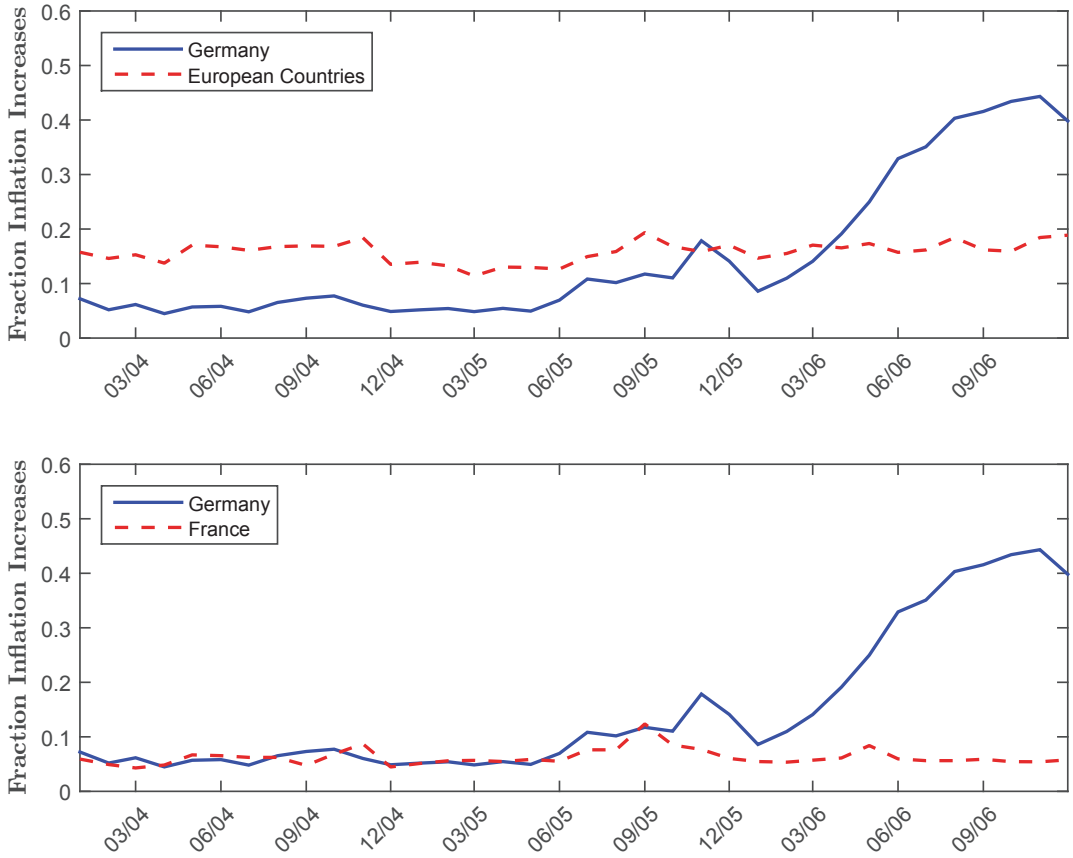
This figure plots average monthly inflation expectation (blue line, left y axis) and the average monthly readiness to purchase durables (green dashed line, right y axis) over time. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to construct these variables. GfK asks a representative sample of 2,000 households how consumer prices will evolve in the next twelve months compared to the previous twelve months and whether it is a good time to purchase durables given the current economic conditions. We create a dummy variable which equals 1 when a household expects inflation to increase. Higher values correspond to better times to purchase durables. The sample period is January 2000 to December 2013 for a total of fourteen years.

Figure 3: **Time Series of CPI Inflation rate**



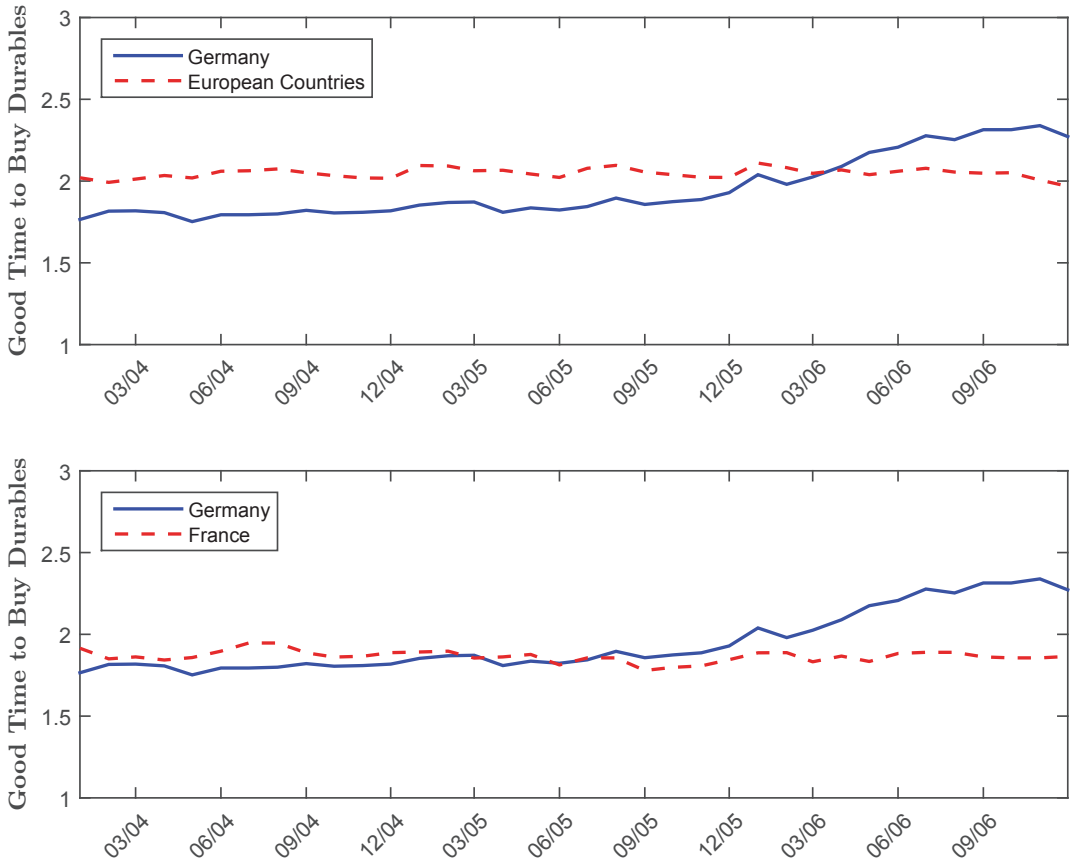
This figure plots the monthly time series of the German consumer price (CPI) inflation rate π in percent at an annual rate. The top left panel plots the harmonized overall consumer price inflation rate. The top right panel plots the all items CPI excluding food and energy. The bottom left panel plots major durables CPI. The bottom right panel plots the non-durable households goods CPI. The sample period is January 2000 to December 2013 for a total of fourteen years.

Figure 4: **Expected Increase in Inflation: Germany and European Union**



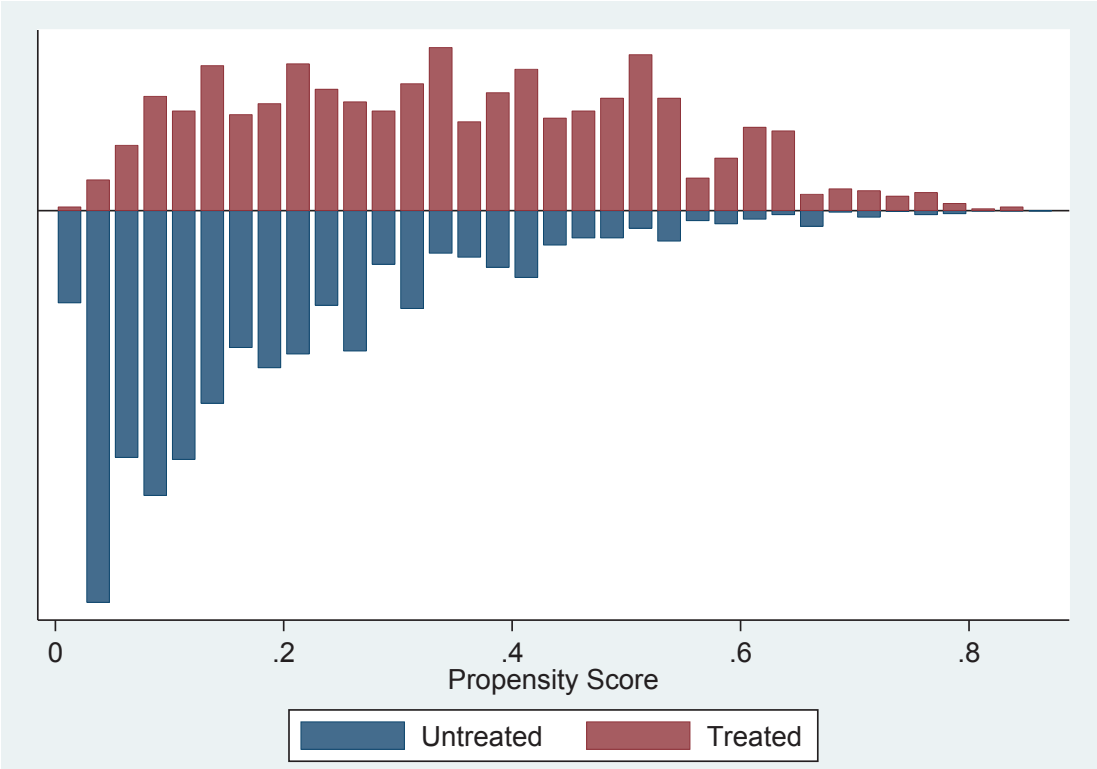
This figure plots average monthly inflation expectation over time. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to construct this variables for Germany and similar data from national statistical agencies and GfK subsidiaries for the United Kingdom, Sweden, and France. GfK asks a representative sample of 2,000 households how consumer prices will evolve in the next twelve months compared to the previous twelve months. We create a dummy variable which equals 1 when a household expects inflation to increase. The sample period is January 2004 to December 2006 for a total of three years.

Figure 5: **Readiness to Spend on Durables: Germany and European Union**



This figure plots the average monthly readiness to purchase durables over time. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to construct these variables for Germany and similar data from national statistical agencies and GfK subsidiaries for the United Kingdom, Sweden, and France. GfK asks a representative sample of 2,000 households whether it is a good time to purchase durables given the current economic conditions. Higher values correspond to better times to purchase durables. The sample period is January 2004 to December 2006 for a total of three years.

Figure 6: **Common Support of Treated and Matched Households**

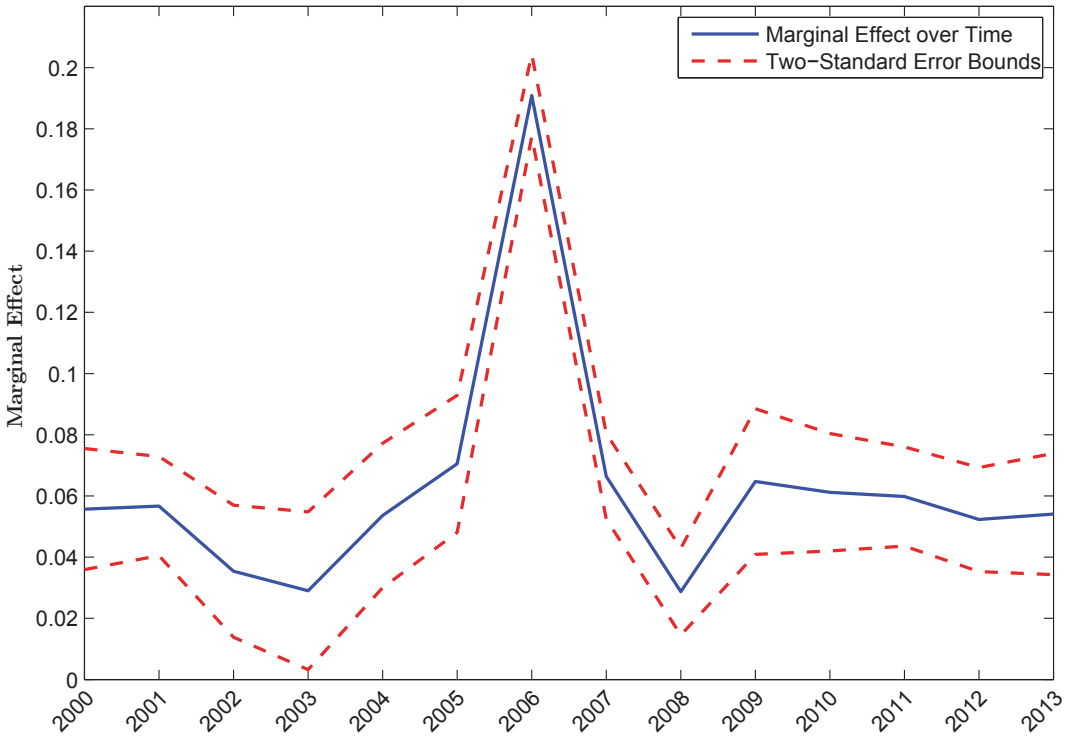


This figure plots the number of households in the untreated (blue) and treated (red) group across 40 equal-length partitions of the distribution of the propensity score in the baseline month (June 2005) for the difference-in-differences analysis. We estimate the propensity score with a logit specification whose outcome variable is the indicator for whether a household is in the treated or control group, and the controls are the observables we use for the matching of households: age group, gender, education group, income group, and social status group. The treated group includes 1,431 German households, whereas the control group includes 5,108 households from the UK, France, and Sweden.

Figure 7: **Change in the Readiness to Spend on Durables for German vs. foreign households**

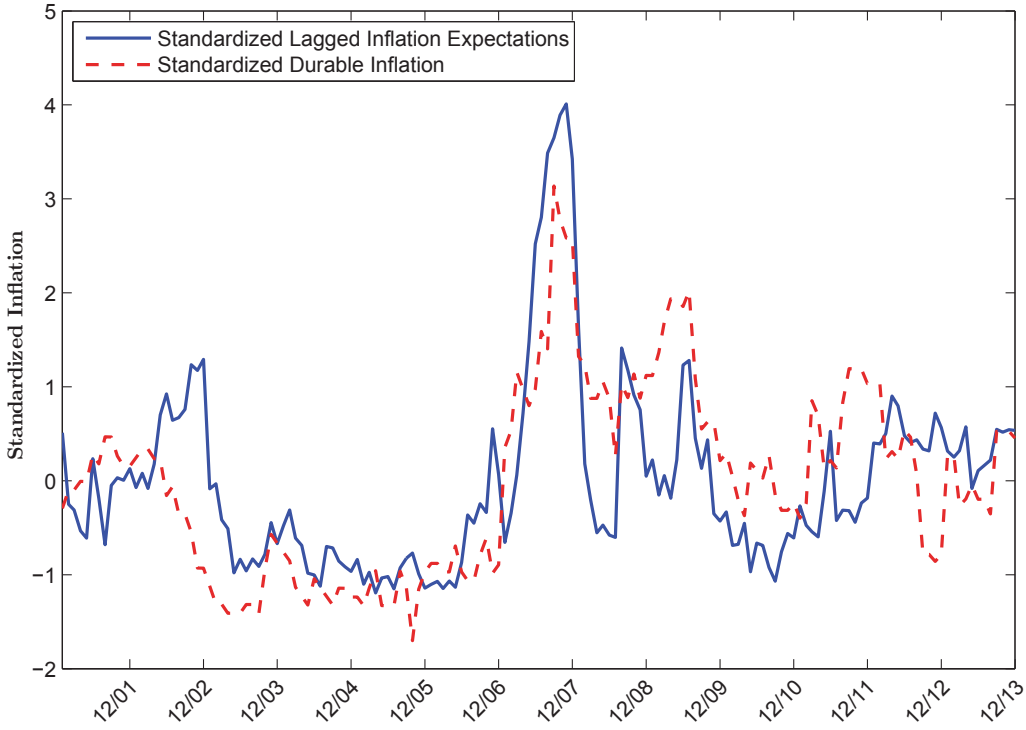
This figure plots β_m *coefficient (solid line) of* $\Delta Dur_{i,06/2005\to m} = \alpha + \beta_m \times VATshock_i + \Delta X'_{i,06/2005\to m} \times \gamma + \epsilon_i$ *and two standard deviation error bands (dashed line).* $\Delta Dur_{i,06/2005\to m}$ *is the difference in the willingness to spend on durable goods between month* m *and June 2005,* $VATshock_i$ *is an indicator which equals 1 if the household was exposed to the VAT shock,* β_m *captures the effect of the VAT shock on the willingness to buy durables for household* i *in month* m*, and* $\Delta X'_{i,06/2005\to m}$ *is the difference in a set of observables between month* m *and the baseline month. We use the micro data underlying the Directorate-General for Economic and Financial Affairs of the European Commission harmonized consumer surveys to construct these variables.*

Figure 8: **Readiness to spend on durables and inflation expectations over time**



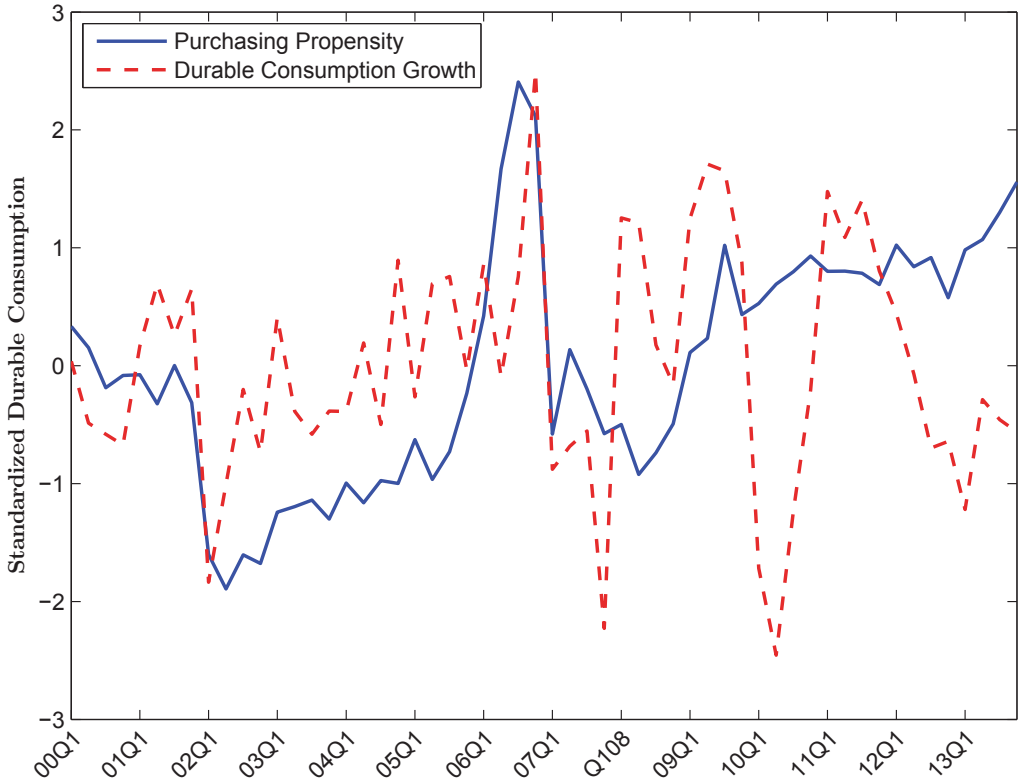
This figure plots the average marginal effect of inflation expectation on households' readiness to purchase durable goods of a multinomial logit regression over time and two standard deviation error bands. Inflation expectation is a dummy variable which equals 1 when a household replies that inflation will increase. The same covariates as in Table 11 were added. We use the micro data underlying the GfK Consumer Climate MAXX survey to construct these variables. GfK asks a representative sample of 2,000 households on a monthly basis whether it is a good time to purchase durables given the current economic conditions. Households can reply that it is a good time, it is a bad time, or it is neither a good time nor a bad time. Standard errors are clustered at the quarter level. The sample period is January 2000 to December 2013 for a total of fourteen years.

Figure 9: **Standardized Lagged Inflation Expectations and CPI Inflation rate**



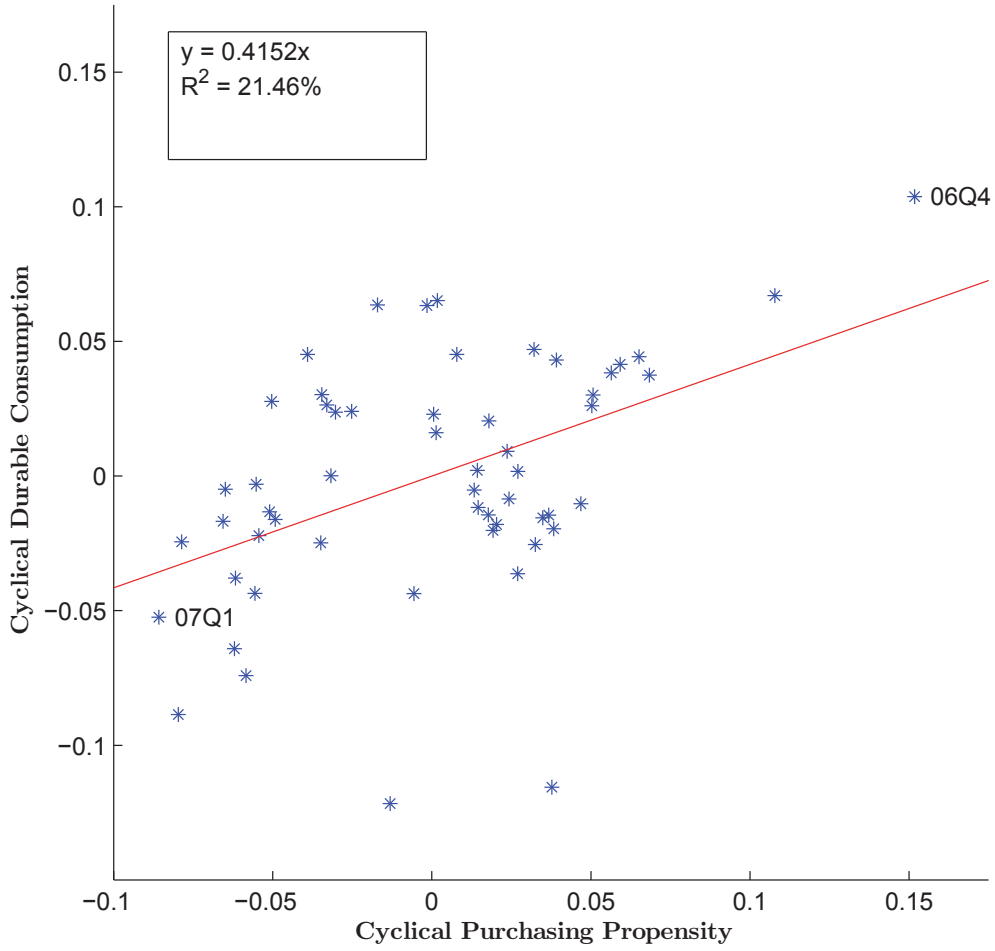
This figure plots the monthly time series of the one-year lagged standardized average monthly inflation expectation and the harmonized major durables consumer price inflation rate in percent at an annual rate. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to construct inflation expectations. GfK asks a representative sample of 2,000 households how consumer prices will evolve in the next twelve months compared to the previous twelve months. We create a dummy variable which equals 1 when a household expects inflation to increase. The sample period is January 2000 to December 2013 for a total of fourteen years.

Figure 10: **Average Readiness to Spend on Durables and Real Durable Consumption Growth**



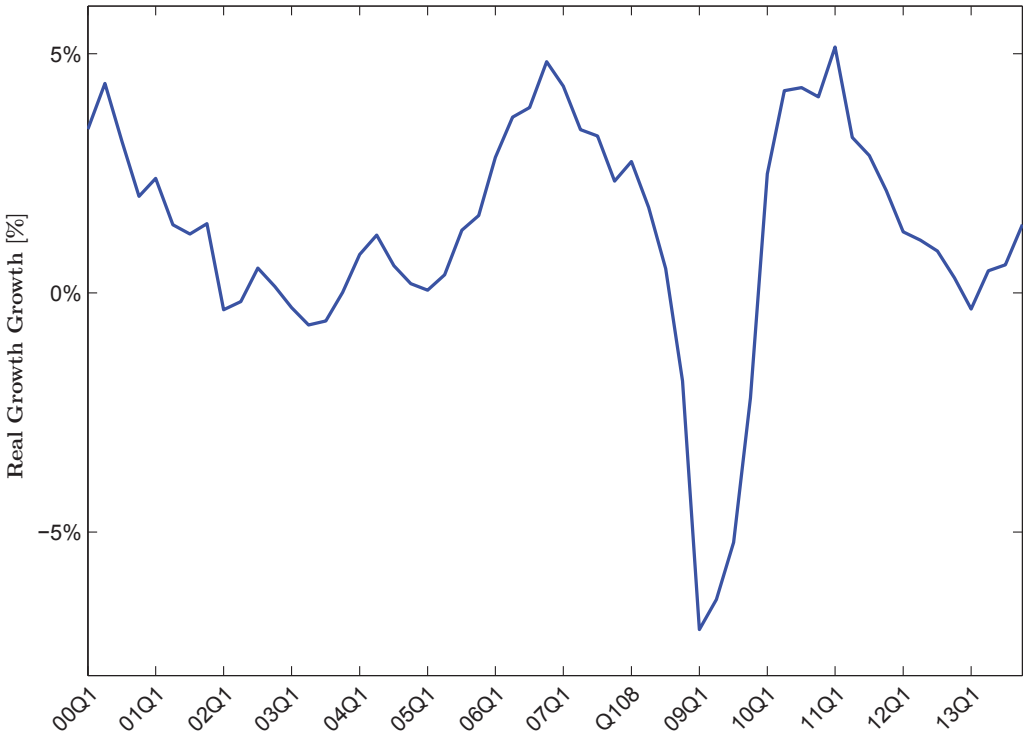
This figure plots average monthly readiness to purchase durables over time and the realized real durable consumption growth. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to construct the readiness to purchase durables index. GfK asks a representative sample of 2,000 households whether it is a good time to purchase durables given the current economic conditions. Higher values correspond to better times. We use the end of quarter value to get a quarterly time series. The sample period is first quarter 2000 to fourth quarter 2013 for a total of fourteen years.

Figure 11: **Cyclical Readiness to Spend on Durables and Real Durable Consumption**



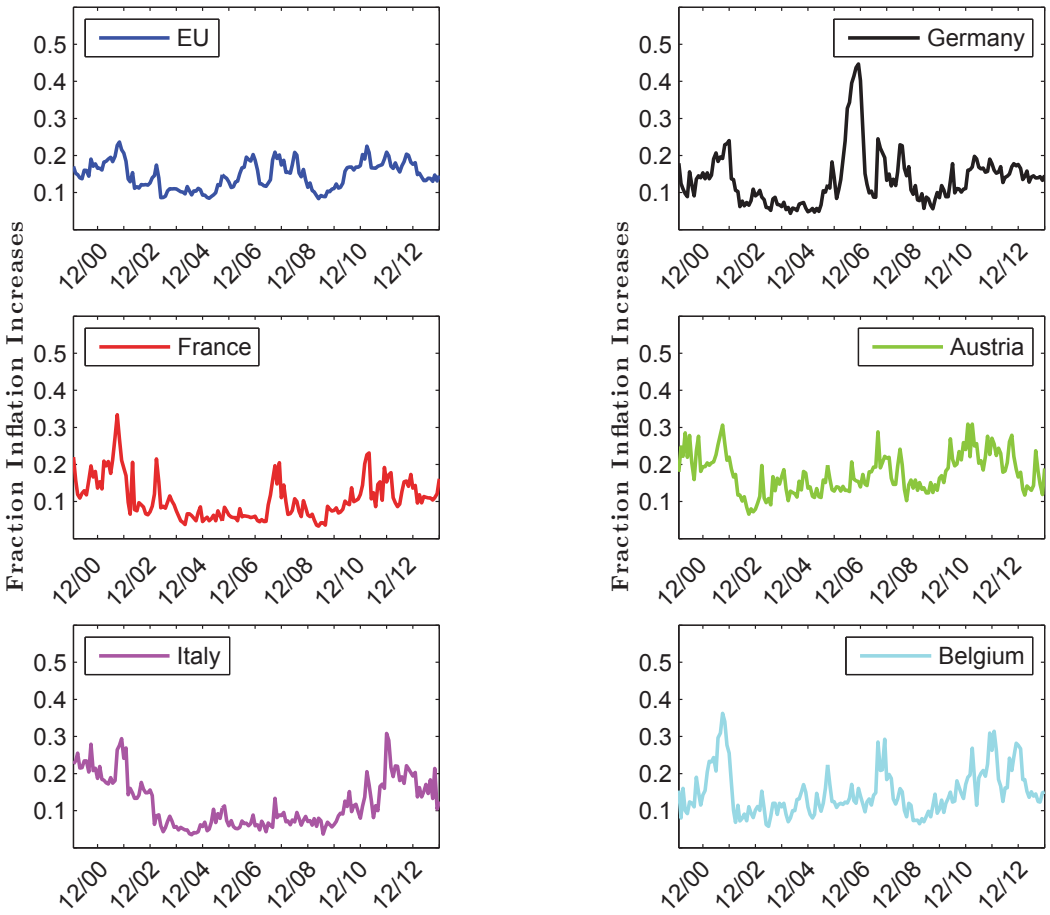
This figure is a scatter plot of the cyclical components of the average monthly readiness to purchase durables over time and of the natural logarithm of the real durable consumption at the quarterly frequency. We use a Hodrick–Prescott filter with smoothing parameter $\lambda = 1,600$ to estimate to cyclical component. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to construct the readiness to purchase durables index. GfK asks a representative sample of 2,000 households whether it is a good time to purchase durables given the current economic conditions. Higher values correspond to better times. We use the end of quarter value to get a quarterly time series. The sample period is fist quarter 2000 to forth quarter 2013 for a total of fourteen years.

Figure 12: **Real GDP Growth**



This figure plots the monthly time series of the German real quarterly GDP growth in percent at an annual rate. The sample period is first quarter 2000 to forth quarter 2013 for a total of fourteen years.

Figure 13: **Expected Increase in Inflation**



This figure plots average monthly inflation expectations over time. We use the time series data on consumer sentiment from the European Commission Directorate on Economic and Financial Affairs to construct these variables. We plot the fraction of households which expects inflation to increase. The sample period is January 2000 to December 2013 for a total of fourteen years.

Table 1: **Descriptive Statistics**

This table reports descriptive statistics for households' inflation expectations and readiness to purchase durables in Panel A, household demographics in Panel B, household expectations and perceptions in Panel C, and macroeconomics aggregates in Panel D. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to measure the variables in Panel A to Panel C. GfK asks a representative sample of 2,000 households questions about general economic expectations, income expectations, and willingness to buy in order to create an aggregate measure labeled "consumer climate." For Panel A, GfK asks whether it is a good time to purchase durables given the current economic conditions. GfK also asks how consumer prices will evolve in the next twelve months compared to the previous twelve months. Inflation increase is a dummy variable which equals 1 when a household replies that inflation will increase. GfK also asks how consumer prices evolved in the previous twelve months. See the online appendix for data sources and detailed data definitions. The sample period is January 2000 to December 2013 for a total of fourteen years.

		Nobs	Mean	Std	Min	p25	p50	p75	Max
Panel A: Inflation expectations and readiness to spend									
Readiness to buy durables	Good time	326,011	20.26%						
	Neither		56.15%						
	Bad time		23.59%						
Inflation increase		355,400	13.77%	0.34	0	0	0	0	1
Inflation perception	increased substantially	348,521	28.06%						
	increased somewhat		29.69%						
	increased slightly		27.80%						
	remained the same		13.23%						
	decreased		1.23%						
Panel B: Household demographics									
Sex	Male	355,400	53.83%						
	Female		46.17%						
Age		355,400	46.07	17.49	14	33	45	60	99
Education	Hauptschule	350,093	42.74%						
	Realschule		38.96%						
	Gymnasium		10.34%						
	Universitaet		7.97%						
Household members		355,400	2.49	1.17	1	2	2	3	5
City	City<9,999	355,400	28.24%						
	9,999<=City<49,999		34.46%						
	50,000<=City<199,999		15.66%						
	199,999<=City		21.64%						
Kids at home	yes	355,400	26.88%						
	no		73.12%						
Number of kids		352,256	0.42	0.78	0	0	0	1	4
Net income (inc)	inc< 1,000	270,592	43.60%						
	1,000<=inc<1,500		28.66%						
	1,500<=inc<2,500		20.81%						
	2,500<=inc		6.93%						
Panel C: Household expectations and perceptions									
Past Financial situation	Improved substantially	351,486	0.02						
	Improved somewhat		0.12						
	Identical		0.61						
	Worsened somewhat		0.21						
	Worsened substantially		0.05						
Financial outlook	Improves substantially	341,105	0.01						
	Improves somewhat		0.11						
	Identical		0.73						
	Worsens somewhat		0.13						
	Worsens substantially		0.02						
Current financial situation	Save a lot	345,683	0.04						
	Save little		0.39						
	Don't save		0.41						
	Dissave		0.13						
	Take on debt		0.02						
Expected unemployment rate	Increases substantially	342,563	14.10						
	Increases somewhat		32.24						
	Identical		35.28						
	Decreases somewhat		17.27						
	Decreases a lot		1.12						

continued on next page

Table 1: **Descriptive Statistics continued**

Continued from previous page.

	Nobs	Mean	Std	Min	p25	p50	p75	Max
Panel D: Macroeconomic aggregates								
CPI Inflation	355,400	1.61%	0.65%	−0.50%	1.21%	1.64%	1.98%	3.27%
Unemployment rate	355,400	8.99	1.61	6.40	7.60	9.00	10.30	12.70
European Uncertainty Index	355,400	134.25	62.78	46.61	83.54	116.53	170.93	331.54
German Uncertainty Index	355,400	119.79	57.60	28.43	79.13	106.68	144.33	377.84
MRO rate	355,400	3.09	1.53	0.25	1.00	4.25	4.25	4.25
Dax	355,400	5840	1511	2424	4769	5970	6949	9552
Volatility DAX	355,400	22.79	8.67	11.24	16.88	20.62	25.91	57.96
Industrial Production Growth	355,400	1.60%	6.97%	−27.25%	0.00%	2.41%	5.65%	14.55%
Oil Price	355,400	63.42	33.66	18.71	29.80	58.76	94.99	132.72

Table 2: **Inflation Expectations and Readiness to Spend: Baseline**

This table reports the average marginal effects of a multinomial logit regression. Households' readiness to purchase durables is the dependent variable. Inflation increase is a dummy variable which equals 1 when a household replies that inflation will increase. Past inflation measures the household perception of the increase in consumer prices during the last twelve months. We also control for household demographics, household expectations, and contemporaneous macroeconomic variables where indicated. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to construct these variables. GfK asks a representative sample of 2,000 households on a monthly basis whether it is a good time to purchase durables given the current economic conditions. Households can reply that it is a good time, it is a bad time, or it is neither a good time nor a bad time. Standard errors are clustered at the quarter level. The sample period is January 2000 to December 2013 for a total of fourteen years.

	Bad time (1)	Good time (2)	Bad time (3)	Good time (4)	Bad time (5)	Good time (6)	Bad time (7)	Good time (8)	Bad time (9)	Good time (10)
Inflation increase	0.0461***	0.0624***	0.0225**	0.0749***	0.0242***	0.0755***	−0.0078	0.0888***	0.0051	0.0875***
	(0.0109)	(0.0162)	(0.0091)	(0.0152)	(0.0094)	(0.0156)	(0.0083)	(0.0160)	(0.0073)	(0.0116)
Past Inflation			0.0632***	−0.0342***	0.0570***	−0.0300***	0.0376***	−0.0200***	0.0331***	−0.0114***
			(0.0048)	(0.0028)	(0.0045)	(0.0030)	(0.0033)	(0.0035)	(0.0020)	(0.0023)
Demographics					X	X	X	X	X	X
Individual expectations							X	X	X	X
Macro aggregates									X	X
Pseudo R^2	0.0031		0.0161		0.0292		0.0654		0.0762	
Nobs	326,011		321,496		244,497		219,799		219,799	

Standard errors in parentheses
$*p < 0.10, **p < 0.05, ***p < 0.01$

Table 3: **Inflation Expectations and Readiness to Spend: Individual Expectations**

This table reports the average marginal effects of a multinomial logit regression for different subsets of households. Households' readiness to purchase durables is the dependent variable. Inflation increase is a dummy variable which equals 1 when a household replies that inflation will increase. Past inflation measures the household perception of the increase in consumer prices during the last twelve months. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to construct these variables. GfK asks a representative sample of 2,000 households on a monthly basis whether it is a good time to purchase durables given the current economic conditions. Households can reply that it is a good time, it is a bad time or it is neither a good time nor a bad time. Standard errors are clustered at the quarter–year level. The sample period is January 2000 to December 2013 for a total of fourteen years. Columns (1) to (4) split the sample based on the median GDP growth expectations over the next twelve months. Columns (5) to (8) split the sample based on the median unemployment expectations over the next twelve months.

	Higher growth outlook		Lower growth outlook		Lower unemployment outlook		Higher unemployment outlook	
	Bad time	Good time	Bad time	Good time	Bad time	Good time	Bad time	Good time
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Inflation increase	−0.0058	0.0841***	0.0289***	0.0729***	0.0002	0.0686***	0.0267***	0.0763***
	(0.0115)	(0.0191)	(0.0090)	(0.0142)	(0.0115)	(0.0249)	−0.0088	−0.0135
Past Inflation	0.0477***	−0.0355***	0.0657***	−0.0320***	0.0342***	−0.0271***	0.0676***	−0.0340***
	(0.0049)	(0.0038)	(0.0047)	(0.0028)	(0.0043)	(0.0047)	(0.0048)	(0.0031)
Pseudo R^2	0.0115		0.0171		0.0065		0.0180	
Nobs	70,000		251,496		58,186		263,310	

Standard errors in parentheses

$*p < 0.10, **p < 0.05, ***p < 0.01$

Table 4: **Balancing of Variables - German and Foreign Households (June 2005)**

This table describes the balancing of the observables we use to match treated and control households in the baseline month (June 2005) for the difference-in-differences analysis. For each variable, the first column reports the mean within the pool of control households (UK, France, and Sweden). The second column reports the mean within the pool of treated German households. The third and fourth column report the results for a two-sided t-test whose null hypothesis is that the means across groups are equal. The two pools are constituted by 1,431 households (treated) and 5,108 households (control) that overlap on the same common support.

Variable	Mean Control	Mean Treated	t-stat	p-value
Age (four groups)	2.33	2.30	1.01	0.31
Male	0.47	0.47	0.22	0.82
Education (three groups)	1.77	1.81	-1.15	0.25
Income (four quartiles)	2.31	2.28	0.8	0.42
Social Status (three groups)	2.60	2.61	-0.37	0.71
Obs in common support	5,108	1,431		

Table 5: **Inflation Expectations and Readiness to Spend: matched sample**

This table reports the average marginal effects of a multinomial logit regression. Households' readiness to purchase durables is the dependent variable. Inflation increase is a dummy variable which equals 1 when a household replies that inflation will increase. Past inflation measures the household perception of the increase in consumer prices during the last twelve months. We use the confidential micro data underlying the Directorate-General for Economic and Financial Affairs of the European Commission harmonized consumer surveys to construct these variables. The surveys ask representative samples of households on a monthly basis whether it is a good time to purchase durables given the current economic conditions. Households can reply that it is a good time, it is a bad time, or it is neither a good time nor a bad time. In this table we study the "it is a good time" outcome. Standard errors are clustered at the quarter level. The sample period is January 2004 to December 2012 for France, January 2004 to April 2015 for Sweden, and January 2005 to April 2015 for the United Kingdom. We use the longest sample available for each country.

	France	Sweden	UK
	(1)	(2)	(3)
Inflation Increase	0.0265***	0.0381***	0.0465***
	(0.0037)	(0.0053)	(0.0061)
Past Inflation	−0.0163***	−0.0315***	−0.0061
	(0.0015)	(0.0055)	(0.0019)
Demographics	X	X	X
Individual expectations	X	X	X
Pseudo R^2	0.0445	0.0288	0.0508
Nobs	163,419	176,829	113,774

Standard errors in parentheses

$*p < 0.10, **p < 0.05, ***p < 0.01$

Table 6: **Inflation Expectations and Readiness to Spend: by Education**

This table reports the average marginal effects of a multinomial logit regression for different levels of education. Households' readiness to purchase durables is the dependent variable. Inflation increase is a dummy variable which equals 1 when a household replies that inflation will increase. Past inflation measures the household perception of the increase in consumer prices during the last twelve months. We also control for household demographics and household expectations. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to construct these variables. GfK asks a representative sample of 2,000 households on a monthly basis whether it is a good time to purchase durables given the current economic conditions. Households can reply that it is a good time, it is a bad time, or it is neither a good time nor a bad time. Standard errors are clustered at the quarter level. The sample period is January 2000 to December 2013 for a total of fourteen years. Columns (1) and (2) restrict the sample to respondents with a Hauptschule degree (nine years of schooling), columns (3) and (4) to respondents with a Realschule degree (ten years of schooling), columns (5) and (6) to respondents with a Gymnasium degree (thirteen years of schooling), and columns (7) and (8) to respondents with a university degree.

	Hauptschule		Realschule		Gymnasium		University	
	Bad time	Good time	Bad time	Good time	Bad time	Good time	Bad time	Good time
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Inflation increase	0.0108	0.0689***	−0.0117	0.0985***	−0.0342***	0.0979***	−0.0387***	0.1128***
	(0.0105)	(0.0152)	(0.0080)	(0.0162)	(0.0118)	(0.0225)	(0.0080)	(0.0188)
Past Inflation	0.0414***	−0.0194***	0.0373***	−0.0188***	0.0319***	−0.0264***	0.0252***	−0.0214***
	(0.0034)	(0.0032)	(0.0034)	(0.0038)	(0.0047)	(0.0048)	(0.0045)	(0.0057)
Demographics	X	X	X	X	X	X	X	X
Individual expectations	X	X	X	X	X	X	X	X
Pseudo R^2	0.0673		0.0635		0.0415		0.0508	
Nobs	89,991		88,315		23,282		18,211	

Standard errors in parentheses

$*p < 0.10, **p < 0.05, ***p < 0.01$

Table 7: **Inflation Expectations and Readiness to Spend: Age**

This table reports the average marginal effects of a multinomial logit regression for different age groups. Households' readiness to purchase durables is the dependent variable. Inflation increase is a dummy variable which equals 1 when a household replies that inflation will increase. Past inflation measures the household perception of the increase in consumer prices during the last twelve months. We also control for household demographics and household expectations. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to construct these variables. GfK asks a representative sample of 2,000 households on a monthly basis whether it is a good time to purchase durables given the current economic conditions. Households can reply that it is a good time, it is a bad time, or it is neither a good time nor a bad time. Standard errors are clustered at the quarter level. The sample period is January 2000 to December 2013 for a total of fourteen years. Columns (1) and (2) restrict the sample to respondents below age 21, columns (3) and (4) to respondents between age 21 and 35, columns (5) and (6) to respondents between age 35 and 50, columns (7) and (8) to respondents between age 50 and 65, and columns (9) and (10) to respondents above age 65.

	Age $\leq$ 21		21 $<$ Age $\leq$ 35		35 $<$ Age $\leq$ 50		50 $<$ Age $\leq$ 65		65 $<$ Age	
	Bad time (1)	Good time (2)	Bad time (3)	Good time (4)	Bad time (5)	Good time (6)	Bad time (7)	Good time (8)	Bad time (9)	Good time (10)
Inflation increase	−0.0089	0.0934***	−0.0111	0.0906***	−0.0087	0.0938***	−0.0136	0.0910***	0.0038	0.0694***
	(0.0134)	(0.0211)	(0.0099)	(0.0191)	(0.0084)	(0.0173)	(0.0089)	(0.0147)	(0.0095)	(0.0134)
Past Inflation	0.0397***	−0.0223***	0.0367***	−0.0179***	0.0361***	−0.0201***	0.0362***	−0.0218***	0.0420***	−0.0216***
	(0.0058)	(0.0043)	(0.0040)	(0.0044)	(0.0034)	(0.0034)	(0.0036)	(0.0038)	(0.0037)	(0.0037)
Demographics	X	X	X	X	X	X	X	X	X	X
Individual expectations	X	X	X	X	X	X	X	X	X	X
Pseudo R^2	0.0447		0.0664		0.0745		0.0668		0.0639	
Nobs	14,913		47,702		70,004		52,186		34,994	

Standard errors in parentheses
$*p < 0.10, **p < 0.05, ***p < 0.01$

Table 8: **Inflation Expectations and Readiness to Spend: by City Size**

This table reports the average marginal effects of a multinomial logit regression for different city sizes. Households' readiness to purchase durables is the dependent variable. Inflation increase is a dummy variable which equals 1 when a household replies that inflation will increase. Past inflation measures the household perception of the increase in consumer prices during the last twelve months. We also control for household demographics and household expectations. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to construct these variables. GfK asks a representative sample of 2,000 households on a monthly basis whether it is a good time to purchase durables given the current economic conditions. Households can reply that it is a good time, it is a bad time, or it is neither a good time nor a bad time. Standard errors are clustered at the quarter level. The sample period is January 2000 to December 2013 for a total of fourteen years. Columns (1) and (2) restrict the sample to respondents living in cities with less than 1,999 inhabitants, columns (3) and (4) to respondents living in cities between 1,999 and 19,999 inhabitants, columns (5) and (6) to respondents living in cities between 19,999 and 99,999 inhabitants, and columns (7) and (8) to respondents living in cities with more than 99,999 inhabitants.

	City $\leq$ 1,999		1,999 $<$ City $\leq$ 19,999		19,999 $<$ City $\leq$ 99,999		99,999 $<$ City	
	Bad time	Good time	Bad time	Good time	Bad time	Good time	Bad time	Good time
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Inflation increase	−0.0123	0.0581***	0.0018	0.0847***	0.0002	0.0854***	−0.0244***	0.1013***
	(0.0132)	(0.0199)	(0.0086)	(0.0151)	(0.0102)	(0.0217)	(0.0092)	(0.0133)
Past Inflation	0.0414***	−0.0196***	0.0298***	−0.0187***	0.0414***	−0.0264***	0.0415***	−0.0177***
	(0.0052)	(0.0055)	(0.0036)	(0.0034)	(0.0037)	(0.0038)	(0.0040)	(0.0042)
Demographics	X	X	X	X	X	X	X	X
Individual expectations	X	X	X	X	X	X	X	X
Pseudo R^2	0.0738		0.0632		0.0721		0.0656	
Nobs	17,833		74,937		59,674		67,355	

Standard errors in parentheses
$*p < 0.10, **p < 0.05, ***p < 0.01$

Table 9: **Inflation Expectations and Readiness to Spend: Income**

This table reports the average marginal effects of a multinomial logit regression by net income. Households' readiness to purchase durables is the dependent variable. Inflation increase is a dummy variable which equals 1 when a household replies that inflation will increase. Past inflation measures the household perception of the increase in consumer prices during the last twelve months. We also control for household demographics and household expectations. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to construct these variables. GfK asks a representative sample of 2,000 households on a monthly basis whether it is a good time to purchase durables given the current economic conditions. Households can reply that it is a good time, it is a bad time, or it is neither a good time nor a bad time. Standard errors are clustered at the quarter–year level. The sample period is January 2000 to December 2013 for a total of fourteen years. Columns (1) and (2) restrict the sample to respondents with monthly income below EUR 1,000, columns (3) and (4) to respondents with monthly net income between EUR 1,000 and EUR 2,500, and columns (5) and (6) to respondents with monthly net income above EUR 2,500.

	Income $\leq$ 1,000		1,000 $<$ Income $\leq$ 2,500		2,500 $<$ Income	
	Bad time	Good time	Bad time	Good time	Bad time	Good time
	(1)	(2)	(3)	(4)	(5)	(6)
Inflation increase	−0.0099	0.0898***	−0.0055	0.0851***	−0.0109	0.1048***
	(0.0105)	(0.0168)	(0.0078)	(0.0151)	(0.0077)	(0.0203)
Past Inflation	0.0423***	−0.0194***	0.0351***	−0.0192***	0.0277***	−0.0299***
	(0.0036)	(0.0037)	(0.0032)	(0.0036)	(0.0043)	(0.0045)
Demographics	X	X	X	X	X	X
Individual expectations	X	X	X	X	X	X
Pseudo R^2	0.0655		0.0596		0.0504	
Nobs	96,555		112,710		16,477	

Standard errors in parentheses
$*p < 0.10, **p < 0.05, ***p < 0.01$

Table 10: **Inflation Expectations and Readiness to Spend: Contrained**

This table reports the average marginal effects of a multinomial logit regression by financial constraints. Households' readiness to purchase durables is the dependent variable. Inflation increase is a dummy variable which equals 1 when a household replies that inflation will increase. Past inflation measures the household perception of the increase in consumer prices during the last twelve months. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to construct these variables. GfK asks a representative sample of 2,000 households on a monthly basis whether it is a good time to purchase durables given the current economic conditions. Households can reply that it is a good time, it is a bad time, or it is neither a good time nor a bad time. Standard errors are clustered at the quarter level. The sample period is January 2000 to December 2013 for a total of fourteen years. Columns (1) and (2) restrict the sample to respondents who report that they currently save or save a lot, and columns (3) and (4) to respondents who report that they dis-save or take on debt.

	Unconstrained		Constrained	
	Bad time	Good time	Bad time	Good time
	(1)	(2)	(3)	(4)
Inflation Increase	−0.0057	0.1042***	−0.0105	0.0747***
	(0.0066)	(0.0180)	(0.0101)	(0.0146)
Past Inflation	0.0345***	−0.0250***	0.0388***	−0.0159***
	(0.0027)	(0.0038)	(0.0040)	(0.0035)
Demographics	X	X	X	X
Individual expectations	X	X	X	X
Pseudo R^2	0.0615		0.0608	
Nobs	98,344		121,455	

Standard errors in parentheses

$*p < 0.10, **p < 0.05, ***p < 0.01$

Table 11: **Inflation Expectations and Readiness to Spend: VAT Experiment**

This table reports the average marginal effects of a multinomial logit regression for different time periods. Households' readiness to purchase durables is the dependent variable. Inflation increase is a dummy variable which equals 1 when a household replies that inflation will increase. Past inflation measures the household perception of the increase in consumer prices during the last twelve months. We also control for household demographics and household expectations. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to construct these variables. GfK asks a representative sample of 2,000 households on a monthly basis whether it is a good time to purchase durables given the current economic conditions. Households can reply that it is a good time, it is a bad time or it is neither a good time nor a bad time. Standard errors are clustered at the quarter level. The sample period is January 2000 to December 2013 for a total of fourteen years. Columns (1) and (2) restrict the sample to 11/2005 – 12/2006 to study the effect of the unexpected VAT increase in 2007 which was announced in November 2005, columns (3) and (4) exclude the period 11/2005 – 12/2006, and columns (5) and (6) restrict the sample to 2010 to 2012 to study the effect of the European sovereign debt crisis.

	11/2005 – 12/2006		excluding 11/2005 – 12/2006		2010–2012	
	Bad time	Good time	Bad time	Good time	Bad time	Good time
	(1)	(2)	(3)	(4)	(5)	(6)
Inflation increase	−0.0594***	0.1909***	0.0049	0.0547***	0.0058	0.0576***
	(0.0062)	(0.0067)	(0.0053)	(0.0031)	(0.0043)	(0.0052)
Past Inflation	0.0160***	0.0206***	0.0384***	−0.0146***	0.0237***	−0.0129***
	(0.0027)	(0.0033)	(0.0034)	(0.0021)	(0.0021)	(0.0043)
Demographics	X	X	X	X	X	X
Individual expectations	X	X	X	X	X	X
Pseudo R^2	0.0631		0.0676		0.0466	
Nobs	19,477		200,322		48,982	

Standard errors in parentheses
$*p < 0.10, **p < 0.05, ***p < 0.01$