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Managing Households' Expectations with Salient Economic Policies

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Managing Households' Expectations with Salient Economic Policies

Abstract

The empirical effectiveness of economic policies that operate theoretically through similar channels differs substantially. We document this fact by comparing an easy-to-grasp expectations-based policy, unconventional fiscal policy, with a policy whose implications are harder to understand by non-expert consumers, forward guidance. Both policies aim to stimulate consumption via managing inflation expectations based on the Euler equation. Unconventional fiscal policy uses trivial announcements of future consumer-price increases to boost inflation expectations and consumption expenditure on impact. Instead, forward guidance requires that agents understand the inflationary effects of future low interest rates to increase their inflation expectations and spending today. We find households' inflation expectations and readiness to spend react substantially to unconventional fiscal policy announcements. The reaction is homogeneous across households with different levels of sophistication. Instead, households do not react after forward guidance announcements. These results support recent work stressing the importance of limited cognition for the effectiveness of policies.

JEL-Codes: D120, D840, D910, E210, E310, E320, E520, E650.

Keywords: expectations, natural experiments, consumption, fiscal policy, monetary policy, macroeconomics with micro data.

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“With nominal short-term interest rates at or close to their effective lower bound in many countries, the broader question of how expectations are formed has taken on heightened importance. [...] many central banks have sought additional ways to stimulate their economies, including adopting policies that are directly aimed at influencing expectations of future interest rates and inflation.”

Janet Yellen (2016)

Theoretically, managing households’ expectations is a powerful policy tool to stabilize business cycles (Ramey (2016)), especially in times of low nominal interest rates (Coibion et al. (2018) and Roth and Wohlfart (2019)). Policymakers around the world have tried to manage households’ expectations through measures of fiscal and monetary policy, mainly based on the predictions of representative agents New Keynesian models. Some of these measures, though, have been barely effective (Hagedorn, Luo, Manovskii, and Mitman (2018)).¹ What determines consumers’ reaction to policies that aim to manage their expectations? Answering this question is important not only to assess the aggregate effectiveness of policies, but also to evaluate the potential unintended distributional effects of policies that trigger reaction by some demographic groups but not others and hence might increase consumption inequality (Krueger and Perri (2006); Fuchs-Schuendeln, Krueger, and Sommer (2010); Roth and Wohlfart (2018); Goldfayn-Frank and Wohlfart (2018)).

We conjecture that consumers react directly to policies only if the implications of such policies are easy to grasp, that is, if policies are *salient* to non-expert consumers.² Recent empirical research motivates this conjecture by documenting that the accuracy of macroeconomic expectations and the understanding of economic policies varies dramatically across consumers’ characteristics and that central bank communication barely reaches ordinary people.³ Macroeconomic theory has also started to study the role of agents’ limited cognition on the effectiveness of monetary and fiscal policy (e.g., see Woodford (2018), Gabaix (2016), and Farhi and Werning (2018)).

To assess this possibility, we introduce micro data on the individual expectations and consumption plans of a large representative European population, which allows us to compare

¹See also Del Negro, Giannoni, and Patterson (2015); McKay, Nakamura, and Steinsson (2015); Kaplan, Moll, and Violante (2018).

²Here we focus on consumers’ *direct* reaction. Indirect effects of monetary policy could operate through changes in income expectations based on higher labor demand or through the effect of forward-guidance announcements on long-term interest rates (see Kaplan et al. (2018) and Swanson (2017)). We do not find empirical evidence for the such indirect effects in the medium term.

³Such dimensions include cognitive abilities (D’Acunto, Hoang, Paloviita, and Weber (2019a,b,c)), socio-economic status (Das, Kuhnen, and Nagel (2019); Ben-David, Ferman, Kuhnen, and Li (2018)), social networks (Bailey, Cao, Kuchler, and Stroebl (2019); Kuchler and Zafar (2018)), and perceptions through consumption bundles (D’Acunto, Malmendier, Ospina, and Weber (2018); D’Acunto, Malmendier, and Weber (2018)), among others. Coibion, Gorodnichenko, and Weber (2019) document the limited and transient reaction of non-expert consumers to traditional monetary policy communication.

the reactions to expectations-based policies whose salience differs. We use unexpected policy announcements for identification through a difference-in-differences design (Fuchs-Schuendeln and Hassan (2016)). Based on our conjecture, salient policies should be successful in managing the expectations of *all* individuals, irrespective of their sophistication in economic matters. Instead, measures of policy whose implications are not salient should not be effective in managing expectations, because agents might not even understand their expectations should react to such policy announcements.

On the salient side, we consider *unconventional fiscal policy*—unexpected pre-announced increases in value-added tax (VAT) to boost consumers’ inflation expectations and stimulate spending via intertemporal substitution.⁴ Unexpected pre-announced VAT increases are salient because the policy announcement trivially communicates to consumers that prices will be higher in the future, once the VAT increase is implemented.

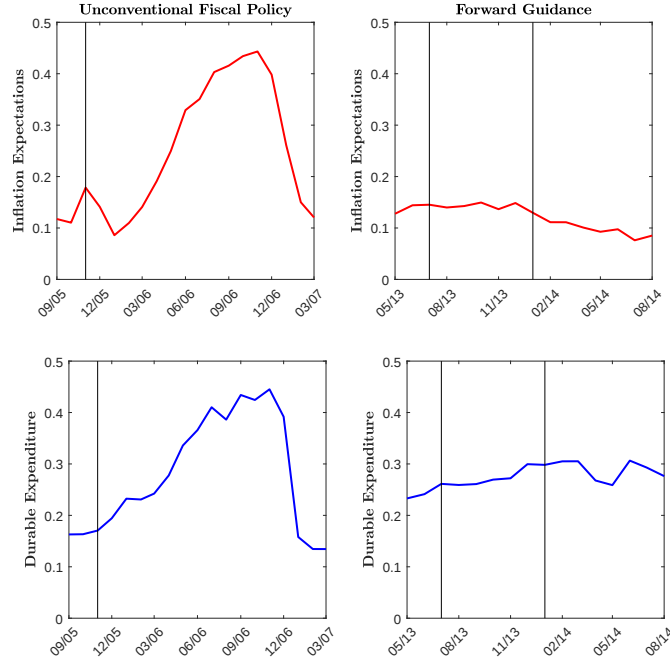
On the non-salient side, we consider forward guidance. Forward guidance announcements do not provide an explicit prescription about future inflation rates. Agents need to understand that the promise to keep interest rates low until after the end of a liquidity trap will raise inflation in the future and hence inflation expectations should increase at the time of the announcement. This direct effect of forward guidance on non-expert consumers’ expectations motivates policy makers: “[T]he benefits of higher inflation expectations (are) in terms of front-loaded spending” as Benoit Coeure, Member of the Executive Board of the ECB highlighted in his speech “The usefulness of forward guidance” in 2013. The European experience is well suited because expectations of experts and financial markets reacted strongly to the ECB forward guidance announcements, which suggests that a lack of credibility of this policy was not an issue.

Figure 1 plots the reaction of individual inflation expectations (top panels) and the propensity to purchase durable goods (bottom panels) to an unconventional fiscal policy announcement (left panels) and two forward guidance announcements (right panels), which we describe in detail below. Consistent with our conjecture, unconventional fiscal policy announcements increase inflation expectations and the willingness to purchase durables on impact. Instead, forward guidance announcements seem unable to manage consumers’ expectations directly in the raw data.

As a measure of unconventional fiscal policy, we exploit the unexpected announcement in November 2005 of an increase in VAT effective in January 2007 by the German government which is well suited as a proxy for unconventional fiscal policy contrary to generic consumption-tax changes. Proxies for unconventional fiscal policy need to be exogenous and unexpected.

⁴See Shapiro (1991), Feldstein (2002), Hall (2011), Correia, Farhi, Nicolini, and Teles (2013), and D’Acunto, Hoang, and Weber (2018)). In Feldstein (2002)’s words: “This [VAT] tax-induced inflation would give households an incentive to spend sooner rather than waiting until prices are substantially higher.”

Figure 1: Inflation Expectations & Durable Purchases



This figure plots the share of German consumers that expect higher inflation in the next 12 months compared to the previous 12 months in the top panels and the share of German consumers that think it is a good time to purchase larger ticket items in the bottom panels. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to construct these variables. In the left panels, the vertical line signals the unconventional fiscal policy announcement (November 2005). In the right panels, the two vertical lines signal the forward-guidance announcements by the president of the European Central Bank, Mario Draghi (July 2013 and January 2014).

Moreover, the announcement should not trigger a change in nominal interest rates, so that higher inflation expectations result in lower real interest rates, reduce households' saving motives, and increase their consumption via intertemporal substitution. Two features make the pre-announcement we propose uniquely suited to our test. First, the European Union (EU) largely imposed this policy on the German government to avoid an infringement procedure for the breach of the Maastricht Treaty, which imposes an arbitrary cap of government deficit to gross GDP of 3%.⁵ The VAT-increase announcement was therefore unexpected and due to inherited fiscal deficits.⁶ Second, Germany has no monetary sovereignty as a member of the European Monetary Union (EMU). The European Central Bank (ECB) explicitly excluded any increase

⁵A recent debate developed on the fact that a few EU bureaucrats chose the 3% threshold without any specific motivation and without substantial negotiations among country representatives. The narrative record suggests a low-level French bureaucrat in the Ministry of Finance, Guy Abeille, came up with the number in 1981. See, e.g., <https://www.faz.net/aktuell/wirtschaft/wirtschaftswissen/3-prozent-defizitgrenze-wie-das-maastricht-kriterium-im-louvre-entstand-12591473.html>.

⁶In the taxonomy of Romer and Romer (2010), the increase qualifies as an "exogenous" tax change due to an inherited fiscal deficit. In section A.2 of the online appendix we provide more discussion on the extent to which the VAT shock was barely related to expected future economic conditions.

in nominal interest rates to counteract the price pressure from a higher VAT in Germany.⁷ The combination of an unexpected announcement of a future VAT increase and the fact that nominal interest rates did not change after the announcement makes this setting a desirable laboratory to study our question.

Our setting also includes two announcements by ECB President Mario Draghi, which President Draghi, the ECB, and the European press labeled as the first forward guidance announcements in the EMU. President Draghi discussed the introduction of forward guidance as a policy tool during the Introductory Statement to the Press Conference following the ECB’s Governing Council meeting of July 4 2013 and “firmly reiterate(d)” it on January 9 2014.⁸ We use these two events to study the effect of forward-guidance announcements on expectations and spending plans.

The raw-data evidence in Figure 1 does not account for the fact that our measures of unconventional fiscal policy and forward guidance affected all German households at the same time. We cannot study the behavior of Germans alone, because we miss a counterfactual. We thus consider consumers in other EU countries not exposed directly to the German VAT shock and/or to the ECB measures of forward guidance as counterfactuals for the behavior of Germans had the policy announcements not happened. We match German and foreign consumers based on observables in a difference-in-differences identification strategy. We have access to micro data from the harmonized European Commission (EC) consumer survey program for Germany, France, the UK, and Sweden. For the forward guidance announcements, we use households in the UK and Sweden that were not exposed to the shocks as control groups. For the unconventional fiscal policy announcement, we also add French households to the control group or as separate control group because they face the same interest rate environment as Germans.

German and foreign consumers are likely to differ along several dimensions. Our identification design allows us to absorb all systematic differences between Germany and other countries, such as differences in legal systems and cultural attitudes. Moreover, we lever the demographic information in our micro data to focus on matched German and foreign consumer pairs based on a large set of characteristics, such as age, income, and education. Systematic and time-varying differences in the demographic composition of German and foreign consumers

⁷According to the German representative on the ECB board, Weber: “We know what the effects of the VAT increase are; as is the case for oil prices, we do not consider one-off effects” (Weber (2006)). Weber’s view also corresponds to the view of the former president of the ECB, Jean-Claude Trichet, and the overall governing council, as we document in section A.3 of the online appendix.

⁸“The Governing Council has taken the unprecedented step of giving forward guidance in a rather more specific way than it ever has done in the past. In my statement, I said “The Governing Council expects the key ...” - i.e. all interest rates - “... ECB interest rates to remain at present or lower levels for an extended period of time.” It is the first time that the Governing Council has said something like this.” See: “Introductory statement to the press conference (with Q&A)” available at <https://www.ecb.europa.eu/press/pressconf/2013/html/is130704.en.html>.

thus cannot drive any of our results.

This strategy might raise concerns about time-varying country-level shocks concurrent to the policy announcements, which might explain the different dynamics of consumers' expectations across countries and over time. The main assumption our strategy requires is that inflation expectations and consumption propensities of Germans and foreigners would have followed parallel trends had the announcements not happened. Although this assumption is untestable, we can compare the average expectations of Germans and foreigners around the policy announcements, and we can test the null hypothesis that foreign consumers' expectations changed around the shock. And, indeed, the expectations and consumption propensities of non-Germans did not change around the announcements. Before the announcements, no differences existed between the behavior of German and foreign consumers. We cannot reject that German and foreigners' inflation expectations and purchasing propensities followed parallel trends before the announcements.

Using our difference-in-differences identification strategy, we confirm the results in Figure 1. The unconventional fiscal policy announcement resulted in a large increase in the willingness to purchase durable goods throughout 2006, the period after the announcement and before the implementation of the VAT increase. A back-of-the-envelope calculation suggests the announcement resulted in 10.3% higher real durable consumption growth throughout 2006, before the actual increase in VAT. The forward-guidance announcements instead had no detectable effects on expectations or readiness to spend on durables.

Note that we would not be able to implement this empirical design using only time-series data. Our micro data allow matching German and foreign consumers based on demographics, which is important because different demographics react differently to changes in inflation expectations (Bachmann et al. (2015)). Moreover, our data allow us to control for income expectations, employment status, and housing choices that might affect consumption responses to policy announcements above and beyond the Euler-equation channel.

A defining feature of unconventional fiscal policy is its salience, that is, the fact that its announcement provides a trivial communication to households that prices will be higher going forward. Because this type of policy is salient and non-expert consumers can grasp its implications easily, unconventional fiscal policy should manage the expectations and choices of *all* consumers, irrespective of their sophistication in economic matters.

To test this prediction, we propose proxies of sophistication in economic matters and test whether unconventional fiscal policy affects all consumers, irrespective of their level of sophistication. We use education levels, age, and income expectations as proxies for sophistication because earlier research shows that all these dimensions correlate with the

accuracy of households' expectations and their understanding of conventional measures of fiscal and monetary policy.⁹

Consistent with earlier research,¹⁰ the unconditional association between inflation expectations and consumption plans is higher for sophisticated consumers than for others. At the same time, consistent with our conjecture, all German consumers reacted similarly in their consumption plans to the VAT announcement irrespective of their sophistication.

If unconventional fiscal policy is effective because of its salience to all consumers, and not because it relaxes other constraints households face on their spending ability, we should find that consumers react differently to this policy announcement based on whether they face financial and liquidity constraints. Consistently, unconstrained Germans increased their spending by about 25% more than constrained Germans.

We then move on to consider the same heterogeneity tests for forward guidance announcements. Testing the potential reaction of consumers based on their sophistication is relevant to disentangle our interpretation—that forward guidance's implications for inflation and spending are not salient enough—from the possibility that consumers did not find such policy announcement credible. Lack of credibility is unlikely to play a role in our setting, because financial markets reacted strongly to the two forward guidance announcements in the EMU, which is *prima facie* evidence that they found such announcement time consistent and credible.¹¹ The possibility that non-expert consumers would not react because of considerations about policy credibility seems thus unlikely. In case consumers thought time-inconsistency of forward guidance was an issue, we would expect sophisticated consumers should have reacted less than other consumers. Sophisticated consumers would understand the time-inconsistency issue of forward guidance whereas other consumers would barely understand it. Instead, we find that no group reacted in an economically or statistically significant way, neither on impact nor several months after the forward guidance announcements. We also detect a broad lack of reaction if we consider constrained or unconstrained consumers separately.

Taken together, our results show that large differences exist in the effectiveness of policies that operate theoretically through the same channels but differ in the salience of their implications to consumers. Consumers' non-response to forward-guidance announcements, either in terms of inflation expectations or consumption plans, suggests that limited cognitive

⁹See, e.g., D'Acunto, Malmendier, Ospina, and Weber (2018); D'Acunto, Malmendier, and Weber (2018); D'Acunto, Hoang, Paloviita, and Weber (2019c)).

¹⁰For instance, see Bachmann et al. (2015); Burke and Ozdagli (2014); Armantier, Bruine de Bruin, Topa, Klaauw, and Zafar (2015); Cashin (2016); Ichiue and Nishiguchi (2015); Crump, Eusepi, Tambalotti, and Topa (2015); Vellekoop and Wiederholt (2017); Christelis, Georgarakos, Jappelli, and van Rooij (2016); and the evidence from historical data in Romer and Romer (2013); Eggertsson (2008); Jalil and Rua (2016).

¹¹For a discussion of the European and US experience, see for instance Andrade and Ferroni (2019), Hubert et al. (2018) and Campbell et al. (2012).

abilities might help explain the forward guidance puzzle (e.g., see Woodford (2018), Gabaix (2016), and Farhi and Werning (2018)). The broad response to unconventional fiscal policy announcements, instead, emphasizes the potentially broader effectiveness of salient measures of expectations-based macroeconomic policies.

Our analysis contains some caveats. The data consist of repeated cross sections of consumers. We cannot exploit within-household variation in inflation expectations to control for time-invariant unobserved heterogeneity at the household level. Also, the survey elicits consumers’ willingness to purchase durable goods but we do not observe actual purchases. We show that our survey-based willingness to spend closely tracks the realized durable consumption expenditure, which is consistent with evidence in Bachmann, Berg, and Sims (2015) for the US (see Figure A.1 in the online appendix).

Note also that the survey we use elicits only qualitative measures of inflation expectations. Using our qualitative measure, we show in Figure A.2 in the online appendix that lagged households’ inflation expectations track closely actual realized inflation—the measure captures meaningful variation in inflation expectations by households. Instead, research that uses quantitative measures of expectations finds an upward bias in average inflation expectations relative to ex-post realized inflation, and substantial dispersion of the levels of inflation expectations across households (Armantier et al. (2015), D’Acunto et al. (2018)).¹² This discrepancy is consistent with households having correct *directional* expectations regarding inflation—which we capture with our qualitative measure—but incorrect perceptions regarding the *level* of inflation (see Vellekoop and Wiederholt (2017)). We discuss these points in more detail in section I.

A. Related Literature

Our paper builds on the recent revival of research on subjective expectations in macroeconomics. Bernanke (2007) motivates this agenda arguing inflation expectations drive the consumption, saving, and borrowing decisions of individuals, workers’ wage bargaining with firms as well as managers’ price-setting decisions, and the effectiveness of fiscal and monetary policy, among other outcomes. Malmendier and Nagel (2009) find lifetime experiences matter for inflation expectations and mortgage choices, Kuchler and Zafar (2018) show individuals extrapolate from the individual experiences to aggregate house price expectations, and D’Acunto et al. (2018) and Cavallo et al. (2017) show individuals extrapolate from their shopping bundles to aggregate inflation.

¹²Quantitative inflation expectations also bunch at salient threshold values and households often report large positive and negative inflation expectations (e.g., see Binder (2015)).

In particular, we belong to the strand of literature that investigates the role of cognition in the formation and updating of subjective expectations. On the theoretical side, macroeconomists have recently modeled agents with limited cognitive abilities such as finite planning horizons (Woodford (2018)), myopic agents (Gabaix (2016)), or level-k thinkers (Farhi and Werning (2017) and Iovino and Sergeyev (2018)). These models imply that some agents do not update their subjective expectations to measures of fiscal and monetary policy. Empirically, D’Acunto et al. (2019a,b,c) find large heterogeneity in the forecast accuracy for inflation and in the reaction of agents’ choices to changes in interest rates and inflation expectations by cognitive abilities. Evidence also exists suggesting income expectations, age, education, gender, and socioeconomic status correlate with subjective expectations.

The two expectations-based macroeconomic policies we study have also been recently debated in theoretical and empirical research. Correia et al. (2013) formalize the notion of unconventional fiscal policy in a framework with a binding zero-lower-bound on nominal interest rates. An increasing path of consumption taxes generates inflation expectations and negative real interest rates and stimulates consumption, whereas a decreasing path of income taxes ensures the production decisions of firms are not distorted.¹³

Unconventional fiscal policy can be interpreted as a form of delayed sales-tax increase, which is announced months in advance and happens in the absence of changes in nominal interest rates. Most research so far has studied the impact consumption response to sales-tax changes (see, e.g., Agarwal, Marwell, and McGranahan (2013); Crossley, Low, and Sleeman (2014); Cashin (2016); and Baker, Johnson, and Kueng (2017)). Moreover, we add to earlier research by observing households’ inflation and income expectations together with their spending plans, which is not possible in the data used in the sales-tax literature and which is crucial to tackle the questions we ask in this paper.

The second policy we consider, forward guidance, has also been debated extensively over the last few years. Eggertsson and Woodford (2003) show that promises to keep interest rates low until the end of a liquidity trap can fully offset the constraints the zero lower bound poses on conventional monetary policy. The representative agent New Keynesian (RANK) model predicts that promises are more powerful in stimulating consumption the further out in the future they are. Del Negro, Giannoni, and Patterson (2015) document empirically the limited power of forward guidance. A recent literature documents the conditions under which a heterogeneous agent New Keynesian model is able to tame the power of forward guidance due to a discounting effect (see McKay, Nakamura, and Steinsson (2015); Kaplan, Moll, and Violante

¹³Eggertsson and Woodford (2004) discuss similar ideas in a Ramsey taxation model, and Farhi, Gopinath, and Itskhoki (2014) show VAT increases paired with payroll tax cuts can resemble exchange-rate devaluations within and outside of currency unions.

(2018); Hagedorn, Luo, Manovskii, and Mitman (2018); but also Werning (2015)).

Our contribution to the forward-guidance literature is empirical in nature. We document that consumers do not change their expectations and spending plans around forward guidance announcements in line with the predictions of standard models even in a setting in which experts deemed forward-guidance announcements credible. Our findings complement Coibion, Gorodnichenko, and Weber (2019) who document the limited and transient reaction of non-expert households to traditional monetary policy communication.

On the methodological side, our paper belongs to a growing strand of empirical macroeconomics literature that uses micro data to obtain causal identification either through natural experiments (Alesina and Fuchs-Schündeln (2007); Fuchs-Schündeln and Hassan (2016); D’Acunto, Prokopczuk, and Weber (2018); D’Acunto (2014)) or through information treatments in controlled environments (Coibion, Gorodnichenko, and Weber (2019); D’Acunto (2018); Roth and Wohlfart (2019); Andre, Pizzinelli, Roth, and Wohlfart (2019)). We contribute to this area by proposing a difference-in-differences identification strategy based on unexpected policy announcements, paired with household-level matching to allow comparison of the expectations and plans of observationally indistinguishable households.

I Data

A. Data Sources

We use the confidential micro data underlying the GfK Consumer Climate MAXX survey. GfK conducts the survey on behalf of the Directorate General for Economic and Financial Affairs (DG ECFIN) of the European Commission. We use similar data from the harmonized surveys of DG ECFIN for several other European countries.¹⁴ GfK asks a representative repeated cross section of 2,000 German households questions about general and personal economic conditions, inflation expectations, and willingness to spend on consumption goods at the monthly frequency. We obtained access to the micro data for the period starting in January 2000 and ending in February 2016. The online appendix contains the original survey and a translation to English.

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 could answer, “It’s neither a good nor a bad time,” “No, it’s a bad time,” or “Yes, it’s a good time.”

¹⁴We discuss the data for other European countries in more detail in the online appendix.

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

Households could answer, “Prices will increase more,” “Prices will increase by the same,” “Prices will increase less,” “Prices will stay the same,” or “Prices will decrease.” We create a dummy variable that equals 1 when households answered, “Prices will increase more,” to get a measure of higher expected inflation.

We also use questions regarding expectations about general economic variables, personal income or unemployment, and a rich set of socio-demographics.

B. Descriptive Statistics

Table 1 contains descriptive statistics. On average, 22% of individuals said it was a good time to buy durables, 22% said it was a bad time, and the others are indifferent. Thirteen percent of individuals expected higher inflation in the following 12 months. More than 80% of respondents thought prices in the previous 12 months increased substantially, somewhat, or slightly, with equal proportions for each answer. Only 15% thought prices remained the same, and essentially nobody thought prices decreased.

The sample is roughly balanced between women and men. Most respondents completed high school, but had no college education.¹⁵ The mean household’s size was 2.5, and the majority of households lived in cities with fewer than 50,000 inhabitants.

Panel C of Table 1 reports statistics for individuals’ personal expectations. Most individuals thought their financial situation had not changed in the previous 12 months, and they expected the same for the future. Most individuals barely saved, and expected a constant or slightly increasing unemployment rate.

B.1 Inflation Expectations and Actual Inflation

A concern with survey-based measures of inflation expectations is that households often report implausible levels of expected inflation. For instance, in the MSC, 3% of households expected deflation of up to 50%, whereas 17% of households expected inflation to increase by more than 9% per year. Forty-eight percent of households reported expected inflation rates as multiples of 5, which Binder (2015) interprets as uncertainty about inflation on the side of households. Moreover, a recent literature discusses the effects different wording of questions about inflation expectations have on households’ answers, and on the extent to which reported inflation

¹⁵Most respondents completed either *Hauptschule* or *Realschule*, and only 8% of respondents had a college degree.

expectations match up with households' reported consumption propensities (see Armantier, Bruine de Bruin, Potter, Topa, van der Klaauw, and Zafar (2013)).

In our setting, assessing whether our proxy for inflation expectations captures any meaningful variation in ex-post realized inflation rates is crucial. The EC consumer confidence survey does not ask households for a point estimate of their inflation expectations, but gives households a mix of qualitative statements about future changes and levels of inflation. Figure A.2 in the online appendix provides direct evidence that the household answers in the survey correlate strongly with future realized levels of inflation irrespective of the survey design.

Our qualitative measures might in fact be desirable when observing repeated cross sections of households. Consider the following example of two households A and B. Household A perceives average inflation to be 2%. Household B perceives it to be 20%. Household A expects inflation to 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. Also suppose household A reports in a quantitative survey that it expects inflation during the next 12 months to be 3%, whereas household B expects it to be 15%. 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.¹⁶

II Empirical Strategy

We move on to discuss the institutional setting of our natural experiments, the identification strategy, and the results.

A. Exogenous Measure of Unconventional Fiscal Policy

The ideal experiment to test for the effect of unconventional fiscal policy on consumption expenditure requires an exogenous increase in future consumption taxes that is not counterbalanced by an increase in nominal interest rates. To the best of our knowledge, no country has yet explicitly used pre-announcements of future VAT increases to stimulate consumption expenditure. We thus identify an exogenous policy shock that closely resembles unconventional fiscal policy following a narrative approach (see Romer and Romer (2010)). This measure should be unexpected, should not increase the budget deficit, and should affect households' inflation expectations.

¹⁶The example is motivated by Vellekoop and Wiederholt (2017) who find large dispersion in individual level inflation expectations but also find that individual fixed effects capture most of the variation in the panel.

In November 2005, the newly formed German government unexpectedly announced a 3-percentage-point increase in the VAT, effective in January 2007. The narrative record, which we discuss in more detail in the online appendix, suggests the VAT increase was legislated to comply with EU law. In each year between 2001 and 2004, Germany posted a deficit-to-GDP ratio above 3%. In 2003, the EU opened a procedure against Germany for infringement of the 3% deficit-to-GDP rule in the Maastricht Treaty. The German government proposed plans to reduce the ratio to 2.9% in 2005 to avoid fines. It became obvious during 2005 that Germany could not deliver on its promises, and the actual deficit-to-GDP ratio was 3.3% for 2005. The EU thus re-opened the deficit procedure and announced in November of 2005 it would fine Germany if the ratio was not below 3% by the end of 2007. The newly elected right-left coalition government announced in November 2005 a 3-percentage-point increase in VAT, from 16% to 19%, effective in January 2007. The increase in VAT was due to an “inherited budget deficit” (Romer and Romer (2010)), and was adopted to satisfy the requirements of the EU Stability and Growth Pact.

For our purposes, the crucial feature of this policy announcement is that Germany has had no monetary sovereignty since joining the EMU. The ECB did not tighten monetary policy to counteract the increase in inflation expectations in Germany, as we document with explicit quotes of former ECB President, Jean-Claude Trichet.

B. Forward Guidance

During the introductory remarks to the press conference on 4 July 2013, Mario Draghi, President of the ECB for the first time explicitly used forward guidance announcements as a policy tool: “The Governing Council expects the key ECB interest rates to remain at present or lower levels for an extended period of time.”¹⁷ Draghi then reiterated “Accordingly, we firmly reiterate our forward guidance that we continue to expect the key ECB interest rates to remain at present or lower levels for an extended period of time” during the introductory statement to the press conference on 9 January 2014.¹⁸

Peter Praet, Member of the Executive Board of the ECB, explained in an article that “longer-term interest rates determine the borrowing conditions that are most relevant for a large component of aggregate spending: first and foremost, durable consumption” and he moves on to argue that by committing to a future path of short-term interest rates the ECB would be able to stimulate durable spending.¹⁹ He goes on to explain that “inflation will start rising

¹⁷See: <https://www.ecb.europa.eu/press/pressconf/2013/html/is130704.en.html>.

¹⁸See: <https://www.ecb.europa.eu/press/pressconf/2014/html/is140109.en.html>.

¹⁹See <https://voxeu.org/article/forward-guidance-and-ecb>.

and the usual pattern of central bank reaction would dictate a resolute firming of the stance. Its promise not to follow that usual pattern of reaction will be painful to fulfill, when that time comes, because the central bank will have to watch inflation rising while remaining atypically passive. But that promise has a value today, as it generates optimistic expectations, supports spending and thus facilitates the central bank’s job at present.”

One potential concern with this form of forward guidance is time inconsistency. Central Banks have incentives to deviate from the policy once the liquidity trap is over and rates are too low generating inflation. Agents in the economy might realize this credibility problem and not react to the policy announcement for this reason. Financial markets though reacted strongly to the two forward guidance announcements. Hence, we find it unlikely that non-expert consumers did not change their inflation expectations or durable consumption plans because they perceived the forward guidance announcement to be time inconsistent.

Note that this form of forward guidance announcement, which publicly commits the ECB to future action, falls under the “Odyssean” category based on the taxonomy of Campbell, Evans, Fisher, and Justiniano (2012). Andrade and Ferroni (2019) study forward guidance in the EMU and argue forward guidance was mainly of the Delphic type in the pre-2012 period but “Odyssean shocks became predominant over the post-2012 period during which policy rates went to zero (in July 2012) and the Governing Council started to give explicit guidance on future rates (in July 2013).” Irrespective of whether the forward-guidance announcements of the ECB were Delphic or Odyssean in nature, theory predicts that the willingness of Germans to purchase durable goods should have increased after the announcements. If the announcements were purely Odyssean, we should detect higher inflation expectations and higher willingness to purchase large ticket items through the Euler equation. Alternatively, lower long-term rates should stimulate consumers’ willingness to purchases durable goods directly, independent of their inflation expectations.

C. Difference-in-Differences Approach

Assessing the effects of the policy announcements we propose on German consumers alone would not be enough, because all German households were exposed to the same announcements, and hence any shock contemporary to the announcements could cause a reaction. For identification purposes, we need a group of households not affected by the shock, but similar to German households before the shock. To this aim, we design a difference-in-differences empirical strategy in the spirit of Poterba (1996) and Besley and Rosen (1999).

The EU conducts harmonized consumer sentiment surveys. We obtained access to the confidential micro data for three additional countries (France, Sweden, and the UK) through

national statistical offices and GfK subsidiaries. We use the households in these three countries to construct our control groups for the counterfactual behavior of German consumers, had they not been exposed to the policy announcements.

Specifically, our difference-in-differences approach compares German consumers' readiness to purchase durables with the readiness of matched consumers in other European countries, whose observable characteristics are similar to German consumers, before and after the policy announcements. Because the micro-level cross-sectional estimation allows us to absorb any time-invariant country characteristic through country fixed effects, no systematic differences across German and other European consumers based on their country of residence drives our estimates.

We estimate the average treatment effect of each policy announcement on the consumers' readiness to purchase durables as follows:

$$(\overline{Dur}_{German, post} - \overline{Dur}_{German, pre}) - (\overline{Dur}_{foreign, post} - \overline{Dur}_{foreign, pre}), \quad (1)$$

where $\overline{Dur}_{German, post}$ is Germans' average readiness to purchase durable goods after each policy announcement; $\overline{Dur}_{German, pre}$ is Germans' average readiness to purchase durable goods before each policy announcement; and $\overline{Dur}_{foreign, post}$ and $\overline{Dur}_{foreign, pre}$ are the analogous averages for foreign households not exposed to the announcements.

D. Identifying Assumptions

The parallel-trends assumption is a necessary condition for identification. In our case, it requires that our control group behaved similarly to German households both before and after the shock, had the shock not happened. We cannot test whether the parallel-trends assumption held after the shock, because we miss the counterfactual of no shock. We therefore test for the potential presence of differential trends before the shock. In the presence of parallel pre-trends, our identifying assumption is that foreign households behaved like German households would have behaved absent the policy announcements over the same period of time.

Figure 2 and Figure 3 provide graphical evidence that we fail to detect violations of parallel pre-trends in our setting. Based on the top left panels of the two figures, the trends in inflation expectations and purchasing propensities are parallel for German and foreign consumers before the announcement of the VAT increase (November 2005). Starting in January 2006, both the German consumers' inflation expectations and willingness to buy durable goods started to increase substantially. At the same time, the trends for foreign consumers did not move compared to the pre-shock period.

When we consider the top right panels of both Figure 2 and Figure 3, we find that even in the case of the forward guidance policy announcements the trends in inflation expectations and purchasing propensities are parallel across German and foreign consumers. Contrary to the VAT announcement, we find no noticeable divergence in inflation expectations and purchasing propensities around the forward guidance announcements.

The bottom panels of Figure 2 and Figure 3 repeat the same parallel-trend test when only using a subset of the foreign countries we observe to match German consumers to similar foreign consumers based on demographics. For the unconventional fiscal policy announcement, we only consider French consumers in the control group. This restriction allows us to only consider consumers that were not subject to the increase in German VAT and at the same time were facing the same level of nominal interest rates over time set by the ECB. The similarity of pre-shock trends is even more pronounced when we only use French households as a control group (see bottom left panels of Figure 2 and Figure 3).

For the forward guidance announcements, we restrict the control group to consumers from the UK and Sweden (see bottom right panels of Figure 2 and Figure 3), who are not part of the EMU and hence are not affected by the ECB forward guidance announcements. Again, we confirm these groups of consumers display parallel trends in the pre-announcement periods in terms of both individual inflation expectations and readiness to purchase durable goods.

Finally, before moving on to our difference-in-differences estimates, we verify that consumers in all countries display a positive association between inflation expectations and willingness to consume durable goods. We perform this test in columns (6)-(8) in Table 2. In column (5), we report the corresponding baseline effect for German households, excluding the forward guidance and unconventional fiscal policy periods. Foreign households are therefore likely to react to increases in inflation expectations in a similar fashion as German households, which alleviates the concerns regarding the external validity of our strategy. We discuss in more detail the empirical models we estimate, the association between inflation expectations and consumption propensities, and the heterogeneity across demographic groups in section V.

***E.* Matching Foreign and German Households**

We match households in Germany with households abroad to account for the heterogeneity in responsiveness to inflation expectations and the large heterogeneity in marginal propensities to consume to macroeconomics shocks such as fiscal and monetary policy shocks (Jappelli and Pistaferri (2014) and Krueger, Mitman, and Perri (2016); see also section V). We first match each German household in each month with a household in another country interviewed in the same month displaying similar demographic characteristics. Our samples are repeated cross

sections, and hence 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 use a nearest-neighbor algorithm to match households based on propensity scores.²⁰ We estimate propensity scores with a logit regression of the treatment indicator on gender, age, education, income, and social status, which are the demographic characteristics that are elicited homogeneously across EU countries.

The matching exercise is meaningful only for German and foreign households in the common support of the distributions of the propensity score for the two groups. In Figure 4, we plot the distribution of the propensity score for the treatment group of German households for the VAT period in panel A (red, top half of panel A) and the control group of French, Swedish, and British households (blue, bottom half of panel A) and for the forward guidance period in panel B. The control group consists of households in the UK and Sweden for the forward guidance period. Figure 4 verifies that households are distributed across the full range of the propensity score in both groups.

To assess the performance of the matching procedure, we compare average household characteristics across German and foreign households in our sample both before and after matching. In Table 4, we analyze the balancing of the variables we use in the matching process. Panel A refers to the unconventional fiscal policy period and Panel B to the forward guidance period.

In each panel of Table 4, columns (1)-(3) report the sample average of the variables we use to compute the propensity score in the unmatched samples of German and foreign households. T-statistics for two-sided t-tests for whether the estimated means are equal reject the null at all plausible levels of significance, for both policy events. This result confirms that without the matching step, comparing German and foreign households would not be meaningful, because on average these two populations differ.

In columns (4)-(6), we report the same statistics for the treated and control observations of the matched samples, which we use in our difference-in-differences analysis. In this case, the differences in the estimated means across groups are economically and statistically negligible, which suggests that the matching procedure effectively provides us with two samples of German and foreign households that have similar demographic characteristics.

All our results are similar if we only use households from a subset of countries as a control group. Using a larger pool of control households increases the size of the common support, and

²⁰All 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.

improves the balancing of matched households' characteristics ex post.

III Policy Announcements, Expectations, and Choice

In this section, we first study the reaction of Germans' inflation expectations to the policy announcements. We then study the consumption response based on our difference-in-differences research design. We finally study the potential heterogeneity of the effects across demographic subgroups.

A. Unconventional Fiscal Policy

We first consider whether the announcement of a future increase in VAT affected consumers' inflation expectations and willingness to purchase durable goods.

Figure 1 in the introduction shows a large increase in the share of individuals that expect higher inflation over the next 12 months relative to the previous 12 months. In fact, the share more than quadruples after the announcement (left panel, vertical line) and stays elevated for the next 13 months until the actual increase in VAT in January 2007. After the actual increase, inflation expectations revert to their pre-announcement level.

We run a set of cross-sectional regressions on the matched sample before and after the announcement of the VAT increase to estimate the average treatment effect of the VAT shock in equation (1). We set the reference month to June 2005, and we change the end month m across regressions. All the results are similar if we use any other month before the announcement of the VAT increase in November 2005.

We estimate the following specification:

$$\Delta Dur_{i, 06/2005 \rightarrow m} = \alpha + \beta_m \times VATshock_i + \Delta X'_{i, 06/2005 \rightarrow m} \times \gamma + \epsilon_i, \quad (2)$$

where $\Delta Dur_{i, 06/2005 \rightarrow m}$ is the difference in the willingness to spend on durable goods between month m and June 2005, $VATshock_i$ is an indicator equal to 1 if the household was exposed to the VAT shock, β_m captures the effect of the VAT shock on household i 's willingness to buy durables in month m , and $\Delta X'_{i, 06/2005 \rightarrow m}$ is the difference in a set of observables between month m and the baseline month. The observables include the matching variables we use to construct households pairs, as well as income expectations. The results are virtually identical if we change the set of observables, or we exclude them altogether.

The left panel of Figure 5 plots the estimated coefficient $\hat{\beta}_m$ (solid line) of equation (2) for each month m from July 2005 to December 2007, as well as the 95% confidence intervals

(dashed line). We find no difference in the readiness to spend on durable goods between German and matched households before the announcement of the VAT increase. Starting in December 2005, the VAT shock resulted in a positive effect on the willingness of German households to purchase compared to matched households: German households were 3.8 percentage points (s.e. 1.5 percentage points) more likely to declare it was a good time to purchase durable goods after the announcement compared to before, and compared to matched foreign households. The effect increased in magnitude throughout 2006 and peaked at 34 percentage points in November 2006. The average treatment effect dropped to zero in January 2007 once VAT increased and higher inflation materialized.²¹

The left panel of Figure 5 shows the VAT shock had 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. The average treatment effect increased over time. This finding is consistent with Crossley et al. (2014), who argue intertemporal arbitrage should increase over time and be highest right before the tax increase, because of irreversibility, uncertainty, and storage costs.

B. Forward Guidance

In our second step, we study whether the two ECB forward-guidance announcements during our sample period affected consumers' willingness to purchase durable goods.

The right panel of Figure 5 plots the estimated coefficient $\hat{\beta}_m$ (solid line) of equation (2) for each month m from April 2013 to June 2014, as well as the 95% confidence intervals (dashed line). We find no difference in the readiness to spend on durable goods between German and matched households before the first forward guidance announcement in July 2013.

The propensity of Germans to purchase durable goods did not change after the first forward guidance announcement relative to before and relative to matched foreign households. Even around the second announcement in January 2014 we see little movement in the average treatment effect of the announcement on the willingness to purchase durable goods.

Moreover, we find barely any reaction of the propensity to purchase durable goods throughout the period, which suggests the forward guidance announcements not only had no effect on impact, but not even any delayed indirect effects through lower long-term interest rates and credit-financed consumption.

²¹Results are virtually identically if we match on income expectations for the next 12 months, in addition to gender, age, education, income, and social status.

IV Does Everyone React to Salient Policies? Does Nobody React to Non-salient Policies?

Earlier research has identified several individual-level characteristics that are relevant for households' understanding and reaction to expectations-based policies. Examples of such characteristics include cognitive abilities—low-IQ men are less responsive to economic policies than high-IQ men (D'Acunto, Hoang, Paloviita, and Weber (2019a,b,c)); gender—women have systematically higher inflation expectations than men (D'Acunto, Malmendier, and Weber (2018); D'Acunto, Malmendier, Ospina, and Weber (2018)); and socio-economic status—low-status individuals have systematically higher and more uncertain inflation expectations than high-status individuals (Das, Kuhnen, and Nagel (2019); Kuhnen and Miu (2017); Ben-David, Fermand, Kuhnen, and Li (2018)).

A defining feature of unconventional fiscal policy is its salience to households. While other policy measures that aim to manage households' expectations require a basic understanding of economic principles to generate a direct reaction by consumers, unconventional fiscal policy does not. Because the policy announcement communicates trivially that consumer prices will increase at a fixed future date with certainty, consumers easily understand that delaying their spending until after the price increase will be costly. For this reason, we conjecture that those dimensions earlier research shows determine households' sensitivity to non-salient policies or the accuracy of households' inflation expectations should *not* matter for salient policies, that is, no heterogeneity should exist in the response to salient policies across those dimensions.

To assess our conjecture, we repeat the difference-in-differences analysis after splitting our sample across several demographic characteristics. To perform this test, we execute the matching of German and foreign households each month within each demographic group. We then estimate the average treatment effect of the policy announcements on households' readiness to purchase durable goods separately within each matched demographic group.

Figure 6 plots the estimated average treatment effects of the unconventional fiscal policy announcement when splitting the samples based on five demographic variables. First, we consider education levels and specifically whether the respondent has a college degree (High Education) or not (Low Education) as a proxy for households' sophistication in economic matters. This split is important, because if understanding economic principles was relevant to households' reaction to salient policies college-educated consumers should react more than others. Instead, we find no noticeable difference in the size of the reaction of respondents with different levels of education over time during the unconventional fiscal policy period.

The second characteristic we consider is gender. Because women have systematically higher

inflation expectations (D’Acunto et al. (2018)), one might wonder whether they reacted more strongly than men to the VAT announcement. In fact, if anything women appear to react slightly less throughout 2016, although this difference is economically negligible and we cannot reject the null hypothesis the difference equals zero in any of the months in 2016.

We then consider households’ income expectations and split the sample between those expecting higher income over the following 12 months and those expecting the same or lower income over the same period. We find the reactions are almost identical throughout the sample period across households with different income expectations.

Moving on to respondents’ age, we find that unconditionally—that is, outside the policy periods—older respondents are on average more likely to respond it is a good time to purchase durable goods relative to younger respondents. This fact is not surprising because older individuals might have less uncertain income profiles or be retired. Importantly, despite the different unconditional readiness to purchase durable goods, we detect no difference in the reaction to the VAT announcement across respondents of different ages.

Finally, we consider differences in socio-economic status. Even in this case we fail to detect any systematic differences across the lowest and highest socio-economic brackets in reaction to the VAT announcement.

Overall, our heterogeneity evidence suggests that basic determinants of how individuals form and update inflation expectations are unrelated to individuals’ reaction to the VAT announcement. The homogeneous and universal response supports the conjecture that unconventional fiscal policy is a salient policy measure that all households seem to understand. By virtue of its salience, unconventional fiscal policy reaches the overall population and triggers a universal reaction.

After considering demographics often assumed to impact households’ behavior, we move on to assess the heterogeneity of the reaction based on whether households face financial constraints. Financial constraints should hinder households’ ability to purchase durable goods irrespective of the extent to which they understand policies. Even if consumers fully understand their propensity to consume should be higher before the actual increase in VAT, consumers facing financial constraints might not be able to react to this policy measure.

We assess this possibility in Figure 7, in which we split households based on two proxies for financial constraints. The first proxy is a direct question in the survey for whether respondents are unable to save any of their income or borrow (high financial constraints) or whether respondents save regularly part of their monthly income (low financial constraints). The second proxy we consider is household income level. Intuitively, households with higher income should be less likely to face financial constraints relative to households with lower income. Consistently,

we find that for both proxies of financial constraints constrained respondents reacted less to the VAT announcement relative to unconstrained respondents.

We repeat the same analysis across demographic sample splits around the two forward guidance announcements. Figure 8 and Figure 9 show these results. Across all sample splits, we fail to detect any significant increase in the willingness to purchase larger ticket items and even the most sophisticated individuals in Germany did not adjust their propensity to consume at all. Note that if the lack of credibility of forward guidance announcements might drive the average non-response in the broad population, we would have expected that more sophisticated consumers reacted less than others, because understanding forward guidance might be time inconsistent should be easier for sophisticated consumers than for unsophisticated consumers.

V Channels

In the last part of the paper, we assess a set of potential economic channels through which announcements of unconventional fiscal policy might affect consumers' reaction in terms of inflation expectations and durable consumption plans. We focus this analysis to the case of unconventional fiscal policy, because through all our tests so far we failed to detect any reaction to the two forward guidance announcements we considered.

Unconventional fiscal policy can affect purchasing propensities via an inflation-expectations channel only if consumers' willingness to purchase reacts to changes in their inflation expectations. In times of fixed nominal interest rates, the Euler equation predicts a positive association between consumption and inflation expectations. Earlier literature, however, found conflicting evidence in micro data for the United States. In this section, we document a positive association between households' inflation expectations and their willingness to purchase durable goods. The size of the association varies substantially across demographics. This result confirms the relevance of our difference-in-differences identification strategy that matches German households with demographically similar households in other EU countries and also informs the dimensions to focus on when studying whether unconventional fiscal policy affects the overall population because of the salience of the policy measure.

A. Intertemporal Substitution

Consumers' readiness to purchase durable goods derives from discrete, non-ordered choices in a survey. We therefore model the response probabilities in a multinomial-logit setting.²²

We assume the answer to the question on the readiness to spend is a random variable

²²Results are similar if we estimate a probit model instead.

representing the underlying population. The random variable may take three values, $y \in \{0, 1, 2\}$: 0 denotes it is neither a good nor a bad time to purchase durable goods; 1 denotes it is a bad time to purchase durable goods; and 2 denotes 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 an $N \times K$ 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.

We assume the distribution of the response probabilities is

$$P(y = t|X) = \frac{e^{X\beta_t}}{1 + \sum_{z=1,2} e^{X\beta_z}} \quad (3)$$

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. 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. We compute the marginal effects of changes in the covariates on the probability that households choose any of three answers in the survey, and report them in the tables.

Table 2 reports the average marginal effects computed from the multinomial logit regressions. We cluster standard errors at the quarter level to allow for correlation of unknown form in residuals across contiguous months. In all columns, we report the marginal effect of the inflation-increase dummy on the likelihood that households respond that it is a good time to buy durables. Columns (1)-(5) focus on the sample of German households, whereas columns (6)-(8) report the results for estimating the same specification separately for foreign country households.

In column (1), the inflation-increase dummy is the only explanatory variable. Germans that expect increasing inflation over the following 12 months are on average 5.8% more likely to answer that it is a good time to buy durables compared to individuals that expected constant or decreasing inflation. Column (2) augments the specification by adding a set of controls, which include perceptions of past inflation (Jonung (1981)), a rich set of demographics characteristics that might determine both purchasing propensities and inflation expectations (see, e.g., Attanasio and Weber (1993)), as well as expectations about personal and macroeconomic variables. The baseline association between expecting higher inflation and readiness to purchase durable goods becomes larger (8.8%), which suggests that omitted factors in this analysis are unlikely to dramatically change the results.

In columns (3)-(5) of Table 2, we show the association between inflation expectations and readiness to consume is robust across subperiods. Consistent with our interpretation of the difference-in-differences analysis, the baseline association is larger during the VAT announcement period, and hence unconventional fiscal policy was successful in not only managing expectations, but also in triggering a higher propensity to purchase durable goods.

At the same time, the baseline association is still true in other periods, including the forward guidance period, but we find no economic or statistical difference between the estimates for the forward guidance period and for normal times. This result corroborates our interpretation that forward guidance was neither successful in managing expectations nor successful in making the relationship between inflation expectations and spending salient to households.

In columns (6)-(8), we find that the baseline association between inflation expectations and readiness to spend is also true, on average, in each of the countries we use in our difference-in-differences analysis. Even in this case, the estimated effect for German households during the VAT announcement period is larger than the baseline effect for foreign households, whereas this difference is economically small during the forward guidance period.

A back-of-the-envelope calculation implies the marginal effect of inflation expectations on the willingness to buy durables translates into 4.8% higher real durable consumption expenditure if all Germans expect higher inflation. During the period after the announcement and before the actual increase in VAT, our back-of-the-envelope calculation implies the increase in VAT by 3 percentage points resulted in a 10.3% higher real durable consumption growth.²³

Table 3 studies the variation in the baseline effect by household characteristics. We first consider respondents' education. Columns (1)-(2) of Table 3 report the marginal effects for our baseline specification estimated separately for survey participants with a *Hauptschule* degree (lowest level of formal education) and those with college education. Households with low levels of education that expect inflation to increase are 6.9% more likely to have a positive stance toward buying durables compared to households that expected constant or decreasing inflation (column (1)). This marginal effect increases with education, and is more than 50% larger for household heads that held a college degree (column (2)).

We find a 5% higher marginal effect of inflation expectations on the likelihood of wealthier survey participants with a monthly net income above EUR 2,500 replying that it was a good time to buy durables (column (4)), compared to survey participants with a monthly net income less than EUR 1,000 (column (3)).

²³To reach this suggestive conclusion, we regress the natural logarithm of real durable consumption expenditure at the quarterly frequency on the end-of-quarter value of the average durable purchasing propensity and quarterly dummies, and multiply the resulting coefficient of 0.5396 by the marginal effect of 8.76% (column (2) of Table 2) and 19.09% for the period of the natural experiment (see column (4)).

Retirees have different time-use and consumption patterns compared to the working-age population, typically have nominal pensions in Germany, hold few real assets, and have lower human capital compared to someone in the labor force. The marginal effect of inflation increases on the willingness to spend is lower for those aged 65 or higher (column (6)) than for the younger population (column (5)).

In our sample, we do not detect large differences in the sensitivity to buy large-ticket items to inflation expectations by gender or income expectations but high socioeconomic status households tend to display a somewhat smaller sensitivity than high status households (see columns (7)–(12)).

To further assess whether the ability of unconventional fiscal policy to manage households' expectations translate into economic choices in a manner consistent with intertemporal substitution, we also consider whether households declare it is a bad time or a good time to save. Higher inflation expectations should indeed trigger lower willingness to save at the time of the survey. Verifying this channel is important, because our results so far might be consistent with households substituting between nondurable and durable spending, without any effects of their propensity to save or overall consumption. Table 5 confirm that higher inflation expectations increase the likelihood German households declare it is a bad time to save and decrease the likelihood they declare it is a good time to save.

Overall, we interpret the results in Table 2 and Table 5 as consistent with the conjecture that intertemporal substitution is a channel through which unconventional fiscal policy affected German households' willingness to purchase durable goods. Conversely, the results show that forward guidance was unable to act through an intertemporal-substitution channel among German households.

B. Alternative Channels

The change in VAT could affect the consumption behavior of Germans through income and wealth effects rather than intertemporal substitution. The increase in VAT might lead households to adjust their income expectations upward. Figure 10 plots the evolution of average income perceptions and income expectations over the next 12 months together with inflation expectations. The announcement of the VAT increase immediately increased average inflation expectations, whereas the average perception of income and the average expectation of future income did not. Moreover, an increase in distortionary taxes might result in a negative wealth effect and lower consumption expenditure. In this case, we would identify a lower bound of the causal effect in such a world.

Modern heterogeneous-agent models prominently feature a redistribution channel of surprise

inflation from lenders to borrowers (see Doepke and Schneider (2006)). Under the assumptions of all goods being subject to the higher VAT and 100% tax incidence on the consumer side, we would expect an increase in consumer price inflation of 2.59%. However, the change in inflation is only a surprise for loan contracts that existed before November of 2005 and matured after December 2006. For this subset of contracts, we expect a redistribution of nominal wealth from lenders to borrowers after the actual increase in VAT. At the same time, the increase in VAT was permanent and should have resulted in a reduction in wealth corresponding to 2.59% of lifetime consumption under the assumption that consumers did not change their consumption bundle after the VAT announcement. The total wealth effect of an increase in VAT is therefore most likely negative for both borrowers and lenders, and we would again identify a lower bound.

More elaborate models with financial constraints or hand-to-mouth consumers might offer alternative channels (Kaplan et al. (2018)). We cannot test for all alternative channels with our data. However, financial constraints or hand-to-mouth behavior are unlikely to drive our findings, because tax increases should result in lower consumption expenditure in these alternative models. We also discuss in section A.2 in the online appendix that labor force participation and unit labor costs did not change during the period we study.

A housing-wealth channel and home-equity extraction were contributors to the boom before the Great Recession in the United States (see, e.g., Mian and Sufi (2011)). Germany has a home-ownership rate of only around 43% compared to two thirds in the United States, but also experienced negative house-price inflation throughout the 2000s.²⁴ A housing-wealth channel is therefore not likely to be an important contributor to our findings.

We discuss in section A.2 in the online appendix other concurrent policy changes, one of which was the abolition of the homeowner subsidy. One potential channel might be a substitution away from home purchases to purchases of other durable goods. Using data from the German Sample Survey of Income and Expenditure, we find a stable homeownership rate of 43.0% in 2003, 43.2% in 2008, and 43.0% in 2013. A substitution away from home purchases to purchases of other durable goods is therefore unlikely to explain our findings.

Bloom (2009) and Bloom et al. (2016) argue uncertainty shocks could be a major driver of business cycles. Higher uncertainty might result in lower consumption due to a precautionary-savings motive. Using the policy uncertainty index of Baker, Bloom, and Davis (2016), we do not see noticeable differences in uncertainty across Germany, France, and the UK (see Figure A.3 in the online appendix).²⁵ An increase in uncertainty occurred in September 2005 in Germany, which was the month of the general election. During the period of our difference-in-differences

²⁴Empirically, we find similar associations between inflation expectations and consumption propensities across renters and home owners.

²⁵We thank Rudi Bachmann for suggesting we test for an uncertainty and policy confidence channel.

test, uncertainty was effectively flat across countries.²⁶

Another alternative channel that we might wish to consider is intratemporal substitution from non-durable to durable consumption without increasing overall consumption. Table 5 shows households expecting higher inflation were more likely to report it was a bad time to save compared to households with constant or decreasing inflation expectations. These results make an intratemporal substitution channel driving our findings unlikely.

Lastly, other channels could have driven our findings if households did not answer the survey truthfully. We show in the Online Appendix that average spending propensities and inflation expectations correlate strongly with ex-post realizations in our sample.

VI Concluding Remarks

Several policies proposed and implemented during the recent Great Recession were less effective than expected or predicted by models used in policy institutions. The forward guidance puzzle and the limited uptake of the 2009 Home Affordable Modification Program are prominent examples (see, e.g., Agarwal et al. (2017) and Del Negro et al. (2015)). In this paper, we argue that the salience of policy interventions, that is, the extent to which policy implications are easy to understand by non-expert consumers, might help explain why alternative policies have different rates of success despite building on the same theoretical channels.

Specifically, we propose a causal test for the effect of unconventional fiscal policy—a salient pre-announced increase in future consumption taxes—and forward guidance announcements on consumers’ expectations and consumption plans using rich micro data on inflation expectations and consumption plans across several European countries.

The unconventional fiscal policy announcement led to an increase in consumers’ inflation expectations and willingness to buy durable goods, relative to similar consumers in countries not exposed to the shock but exposed to the same macroeconomic environment. All demographic groups reacted to the policy shock, including consumers with low levels of education.

For the forward guidance announcements, we do not find any change in inflation expectations and consumption plans at the household level after the announcements relative to before and relative to observationally similar households. This non-response holds for the average consumer in the full sample but also for each individual demographic group including highly educated individuals.

The stark difference in the effectiveness of the two expectations-based measures of policy,

²⁶Baker et al. (2016) do not provide uncertainty data for Sweden. All our results hold if we exclude Sweden from the analysis.

which should operate theoretically through the same economic channels, suggests that the easiness with which ordinary consumers can understand policies (“policy salience”) might be an important feature to include in macroeconomic models.

Our results open other questions for both theoretical and empirical research. For instance, what are the distributional consequences of ordinary consumers’ lack of reaction to non-salient policies? Because only experts in financial markets reacted to forward guidance announcements in the EU, non-salient policies could have unintended redistributive consequences and might thus increase consumption inequality (Krueger and Perri (2006) and Fuchs-Schuendeln, Krueger, and Sommer (2010)). The universal reaction to a salient policy like unconventional fiscal policy, instead, emphasizes an important role of ensuring that policy makers consider ordinary consumers and the extent of their understanding of economic mechanisms when proposing alternative policy designs.

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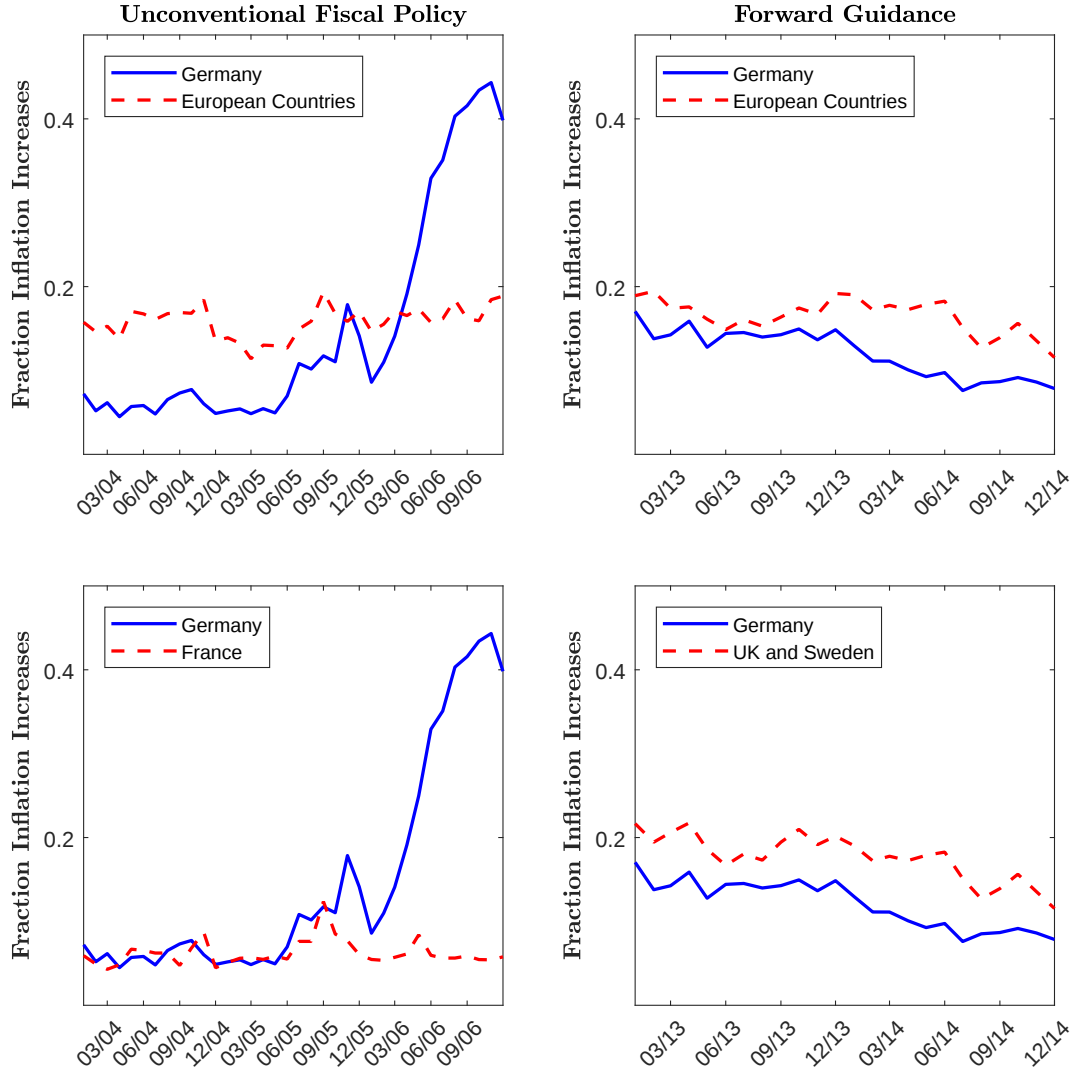
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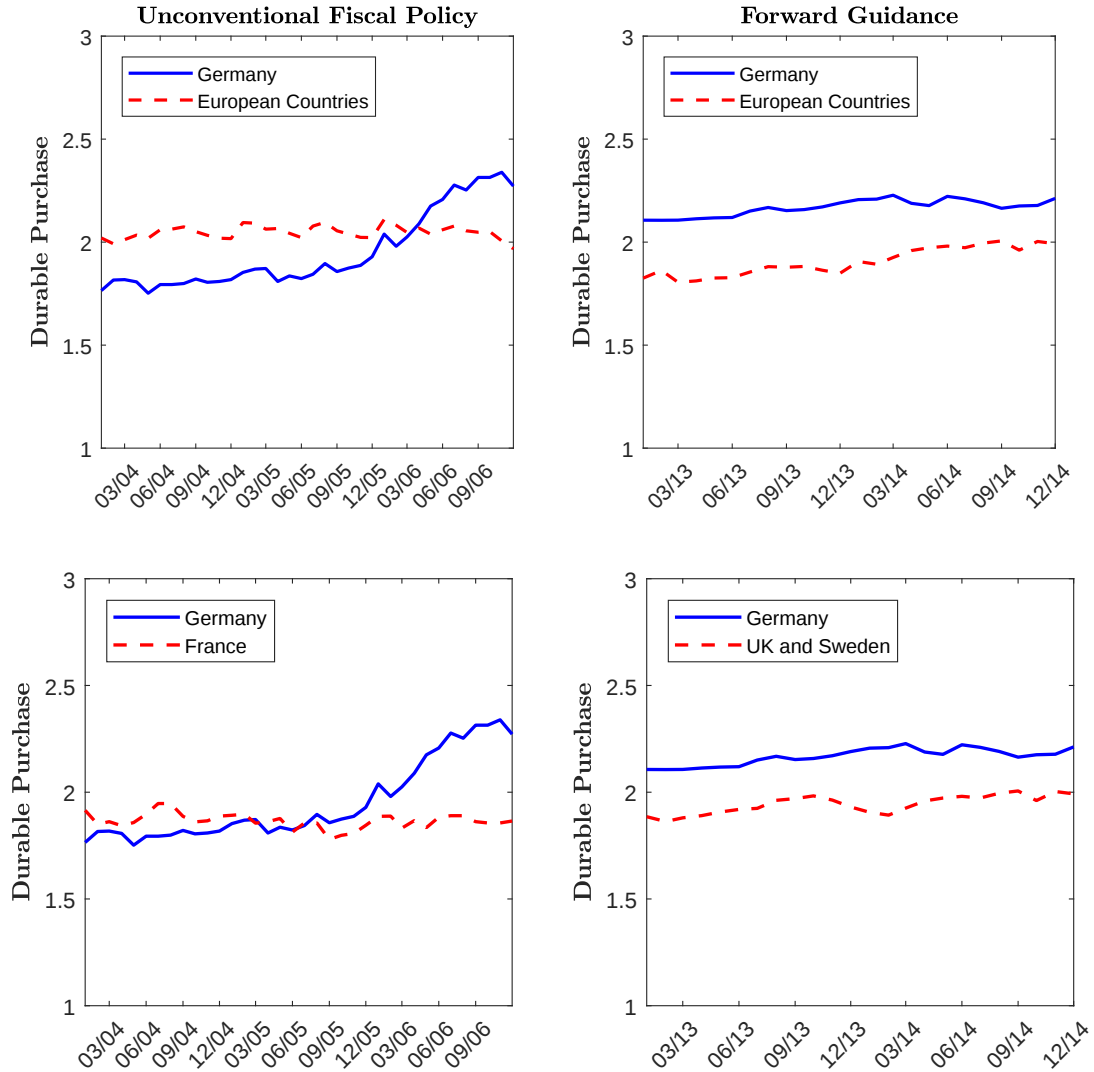
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Figure 2: **Expected Increase in Inflation: Germany and European Countries**



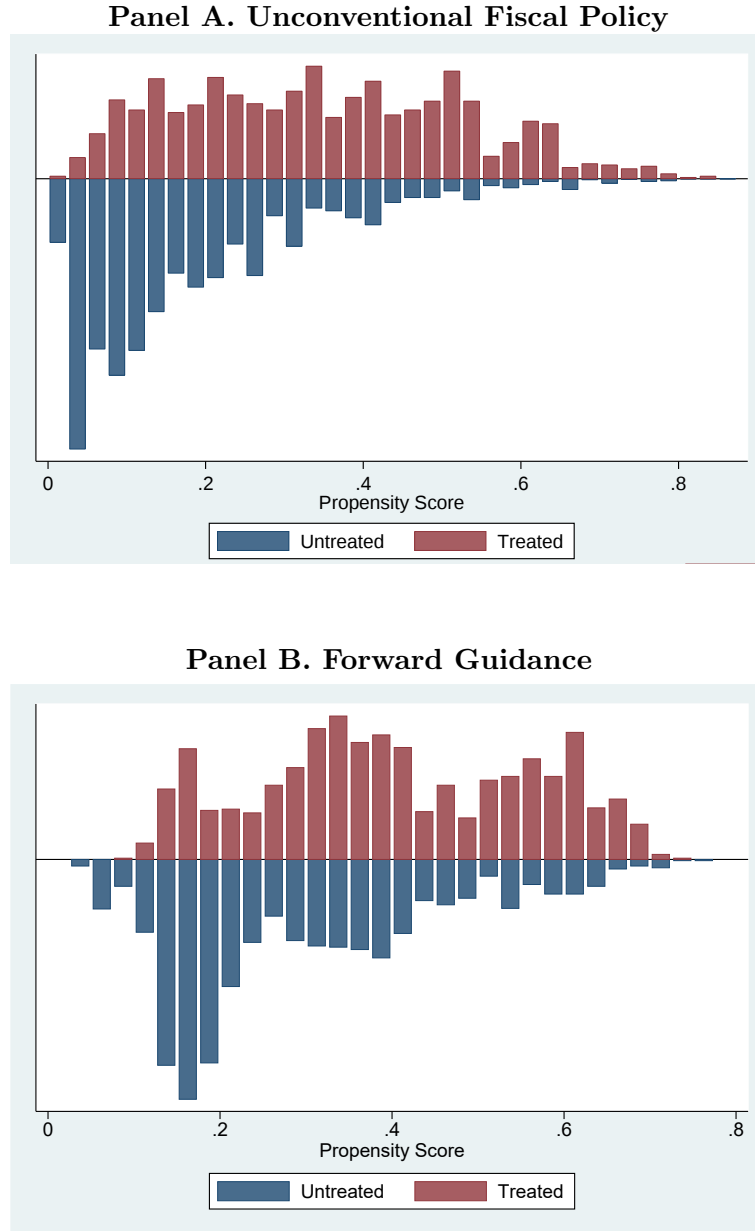
This figure plots average monthly inflation expectations over time. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to construct the variables for Germany and similar data from national statistical agencies and GfK subsidiaries for the United Kingdom, Sweden, and France. GfK asks a representative sample of 2,000 households how consumer prices will evolve in the next 12 months compared to the previous 12 months. We create a dummy variable which equals 1 when a household expects inflation to increase. The sample periods are January 2004—December 2006 and January 2013—December 2014.

Figure 3: **Readiness to Spend on Durables: Germany and European Countries**



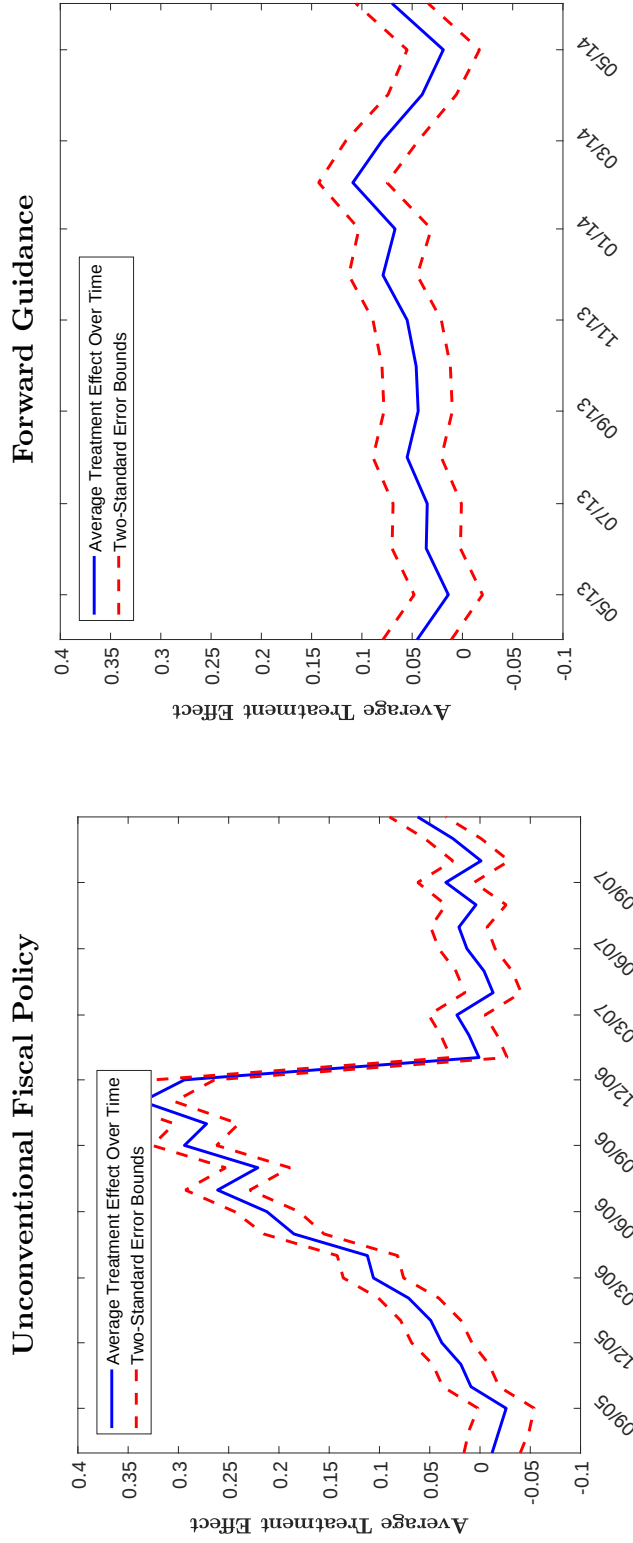
This figure plots the average monthly readiness to purchase durables over time. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to construct these variables for Germany and similar data from national statistical agencies and GfK subsidiaries for the United Kingdom, 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 periods are January 2004—December 2006 and January 2013—December 2014.

Figure 4: **Common Support of Treated and Matched Households**



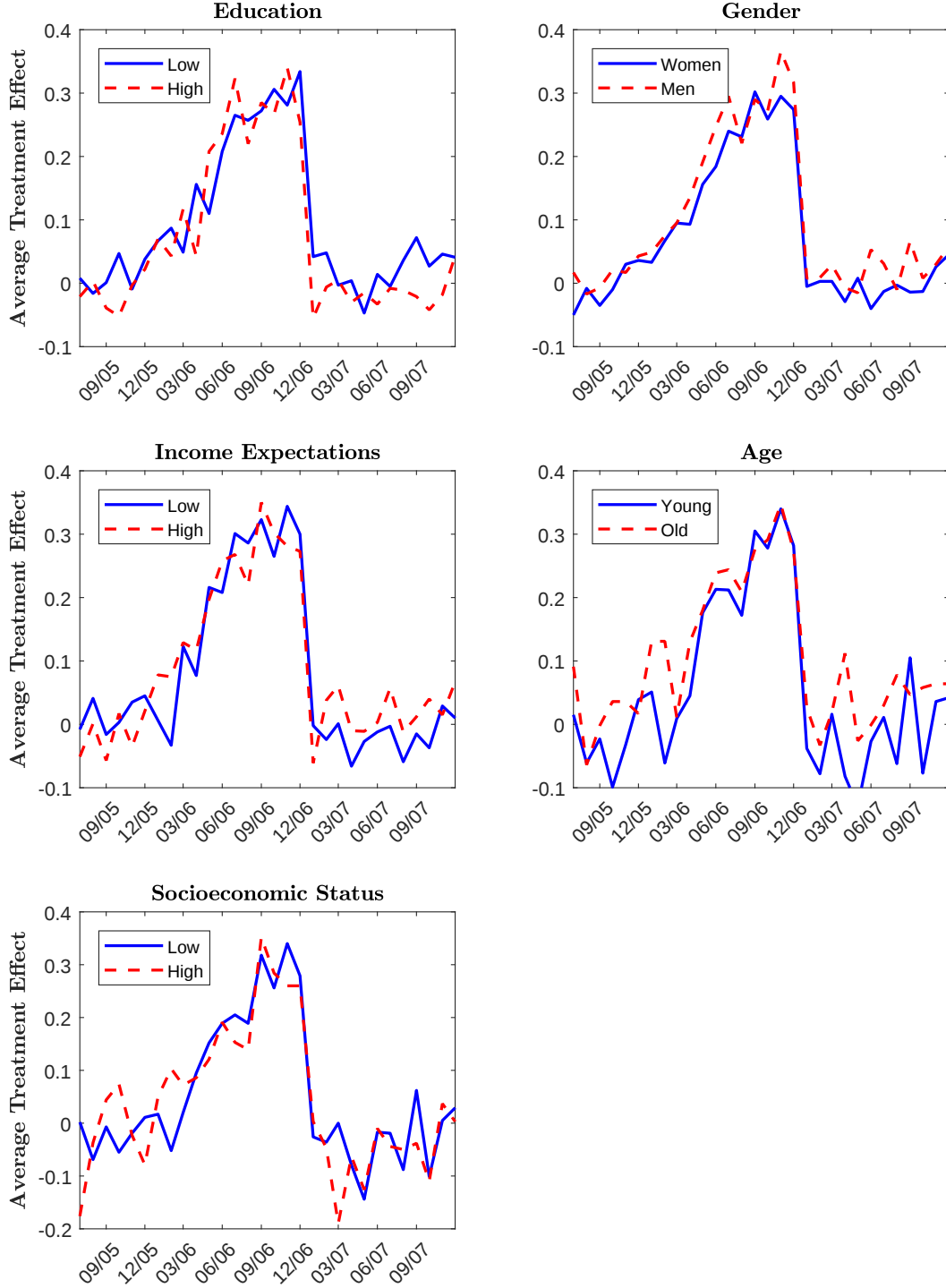
This figure plots the number of households in the untreated (blue) and treated (red) groups across forty equal-length partitions of the distribution of the propensity score in the baseline months (June 2005 and March 2013) for the difference-in-differences analyses. We estimate the propensity score with a logit specification whose outcome variable is the indicator for whether a household is in the treated or control group. 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 German households, whereas the control group includes households from the UK, France, and Sweden in Panel A and from the UK and Sweden in Panel B.

Figure 5: Change in the Readiness to Spend on Durables for German vs. Foreign Households



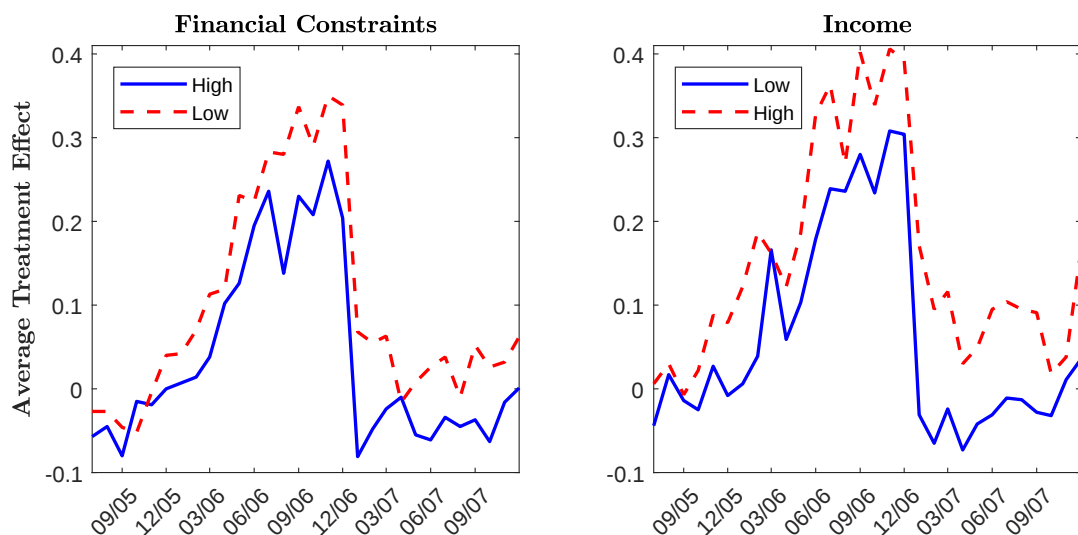
This figure plots the β_m coefficient (solid line) estimated from the following specification: $\Delta Dur_{i, base \rightarrow m} = \alpha + \beta_m \times Shock_i + \Delta X'_{i, base \rightarrow m} \times \gamma + \epsilon_i$. Dashed lines are two standard deviation error bands. Shock is an indicator that equals 1 if the household was exposed to the VAT shock in the left panel or to the Forward Guidance announcements in the right panel. For the VAT shock, the base month m is June 2005. For the Forward Guidance announcement, the base month m is March 2013. $\Delta Dur_{i, base \rightarrow m}$ is the difference in the willingness to spend on durable goods between month m and the base month. β_m captures the effect of each shock on the willingness to buy durables for household i in month m . 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 6: **Effect of Unconventional Fiscal Policy by Sophistication and Demographics**



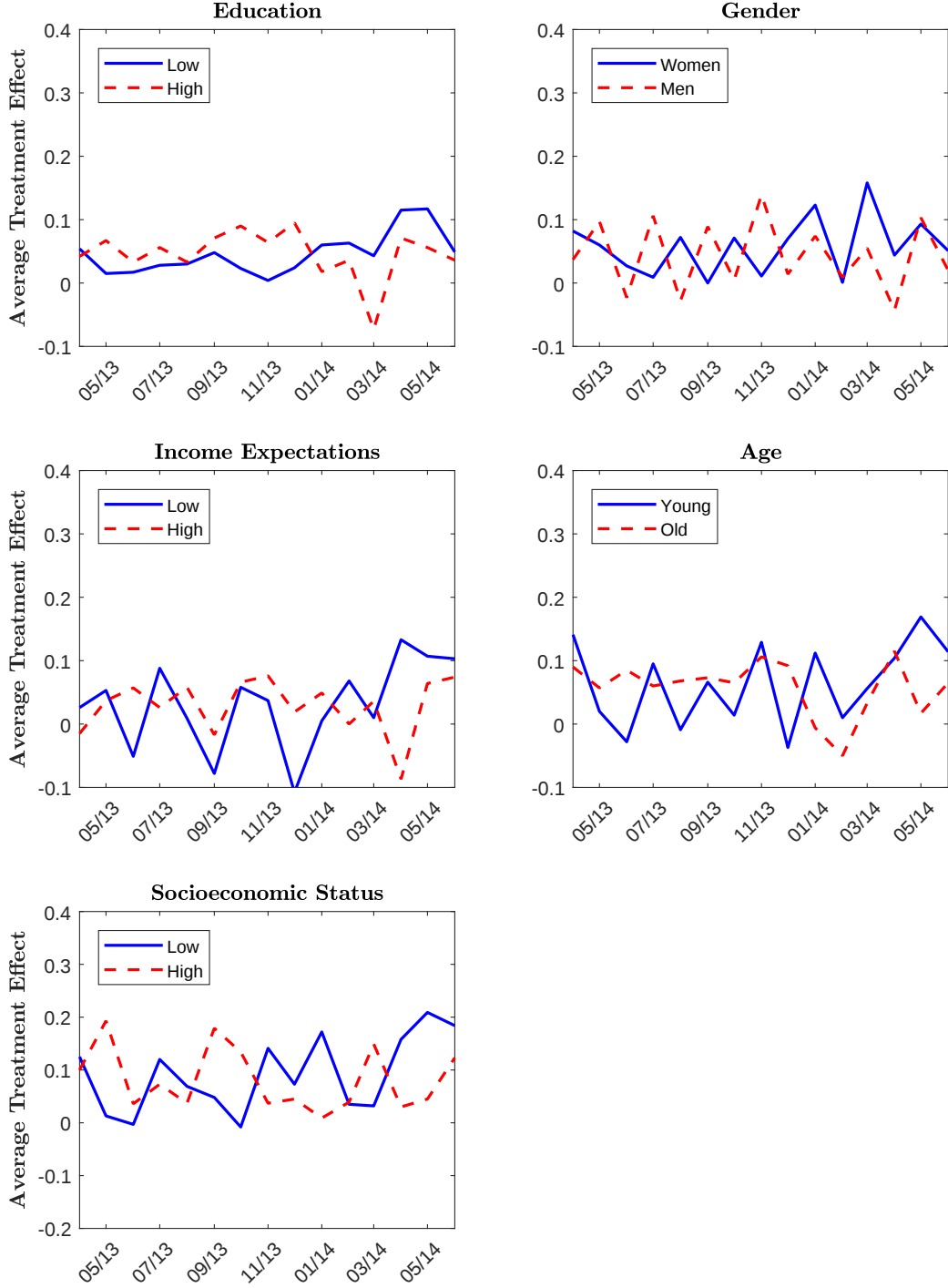
This figure plots the β_m coefficient (solid line) estimated from the following specification: $\Delta Dur_{i,06/2005 \rightarrow m} = \alpha + \beta_m \times VATshock_i + \Delta X'_{i,06/2005 \rightarrow m} \times \gamma + \epsilon_i$, for different sample splits by demographic characteristics. $\Delta Dur_{i,06/2005 \rightarrow m}$ 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 $\Delta X'_{i,06/2005 \rightarrow m}$ 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 7: **Effect of Unconventional Fiscal Policy by Proxies of Financial Constraints**



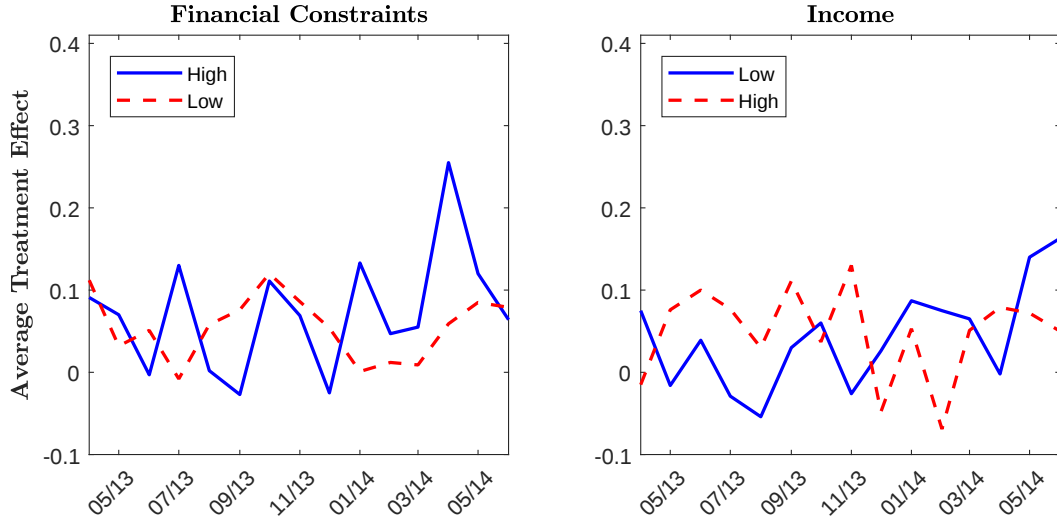
This figure plots the β_m coefficient (solid line) estimated from the following specification: $\Delta Dur_{i,06/2005 \rightarrow m} = \alpha + \beta_m \times VATshock_i + \Delta X'_{i,06/2005 \rightarrow m} \times \gamma + \epsilon_i$, for different sample splits by financial constraints. $\Delta Dur_{i,06/2005 \rightarrow m}$ 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 $\Delta X'_{i,06/2005 \rightarrow m}$ 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: **Effect of Forward Guidance by Sophistication and Demographics**



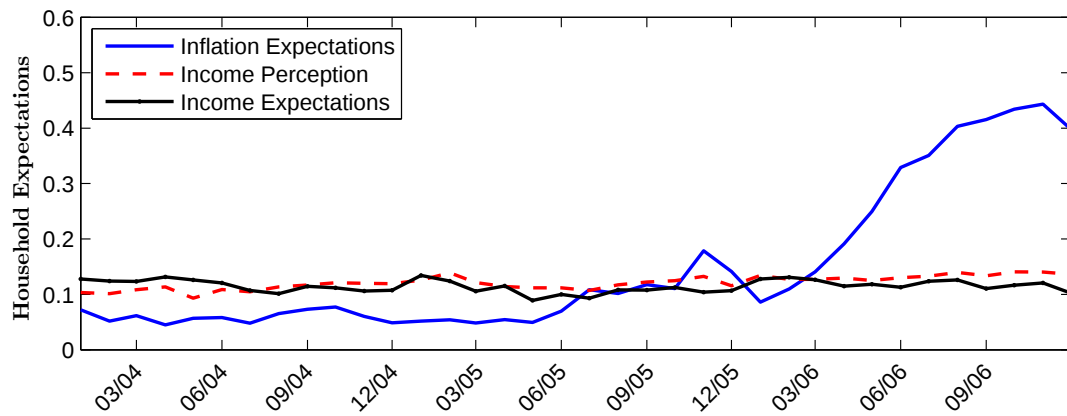
This figure plots β_m coefficient (solid line) of $\Delta Dur_{i,03/2013 \rightarrow m} = \alpha + \beta_m \times VATshock_i + \Delta X'_{i,03/2013 \rightarrow m} \times \gamma + \epsilon_i$, for different sample splits by demographics. $\Delta Dur_{i,03/2013 \rightarrow m}$ is the difference in the willingness to spend on durable goods between month m and March 2013, $VATshock_i$ 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 $\Delta X'_{i,03/2013 \rightarrow m}$ 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 9: Effect of Forward Guidance by Proxies of Financial Constraints



This figure plots β_m coefficient (solid line) of $\Delta Dur_{i,03/2013 \rightarrow m} = \alpha + \beta_m \times VATshock_i + \Delta X'_{i,03/2013 \rightarrow m} \times \gamma + \epsilon_i$, for different sample splits by financial constraints. $\Delta Dur_{i,03/2013 \rightarrow m}$ is the difference in the willingness to spend on durable goods between month m and March 2013, $VATshock_i$ 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 $\Delta X'_{i,03/2013 \rightarrow m}$ 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 10: **Channels of Unconventional Fiscal Policy: Income Effect?**



This figure plots average monthly inflation expectation, perception of past income, and expectation of future income over time. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to construct those variables. GfK asks a representative sample of 2,000 households how consumer prices will evolve in the next 12 months compared to the previous 12 months, how the financial situation of the household evolved during the past 12 months, and how the financial situation of the household will evolve during the next 12 months. We create a dummy variable that equals 1 if a household expects inflation to increase, perceives an improved financial situation, and expects an improved financial situation. The sample period is January 2004 to December 2006 for a total of 3 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; and household expectations and perceptions in Panel C. We use the confidential micro data underlying the GfK Consumer Climate survey to measure these variables. 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 12 months compared to the previous 12 months. Inflation increase is a dummy variable that equals 1 if a household replies that inflation will increase. GfK also asks how consumer prices evolved in the previous 12 months. See the online appendix for data sources and detailed survey questions. The sample period is January 2000 to February 2016.

		Nobs	Mean	Std	Min	p25	p50	p75	Max
Panel A: Inflation expectations and readiness to spend									
Readiness to buy durables	Good time	377,064	21.85%	0.34	0	0	0	0	1
	Neither		56.43%						
	Bad time		21.72%						
Inflation increase		408,776	13.17%						
Inflation perception	increased substantially	400,169	25.79%						
	increased somewhat		29.39%						
	increased slightly		28.67%						
	remained the same		14.82%						
	decreased		1.33%						
Panel B: Household demographics									
Sex	Male	408,776	45.99%						
	Female		54.01%						
Age		408,776	46.56	17.57	14	33	46	60	99
Education	Hauptschule	402,624	41.99%						
	Realschule		39.30%						
	Gymnasium		10.48%						
	Universitaet		8.23%						
Household members		408,776	2.47	2.47	1	2	2	3	5
City	City<9,999	408,776	28.05%						
	9,999<=City<49,999		34.46%						
	50,000<=City<199,999		15.56%						
	199,999<=City		21.94%						
Kids at home	yes	408,776	26.11%						
	no		73.89%						
Number of kids		363,476	0.45	0.80	0	0	0	1	4
Net income (inc) (EUR per month)	inc< 1,000	312,224	42.40%						
	1,000<=inc<1,500		28.52%						
	1,500<=inc<2,500		21.73%						
	2,500<=inc		7.36%						
Panel C: Household expectations and perceptions									
Past Financial situation	Improved substantially	404,494	1.53%						
	Improved somewhat		12.29%						
	Identical		62.32%						
	Worsened somewhat		19.46%						
	Worsened substantially		4.39%						
Financial outlook	Improves substantially	392,898	1.17%						
	Improves somewhat		11.43%						
	Identical		73.83%						
	Worsens somewhat		11.67%						
	Worsens substantially		1.91%						
Current financial situation	Save a lot	398,014	4.35%						
	Save little		41.06%						
	Don't save		40.49%						
	Dissave		11.96%						
	Take on debt		2.14%						
Expected unemployment rate	Increases substantially	408,776	13.08%						
	Increases somewhat		31.75%						
	Identical		36.71%						
	Decreases somewhat		17.35%						
	Decreases a lot		1.10%						

Table 2: Inflation Expectations and Readiness to Spend

This table reports the average marginal effects of a multinomial logit regression. Households' readiness to purchase durables is the dependent variable. Inflation expectation is a dummy variable that equals 1 if a household expects inflation to increase. We also control for household demographics and household expectations where indicated. Demographics include: gender, age, age squared, education level, household size, rural or urban residence, socio-economic status group, number of children, rental or owned housing, employment status, income level group. Expectations include: income expectations and perceptions, expected financial situation, expected GDP growth, expected unemployment rate, saving expectations and perceptions, inflation perceptions. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to construct these variables and similar data from national institutes for the European households. 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 February 2016.

	German Households				European Households			
	Baseline (1)	Controls (2)	VAT Period (3)	Forward Guidance (4)	No VAT or Forward Guidance (5)	France (6)	Sweden (7)	UK (8)
Inflation expectation	0.0582*** (0.0147)	0.0876*** (0.0157)	0.1909*** (0.0094)	0.0508*** (0.0132)	0.0540*** (0.0031)	0.0391*** (0.0072)	0.0371*** (0.0052)	0.0254*** (0.0031)
Demographics		X	X	X	X	X	X	X
Expectations		X	X	X	X	X	X	X
Pseudo R ²	0.0030	0.0663	0.0631	0.0517	0.0689	0.0540	0.0301	0.0438
Nobs	377,064	227,027	19,477	11,685	195,865	63,264	176,389	180,646

Standard errors in parentheses

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

Table 3: Inflation Expectations and Readiness to Spend: Heterogeneity

This table reports the average marginal effects of a multinomial logit regression. Households' readiness to purchase durables is the dependent variable. Inflation expectation is a dummy variable that equals 1 if a household expects inflation to increase. We also control for household demographics and household expectations. Demographics include: gender, age, age squared, education level, household size, rural or urban residence, socio-economic status group, number of children, rental or owned housing, employment status, income level group. Expectations include: income expectations and perceptions, expected financial situation, expected GDP growth, expected unemployment rate, saving expectations and perceptions, inflation perceptions. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to construct these variables and similar data from national institutes for the European households. 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 February 2016.

	Education		Income		Age		Gender		Income Expectations		Socioeconomic Status	
	High School (1)	College (2)	<= 1,000 (3)	2,500 < (4)	<= 21 (5)	65 < (6)	Men (7)	Women (8)	Low (9)	High (10)	Low (11)	High (12)
Inflation expectation	0.0691*** (0.0150)	0.1080*** (0.0184)	0.0899*** (0.0164)	0.0940*** (0.0202)	0.0917*** (0.0210)	0.0695*** (0.0135)	0.0845*** (0.0160)	0.0902*** (0.0157)	0.0489*** (0.0152)	0.0428* (0.0222)	0.0905*** (0.0174)	0.0769*** (0.0156)
Demographics	X	X	X	X	X	X	X	X	X	X	X	X
Expectations	X	X	X	X	X	X	X	X	X	X	X	X
Pseudo R^2	0.0677	0.0510	0.0638	0.0511	0.0444	0.0632	0.0678	0.0645	0.0861	0.0519	0.0573	0.0679
Nobs	91,936	19,008	93,249	17,487	15,319	35,023	107,002	120,025	5,103	3,097	47,555	36,882

Standard errors in parentheses

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

Table 4: **Balancing of Variables - German and Foreign Households**

This table describes the balancing of the observables we use to match treated and control households during the unconventional fiscal policy period (11/2005–12/2006) in Panel A and during the forward guidance period in Panel B (03/2013–06/2014) for the difference-in-differences analysis. For each variable, columns (1) and (4) report the mean within the pool of treated German households in the raw and matched samples. Columns (2) and (5) report the mean within the pool of control households (UK, France, and Sweden) in the raw and matched samples. Columns (3) and (6) report the results for a two-sided t-test whose null hypothesis is that the means across groups are equal.

Variable	Unmatched Sample			Matched Sample		
	Mean Treated (1)	Mean Control (2)	t-stats (3)	Mean Treated (4)	Mean Control (5)	t-stats (6)
Panel A: Unconventional Fiscal Policy Period						
Age (four groups)	2.38	2.49	-15.32	2.38	2.38	0.00
Male	0.46	0.44	5.61	0.46	0.46	-0.01
Education (three groups)	1.77	2.32	-109.47	1.77	1.77	0.00
Income (four quartiles)	2.36	2.77	-41.53	2.36	2.36	0.01
Social Status (three groups)	2.65	1.93	107.50	2.65	2.65	0.00
Nobs in common support				28,642	95,890	
Panel B: Forward Guidance Period						
Age (four groups)	2.57	2.46	13.48	2.57	2.57	0.00
Male	0.46	0.49	-7.96	0.46	0.46	0.00
Education (three groups)	1.85	2.43	-105.57	1.85	1.85	0.00
Income (four quartiles)	2.59	3.39	-53.60	2.59	2.59	0.00
Social Status (three groups)	2.65	2.41	30.89	2.65	2.65	0.00
Nobs in common support				24,321	49,535	

Table 5: **Inflation Expectations and Readiness to Save**

This table reports the average marginal effects of a multinomial logit regression. Households' readiness to save is the dependent variable. Inflation expectation is a dummy variable that equals 1 if a household expect higher inflation. Demographics include: gender, age, age squared, education level, household size, rural or urban residence, socio-economic status group, number of children, rental or owned housing, employment status, income level group. Expectations include: income expectations and perceptions, expected financial situation, expected GDP growth, expected unemployment rate, saving expectations and perceptions, inflation perceptions. We use the confidential micro data underlying the GfK Consumer Climate MAXX survey to construct these variables and similar data from national institutes for the European households. GfK asks a representative sample of 2,000 households on a monthly basis whether it is a good time to save 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 February 2016.

	Not at all (1)	Not really (2)	Good time (3)
Inflation expectation	0.0282*** (0.0027)	0.0015 (0.0057)	−0.0297*** (0.0069)
Demographics	X	X	X
Individual expectations	X	X	X
Pseudo R ²		0.1471	
Nobs		242,820	

Standard errors in parentheses

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

Online Appendix:

Managing Households' Expectations with Salient Economic Policies

Francesco D'Acunto, Daniel Hoang, and Michael Weber

Not for Publication

A.1 Survey Questions

Below we report the original survey questions with answer choices for Germany, the English translation, and the harmonized surveys from the Directorate-General for Economic and Financial Affairs of the European Commission harmonized consumer surveys used in Section II for the matching estimator.

A. Germany

Question 1 *Wie hat sich Ihrer Meinung nach die "allgemeine Wirtschaftslage" in Deutschland in den letzten 12 Monaten entwickelt?*

Sie ...

- hat sich wesentlich verbessert
- hat sich etwas verbessert
- ist in etwa gleich geblieben
- hat sich etwas verschlechtert
- hat sich wesentlich verschlechtert
- weiss nicht

Question 2 *Wie haben sich Ihrer Ansicht nach die Verbraucherpreise in den letzten 12 Monaten entwickelt?*

Sie sind ...

- stark gestiegen
- in Massen gestiegen
- leicht gestiegen
- in etwa gleich geblieben
- gesunken
- weiss nicht

Question 3 *Wie werden sich Ihrer Ansicht nach die Verbraucherpreise in den kommenden 12 Monaten im Vergleich zu den letzten 12 Monaten entwickeln?*

Sie werden ...

- staerker als bisher steigen
- etwa im gleichen Masse wie bisher steigen

- weniger stark als bisher steigen
- in etwa gleich bleiben
- gesunken
- weiss nicht

Question 4 *Wie hat sich die finanzielle Lage Ihres Haushaltes in den letzten 12 Monaten entwickelt?*

Sie ...

- hat sich wesentlich verbessert
- hat sich etwas verbessert
- ist in etwa gleichgeblieben
- hat sich etwas verschlechtert
- hat sich wesentlich verschlechtert
- weiss nicht

Question 5 *Wie wird sich Ihrer Ansicht nach die finanzielle Lage Ihres Haushaltes in den kommenden 12 Monaten entwickeln?*

Sie wird ...

- sich wesentlich verbessern
- sich etwas verbessern
- in etwa gleichbleiben
- sich etwas verschlechtern
- sich wesentlich verschlechtern
- weiss nicht

Question 6 *Wie wird sich Ihrer Ansicht nach die allgemeine Wirtschaftslage in Deutschland in den kommenden 12 Monaten entwickeln?*

Sie wird ...

- sich wesentlich verbessern
- sich etwas verbessern
- in etwa gleichbleiben
- sich etwas verschlechtern
- sich wesentlich verschlechtern
- weiss nicht

Question 7 *Wie ist die derzeitige finanzielle Lage Ihres Haushaltes?*

- wir sparen viel
- wir sparen ein wenig
- wir kommen mit unseren finanziellen Mitteln so gerade aus
- wir greifen etwas unsere Ersparnisse an
- wir verschulden uns
- weiss nicht

Question 8 *Glauben Sie, dass es in Anbetracht der allgemeinen Wirtschaftslage derzeit guenstig ist, groessere Anschaffungen (Moebel, elektrische/elektronische Ger-aete usw.) zu taetigen?*

- ja, jetzt der Augenblick ist guenstig
- der Augenblick ist weder besonders guenstig noch besonders unguenstig
- nein, der Augenblick ist nicht guenstig
- weiss nicht

Question 10 *Wie wird sich Ihrer Ansicht nach die Zahl der Arbeitslosen in Deutschland in den kommenden 12 Monaten entwickeln?*

Die Zahl wird ...

- stark steigen
- leicht steigen
- in etwa gleich bleiben
- leicht zurueckgehen
- stark zurueckgehen
- weiss nicht

Question 11 *Wollen Sie in den kommenden 12 Monaten fuer groessere Anschaffungen (Moebel, elektrische /elektronische Geraete usw.) mehr oder weniger ausgeben als in den letzten 12 Monaten?*

Ich werde ...

- wesentlich mehr ausgeben
- etwas mehr ausgeben
- in etwa gleich viel ausgeben
- etwas weniger ausgeben
- wesentlich weniger ausgeben
- weiss nicht

Question 12 *Wie wahrscheinlich ist es, dass Sie in den kommenden 12 Monaten Geld sparen werden?*

- sehr wahrscheinlich
- recht wahrscheinlich
- unwahrscheinlich
- sehr unwahrscheinlich
- weiss nicht

Question 13 *Glauben Sie, dass es in Anbetracht der allgemeinen Wirtschaftslage derzeit ratsam ist, zu sparen?*

- ja, auf alle Faelle
- wahrscheinlich ja
- eher nicht
- auf keinen Fall
- weiss nicht

Question 1 *How did you perceive the general economic situation in Germany over the last 12 months?*

It ...

- improved substantially

- improved somewhat
- remained about the same
- worsened somewhat
- worsened substantially
- don't know

Question 2 *What is your perception on how consumer prices evolved during the last 12 months?*

They ...

- increased substantially
- increased somewhat
- increased slightly
- remained about the same
- decreased
- don't know

Question 3 *How will consumer prices evolve during the next 12 months compared to the previous 12 months?*

They will ...

- increase more
- increase the same
- increase less
- stay the same
- decrease
- don't know

Question 4 *How did the financial situation of your household evolve during the past 12 months?*

It ...

- improved substantially
- improved somewhat
- remained about the same
- worsened somewhat
- worsened substantially
- don't know

Question 5 *How will the financial situation of your household evolve during the next 12 months?*

It will ...

- improve substantially
- improve somewhat
- remain the same
- worsen slightly
- worsen substantially
- don't know

Question 6 *How will the general economic situation in Germany evolve during the next 12 months?*

It will ...

- improve substantially
- improve slightly
- remain the same
- worsen slightly
- worsen substantially
- don't know

Question 7 *What is the current financial situation of your household?*

- we save a lot
- we save a bit
- we just manage to live from our financial inflows and don't save
- we have to de-save
- we become indebted
- don't know

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?*

- yes, it's a good time
- the time is neither good nor bad
- no, it's a bad time
- don't know

Question 10 *What is your expectation regarding the number of unemployed people in Germany in the next 12 months?*

It will ...

- increase substantially
- increase somewhat
- remain the same
- decrease somewhat
- decrease a lot
- don't know

Question 11 *Do you plan to spend more money during the next 12 months on larger items such as furniture, electronics, etc compared to the previous 12 months?*

I will ...

- spend substantially more
- spend somewhat more
- spend about the same
- spend somewhat less
- spend substantially less
- don't know

Question 12 *How likely is it that you will save money during the next 12 months?*

- very likely
- quite likely
- unlikely
- very unlikely
- don't know

Question 13 *Given the current economic situation, do you think it's a good time to save right now?*

- yes, it's a good time
- probably yes
- not really
- not at all
- don't know

B. France

Question 1 *A votre avis, au cours des douze derniers mois, la situation économique générale de la France ...*

- s'est nettement améliorée
- s'est un peu améliorée
- est restée stationnaire
- s'est un peu dégradée
- s'est nettement dégradée
- ne sait pas

Question 2 *A votre avis, au cours des douze prochains mois, la situation économique générale de la France ...*

- va nettement s'améliorer
- va un peu s'améliorer
- va rester stationnaire
- va un peu se dégrader
- va nettement se dégrader
- ne sait pas

Question 3 *Pensez-vous que, dans les douze prochains mois, le nombre de chômeurs va ...*

- fortement augmenter
- un peu augmenter
- rester stationnaire
- un peu diminuer
- fortement diminuer
- ne sait pas

Question 4 *Trouvez-vous que, au cours des douze derniers mois, les prix ont ...*

- fortement augmenté
- moyennement augmenté
- un peu augmenté
- stagné
- diminué
- ne sait pas

Question 5 *Par rapport aux douze derniers mois, quelle sera $\tilde{A}$ votre avis l'évolution des prix au cours des douze prochains mois?*

- elle va être plus rapide
- elle va se poursuivre au même rythme
- elle va être moins rapide
- les prix vont rester stationnaires
- les prix vont diminuer
- ne sait pas

Question 6 *Dans la situation économique actuelle, pensez-vous que les gens aient intérêt à faire des achats importants? (meubles, machines à laver, matériels électroniques ou informatiques ...)*

- oui, le moment est plutôt favorable
- le moment n'est ni favorable ni défavorable ...
- non, le moment est plutôt défavorable
- ne sait pas

Question 7 *Dans la situation économique actuelle, pensez-vous que ce soit le bon moment pour épargner?*

- oui, certainement
- oui, peut-être
- non, probablement pas
- non, certainement pas
- ne sait pas

Question 8 *A votre avis, au cours des douze derniers mois, le niveau de vie en France, dans l'ensemble s'est ...*

- nettement amélioré
- un peu amélioré
- restée stationnaire
- un peu dégradé
- nettement dégradé
- ne sait pas

Question 9 *A votre avis, au cours des douze prochains mois, le niveau de vie en France, dans l'ensemble va ...*

- nettement s'améliorer
- s'améliorer un peu
- rester stationnaire
- se dégrader un peu
- nettement se dégrader
- ne sait pas

Question 10 *Laquelle des affirmations suivantes vous semble décrire le mieux la situation financière actuelle de votre foyer?*

- vous arrivez à mettre pas mal d'argent de côté
- vous arrivez à mettre un peu d'argent de côté
- vous bouclez juste votre budget
- vous tirez un peu sur vos réserves
- vous êtes en train de vous endetter
- ne sait pas

Question 11 *Au cours des douze derniers mois, la situation financière de votre foyer s'est ...*

- nettement améliorée
- un peu améliorée
- restée stationnaire
- un peu dégradée
- un peu dégradée
- ne sait pas

Question 12 *Pensez-vous que, au cours des douze prochains mois, la situation financière de votre Foyer va ...*

- nettement s'améliorer
- un peu s'améliorer
- rester stationnaire
- un peu se dégrader
- nettement se dégrader
- ne sait pas

Question 13 *Pensez-vous réussir à mettre de l'argent de côté au cours des douze prochains mois?*

- oui, certainement
- oui, peut-être
- non, probablement pas
- non, certainement pas
- ne sait pas

Question 14 *Au cours des douze prochains mois, par rapport aux douze mois passés, avez-vous l'intention de dépenser, pour effectuer des achats importants ...*

- beaucoup plus
- un peu plus
- autant
- un peu moins
- beaucoup moins
- ne sait pas

C. Sweden

Question 1 *Hur ar ditt hushalls ekonomiska situation for narvarande jamfort med for 12 manader sedan? Ar den ...*

- Mycket battre
- Nagot battre
- Ungefär lika
- Nagot samre
- Mycket samre
- Vet inte

Question 2 *Hur tror du att ditt hushalls ekonomiska situation ar om 12 manader? Ar den ...*

- Mycket battre
- Nagot battre
- Ungefär lika
- Nagot samre
- Mycket samre
- Vet inte

Question 3 *Hur tycker du att den ekonomiska situationen ar i Sverige for narvarande jamfort med for 12 manader sedan? Ar den ...*

- Mycket battre
- Nagot battre
- Ungefär lika
- Nagot samre
- Mycket samre
- Vet inte

Question 4 *Hur tror du att den ekonomiska situationen ar i Sverige om 12 manader? Ar den...*

- Mycket battre
- Nagot battre
- Ungefär lika
- Nagot samre
- Mycket samre
- Vet inte

Question 5 *Jamfort med for 12 manader sedan, tycker du att priserna i allmanhet for narvarande ar...*

- Mycket hogre
- Ganska mycket hogre
- Nagot hogre
- Ungefär desamma
- Lagre
- Vet inte

Question 6 *Om du jamfor med dagens situation, tror du att priserna i allmanhet om 12 manader kommer att ...*

- Stiga snabbare
- Stiga i samma takt
- Stiga långsammare
- Vara i stort sett oförändrade
- Sjunka något
- Vet inte

Question 7 *Hur tror du att arbetslösheten kommer att utvecklas under de närmaste 12 månaderna? Kommer den att ...*

- Oka mycket
- Oka något
- Vara ungefär som nu
- Minska något
- Minska mycket
- Vet inte

Question 8 *Har risken för att Du själv ska bli arbetslös under de senaste 12 månaderna ...?*

- Oka mycket
- Oka något
- Vara ungefär som nu
- Minska något
- Minska mycket
- Vet inte

Question 9 *Tycker du att det i dagsläget är fördelaktigt för folk i allmänhet att göra stora inköp, som exempelvis mat, tvättmaskiner, TV osv.?*

- Ja, det är rätt tidpunkt
- Varken rätt eller fel tidpunkt
- Nej, det är fel tidpunkt, inköpet bör ske senare
- Vet inte

Question 10 *Hur mycket pengar tror du att ditt hushåll kommer att använda till inköp av sådana kapitalvaror under de närmaste 12 månaderna jämfört med de senaste 12 månaderna? Blir det ...*

- Mycket mer
- Något mer
- Ungefär lika mycket
- Något mindre
- Mycket mindre
- Vet inte

Question 11 *Mot bakgrund av det allmänna ekonomiska läget, hur tycker du att det är att spara för närvarande? Som sparande räknas även minskning av eventuella lån. Är det...*

- Mycket fördelaktigt
- Ganska fördelaktigt
- Varken fördelaktigt eller ofördelaktigt
- Ganska ofördelaktigt

- Mycket ofordelaktigt
- Vet inte

Question 12 *Hur troligt ar det att Ditt hushall kommer att kunna spara nagot under de narmaste 12 manaderna? Som sparande raknas aven minskning av eventuella lan. Ar det ...?*

- Mycket troligt
- Ganska troligt
- Inte sarskilt troligt
- Inte alls troligt
- Vet inte

Question 13 *Vilket av foljande pastaenden beskriver bast ditt hushalls nuvarande ekonomiska situation?*

- Vi skuldsatter oss och/ eller utnyttjar sparade medel i stor utstrackning
- Vi skuldsatter oss och/ eller utnyttjar sparade medel
- Vi gar ungefar jamnt upp
- Vi sparar nagot
- Vi sparar mycket
- Vet inte

D. United Kingdom

Question 1 *How has the financial situation of your household changed over the last 12 months?*

It has ...

- Got a lot better
- Got a little better
- Stayed the same
- Got a little worse
- Got a lot worse
- Don't Know

Question 2 *How do you expect the financial position of your household to change over the next 12 months?*

It will ...

- Get a lot better
- Get a little better
- Stay the same
- Get a little worse
- Get a lot worse
- Don't Know

Question 3 *How do you think the general economic situation in this country has changed over the past 12 months?*

It has ...

- Got a lot better
- Got a little better
- Stayed the same
- Got a little worse
- Got a lot worse
- Don't Know

Question 4 *How do you expect the general economic situation in this country to develop over the next 12 months?*

It will ...

- Get a lot better
- Get a little better
- Stay the same
- Get a little worse
- Get a lot worse
- Don't Know

Question 5 *How do you think consumer prices have developed over the last 12 months?*

They have ...

- Risen a lot
- Risen moderately
- Risen slightly
- Stayed about the same
- Fallen
- Don't Know

Question 6 *In comparison with the past 12 months, how do you expect consumer prices will develop in the next 12 months?*

They will ...

- Increase more rapidly
- Increase at the same rate
- Increase at a slower rate
- Stay about the same
- Fall
- Don't Know

Question 7 *How do you expect the number of people unemployed in this country will change over the next 12 months?*

The number will ...

- Increase sharply
- Increase slightly
- Remain the same
- Fall slightly
- Fall sharply
- Don't Know

Question 8 *In view of the general economic situation, do you think now is the right time for people to make major purchases such as furniture or electrical goods?*

- Yes, now is the right time
- It is neither the right time nor the wrong time
- No, it is the wrong time
- Don't Know

Question 9 *Compared to the last 12 months, do you expect to spend more or less money on major purchases such as furniture and electrical goods?*

I will spend ...

- Much more
- A little more
- About the same
- A little less
- Much less
- Don't Know

Question 10 *In view of the general economic situation, do you think that now is?*

- A very good time to save
- A fairly good time to save
- Not a good time to save
- A very bad time to save
- Don't Know

Question 11 *Over the next 12 months, how likely will you be to save any money?*

- Very likely
- Fairly likely
- Not likely
- Not at all likely
- Don't Know

Question 12 *Which of these statements best describes the current financial situation of your household?*

- We are saving a lot
- We are saving a little
- We are just managing to make ends meet on our income
- We are having to draw on our savings
- We are running into debt
- Don't Know

A.2 Additional Discussion of the Measure of Unconventional Fiscal Policy

In this section, we describe in detail the narrative records surrounding the 2005 general elections in Germany, and the relationship between willingness to spend and actual spending, inflation expectations and actual inflation, the potential mapping of our findings into the framework of Correia et al. (2013), the marginal effect of inflation expectations on consumption expenditure over time, salience of VAT changes, and the differences between reduced and full VAT rates.

Relevant Narrative about the 2005 German Elections. The Christian Democrats (CDU, center-right) were the only German party in the 2005 electoral campaign advocating an increase in VAT by 2% starting in January 2006 to lower non-wage labor costs (see CDU (2005), page 14). The Social Democrats (SPD, center-left) strongly opposed an increase in VAT, and instead favored a 3% increase in income tax for top income earners (see SPD (2005), page 39). The Greens (center-left) and Liberals (center-right) also strongly opposed an increase in VAT. The Liberals, for example, promised to decrease the general tax burden by EUR 19bn.

All parties except the CDU strongly opposed raising VAT, including CDU's preferred coalition partner, the Liberals. The projections of the election outcomes were highly uncertain (see below), as were the fiscal policy measures the new government would have implemented. A VAT increase of 3% was therefore highly unexpected. Consistently, the opposition parties and the popular press accused the new government between CDU and SPD of electoral fraud after it announced this policy measure in November 2005, and they fiercely criticized the new government. The online appendix contains press clippings commenting on the VAT policy (see section A.5 of the online appendix).

Empirically, households' inflation expectation over the next 12 months did not increase until January 2006, after the new government had announced its plans in November 2005 to increase VAT in 2007, rather than 2006 as the CDU had planned initially which is direct evidence German households did not expect an increase in VAT in 2006, as the CDU proposed.¹

Neither of the two blocks—CDU and Liberals on the one hand, and SPD and Greens on the other hand—had a majority in polls before the elections.² In the actual election on September

¹If voters had considered the CDU proposal credible, we should already see an increase in inflation expectation during the campaign in the summer of 2005, because the plan was to increase VAT in January 2006.

²Eleven days before the elections, the polling institute Infratest Dimap predicted a vote share of 41% for the CDU, 34% for the SPD, 8.5% for the Left, 7% for the Greens, and 6.5% for the Liberals. See <http://www.infratest-dimap.de/en/umfragen-analysen/bundesweit/sonntagsfrage/>. All parties explicitly ruled out any coalition with the Left. The media mentioned all other possible combinations, including non-traditional combinations, as possible coalitions, including a “traffic-light” coalition among SPD, Greens, and Liberals and a “Jamaica” coalition among CDU, Liberals, and Greens.

18, 2005, the CDU gained 35.2% electoral support; the SPD, 34.2%; the Liberals, 9.8%; the Left, 8.7%; and the Greens, 8.1%. Neither the CDU nor the SPD were able to form a “small” coalition with their preferred coalition partner (Liberals and Greens, respectively). The CDU and SPD therefore agreed to form a “grand” coalition.

The coalition agreed on an overall contractionary fiscal policy (see below), including the 3% increase in VAT, and the use of one third of the additional tax revenue to decrease non-wage labor costs by two percentage points. The government planned to use two thirds of the VAT increase to consolidate the federal budget to comply with the Maastricht Treaty and hinder an infringement procedure by the European Commission. Table ?? in the online appendix shows the total tax revenue indeed increased in 2007, and Germany no longer violated the EU Stability and Growth Pact.

Concurrent Policy Measures. The new government announced additional policy measures as part of its coalition agreement. The preamble of the official agreement emphasizes the need to reduce Germany’s public debt as the major challenge for the new government, and the set of agreed-upon policy measures would be contractionary overall. In addition to the VAT increase and the non-wage labor-costs reduction, the government announced an investment program of 0.25% of 2005 GDP per year over the following four years. The government planned to finance the majority of the program through budget cuts. Moreover, the government announced an increase in the top marginal income tax rate from 42% to 45% for incomes above EUR 250,000 for singles and EUR 500,000 for couples. The Panel of Household Finances of the Deutsche Bundesbank reports for 2014 a 95th percentile of gross income of EUR 113,900, which implies the tax increase only affected a small fraction of households. Lastly, the government planned to increase indirect taxes for retirement from 19.4% to 19.9%, and it abolished the home-buyer subsidy, which had been guaranteed since 1949, and amounted to EUR 11.4 billion in 2004.³ The overall contractionary nature of this set of policies suggests our estimates in section II represent a lower bound of the positive effect of the announcement to increase VAT in 2007 on households’ willingness to purchase durables.

Willingness to Spend versus Actual Spending. We are ultimately interested in how inflation expectations transform into *actual* consumption expenditure. Our survey only reports the willingness to purchase durable goods. Figure A.1 in the online appendix is a scatter plot of the cyclical components of log real durable consumption expenditure and the average propensity to purchase durables.⁴ Real and reported spending on durables are positively related, which is consistent with Bachmann et al. (2015). The correlation is 0.46.

³See <http://www.kas.de/upload/ACDP/CDU/Koalitionsvertraege/Koalitionsvertrag2005.pdf> for details.

⁴We use a Hodrick-Prescott filter with smoothing parameter λ of 1,600 to extract the cyclical component.

The reported willingness to purchase has potential advantages compared to measures of actual expenditures elicited with surveys. Spending data in surveys typically contain 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)).

Empirical Evidence and Relationship with Theory. Correia et al. (2013) formalize the ideas in Shapiro (1991), Feldstein (2002), and Hall (2011) and study unconventional fiscal policy in a New Keynesian model. They show unconventional fiscal policy can fully circumvent the zero-lower-bound constraint on nominal interest rates in a budget-neutral and time-consistent manner. Their benchmark model is a textbook New Keynesian model, in which labor is the only factor of production. This model suggests that an increasing path of consumption taxes generates inflation expectations and negative real interest rates. Lower labor income taxes ensure consumption taxes do not affect the intratemporal margin between leisure and consumption, and hence the real wage. Firms’ pricing decisions are independent of the change in consumption taxes, and marginal costs do not change either. Therefore, the production allocation across firms is efficient and the government can offset the distortion coming from monopoly rents with taxes as in the textbook model.

Our natural experiment resembles the proposals in Shapiro (1991), Feldstein (2002), and Hall (2011), but deviates from the setting in Correia et al. (2013) in a few dimensions. First, the German government used 2 percentage points of the 3% increase in VAT to consolidate the federal budget, and 1 percentage point to lower indirect labor taxes by 2%.⁵ Empirically, we do not find any effect on labor force participation or unit labor costs.⁶ Moreover, we find similar marginal effects of inflation expectations on the propensity to purchase durables for full-time, part-time, and unemployed survey participants. In addition, Nakamura, Steinsson, Sun, and Villar (2016) question whether producer price dispersion has real economic costs.

Second, we only observe attitudes towards purchases of durable goods. In a model with both durable and non-durable consumption, the intertemporal substitution effect of higher future consumption taxes is larger for durable goods (see Barsky et al. (2007) and Barsky et al. (2016)).⁷

⁵Efficiency gains in the unemployment insurance system financed the second percentage-point decrease in indirect labor taxes.

⁶Data from the OECD show unit labor costs decreased in Germany during 2006 and 2007 in absolute terms and relative to France, Sweden, and the UK (see: <http://stats.oecd.org/Index.aspx?QueryName=426>). Labor force participation, instead, barely changed from 58.4% in 2005 to 59.1% in 2007 (see: <http://data.worldbank.org/indicator/SL.TLF.CACT.ZS?locations=DE>).

⁷Shapiro (1991) already emphasizes the effect of unconventional fiscal policy should mainly operate through expenditure on durable goods. Storability of durable goods can lead to an increase in durable expenditure due to a future increases in VAT even if the IES is small through an arbitrage effect.

A potential concern for policymakers aiming to stimulate overall consumption is that households might substitute intratemporally from non-durable to durable consumption, because the VAT change did affect nondurable goods less than durable goods (see discussion below). We do not observe households' attitudes towards purchases of non-durable goods. To address this concern directly, we show realized non-durable consumption growth increased during 2006. German households also lowered their savings attitudes during 2006 in absolute terms and relative to matched foreign households, supporting the conclusion that households increased *overall* consumption (see Table 5).

Third, Correia et al. (2013) study unconventional fiscal policies during a liquidity trap, whereas we study the effect for a single country in a currency union. To predict higher consumption, the consumption Euler equation requires only that nominal interest rates not increase sufficiently to offset the increase in inflation expectations rather than being in a liquidity trap. The ECB explicitly excluded an increase in nominal interest rates to counteract the announcement of a higher VAT in Germany, because it believed the increase in consumer price inflation would be temporary and limited to Germany. The then-president of the German Bundesbank excluded an increase in nominal rates to offset inflationary pressure: "We know what the effects of the VAT increase are; as is the case for oil prices, we do not consider one-off effects" (see Weber (2006); see also section A.3 in the online appendix). Nominal interest rates for consumption loans also barely changed and were 6.7% in January 2006 and 6.4% in December 2007. Moreover, in our difference-in-differences estimation in section II, we compare the behavior of German households to matched French households that face the same nominal interest rates as German households.

Last, we study the pre-announced increase in VAT rather than consumption taxes. Correia et al. (2013) already highlight both VAT and consumption taxes should have similar implications because of "the extensive evidence of very high pass-through of consumption taxes even in the cases in which the usual practice is to quote after-tax prices, as is the case for the value-added tax in Europe." This point is consistent with the ex-ante expectations for the specific case of the VAT increase in Germany and the actual ex-post result. The Association of Consumer & Home Electronics expected the increase in VAT would be fully passed through to consumers (see Stehle (2006)). Ex-post, the German statistical office shows some categories immediately and fully adjusted prices, such as tobacco and services, whereas other categories adjusted prices with a delay, such as electronics and furniture. By early 2008, all categories underlying the German CPI had fully adjusted their prices by the theoretical amount.⁸

⁸See <https://www.destatis.de/DE/Publikationen/WirtschaftStatistik/Preise/MwSterhoehungJan2007.pdf>.

Farhi et al. (2014) show an increase in VAT coupled with a decrease in payroll subsidy can, under certain conditions, replicate an exchange-rate devaluation even within a currency union. Theoretically, this fiscal devaluation makes goods in Germany cheaper than French goods and results in an increase in the demand for goods produced in Germany by both French and German households. Crucially, the fiscal devaluation should barely affect the overall consumption decision of French households, and hence the spending attitudes of French households represent a plausible counterfactual for the spending attitudes of German households in our setting.

Salience of VAT Changes. Pre-announced VAT increases are a salient way to generate future consumer price inflation and induce current spending compared to conventional and unconventional monetary policy or future government purchases. Menz and Poppitz (2013) study the media coverage of inflation in Germany during the time period of our natural experiment and document a surge in coverage of inflation.

Reduced and Full VAT. All services and products in Germany are subject to a value-added tax that 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. Virtually all durable goods are subject to the full VAT, whereas only 59% of non-durables are subject to a VAT rate of 19%.

A.3 ECB View on German VAT Increase

In this section, we report the answer of the former president of the ECB, Jean-Claude Trichet, during a Q&A after the introductory remarks following the council meeting on October 5 2006. The full transcript can be found here: <https://www.ecb.europa.eu/press/pressconf/2006/html/is061005.en.html>

Question: [...] Seeing how you have to think ahead as good central bankers, I wondered if you could tell us what your working hypothesis is regarding the effects on price stability and on growth of the value added tax increase that is coming in a large European country on 1 January?

Trichet: [...] As regards your second question I will not enter into our baseline scenario. If the baseline scenario was not confirmed, whether it would be upward or downward, we would draw the appropriate consequences. We have a compass and we have a needle in our compass: it is price stability, the delivery of price stability in the medium-term and the credibility of the delivery of price stability. It is because we are credible in the delivery of price stability that our inflationary expectations are anchored in line with our definition of price stability. This solid anchoring is essential, as I have said, for sustainable growth and job creation in the medium and long-term. As regards the profile of HICP due to the VAT increase in one big economy in the euro area, clearly there we have, I would say, a mainstream analysis which is suggesting that we will have a hump in HICP, starting in January 2007 it is extraordinarily likely, arithmetically speaking, and there is also a probability of having more consumption in the last quarter of this year, and less consumption in the first quarter of next year. That's also clearly suggested by the situation. As you know, there are several schools of thought around the mainstream analysis, and we will see exactly what happens. My sentiment—and I am communicating the overall sentiment of the Governing Council—is that after a relatively short period of volatility we will go back to more normal behaviour. We should not pay too much attention to the short-term volatility that would be induced by this phenomenon. In any case we think in the Governing Council that we must extract information from all sources we have as far as data, facts, figures are concerned, and extract from that an assessment on the trend. You remember we had a very poor quarter in the last quarter last year. It was, until the recent revision upward, only 0.3%, it was disappointing obviously but we said it doesn't put into question our understanding of what is the trend growth. And the results of the first and second quarters of this year confirmed that our assessment of the situation was fully justified.

A.4 Data

When conducting the survey, GfK also collects a rich set of demographics. We enlist the variables below, and report the possible values the variables obtained in the sample in parentheses.

Sex (male, female), age (continuous), household size (1, 2, 3, 4, 5 and more), city size ($0 \leq \text{size} \leq 1,999$, $2,000 \leq \text{size} \leq 2,999$, $3,000 \leq \text{size} \leq 4,999$, $5,000 \leq \text{size} \leq 9,999$, $10,000 \leq \text{size} \leq 19,999$, $20,000 \leq \text{size} \leq 49,999$, $50,000 \leq \text{size} \leq 99,999$, $100,000 \leq \text{size} \leq 199,999$, $200,000 \leq \text{size} \leq 499,999$, $500,000 \leq \text{size}$), marital status (single, couple, married, widowed, divorced, separated), children at home (yes, no), number of children (1, 2, 3, 4 and more), homeownership (house owner, apartment owner, renter), household head (yes, no), education (*Hauptschule*, *Realschule*, *Gymnasium*, University), employment (full-time, part-time, not employed), state (Schleswig-Holstein, Hamburg, Bremen, Berlin(West), Niedersachsen, Nordrhein-Westfalen, Hessen, Rheinland-Pfalz, Saarland, Baden-Wuerttemberg, Bayern, Mecklenburg-Vorpommern, Sachsen-Anhalt, Brandenburg, Thuringen, Sachsen, Berlin(Ost)), monthly net income (inc) ($\text{inc} \leq 500$, $500 < \text{inc} \leq 750$, $750 < \text{inc} \leq 1,000$, $1,000 < \text{inc} \leq 1,250$, $1,250 < \text{inc} \leq 1,500$, $1,500 < \text{inc} \leq 2,000$, $2,000 < \text{inc} \leq 2,500$, $2,500 < \text{inc} \leq 3,000$, $3,000 < \text{inc} \leq 3,500$, $3,500 < \text{inc} \leq 4,000$, $4,000 < \text{inc}$), job (farmer, liberal profession, self-employed, civil servant, white-collar worker, blue-collar worker, student, trainee, draftee, housewife, retiree, unemployed).

Data on the consumer price index, the unemployment rate, real durable consumption expenditure, real GDP, and industrial production are from the German Statistical Office (DeStatis); Data on the European and German uncertainty index are from Baker et al. (2016); Data on DAX and Volatility DAX are from the Deutsche Boerse; and oil price data are from Bloomberg.

We obtain the harmonized consumer price indexes (CPI) from the Statistical Data Warehouse at the European Central Bank. The data ID for the harmonized overall CPI is ICP.M.DE.N.000000.4.INX; for the all items CPI excluding food and energy it is ICP.M.DE.N.XEF000.4.INX; for the major durables CPI it is ICP.M.DE.N.0921_2.4.INX; and for the non-durable households goods CPI it is ICP.M.DE.N.056100.4.INX.

We obtain data for bank interest rates for loans to households in Germany for consumption from the Statistical Data Warehouse at the European Central Bank. The data ID is MIR.M.DE.B.A2B.A.R.A.2250.EUR.N. The rate is the annualized agreed rate, narrowly defined effective rate, for new loans for consumption excluding revolving loans and overdrafts, convenience and extended credit card debt.

Inflation expectations data for European Union member countries are from the European Commission Directorate on Economic and Financial Affairs.

A.5 Press Clippings

We briefly cite a few media quotes following the announcement of the newly-elected administration in 2005 to increase VAT by 3%.

“Mehrwertsteuer ist glatter Betrug an den Waehler.” Gruenen-Vorsitzende Claudia Roth haelt den Koalitionsvertrag fuer unsozial

“VAT is electoral fraud.” Green party leader Claudia Roth calls coalition agreement antisocial

Berliner Morgenpost, 11/21/2005

Opposition kritisiert “Wahlbetrug.” Vor allem hoehere Mehrwertsteuer stoesst auf Protest

Opposition criticizes “electoral fraud.” Especially higher VAT fiercely criticized

Frankfurter Rundschau, 11/14/2005

Opposition spricht von Wahlbetrug.

Opposition stresses “electoral fraud.”

Die Welt, 11/13/2005

Die dreissten Steuerluegen.

Unapologetic tax lies.

Berliner Morgenpost, 5/19/2006

Westerwelle geisselt Steuererhoehungen.

Westerwelle criticizes tax hike.

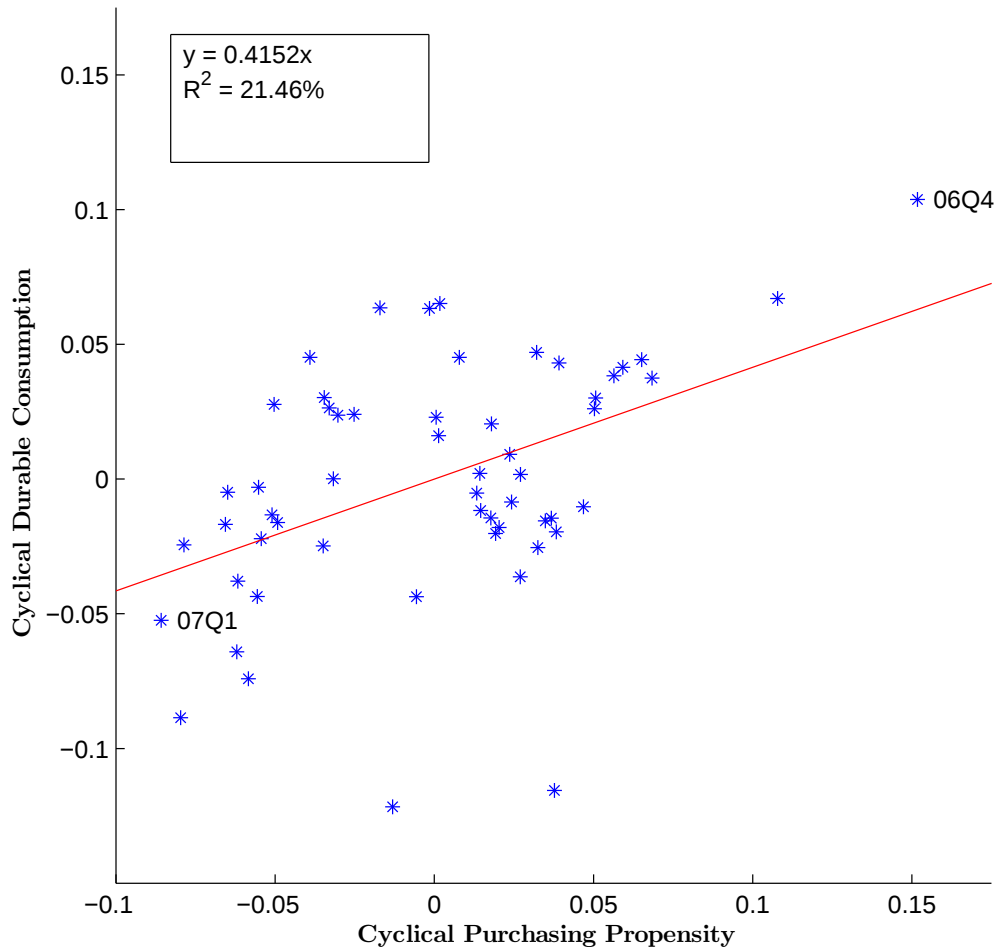
Sueddeutsche Zeitung, 5/15/2006

Warum luegen Politiker?

Why do politician lie?

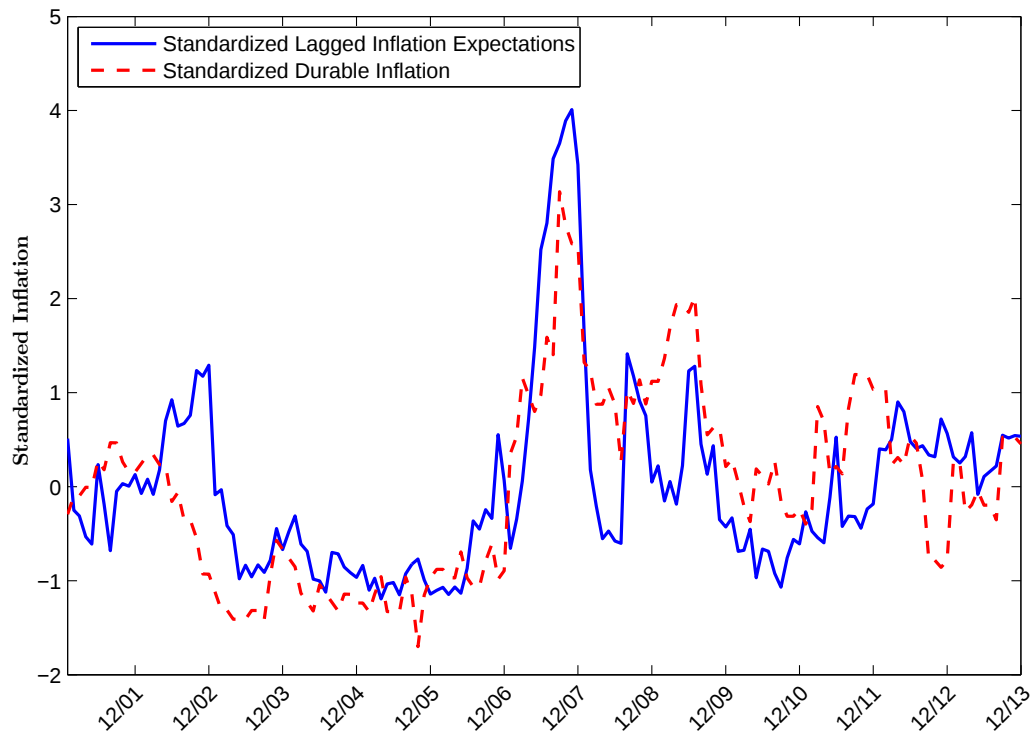
Welt am Sonntag, 5/14/2006

Figure A.1: Cyclical Readiness to Spend on Durables and Real Durable Consumption



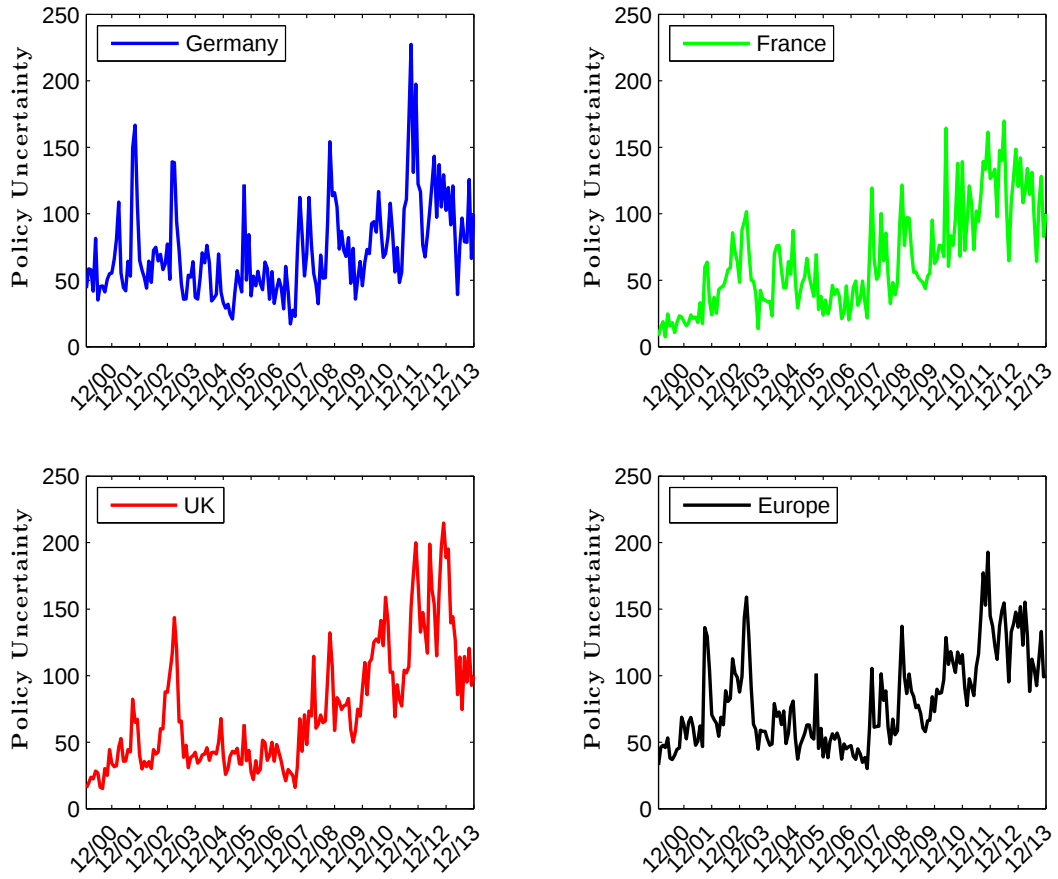
This figure is a scatter plot of the cyclical components of the average monthly readiness to purchase durables over time and of the natural logarithm of the real durable consumption at the quarterly frequency. We use a Hodrick–Prescott filter with smoothing parameter $\lambda = 1,600$ to estimate the 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 first quarter 2000 to fourth quarter 2013 for a total of 14 years.

Figure A.2: **Lagged Inflation Expectations and Realized Durable 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 12 months compared to the previous 12 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 14 years.

Figure A.3: Policy Uncertainty



This figure plots the monthly policy uncertainty index of Baker, Bloom, and Davis (2016) over time. The sample period is January 2000 to December 2013 for a total of 14 years.