Unconventional Fiscal Policy, Inflation Expectations, and Consumption Expenditure

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Research Question

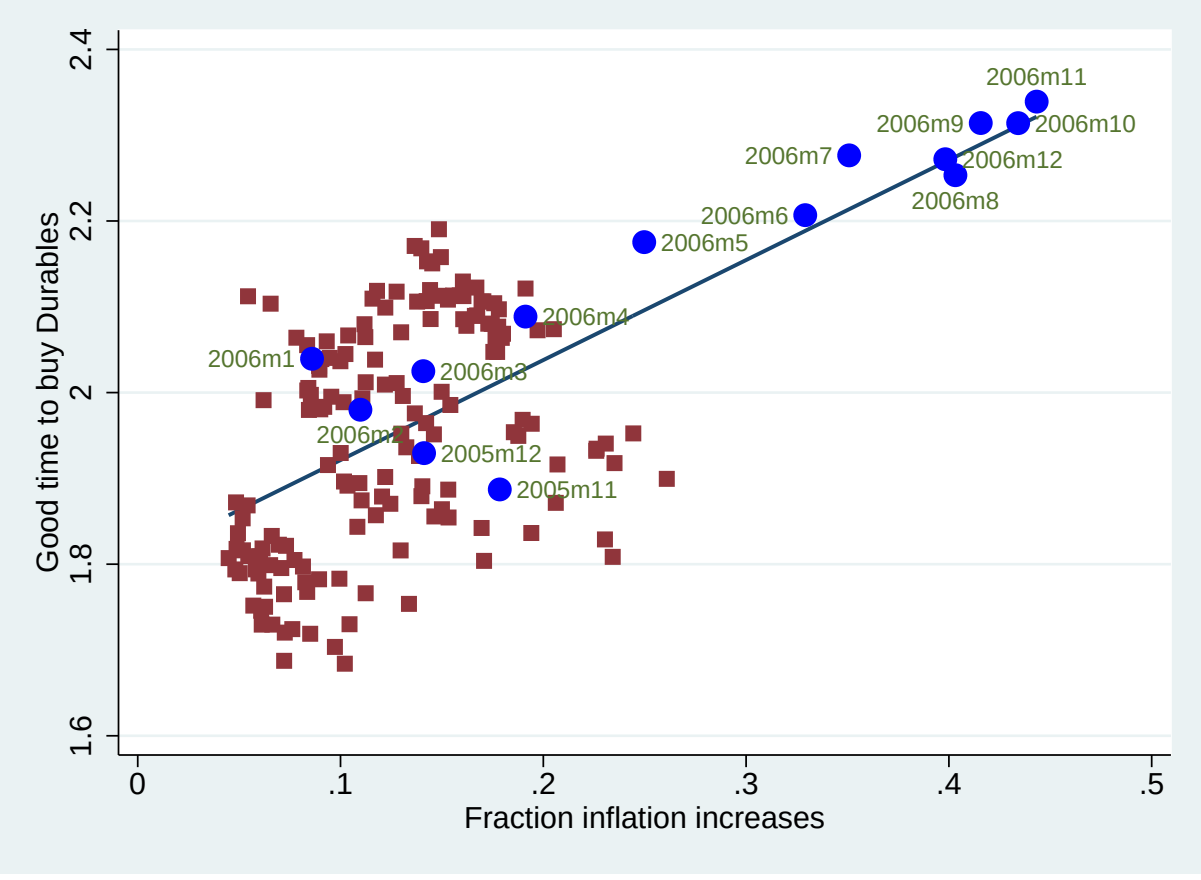
- Do higher inflation expectations lead to higher consumption?
- Monetary policy constrained when zero lower bound (ZLB) binds
- Higher inflation expectations lower real interest rates with binding ZLB
- Fiscal multipliers increase with higher inflation when ZLB binds
- **But**: precautionary savings channel, preference assumptions, inflation tax on liquid asset, income effects, etc.

$\Rightarrow$ Inflation expectations $\Leftrightarrow$ consumption nexus (open) empirical question

This Paper

- Relationship btw inflation expectations & willingness to purchase
- Use novel German household data for sample Jan 2000 to Dec 2013
- Unexpected rise in value-added tax as shock to inflation expectations
- Match German & foreign HHs in DiD research design for identification
- **Main finding**: Households which expect inflation to increase 9% more likely to purchase durables
- Effect stronger for more educated, high-income, urban households

Overview of Results: Time-Series Evidence



- HH with positive inflation expectations 9% more likely to purchase durables in XS
- 19% after announcement and before taking effect of VAT (11/05 – 12/06): blue dots

Related Literature

- Theoretical literature on stabilization role of inflation
  - **Monetary policy**: Krugman (1998), Eggertsson, Woodford (2003), Eggertsson (2006), Werning (2012)
  - **Fiscal policy**: Eggertsson (2011), Christiano, Eichenbaum, Rebelo (2001), Woodford (2011)
  - **Historical perspective**: Romer, Romer (2013), Eggertsson (2008)
- Household survey data on inflation expectations
  - Bachmann, Berg, Sims (2015), Burke, Ozdagli (2013), Ichiue, Nishiguchi (2015), Carvalho, Necchio (2014), Binder (2015)

Data Sources

- European Union harmonized survey on consumption climate
- Representative sample of 2,000 German households every months
- Questions about aggregate and personal economic expectations
- Sample period from January 2000 to December 2013
- Rich demographics (age, income, marital status, city size, kids, job)
- Macro aggregates (unemployment, uncertainty, Dax, interest rates)

Pros and Cons of Data

- Pros
  - Unique natural experiment for causal identification
  - Micro data allows study at level of actual decision maker
  - Study household heterogeneity and control for wealth effects
  - Examine effect over time

- Cons
  - No panel, but rich set of demographics and individual expectations
  - Only qualitative question, but Binder (2015): households have no clue
  - Only willingness to purchase, but tracks actual spending closely

Survey Questions I

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.?

Answer choices: "it's neither good nor bad time," "it's bad time," or "it's a good time."

Survey Questions II

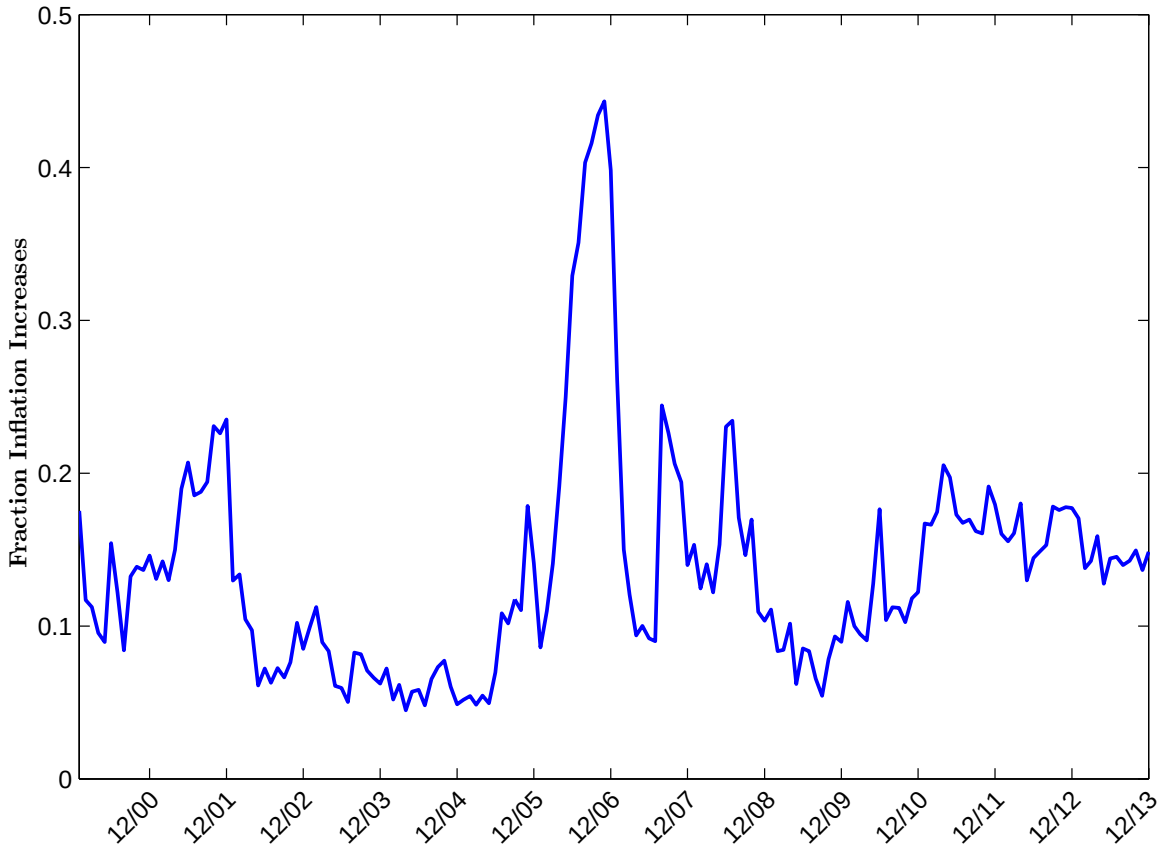
Question 3

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

Answer choices: "prices will increase more," "prices will increase by the same," "prices will increase less," "prices will stay the same," or "prices will decrease."

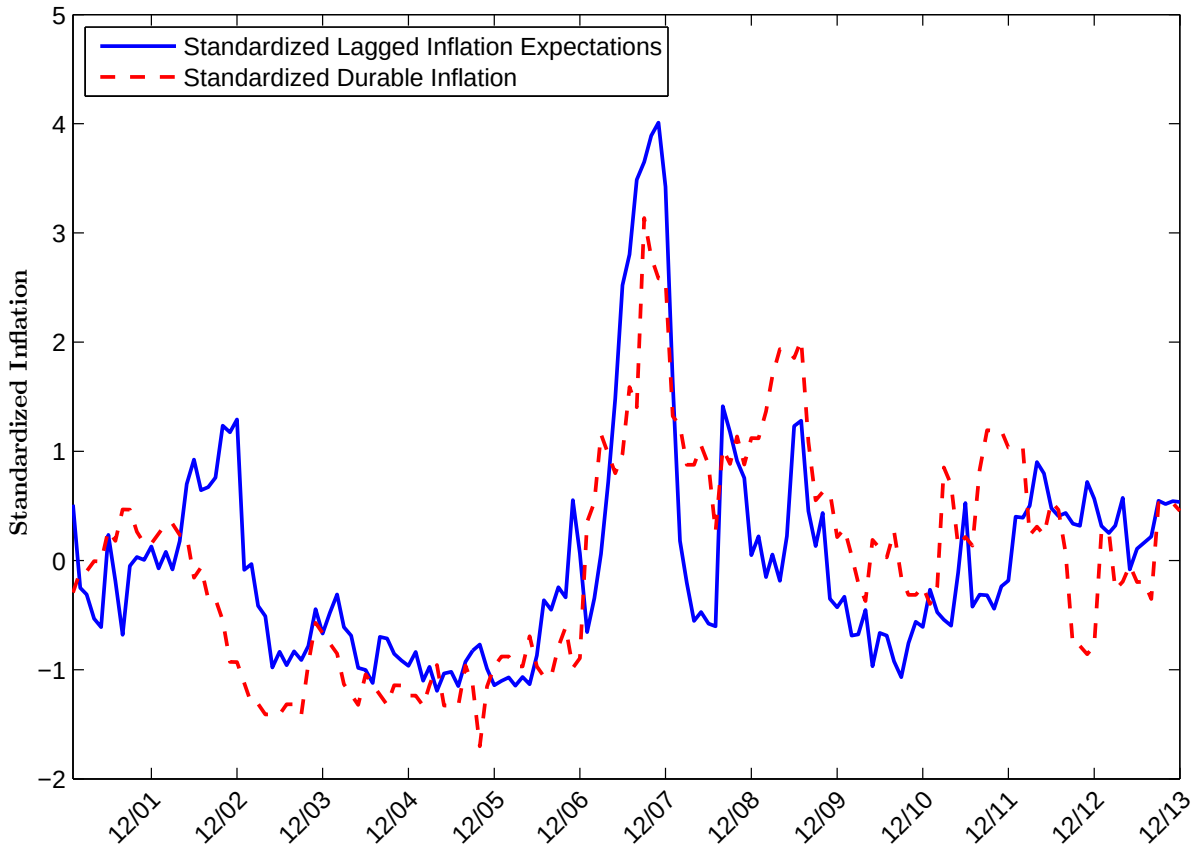
Create a dummy that equals 1 when households answer "prices will increase more."

Inflation Expectations over time



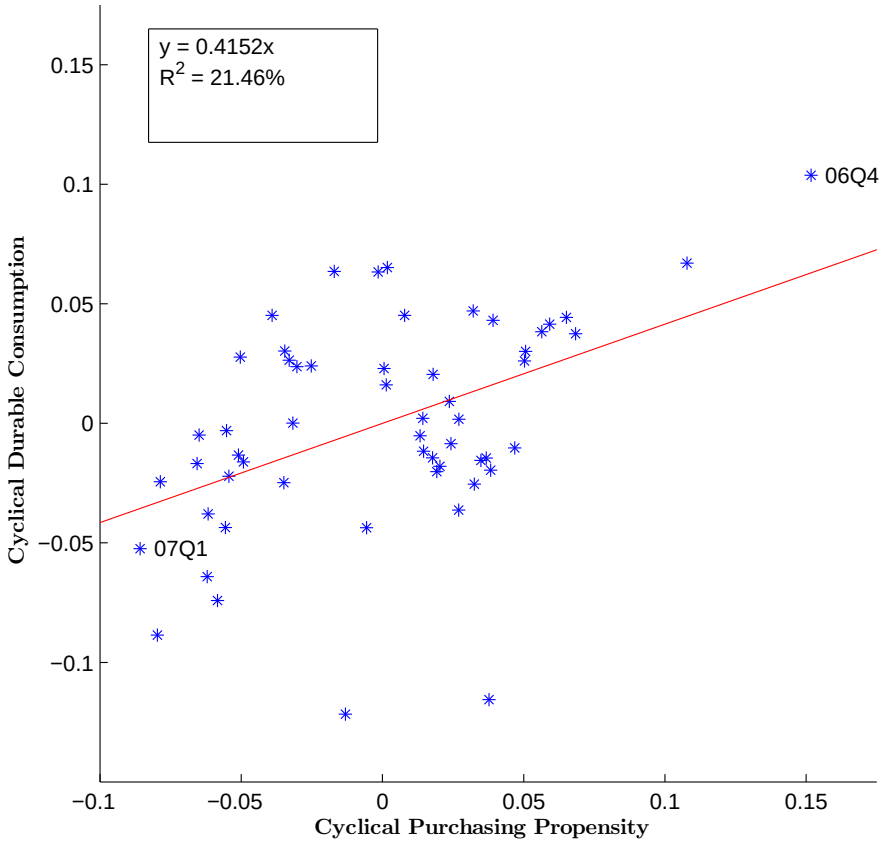
- Inflation expectation start building up beginning of 2006
- Spike in December of 2006

Durable Inflation and lagged Inflation Expectations



- Increase in CPI inflation in 2007 driven by durable goods inflation subject to VAT increase
- Lagged inflation expectations and standardized durable inflation highly correlated

Readiness to Spend and Real Durable Consumption



- Positive correlation between purchasing propensity and actual purchases
- Most positive observation in last quarter before VAT increase
- Large negative observation in quarter of increase

Baseline Specification: Multinomial Logit

- Assume survey answer is random variable y
- Define the response probabilities as $P(y = t|X)$
- Assume the distribution of the response probabilities is

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

- Estimate β_t via maximum likelihood
- Marginal effect: derivative of $P(y = t|x)$ with respect to x
- Empirically: define "it's neither good nor bad time" as baseline

Baseline Specification

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

	Bad time (1)	Good time (2)	Bad time (3)	Good time (4)
Inflation Increase	4.61***	6.24***	2.25**	7.49***
	(1.09)	(1.62)	(0.91)	(1.52)
Past Inflation			6.32***	−3.42***
			(0.48)	(0.28)
Pseudo R^2	0.0031		0.0161	
Nobs	326,011		321,496	

Households which expect inflation to increase

- 7% more likely to answer "good time to purchase durables"
- BUT also 2% to 4.5% more likely to reply "bad time to purchase durables"

Demographics, Expectations, and Macro Aggregates

- HH characteristics shape purchasing propensities (age, income, ...)
  - Characteristics might be systematically related to inflation expectations
- Economic outlook can affect cross-sectional relationship
  - Optimistic households might expect high growth and low inflation
- Household might be bullish or bearish about the economy
  - w/ Philips curve in mind: answer high growth and high inflation

Control for Demographics, Outlook, and Macro–aggregates

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

	Bad time (1)	Good time (2)	Bad time (3)	Good time (4)	Bad time (5)	Good time (6)
Inflation increase	2.42***	7.55***	−0.78	8.88***	0.51	8.75***
	(0.94)	(1.56)	(0.83)	(1.60)	(0.73)	(1.16)
Past Inflation	5.70***	−3.00***	3.76***	−2.00***	3.31***	−1.14***
	(0.45)	(0.30)	(0.33)	(0.35)	(0.20)	(0.23)
Demographics	X	X	X	X	X	X
Individual expectations			X	X	X	X
Macro Aggregates					X	X
Pseudo R^2	0.0292		0.0654		0.0762	
Nobs	244,497		219,799		219,799	

- HH which expect inflation to increase 8% more likely to answer "good time to purchase"
- Positive effect on "bad time to purchase durables" disappears

Control for Demographics, Outlook, and Macro–aggregates

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Individual Economic Outlook

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

	Higher growth outlook		Lower growth outlook	
	Bad time	Good time	Bad time	Good time
	(1)	(2)	(3)	(4)
Inflation increase	-0.58	8.41***	2.89***	7.29***
	(1.15)	(1.91)	(0.90)	(1.42)
Past Inflation	4.77***	−3.55***	6.57***	−3.20***
	(0.49)	(0.38)	(0.47)	(0.28)
Demographics	X	X	X	X
Individual expectations			X	X
Pseudo R^2	0.0115		0.0171	
Nobs	70,000		251,496	

- HH which expect inflation to increase 8% more likely to answer "good time to purchase"
- Positive effect on "bad time to purchase" contained among HH with negative outlook

Exogenous Shock to Inflation Expectations

- Still cannot rule out movements along the supply curve
- Ideal experiment: shock to inflation expectations that does not affect households' willingness to purchase durables through channels different from expectations of rising prices
- Follow narrative approach of Romer and Romer (2010)

$\Rightarrow$ Unexpected increase in value-added tax (VAT)

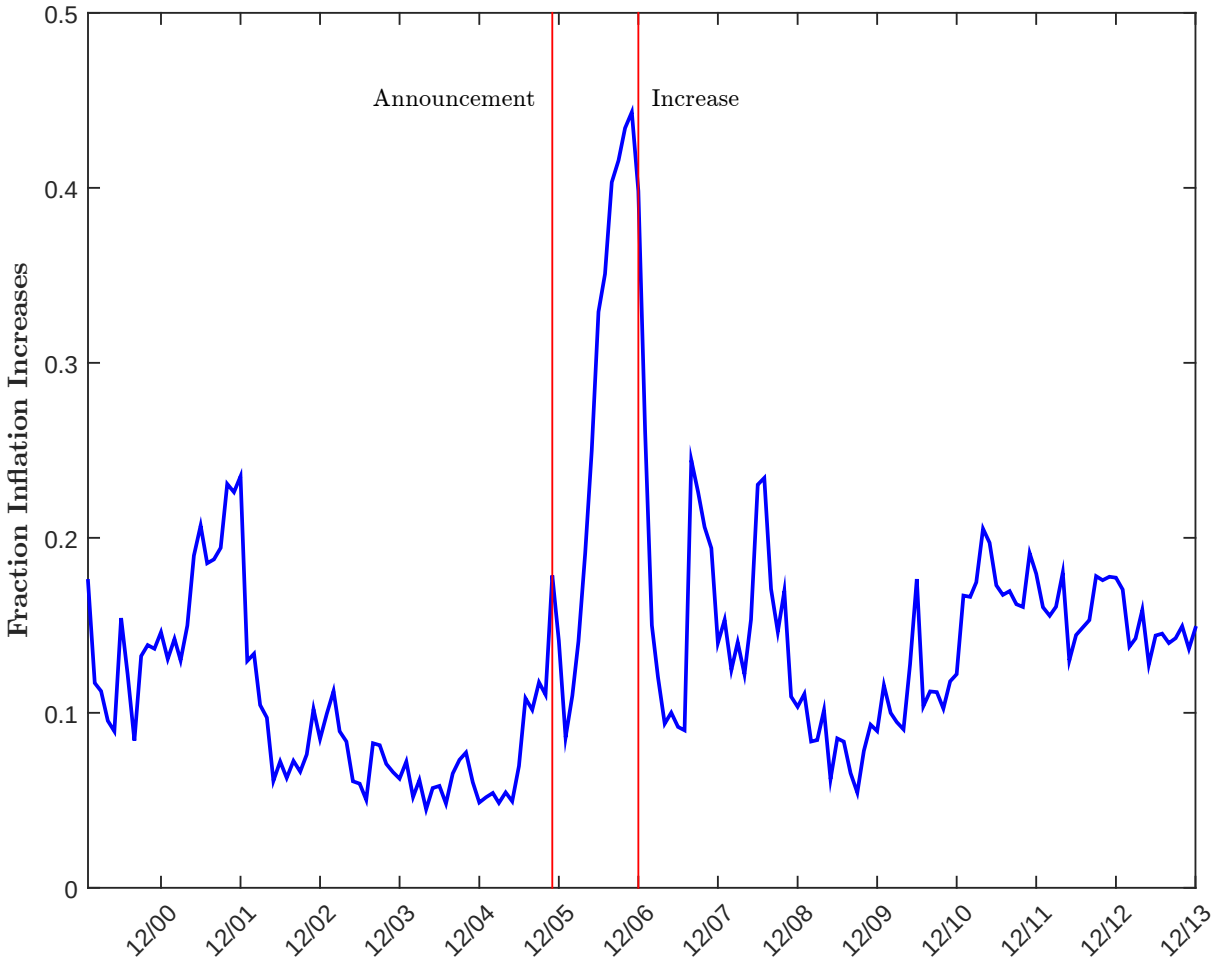
VAT Experiment of 2007 I

- Pre-election 2005: promise not to increase VAT
- Nov 2005: new government announces increase in VAT by 3%
- Jan 2007: entry into force of VAT increase
- VAT increase legislated to consolidate budget
- Not related to prospective economic conditions
- Exogenous tax change acc to Romer and Romer nomenclature

VAT Experiment of 2007 II

- Inflation expectations build up during 2006
- Germany part of Euro zone and no independent monetary policy
- Nominal rate did not increase to offset inflation expectations
- Experiment resembles unconventional fiscal policy described in Correira, Fahri, Nicolini, Teles (2013)
- Feldstein (2002) proposition for Japan: Pre-announced VAT increases
- Stimulate inflation expectations & private spending

VAT as Shock to Inflation Expectations



- Inflation expectation start building up beginning of 2006
- Spike in December of 2006

Difference-in-Differences Matching Estimator

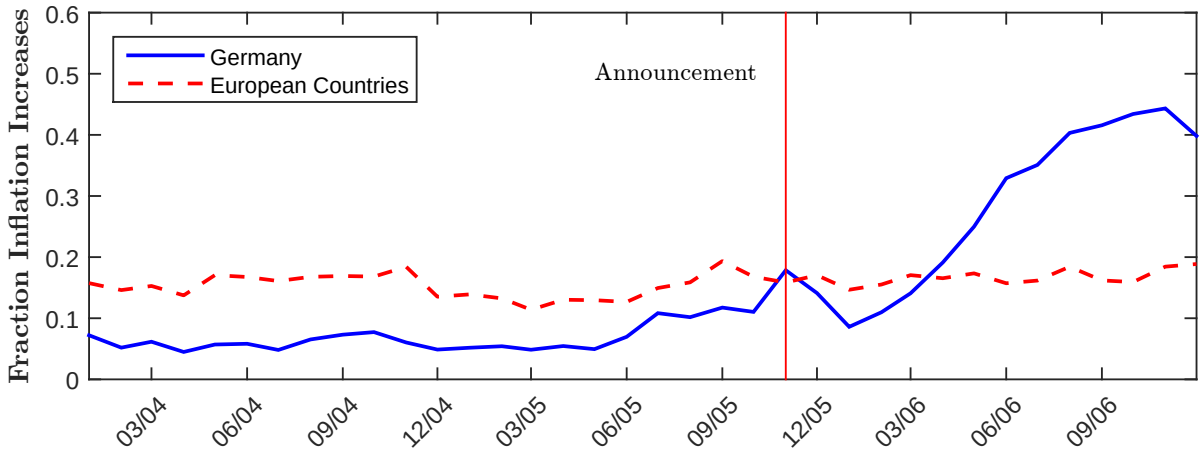
- All Germans treated by VAT shocks
- Micro data for France, UK, Sweden from EU harmonized survey
- Match German & foreign households with nearest-neighbor algorithm
- Matching categories: gender, age, education, income, social status
- Estimate Average Treatment Effect of VAT shock:

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

Parallel-Trends Identification Assumption I

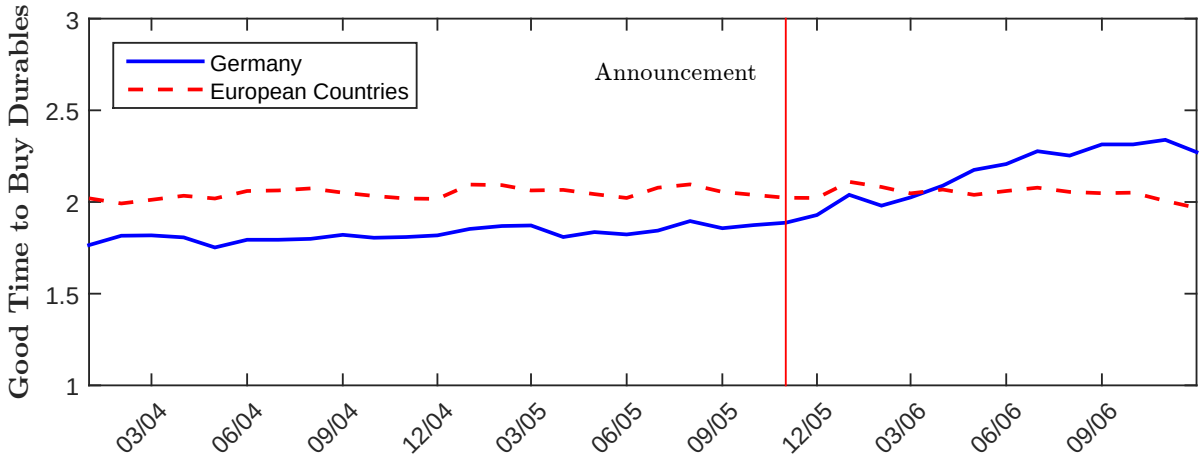
- Control group behaves similarly to Germans *before* VAT shock
- Behavior of control group *after* shock how Germans behaved absent of it

Parallel-Trends Identification Assumption II



Parallel trends in inflation expectations *before* the announcement of the VAT increase

Parallel-Trends Identification Assumption III



Parallel trends in durable propensity *before* the announcement of the VAT increase

Further Identification Assumption

- Balanced households' characteristics after matching ( )
- Treated and control households distributed across full distribution ( )
- Positive effect of inflation expectations on consumption expenditure at micro level for all countries ( )

Further Identification Assumption

- Balanced households' characteristics after matching ($\surd$)

Balance

- Treated and control households distributed across full distribution ( )

- Positive effect of inflation expectations on consumption expenditure at micro level for all countries ( )

Further Identification Assumption

- Balanced households' characteristics after matching ($\surd$)

  Balance

- Treated and control households distributed across full distribution ($\surd$)

  Support

- Positive effect of inflation expectations on consumption expenditure at micro level for all countries ( )

Further Identification Assumption

- Balanced households' characteristics after matching ($\surd$)

  Balance

- Treated and control households distributed across full distribution ($\surd$)

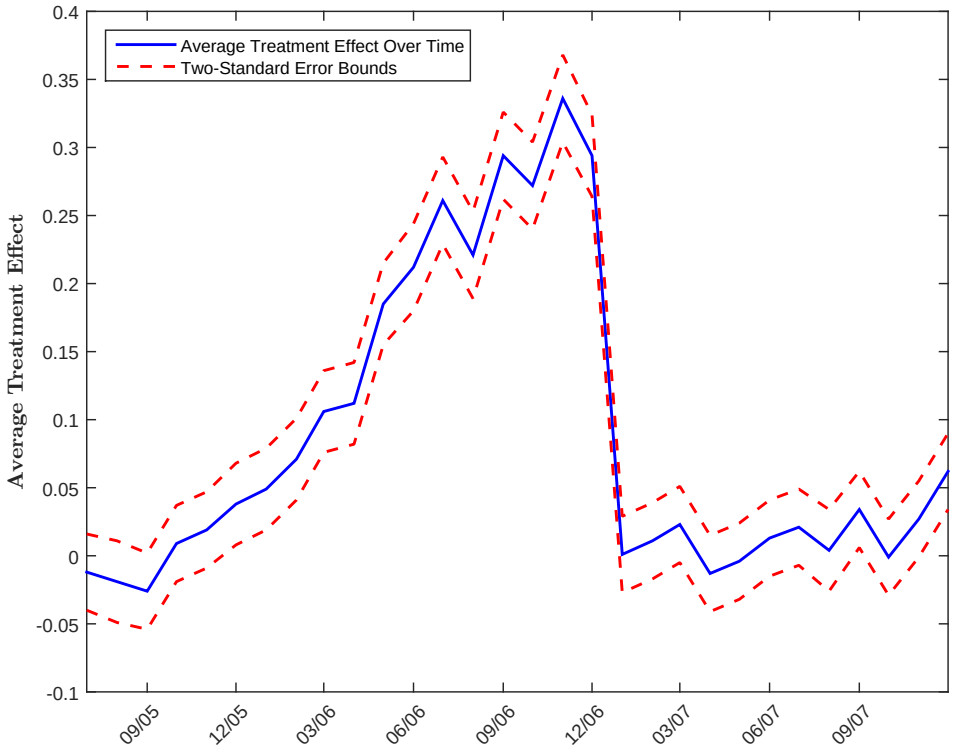
  Support

- Positive effect of inflation expectations on consumption expenditure at micro level for all countries ($\surd$)

  Foreign Baseline

Average Treatment Effect of VAT shock

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

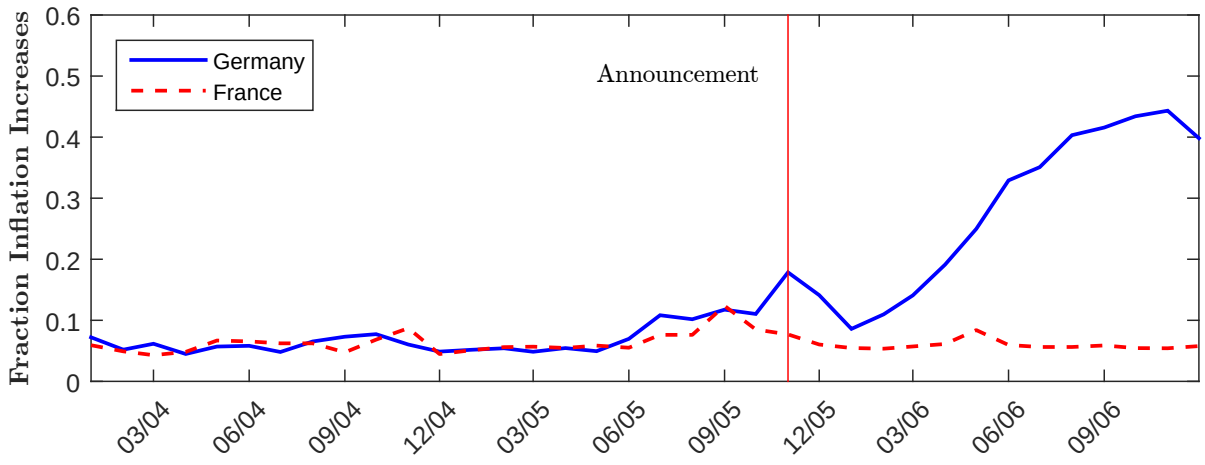


- German and foreign households behave similarly before shock
- Immediate increase of purchasing behavior of Germans after shock
- Effect builds up during 2006
- Reversion to normal after actual VAT increase

Matched Sample: Robustness

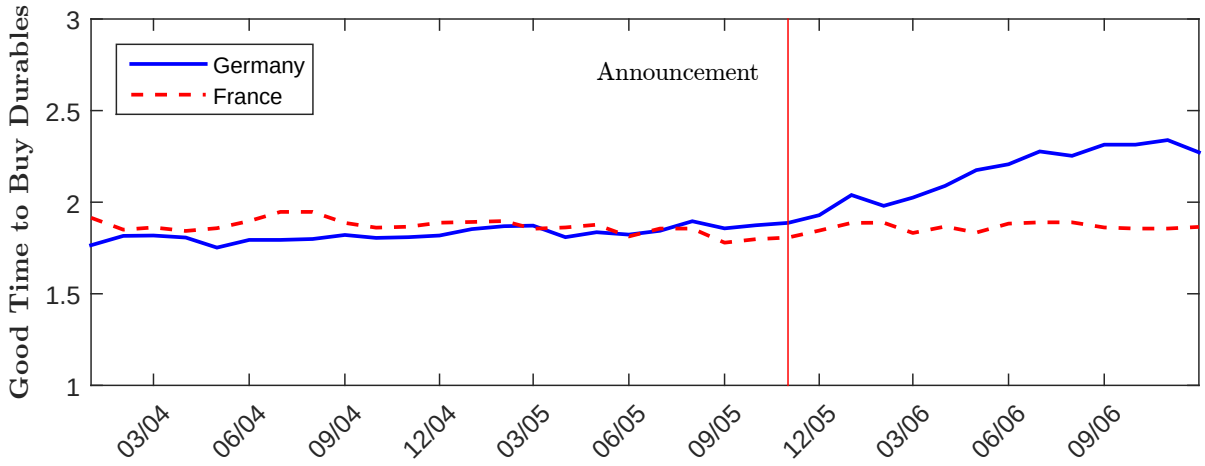
- France, UK, Sweden all part of Europe
- Larger set of households guarantees better balancing
- But UK and Sweden not part of European Monetary Union
- Replicate results for French households only

Parallel-Trends Identification Assumption France I



Parallel trends in inflation expectations *before* the announcement of the VAT increase

Parallel-Trends Identification Assumption France II

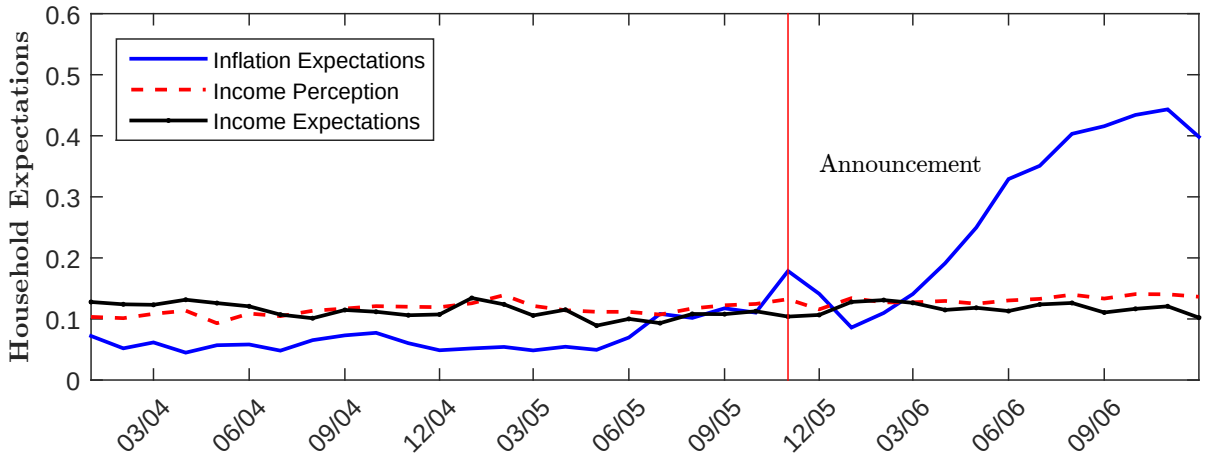


Parallel trends in durable propensity *before* the announcement of the VAT increase

General Equilibrium Effects

- VAT change could affect purchasing decision through other channels
  - Consumer confidence
  - Crowding out
- But: tax increase regressive
- Other channels should operate via income perception or expectations

Other Household Expectations

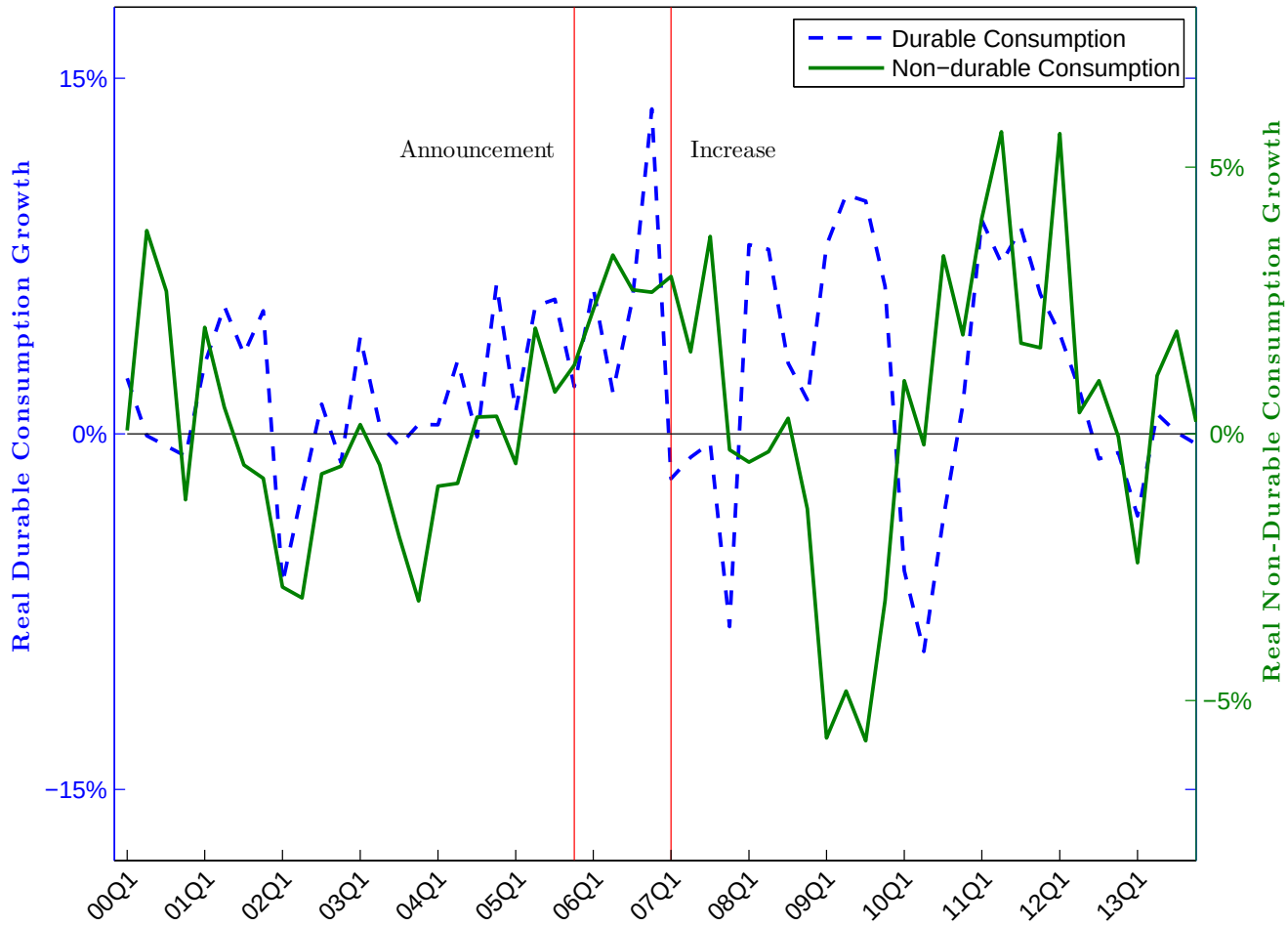


Income perceptions and expectations do not change after the announcement

Intratemporal Substitution

- Policy makers concerned with stimulating overall consumption
- Survey only asks about purchasing intentions of larger items
- VAT mainly affects durable goods
- Households might substitute from non-durables to durables

Real Aggregate Consumption Growth



- Both real nondurable and durable consumption growth increase
- Average savings propensity decreases

Baseline Specification: Savings Propensity

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

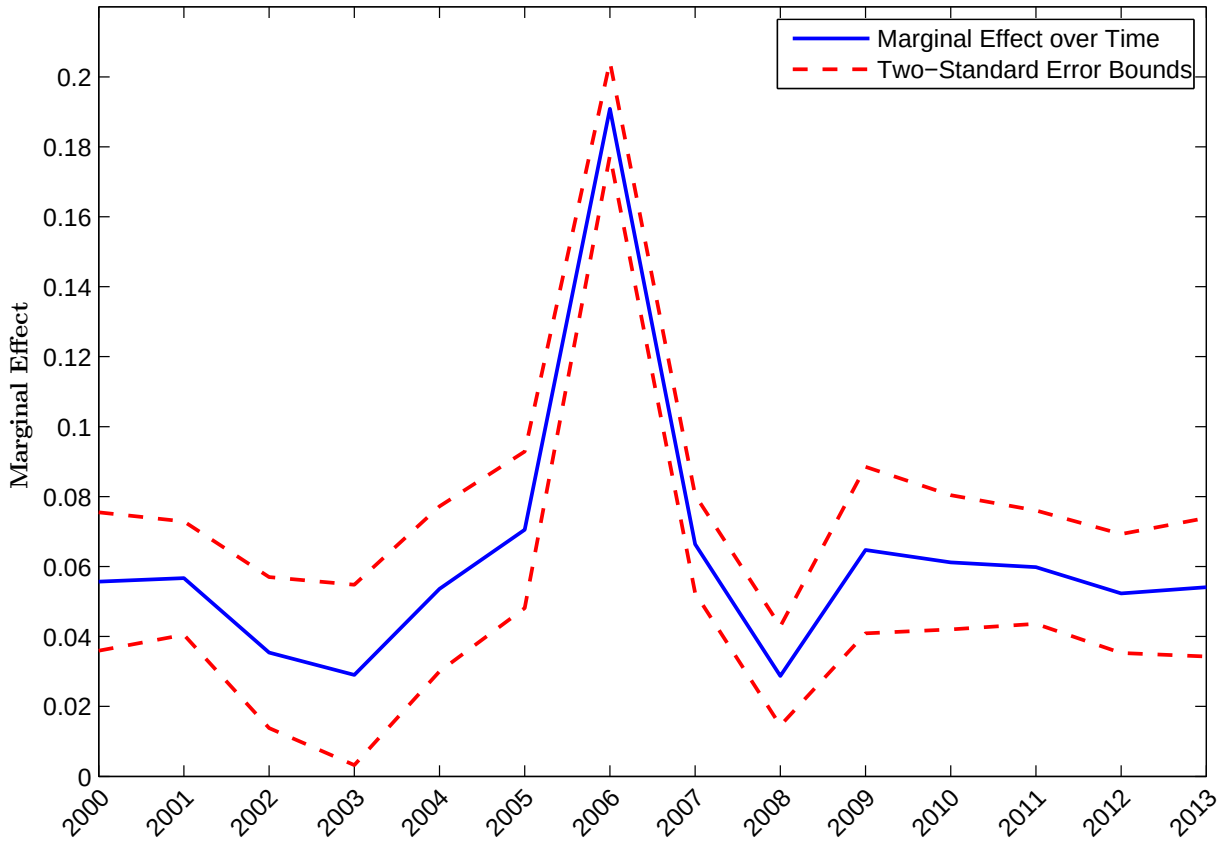
	Bad time (1)	Good time (2)
Inflation Increase	2.85***	-0.09
	(0.27)	(0.40)
Pseudo R^2	0.1181	
Nobs	235,373	

HH which expect inflation to increase 3% more likely to answer "bad time to save"

Salience and Uncertainty

- VAT change: salient mean of generating consumer price inflation
- VAT "experiment" maybe not directly applicable to other situation
- Effects of forward guidance possible less salient and more uncertain

Baseline Effect over Time



- Baseline marginal effect positive across years
- Marginal effect substantially larger during VAR "experiment"

Baseline Specification: Deflation Expectation

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

	Bad time (1)	Good time (2)
Inflation Increase	2.65***	-3.55***
	(0.59)	(0.96)
Pseudo R^2	0.0628	
Nobs	219,799	

HH which expect inflation to decrease 3.5% less likely to answer "good time to purchase"

Household Heterogeneity

Positive effect of inflation expectations on willingness to spend stronger for

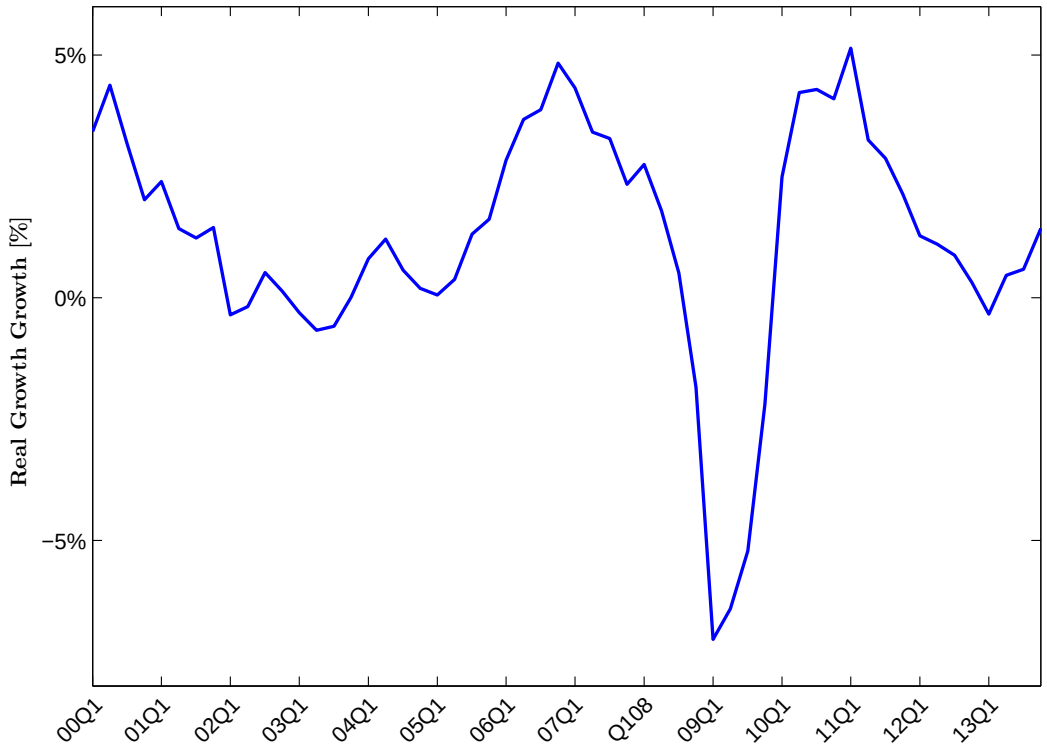
- More educated households by Education
- High income households by Income
- Urban households by City Size
- Unconstrained households by Financial Constraints

Robustness

- Different left-hand side variables: cars, furniture, etc.
- Split by individual economic outlook
- Inflation dummies for all categories
- OLS and ordered probit specification
- Year and month dummies

Conclusion

Durable Consumption versus Aggregate Demand



- HH with higher inflation expectations more willing to purchase durables
- We do not observe other components of consumption or investment
- Real GDP growth increased from 1.6% in 2005Q4 to 4.4% in 2006Q4

Permanent vs temporary Increases in Inflation Expectations

- Suggestion to unexpectedly increase inflation to inflate away debt
  - Hilscher, Raviv, Reis (2014): unlikely to substantially lower real debt
- Suggestion to permanently increase inflation targets
  - Mishkin (2011): occurrence of zero-lower bound periods too rare
  - Coibion, Gorodnichenko, Wieland (2012): optimal inflation rate $< 2\%$
  - Gorodnichenko and Weber (2015): large costs of price adjustments

Permanent vs temporary Increases in Aggregate Demand

- Higher inflation expectations $\Rightarrow$ higher purchasing propensity
- No evidence on persistence of increase in spending
- Effect in 2006 could be pull forward effects
- Consistent with intertemporal substitution channel
- Durable consumption growth & propensities decrease in 2007Q1
- BUT: no stark drop in GDP growth!
- German & foreign HHs behave similarly *after* VAT rise: back to normal

Fiscal vs Monetary Policy

- Models often rely on monetary policy to engineer higher inflation
- Cannot identify source of heterogeneity in survey expectations
- VAT experiment: fiscal policy as source of increases in expectations
- Baseline finding holds when excluding period 11/2005 – 12/2006
- NK fiscal multiplier: substitution rather than income channel
- *Unconventional* discretionary fiscal policy in severe recessions
- Increase private incentives to spend while keeping budget balanced

Inflation Expectations: Good vs Bad Times

- Higher inflation to stimulate demand often prescribed in liquidity trap
- Key mechanism relies on nominal rates not moving sufficiently
- In XS: HH with higher inflation expectations should consume more
- Conjecture larger marginal effects during liquidity trap
- Preferred policy tool might differ but Feldstein (2002)

Identification vs Policy Implications

- HH characteristics shape purchasing propensities
- Control for those to interpret effect of inflation expectations causally
- Policy makers cannot condition on characteristics
  (conventional monetary policy or VAT increase studied here)
- Findings hold in aggregate and without controlling for characteristics
- Heterogeneous effects call for increased policy transparency

Follow-up Work

- What determines heterogeneity in inflation expectations?
  - Hypothesis: Consumption bundle and frequency of purchase
  - Test: AC Nielsen homescan data and own survey on household panel
  - Within household and across household-member variation
- Human frictions to the transmission of policies
  - Who updates inflation expectations to exogenous shocks
  - Which characteristics determine household response
  - Match Finnish inflation survey with IQ tests and related data

Conclusion

- We document a positive cross-sectional relationship between households' inflation expectation and their willingness to purchase durable goods
- The positive effect is stronger for more educated, urban, working-age, and higher income households
- Our findings provide support for conventional wisdom that temporarily higher inflation expectations can stir consumption expenditure
- The heterogeneity across households and the delayed response in 2006 suggest scope for increased economic literacy and policy transparency
- Discretionary fiscal policy in recessions: series of pre-announced VAT increases and a simultaneous reduction in income tax rates

Balancing of Variables: German and Foreign Households

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

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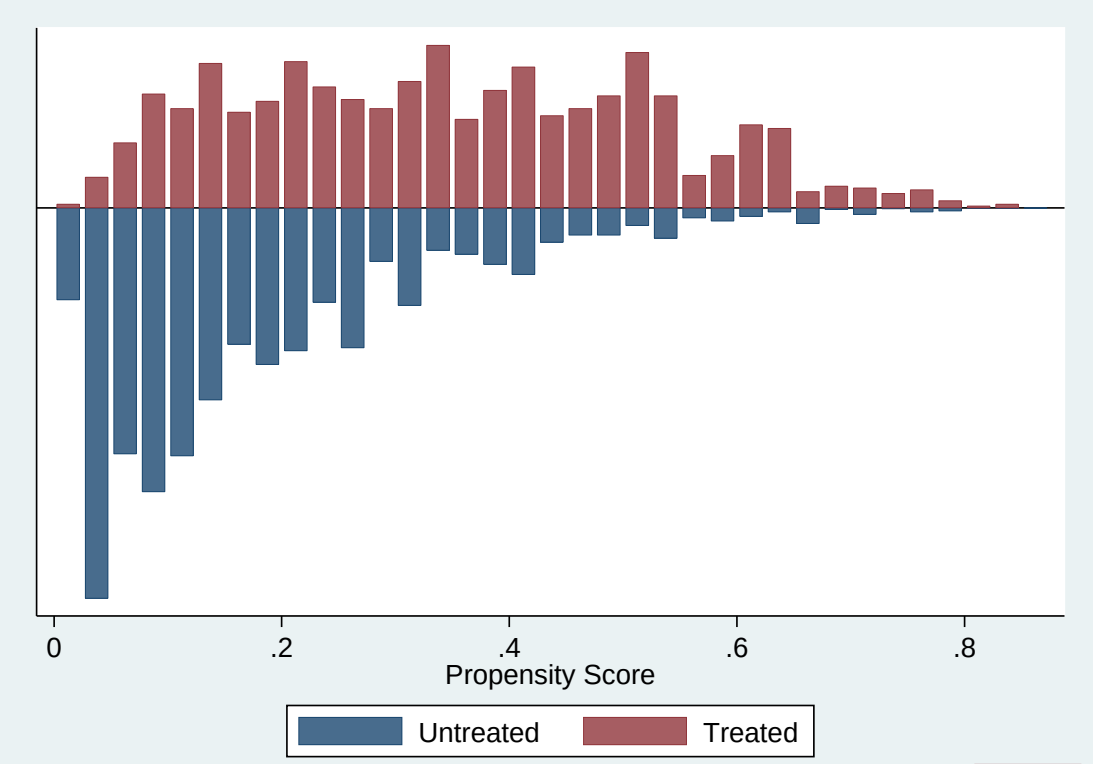
Balancing of Variables: German and Foreign Households



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Baseline Specification Foreign Households

	France (1)	Sweden (2)	UK (3)
Inflation Increase	2.65***	3.81***	4.65***
	(0.37)	(0.53)	(0.61)
Past Inflation	−1.63***	−3.15***	−0.61
	(0.15)	(0.55)	(0.19)
Demographics	X	X	X
Individual expectations	X	X	X
Pseudo R^2	0.0445	0.0288	0.0508
Nobs	163,419	176,829	113,774

Standard errors in parentheses

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

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Baseline Specification by Education

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

	Hauptschule		Realschule		Gymnasium		University	
	Bad time	Good time	Bad time	Good time	Bad time	Good time	Bad time	Good time
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Inflation increase	1.08	6.89***	1.17	9.85***	−3.42***	9.79***	−3.87***	11.28***
	(1.05)	(1.52)	(0.80)	(1.62)	(1.18)	(2.25)	(0.80)	(1.88)
Past Inflation	4.14***	−1.94***	3.73***	−1.88***	3.19***	−2.64***	2.52***	−2.14***
	(0.34)	(0.32)	(0.34)	(0.38)	(0.47)	(0.48)	(0.45)	(0.57)
Demographics	X	X	X	X	X	X	X	X
Individual expectations	X	X	X	X	X	X	X	X
Pseudo R^2	0.0673		0.0635		0.0415		0.0508	
Nobs	89,991		88,315		23,282		18,211	

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Baseline Specification by Income

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

	Income $\leq$ 1,000		1,000 $<$ Income $\leq$ 2,500		2,500 $<$ Income	
	Bad time	Good time	Bad time	Good time	Bad time	Good time
	(1)	(2)	(3)	(4)	(5)	(6)
Inflation increase	−0.99	8.98***	−0.55	8.51***	−1.09	10.48***
	(1.05)	(1.68)	(0.78)	(1.51)	(0.77)	(2.03)
Past Inflation	4.23***	−1.94***	3.51***	−1.92***	2.77***	−2.99***
	(0.36)	(0.37)	(0.32)	(0.36)	(0.43)	(0.45)
Demographics	X	X	X	X	X	X
Individual expectations	X	X	X	X	X	X
Pseudo R^2	0.0655		0.0596		0.0504	
Nobs	96,555		112,710		16,477	

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Baseline Specification by City Size

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

	City $\leq$ 2T		2T $<$ City $\leq$ 20T		20T $<$ City $\leq$ 100T		100T $<$ City	
	Bad time (1)	Good time (2)	Bad time (3)	Good time (4)	Bad time (5)	Good time (6)	Bad time (7)	Good time (8)
Inflation increase	−1.23	5.81***	0.18	8.47***	0.02	8.54***	−2.44***	10.13***
	(1.32)	(1.99)	(0.86)	(1.51)	(1.02)	(2.17)	(0.92)	(1.33)
Past Inflation	4.14***	−1.96***	2.98***	−1.87***	4.14***	−2.64***	4.15***	−1.77***
	(0.52)	(0.55)	(0.36)	(0.34)	(0.37)	(0.38)	(0.40)	(0.42)
Demographics	X	X	X	X	X	X	X	X
Individual expectations	X	X	X	X	X	X	X	X
Pseudo R^2	0.0738		0.0632		0.0721		0.0656	
Nobs	17,833		74,937		59,674		67,355	

Standard errors in parentheses

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

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Baseline Specification by Financial Constraints

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

	Unconstrained		Constrained	
	Bad time	Good time	Bad time	Good time
	(1)	(2)	(3)	(4)
Inflation Increase	−0.57	10.42***	−1.05	7.47***
	(0.66)	(1.80)	(1.01)	(1.46)
Past Inflation	3.45***	−2.50***	3.88***	−1.59***
	(0.27)	(0.38)	(0.40)	(0.35)
Pseudo R^2	0.0615		0.0608	
Nobs	98,344		121,455	

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