

Effect of Unconventional Fiscal Policy on Consumption Expenditure

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Motivation

“There are forces in the global economy conspiring to hold inflation down.”

Mario Draghi, February 4 2016

“Fiscal Constraints Await the Next President.”

Wall Street Journal, September 25 2016

- Annual inflation rate Euro area in May 2016: -0.1%
- Inflated Central Bank balance sheets and large sovereign debt burdens
- **Can unconventional fiscal policy stimulate inflation & demand?**

Research Question

- Higher inflation expectations \rightarrow 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.

Inflation expectations \Leftrightarrow consumption (open) empirical question

This Paper

- Inflation expectations \Leftrightarrow willingness to purchase durables

- **Identification: Difference-in-Differences**

Novel German household data between Jan 2000 to Dec 2013

Unexpected rise in VAT as shock to inflation expectations

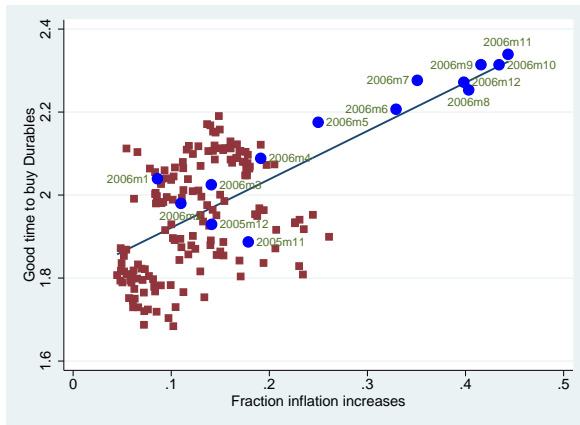
Match German & foreign households in DiD design

- **Main finding**

Households expecting higher inflation 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

Data Sources

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

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

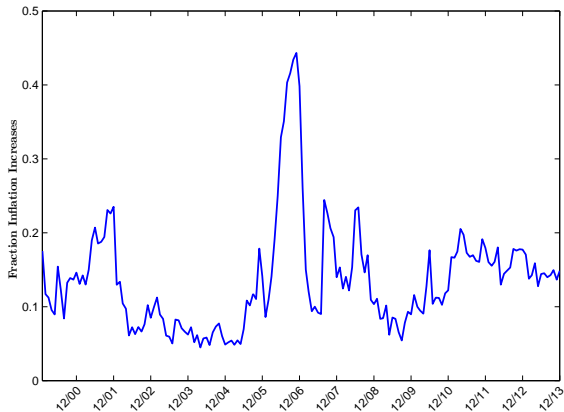
Question 3

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.”

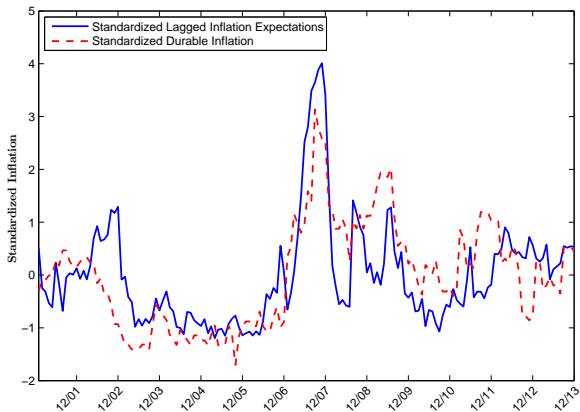
Create a dummy that equals 1 when households answer “prices will increase more.”

Inflation Expectations over time



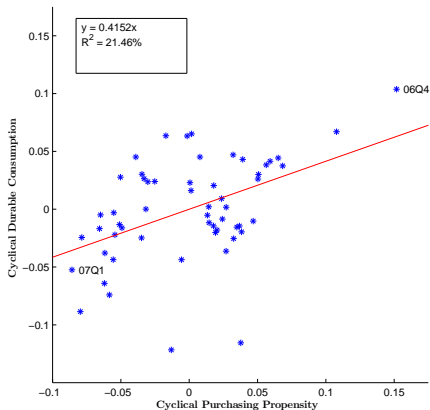
- Inflation expectation start building up beginning of 2006
- Spike in December of 2006

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

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

Good time to buy		
Inflation Increase	6.24*** (1.62)	7.49*** (1.52)
Past Inflation		-3.42*** (0.28)
N. obs	326,011	321,496

Households which expect inflation to increase

- 7% more likely to answer “good 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

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

	Good time	Good time	Good time
Inflation increase	7.55*** (1.56)	8.88*** (1.60)	8.75*** (1.16)
Past Inflation	-3.00*** (0.30)	-2.00*** (0.35)	-1.14*** (0.23)
Demographics	X	X	X
Individual expectations		X	X
Macro Aggregates			X
Nobs	244,497	219,799	219,799

- **8%** more likely to answer “good time to purchase”

Control for Demographics, Outlook, and Macro-aggregates

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

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Demographics	X	X	X
Individual expectations		X	X
Macro Aggregates			X
Pseudo R ²	0.0292	0.0654	0.0762
Nobs	244,497	219,799	219,799

- 9% more likely to answer “good time to purchase”

Control for Demographics, Outlook, and Macro-aggregates

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

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- 9% more likely to answer “good time to purchase”

Household Heterogeneity

Effect of inflation expectations on willingness to spend higher for

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

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 & Romer (2010), Ramey (2011)

⇒ Unexpected increase in value-added tax (VAT)

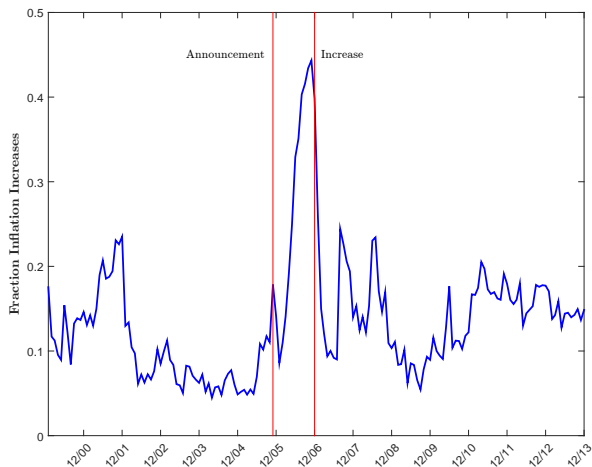
VAT Experiment of 2007 I

- 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 Correia, 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

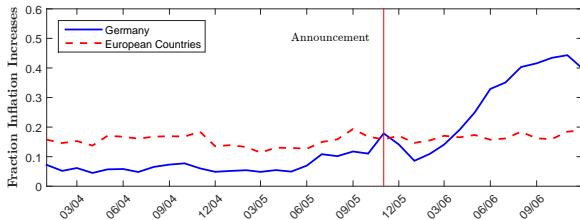
- All Germans treated by VAT shocks
- Micro data for France, UK, Sweden from EU harmonized survey
- Match German & foreign households with nearest-neighbor algorithm
- Matching categories: gender, age, education, income, social status
- Estimate Average Treatment Effect of VAT shock:

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

Parallel-Trends Identifying Assumption I

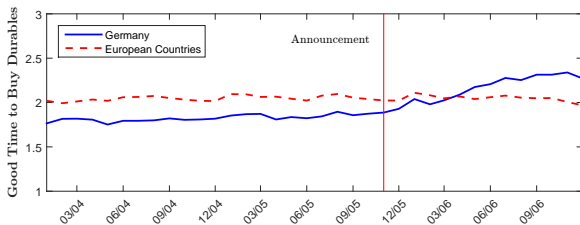
- Control group behaves similarly to Germans *before* VAT shock
- Behavior of control group *after* shock how Germans behaved absent of it

Parallel-Trends Identifying Assumption II



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

Parallel-Trends Identifying Assumption III



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

Further Identifying Assumptions

- 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 Identifying Assumptions

- Balanced households' characteristics after matching (✓)

Balance

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

Further Identifying Assumptions

- Balanced households' characteristics after matching (✓)

Balance

- Treated and control households distributed across full distribution (✓)

Support

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

Further Identifying Assumptions

- Balanced households' characteristics after matching (✓)

Balance

- Treated and control households distributed across full distribution (✓)

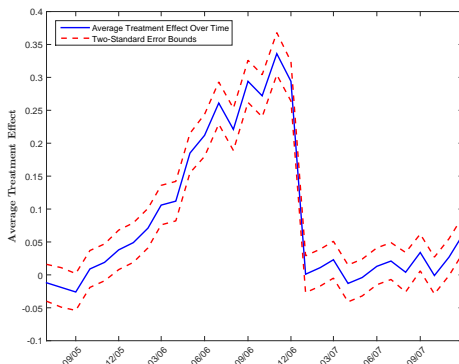
Support

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

Foreign Baseline

Average Treatment Effect of VAT shock

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

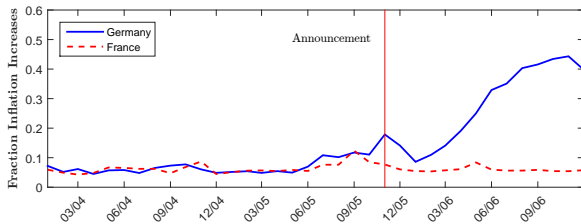


- German and foreign households behave similarly before shock
- Immediate increase of purchasing behavior of Germans after shock
- Effect builds up during 2006
- Reversion to normal after actual VAT increase

Matched Sample: Robustness

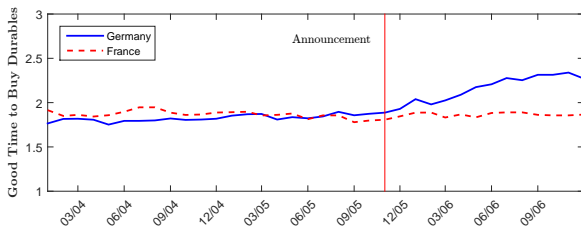
- France, UK, Sweden all part of Europe
- Larger set of households guarantees better balancing
- But UK and Sweden not part of European Monetary Union
- Replicate results for French households only

Parallel-Trends Identifying Assumption: France I



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

Parallel-Trends Identifying Assumption: France II

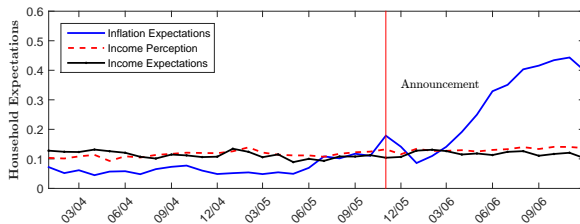


Parallel trends in durable propensity *before* the announcement of the VAT increase

General Equilibrium Effects

- VAT change could affect purchasing decision through other channels
 - Consumer confidence
 - Crowding out
 - Redistribution channel
 - Financial constraints
 - Home-equity extraction
 - Political uncertainty
- But: tax increase regressive
- Other channels should operate via income perception or expectations

Other Household Expectations

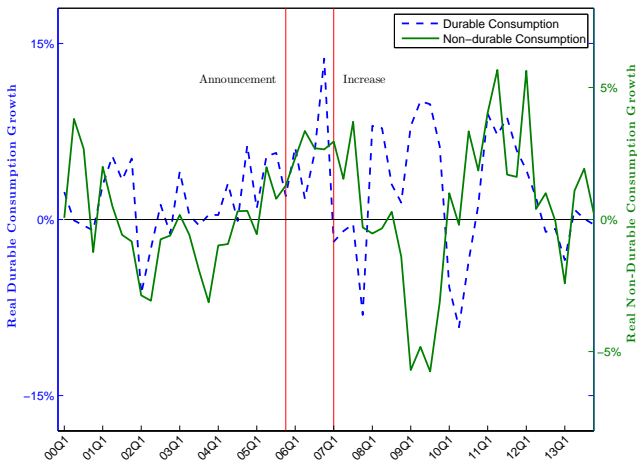


Income perceptions and expectations do not change after the announcement

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

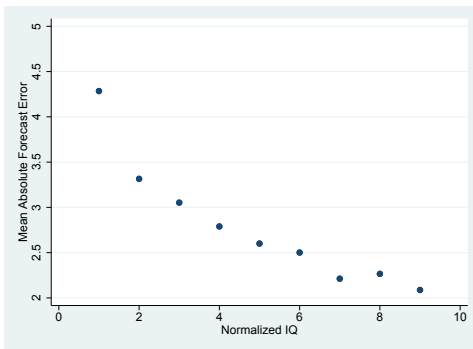
Taking Stock

- Unconventional fiscal policy is salient, easy to understand
- Reaction across cuts of the data by income, education, age, etc
- But: low reaction to “complex” policies: e.g., *forward guidance puzzle*
- Do cognitive abilities limit the effectiveness of economic policies?

D'Acunto, Hoang, Paloviita, Weber (2018):

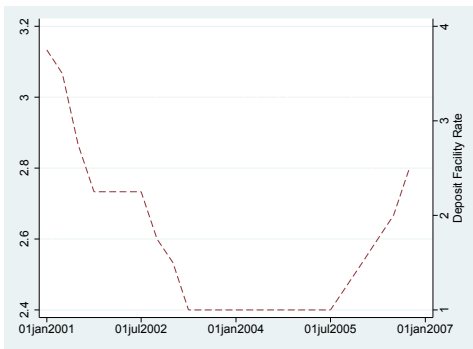
Human Frictions to the Transmission of Economic Policies

Mean Absolute Forecast Error by IQ



- Absolute forecast errors twice as large for low IQ men than for high IQ men
- Monotonic relationship btw absolute forecast error and IQ

ECB Deposit Facility Rate: Beginning of Quarter



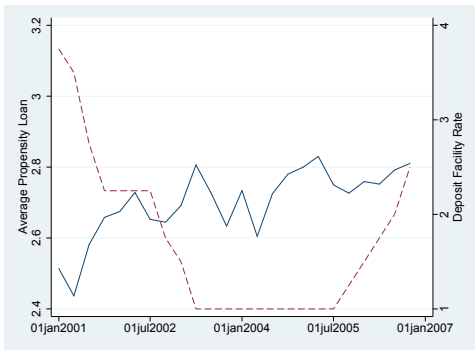
- Until end of 2001: rate falls from 3.75% to 2.25%
- Trough of 1% in June 2003
- December 2005 rates start to increase; 2.5% end of 2006

Propensity to take out Loan: High IQ



- Early 2001: average propensity to take out loans is about 2.5
- 2001-2003: rates fall and propensities increase to more than 3
- Until mid-2005: rates and propensities flat
- 2005-2007: rates increase, propensities fall

Propensity to take out Loan: Low IQ



- Early 2001: average propensity to take out loans of around 2.6
- 2011-2007: propensities flat, hover around 2.8

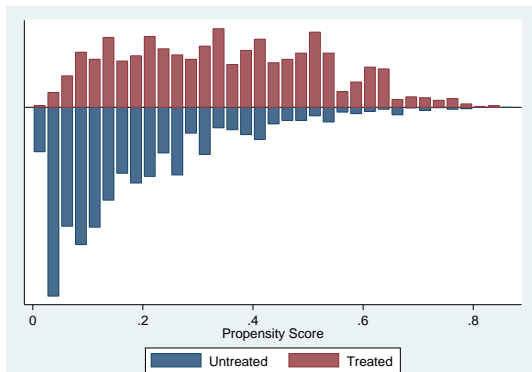
Conclusion

- Households expecting higher inflation want to purchase more durables
- Discretionary fiscal policy in recessions: series of pre-announced VAT increases and a simultaneous reduction in income tax rates
- Large effect across households
- Scope for increased economic literacy, policy transparency, & salience

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		

Balancing of Variables: German and Foreign Households



Baseline Specification Foreign Households

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

Standard errors in parentheses

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

Baseline Specification by Education

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

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

Baseline Specification by Income

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

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

Baseline Specification by City Size

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

	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 (1.32)	5.81*** (1.99)	0.18 (0.86)	8.47*** (1.51)	0.02 (1.02)	8.54*** (2.17)	-2.44*** (0.92)	10.13*** (1.33)
Past Inflation	4.14*** (0.52)	-1.96*** (0.55)	2.98*** (0.36)	-1.87*** (0.34)	4.14*** (0.37)	-2.64*** (0.38)	4.15*** (0.40)	-1.77*** (0.42)
Demographics	X	X	X	X	X	X	X	X
Individual expectations	X	X	X	X	X	X	X	X
Nobs	17,833		74,937		59,674		67,355	

Standard errors in parentheses

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

Baseline Specification by Financial Constraints

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

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