How do inflation expectations impact consumer behaviour?

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Context

- recent low and declining inflation and inflation expectations central to concerns about the recovery: low inflation expectations boosting real rates and weakening aggregate demand

- at **Effective Lower Bound** (ELB) the change in inflation expectations transmits fully to ex ante real rates; negative impact on demand may be stronger

- re-anchoring channel: monetary policy is constrained due to ELB, non-standard monetary policies signalling the central bank commitment to raising future inflation, lowering ex ante real interest rates

Standard macroeconomic theory

- higher inflation expectations decrease real interest rates (Fisher equation)
- lower interest rates reduce savings and stimulate consumption (Euler equation)
- stabilization role of inflation expectations at the effecttive lower bound: Krugman et al. (1998), Eggertsson and Woodford (2003), Jung et al. (2005), Eggertson (2006)
- **but**:offsetting income effect, durables/non durables, inflation uncertainty (reduce consumption via a precautionary savings channel)

Open empirical question

For an increase in inflation expectations

- Bachman et al. (2015) on US: the effect on consumer readiness to spend is close to zero and statistically not significant during normal times; negative when ELB is binding
- Burke and Ozdagli (2013) on US: consumers do not increase their spending on large home appliances and alectronics, but they increase it for non-durables
- D'Acunto et al. (2016) on Germany: a 6 to 9% increase in the probability that consumers are ready to spend
- Ichiue and Nishiguchi (2015) on Japan: increase in current consumption relative to future spending

The macroeconomic approach
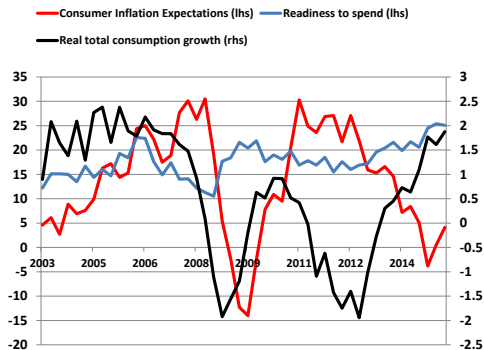
- small sample
- endogeneity
- very short ELB period

Figure 1: Consumer Inflation Expectations, Readiness to spend, Real total consumption. 2003Q4 - 2015Q3.

Alternative: rich (but confidential) micro-dataset providing individual consumer level information

European Commission Consumer Survey

- multi-country EU/ EA survey: 25,440 monthly interviews, whereas NY Fed SCE (1200) or Michigan Survey (500)
- quantitative questions on subjective inflation perceptions and expectations
- matched replies to other questions on financial/economic situation, saving/spending behaviour
- rich demographic classification: gender, educational attainment, occupation, income
- sample: May 2003 to July 2015

Outline

1. Motivation   ✓
2. Survey data and micro-evidence
3. Methodology
4. Results
5. Conclusions

Survey questions

- **Inflation perceptions**

Q51: By how many per cent do you think that consumer prices have gone up/down over the past 12 months?
A: Consumer prices have increased/decreased by _ _, _ _%.

- **Inflation expectations**

Q61: By how many per cent do you expect consumer prices to go up/down in the next 12 months?
A: Consumer prices will increase/decrease by _ _, _ _%.

- **Readiness to spend**

Q8: In view of the general economic situation, do you think it is the right moment for people to make major purchases?
A: (1) No (2) Neither right, nor wrong (3) Yes

Expected change in inflation

$$\Delta\pi_{it}^e = \pi_{it}^e - \pi_{it}^p$$

where π_{it}^e inflation expectations and π_{it}^p inflation perceptions

- controls for the strong variation in the level of perceived inflation across consumers
- when changing their spending intentions, consumers are likely to consider their expected future inflation rate relative to their perceptions about current inflation
- both expectations and perceptions of inflation have an upward bias when compared to official statistics such as the HICP (the difference may reduce any distortion due to extreme pessimism/optimism about inflation)

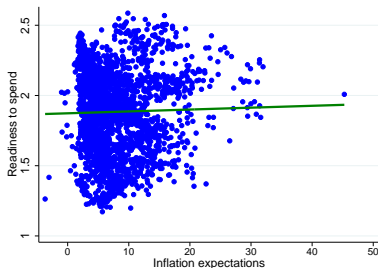# EA consumer readiness to spend and inflation expectations

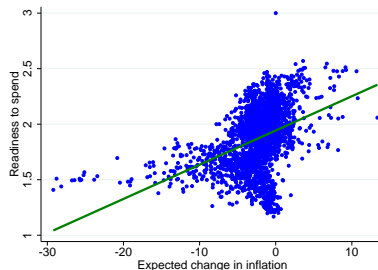Figure 2: Scatterplot readiness to spend vs inflation expectations.

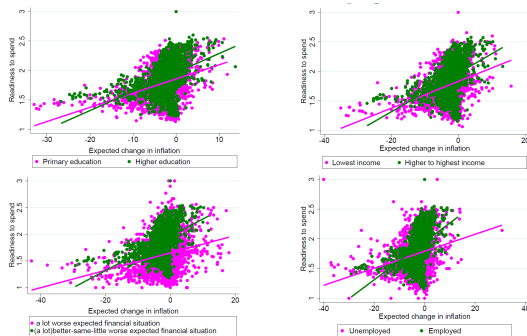Figure 3: Scatterplot readiness to spend vs expected change in inflation.

Heterogneity

Figure 4: Scatterplots of expected change in inflation vs readiness to spend differentiating by consumer education, income, expected financial situation and employment status. One dot represents a simple average of a particular category of consumers at one moment in time (identified by month and year).

2 steps approach

Step1: Micro

- estimate the relationship between expected change in inflation and consumer readiness to spend
- monthly consumer level survey data
- discrete choice model

Step2: Linking micro to macro

- estimate the relationship between readiness to spend and actual consumption
- quarterly macro data
- bi-variate VAR

Discrete choice model: ordered logit

Define a latent variable (continuous measure of readiness to spend):

$$y_{it}^* = X_{it}\beta + \varepsilon_{it}$$

Then:

$$y_{it} = \begin{cases} 1 & \text{if } y_{it}^* < \alpha_1 \\ 2 & \text{if } \alpha_1 \leq y_{it}^* < \alpha_2 \\ 3 & \text{if } y_{it}^* \geq \alpha_2 \end{cases}$$

Each alternative has a probability Pr attached, e.g., the probability of being ready to spend:

$$Pr\left(y_{it} = 3\right) = Pr\left(y_{it}^* \geq \alpha_2\right) = Pr\left(X_{it}\beta + \varepsilon_{it} \geq \alpha_2\right) =$$
$$= Pr\left(\varepsilon_{it} \geq \alpha_2 - X_{it}\beta\right) = F\left(X_{it}\beta - \alpha_2\right)$$

Maximum likelihood estimation

Latent variable specification

$$y_{it}^* = \beta_0 + \beta_1 ELB + \beta_2 \Delta\pi_{it}^e + \beta_3 \Delta\pi_{it}^e ELB + X_{it}\gamma + \varepsilon_{it}$$

where ELB dummy variable taking 1 from June 2014 to July 2015
and X_{it} vector of controls:

- **Demographics**: age, gender, education, employment, income
- **Expectations and financial status**: expectations of individual financial situation, general economic and unemployment situation and current financial status
- **Interactions**: pairwise, expected change in inflation with expected financial situation, debt and employment status, income, education
- **Time dummies**, **Country dummies**
- **Macro aggregates**: SPF GDP uncertainty, lending rates, log disposable income

Euro Area results

			Average marginal effects					
ELB=0	ELB=1	Demographics	Expectations and financial status	Interactions	Time dummies	Country dummies	Macro aggregates	No outliers
0.00260***	0.00302***							
(0.000600)	(0.000597)							
0.00250***	0.00269***	X						
(0.000587)	(0.000590)							
0.00268***	0.00280***	X	X					
(0.000537)	(0.000590)							
0.00293***	0.00305***	X	X	X				
(0.000541)	(0.000627)							
0.00290***	0.00325***	X	X	X	X			
(0.000559)	(0.000608)							
0.00166***	0.00239***	X	X	X	X	X		
(0.000236)	(0.000380)							
0.00163***	0.00241***	X	X	X	X	X	X	
(0.000239)	(0.000382)							
0.00224***	0.00341***	X	X	X	X	X	X	X
(0.000361)	(0.000584)							

Table 1: Propensity to spend: average marginal effects, Euro Area. Clustered standard errors (at country level) in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$. The table shows the average marginal effect of a unit increase in the expected change in inflation on the probability that consumers are ready to spend.
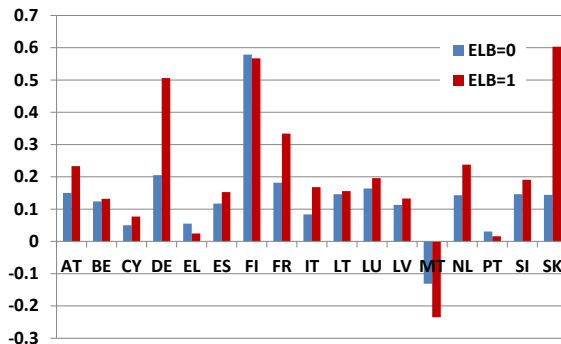
Country results

Figure 5: Average marginal effects by country. Based on the ordered logit specification which includes all control groups. All average marginal effects are statistically significant at 1% or 5% level, except average marginal effects at the ELB for Greece and Portugal.

Other average marginal effects on the propensity to spend

Variables	ELB=0	ELB=1
Expected financial situation (a lot better)	0.117***	0.121***
	(0.0148)	(0.0154)
Expected general economic situation (a lot better)	0.136***	0.140***
	(0.0153)	(0.0158)
Expected general unemployment situation (increase sharply)	-0.0905***	-0.0936***
	(0.0197)	(0.0208)
Observations	1,793,108	1,793,108

Table 2: Average marginal effects of expectations about individual financial situation, general economic and unemployment situaton on the propensity to spend, based on the full specification. Clustered (at country level) standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Linking consumption to inflation expectations through the probability of spending

- 2 variable quarterly VAR: consumer aggregate propensity to spend $\overline{Pr_t}$ and log real total consumption C_t
- $\overline{Pr_t}$: weighted average of individual propensities to spend using individual and country weights, transformed to quarterly frequency by taking the 1st month of each quarter
- VAR(1): Schwarz and Hannan-Quinn information criteria
- identification: Choleski, with $\overline{Pr_t}$ ordered first
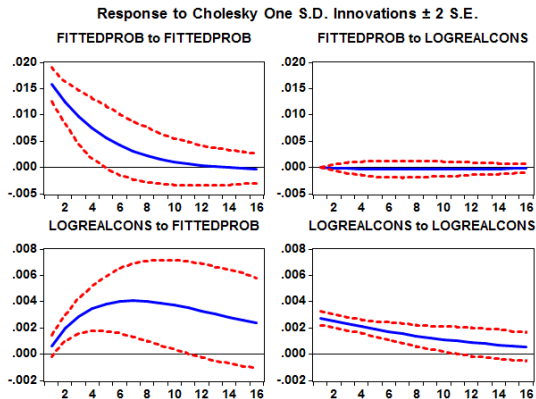
Impulse responses

Figure 6: Bivariate VAR: Impulse response functions.

Conditional forecast

- Two scenarios: cumulative 2.0pp rise in consumer inflation expectations i) under ELB and ii) away from ELB
- Calibrated as four consecutive shocks to the spending probability equivalent to a 0.5pp rise in inflation expectations
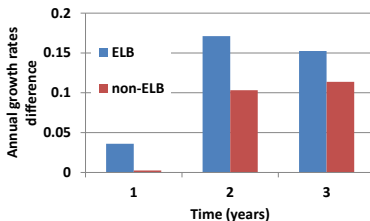

Figure 7: Impact on real consumption of a gradual increase in consumer inflation expectations compared to a scenario of constant consumer inflation expectations

How do inflation expectations impact consumer behaviour?

- rich granular consumer level information : EC Consumer Survey
- positive link between consumer inflation expectations and readiness to spend: under several model specifications; stronger at the ELB; holds also at country level
- gradual 2.0pp rise in expected inflation boosts real spending by 0.4% in cumulative terms over 3 years (lower away from ELB)
- a drop in inflation expectations has potential to weaken aggregate demand by reducing consumers' readiness to spend: ECB non-standard monetary policy (re-anchoring channel)
- other expectations over individual financial, general economic and unemployment situation have a bigger impact on the spending decision

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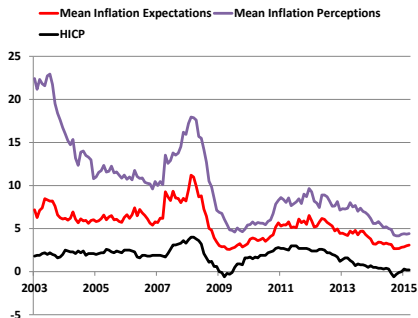# Consumer inflation expectations and perceptions vs HICP

Figure 8: Average consumer inflation expectations and perceptions (individual and country weights were used for aggregation) vs HICP

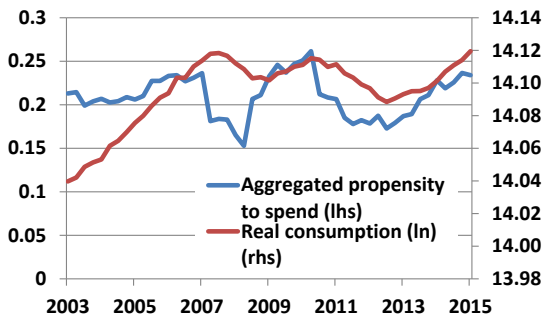# Aggregated propensity to spend and real consumption (ln)

Figure 9: Aggregated propensity to spend and real consumption (ln)