

State-dependent inflation expectations and consumption choices

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Inflation expectations and consumption choices

- Growing empirical evidence that households' π_t^e affect their spending decisions:
 - ▶ see among others Andrade et al. (2023), D'Acunतो et al. (2022), Crump et al. (2022), Burke and Ozdagli (2023), Dräger and Nghiem (2021), Vellekoop and Wiederholt (2019), Bachmann et al. (2015), Ichiue and Nishiguchi (2015) or Coibion et al. (2023).

- Yet this evidence stems primarily from times of stable and low inflation.

- But growing evidence that agents consider inflation differently depending on its level:
 - ▶ See among others Cavallo et al. (2017), Weber et al. (2023), Korenok et al. (2023), Pfäuti (2023a), Pfäuti (2023b), or Bracha and Tang (2022).

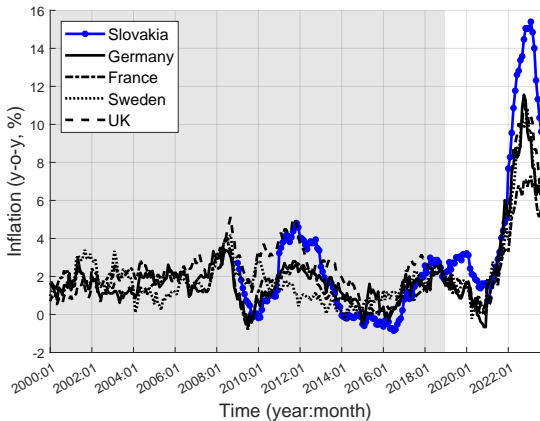
- Do households' π_t^e affect spending decisions differently during periods of high and low inflation?

This work

- relies on a novel rich micro data from the European Commission Consumer Survey for Slovakia,
- studies how people form and use π^e for consumption choices,
- compares the findings with the existing literature:
 - ✓ π^e are upward biased, dispersed and volatile,
 - ✓ they differ systematically across socio-demographic groups,
 - ✓ they significantly affect the propensity to consume.
- **Novelty:** time variation in these results, especially the role of **inflation regimes** (accelerating inflation, deflation, disinflation, low and stable inflation)
 - ▶ This paper demonstrates that the strength of the relationship between inflation expectations and consumption depends on the dynamics of inflation (**inflation regime**).
 - ▶ During the recent surge in inflation, expectations of high or rising inflation boosted consumption, whereas merely anticipating positive inflation had no significant impact.
 - ▶ During deflation, the expectation of any positive inflation spurred consumption.
 - ▶ Inflation regime determines which inflation expectations impact consumption most.
 - ▶ A lack of inflation expectations diminishes consumption propensity.

Underlying inflation in various studies

D'Acunto, Hoang and Weber (2022), Andrade, Mengus and Gautier (2023), this work



Data

Dataset description

- European Commission Consumer Survey
- regular harmonised survey in national languages conducted for all the European Union economies and the applicant countries
- monthly survey of repeated cross sections (in SK 1,200 households)
- data collected by national institutions, in SK it is the Statistical office SR
- aggregated answers are publicly available at the country level starting from 1985
- quantitative expectations elicited since 2003 but publicly available only as an aggregate for all countries together
- common use in the literature
 - ▶ D'Acunto, Hoang and Weber (2022): DEU, UK, SWE, FRA
 - ▶ Andrade, Gautier and Mengus (2023): FRA
 - ▶ D'Acunto, Hoang, Paloviita and Weber (2021): FI

Survey questions

- 1 How has the **financial situation of your household** changed over the last 12 months?
- 2 How do you expect the financial position of your household to change over the next 12 months?
- 3 How do you think the **general economic situation in Slovakia** has changed over the past 12 months?
- 4 How do you expect the general economic situation in Slovakia to develop over the next 12 months?
- 5 How do you think **consumer prices** have developed over the last 12 months?
- 6 In comparison with the past 12 months, how do you expect consumer prices will develop in the next 12 months?
- 7 How do you expect the **number of people unemployed** in this country will change over the next 12 months?
- 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**?
- 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?
- 10 In view of the general economic situation, do you think that now is **good time to save**?
- 11 Over the next 12 months, how likely will you be to save any money?
- 12 Which of these statements best describes the current **financial situation of your household**? (from saving a lot up to running into debt)

Survey questions

- 5 How do you think **consumer prices** have developed over the last 12 months?
- 6 In comparison with the past 12 months, how do you expect consumer prices will develop in the next 12 months?

- 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**?

Key survey questions for this work

- Q5** 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
- ⇒ if the answer is not "about the same" or "don't know," the respondent will be asked about a point estimate
- Q51** *By how many per cent have consumer prices risen or fallen over the last 12 months?*
- Q6** 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
- ⇒ if the answer is not "about the same" or "don't know," the respondent will be asked about a point estimate
- Q61** *By how many per cent will consumer prices rise or fall in the next 12 months?*
- Q8** 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
 - ▶ significant indicator for real (durable) consumption [details](#)

Data cleaning & descriptive statistics

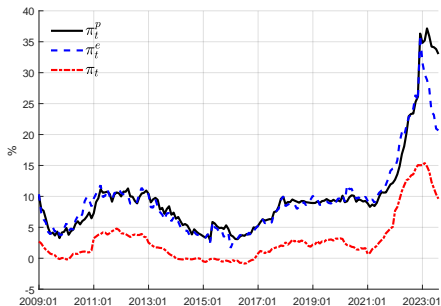
- data cleaning: 191,081 → 119,387 observations details
 - ▶ discarding invalid "zero" π^e observations
 - ▶ discarding obs. due to missing Q1, Q2, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q12 and no income data

- Splitting the sample (January 2009 - August 2023) into four sub-periods
 - 1 when inflation is very low (zero) and stable: January 2014 - December 2016
 - 2 when inflation goes from low to high: June 2021 - February 2023
 - 3 when inflation goes from high to low: March 2023 - August 2023
 - 4 when inflation is low and stable: remaining periods (normal times)

	whole sample	surge	defl. times	disinfl.	normal times
time sample	2009:01-2023:08	2021:06-2022:12	2014:01-2016:12	2023:01-2023:05	all other periods
no. obs.	119,387	11,322	23,877	3,185	81,003
<i>Measures of inflation expectations and readiness to spend</i>					
readiness to buy durables (Q8)	18.8%	14.5%	21.0%	11.9%	19.0%
inflation increasing more rapidly (Q6)	27.5%	52.0%	13.9%	27.4%	28.5%
inflation at least constant (Q6)	65.8%	85.6%	47.7%	62.1%	68.9%
inflation will be positive (Q6, Q61)	81.2%	95.0%	65.2%	91.9%	83.6%
average π^e conditionally on $\pi_{i,t}^e > 0$ (Q61)	11.2%	19.0%	6.9%	28.4%	10.1%
<i>Macro variables</i>					
average headline HICP π_t , y-o-y	2.9%	9.1%	-0.3%	12.9%	2.1%
average households' nom. i_t	4.8%	2.4%	5.1%	5.0%	5.1%

Time series evidence

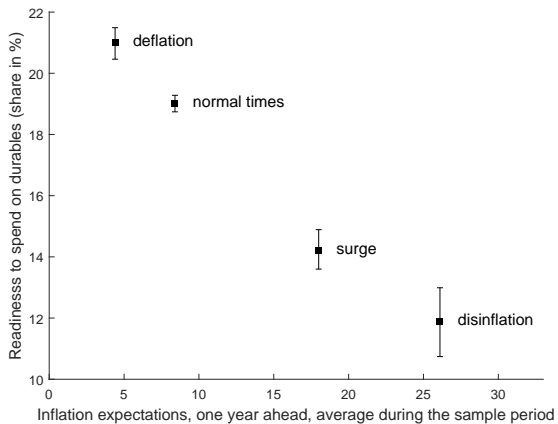
Co-movement of perceptions and expectations



Notes: This figure shows the co-movement of the cross-sectional average of quantitative inflation perceptions, π_t^p , and inflation expectations, π_t^e , over time and against the headline HICP, y-o-y, inflation, π_t . All variables are in percentage points. Sample period: January 2009 - August 2023.

Consumption and savings

Unconditional correlation of π^e with the readiness to spend



Econometric approach

- **Logit regressions** - estimate *separately* the effect of different inflation expectations on the probability to indicate readiness to spend
- The random variable can take two values, $\{0, 1\}$: one denotes a good time to purchase durable goods, zero otherwise.
- Different measures of inflation expectations:
 - ▶ EM (fr_t^+) and IM (dp_t^+) à la Andrade, Gautier and Mengus (2023),
 - ▶ DHW measure.
- Controls
 - ▶ yearly and monthly fixed effects
 - ▶ gender, age, income category per capita, education, employment
 - ▶ past and exp. own financial situation, exp. economic growth in Slovakia, exp. unemployment, current financial status, right time to save, inflation perceptions
 - (control for the quantitative perceived inflation in the regressions that use the quantitative inflation expectation questions and control for the qualitative inflation perception in the regressions using the qualitative inflation expectation measures)
 - ▶ actual inflation, nominal interest rate (HH's loan rate)
- Potential identification & endogeneity issues [details](#)

Regression results for the propensity to purchase durable goods

Only one inflation expectations measure is employed in a regression at a time.

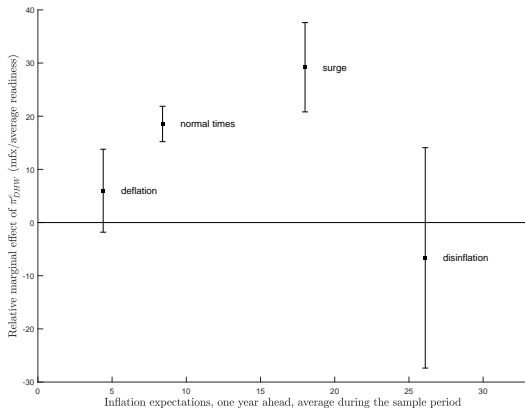
	whole sample (1)	surge (2)	defl. times (3)	drop (4)	normal times (5)
average π_t	2.9%	9.1%	-0.3%	12.3%	2.1%
average π_t^e	9.4%	18.0%	4.4%	26.1%	8.4%
readiness to spend	18.8%	14.5%	21.0%	11.9%	19.0%
Right time to purchase					
(A) higher inflation (π_{DHW}^e)	0.033*** (0.003)	0.042*** (0.005)	0.013 (0.010)	-0.008 (0.011)	0.035*** (0.004)
(B) at least constant inflation	0.011*** (0.004)	0.035*** (0.007)	0.019** (0.007)	-0.015* (0.006)	0.008* (0.005)
(C) EM_{AGM}	0.014*** (0.004)	0.019 (0.016)	0.024** (0.008)	0.024 (0.021)	0.011** (0.005)
(D) IM_{AGM}	0.001*** (0.000)	0.002*** (0.001)	0.001 (0.001)	0.000 (0.001)	0.001*** (0.000)
(E) all quant. π^e	0.001*** (0.000)	0.002*** (0.000)	0.002** (0.001)	0.001 (0.001)	0.001*** (0.000)
Controls					
Demographics	X	X	X	X	X
Expectations	X	X	X	X	X
π_t	X	X	X	X	X
i_t	X	X	X	X	X
No. obs.	119,387	11,322	23,877	3,185	81,003
No. obs. IM	96,945	10,753	15,579	2,891	67,722

Standard errors, clustered at the quarter level, in parentheses.

Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Notes: This table reports the estimated marginal effects of a binomial logit regression evaluated at the sample mean. We control for the quantitative perceived inflation in the regressions that use the quantitative inflation expectation questions and control for the qualitative inflation perception in the regressions using the qualitative inflation expectation measures.

Relative marginal effects of π_{DHW}^e in different inflation regimes



"I do not know" inflation expectations

- Hypothesis: people answering the question about evolution of consumer prices over the next 12 months with "I do not know" may not adhere to the Euler-equation rationale.
- I introduce a dummy variable which equals one when households answered "I do not know" to the question on qualitative π^e conditionally on answering the question about perceived inflation.

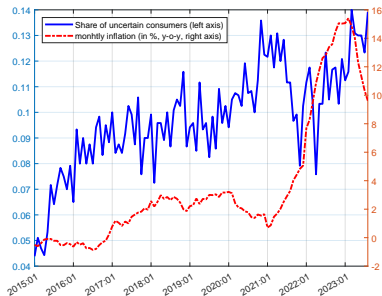
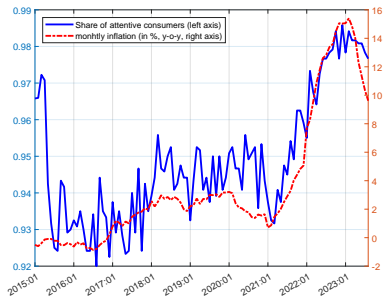
	whole sample (1)	surge (2)	defl. times (3)	drop (4)	normal times (5)
Right time to purchase					
π_{DHW}^e	0.034*** (0.003)	0.045*** (0.005)	0.013 (0.010)	-0.004 (0.010)	0.036*** (0.004)
$\pi_{Don't\ know}^e$	-0.035*** (0.008)	-0.056*** (0.012)	-0.012 (0.021)	-0.035** (0.017)	-0.033*** (0.010)
Controls					
Demographics	X	X	X	X	X
Expectations	X	X	X	X	X
π_t	X	X	X	X	X
i_t	X	X	X	X	X
No. obs.	122,681	11,902	24,533	3,385	82,861

Standard errors, clustered at the quarter level, in parentheses.

Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

- People with no inflation expectations tend to *decrease* their readiness to purchase durables and much more so during periods of high inflation.
- Indicative of a precautionary savings motive.

Inflation attention and inflation uncertainty



Notes: The left panel shows that attention to inflation measure of Bracha and Tang (2022) calculated as the share of consumers at a time who do not answer the question on qualitative inflation perception with "I do not know." The right panel shows an uncertainty measure about future inflation calculated as a share of respondents not answering the question on expected inflation conditionally on answering the question about perceived inflation.

Concluding discussion

- This work presented evidence on a state-dependent impact of inflation expectations on private consumption.
- This state-dependency holds for both *quantitative (level)* and *qualitative (directional)* measures of inflation expectations.
- Distinguishing among qualitative expectations matters in all regimes but times of close to zero inflation/deflation (complementary to Andrade et al. (2023)).
- How do these results align with and add to the literature?
 - ▶ Not only do consumers pay more attention to inflation, but they also react more strongly to it.
 - ▶ Possible ways to model the state-dependency: models of learning or endogenous information acquisition.
- Implications for monetary policy
 - ▶ Communicating qualitatively about inflation might affect consumption choices more strongly.
 - ▶ Discussions about anchoring inflation expectations should consider the dispersion of anticipated qualitative inflation regimes.
 - ▶ Yet stronger intervention during periods of surging inflation may pose a challenge due to the generally lower demand during times of high inflation.

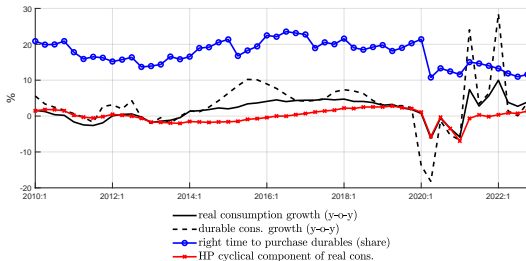
Thank you for your attention!

References

- Andrade, P., E. Gautier, and E. Mengus (2023). What matters in households' inflation expectations? *Journal of Monetary Economics*.
- Bachmann, R., T. O. Berg, and E. R. Sims (2015, February). Inflation expectations and readiness to spend: Cross-sectional evidence. *American Economic Journal: Economic Policy* 7(1), 1–35.
- Bracha, A. and J. Tang (2022). Inflation levels and (in)attention. Federal Reserve Bank of Boston Working Paper No. 22-4.
- Burke, M. A. and A. Ozdagli (2023, 07). Household Inflation Expectations and Consumer Spending: Evidence from Panel Data. *The Review of Economics and Statistics* 105(4), 948–961.
- Cavallo, A., G. Cruces, and R. Perez-Truglia (2017, July). Inflation expectations, learning, and supermarket prices: Evidence from survey experiments. *American Economic Journal: Macroeconomics* 9(3), 1–35.
- Coibion, O., D. Georganakos, Y. Gorodnichenko, and M. van Rooij (2023, July). How does consumption respond to news about inflation? field evidence from a randomized control trial. *American Economic Journal: Macroeconomics* 15(3), 109–52.
- Crump, R. K., S. Eusepi, A. Tambalotti, and G. Topa (2022). Subjective intertemporal substitution. *Journal of Monetary Economics* 126, 118–133.
- D'Acunto, F., D. Hoang, and M. Weber (2022, 07). Managing Households' Expectations with Unconventional Policies. *The Review of Financial Studies* 35(4), 1597–1642.
- D'Acunto, F., U. Malmendier, J. Ospina, and M. Weber (2021). Exposure to grocery prices and inflation expectations. *Journal of Political Economy* 129(5), 1615–1639.
- Dräger, L. and G. Nghiem (2021, 07). Are Consumers' Spending Decisions in Line with A Euler Equation? *The Review of Economics and Statistics* 103(3), 580–596.
- Ichiue, H. and S. Nishiguchi (2015). Inflation expectations and consumer spending at the zero bound: Micro evidence. *Economic Inquiry* 53(2), 1086–1107.
- Korenok, O., D. Munro, and J. Chen (2023, 11). Inflation and Attention Thresholds. *The Review of Economics and Statistics*, 1–28.
- Pfäuti, O. (2023a, August). Inflation - who cares? monetary policy in times of low attention.
- Pfäuti, O. (2023b, August). The inflation attention threshold and inflation surges.
- Vellekoop, N. and M. Wiederholt (2019). Inflation expectations and choices of households: evidence from linked survey and administrative data. SAFE Working Paper No. 250.
- Weber, M., B. Candia, T. Ropele, R. Lluberas, S. Frache, B. H. Meyer, S. Kumar, Y. Gorodnichenko, D. Georganakos, O. Coibion, G. Kenny, and J. Ponce (2023, July). Tell me something i don't already know: Learning in low and high-inflation settings. Working Paper 31485, National Bureau of Economic Research.

Durable consumption decisions

- Is the survey evidence a relevant indicator of actual consumption in Slovakia?



- Correlations

	right time to purchase durable goods	
	2010-2019	2010-2022
overall cons. growth	0.72	0.37
durable cons. growth	0.58	0.22
overall cons. HP-cyclical component	0.37	0.45

Comparing the full sample with the selected sample

- The various steps involved in sample selection reduce the number of observations from 191,081 to 119,387, retaining 62.5% of the raw observations.
- Despite losing a significant portion of observations, both the full and selected samples are still remarkably comparable in terms of demographic dimensions (see the table below).
- In the nationally representative full sample, there is a slightly higher proportion of older people (aged 65+), individuals with lower education levels, and those not active in the labor market.
- However, overall, the selected sample closely approximates the full sample and does not exhibit marked differences along any significant demographic dimension.

		cleaned data (1)	raw data (2)
no. obs.		119,387	191,081
<i>Household demographics</i>			
gender	male	47.9%	47.6%
	female	52.1%	52.3%
age	16-29	23.3%	24.9%
	30-49	38.9%	36.3%
	50-64	24.0%	23.5%
	65+	13.8%	15.4%
education	primary	16.1%	19.2%
	secondary	67.5%	66.0%
	further	16.4%	14.8%
employment status	active	59.0%	54.5%
	not active	41.0%	45.3%

Extensive vs. intensive margin

Andrade, Gautier and Mengus, JME, 2023

- Question: What drives inflation expectations, **how many people expect non-zero inflation** or **conditional on expecting a non-zero inflation, how high the inflation is expected to be?**
- This study uses the decomposition suggested in Klenow and Kryvtsov (QJE, 2008) to decompose the quantitative inflation expectations into the **extensive** and the **intensive margin**.

$$\pi_{t|t+1}^e = fr_{t|t+1}^e \cdot dp_{t|t+1}^e$$

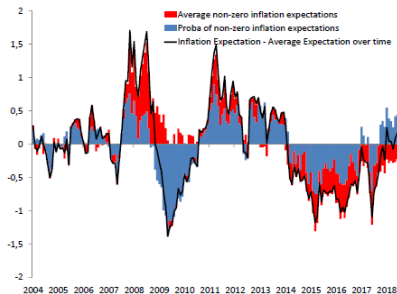
$$em_t = (fr_t^e - \bar{fr}_t^e) \cdot \bar{dp}_t^e$$

$$im_t = (dp_t^e - \bar{dp}_t^e) \cdot \bar{fr}_t^e$$

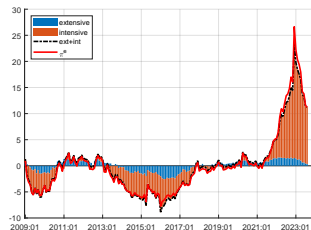
$$\pi_{t|t+1}^e - \bar{\pi}^e = em_t + im_t + \mathcal{O}_t$$

$$var(\pi_t^e) = \underbrace{var(dp_t^e) \bar{fr}^e^2}_{\text{IM term}} + \underbrace{var(fr_t^e) \bar{dp}^e^2 + 2 \bar{fr}^e \bar{dp}^e cov(fr_t^e, dp_t^e)}_{\text{EM terms}} + \mathcal{O}_t$$

Variance decomposition of π^e

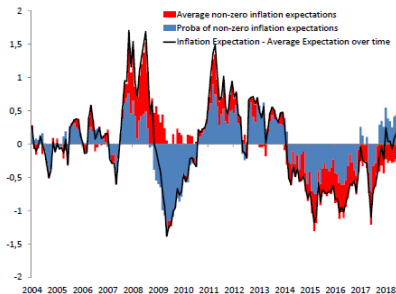


France
75% extensive margin

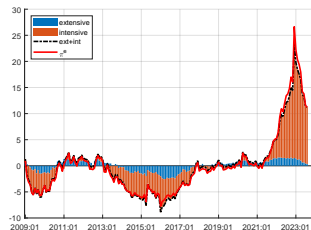


Slovakia
33% extensive margin

Variance decomposition of π^e



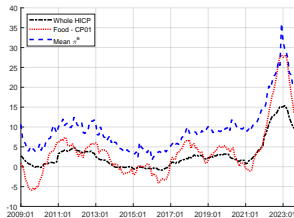
France
75% extensive margin



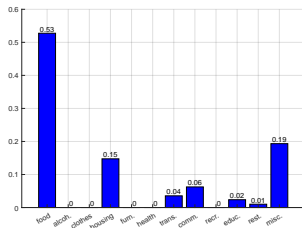
Slovakia
33% extensive margin

- At times of high and particularly low inflation, i.e. outside of the low and stable inflation region (2-3%), it is the intensive margin which tends to drive the aggregate fluctuations of quantitative π^e .
- But what about the consumption decisions - does the extensive margin still matter?

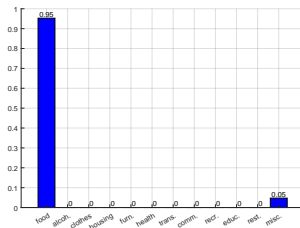
Attention to food prices explains the rise in the upward bias



□ Variance decomposition of fitted π^e fluctuations based on LASSO estimation



pre-inflation surge period



surge period

Potential identification & endogeneity issues

- Identification relies on cross-sectional variation in households' inflation expectations. Is this variation sufficient?
- Reverse causality: households that purchased durables may tend to perceive that prices increased and thus expect a positive inflation rate.
- Estimates might also suffer from an endogeneity bias resulting from omitted time-varying variables.
- Missing panel data → no observation of changes in expected level of inflation.

Socio-demographic differences between the pool of people expecting higher inflation and the pool of people with no inflation expectations

during the surge period 2021:06-2022:12

		higher inflation	don't know
no. obs.		5,523	600
readiness to buy durables (Q8)		15.6%	8.8%
<i>Household demographics</i>			
gender	male	46.1%	50.2%
	female	53.9%	49.8%
age	16-29	17.7%	19.3%
	30-49	39.7%	37.0%
	50-64	27.4%	28.0%
	65+	15.2%	15.7%
education	primary	13.1%	14.2%
	secondary	67.3%	68.8%
	further	19.6%	17.0%
income category	1st (lowest) quartile	9.0%	6.2%
	2nd quartile	26.6%	20.0%
	3rd quartile	27.3%	29.7%
	4th quartile	37.0%	44.2%
employment status	active	60.9%	56.5%
	not active	39.1%	43.5%
<i>Household expectations and perceptions</i>			
current financial situation	save a lot	4.1%	6.3%
	save little	49.1%	40.5%
	don't save	33.9%	39.7%
	dissave	6.5%	5.8%
	take on debt	6.4%	7.7%
financial outlook	improves substantially	0.6%	1.3%
	improves somewhat	7.8%	6.7%
	identical	57.3%	66.5%
	worsens somewhat	24.4%	17.2%
	worsens substantially	10.0%	8.3%
savings good times	yes	26.9	24.5%
economic outlook	improves substantially	0.6%	0.7%
	improves somewhat	5.1%	7.2%
	identical	18.3%	25.5%
	worsens somewhat	37.8%	40.3%
expected unemployment rate	worsens a lot	38.1%	26.3%
	increases substantially	21.0%	16.3%
	increases somewhat	39.7%	35.5%
	identical	27.8%	36.8%
	decreases somewhat	10.7%	10.2%
	decreases a lot	0.8%	1.2%