

**Inflation expectations
at times of high and low inflation**

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October 5, 2023

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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).

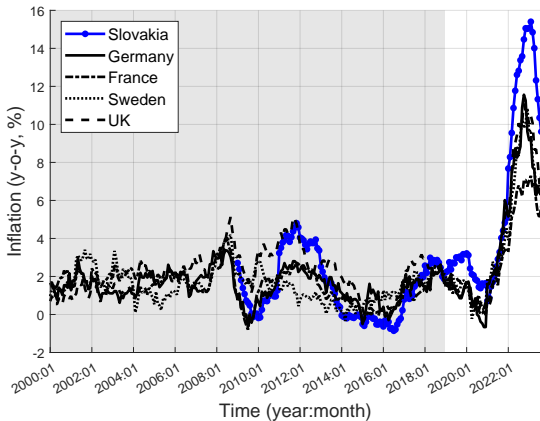
- Yet this evidence stems primarily from times of stable and low inflation.

- But growing evidence that agents consider inflation differently depending on its level:
 - ▶ see among others Cavallo et al. (2017), Weber et al. (2023), 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?

Underlying inflation in various studies

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



This work

- relies on a novel rich micro data from the ECCS 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 times of high and low inflation
 - 1 The strength of the positive π^e impact is state-dependent, it increases at times of surging inflation but is not significant during periods of declining inflation and weaker during deflationary periods.
 - 2 It is important to distinguish between *quantitative expectations* and *qualitative expectation regimes*, as the latter have a greater impact on consumption choices.
 - 3 Consumers who respond with 'I do not know' when asked about future inflation tend to reduce their propensity to consume durable goods, reflecting a precautionary savings motive.

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
- significant indicator for real (durable) consumption [details](#)

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

Data cleaning & descriptive statistics

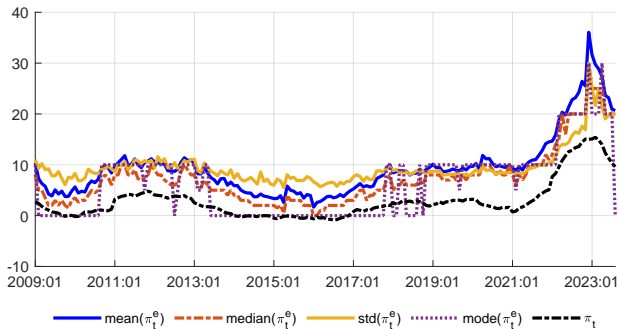
- data cleaning: 191,081 → 119,387 observations details
 - ▶ discarding invalid "zero" π^e observations
 - ▶ discarding obs. due to missing Q1, Q2, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q12 and no income data

- 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 - December 2022
 - 3 when inflation goes from high to low: January 2023 - August 2023
 - 4 when inflation is low and stable: remaining periods (normal times)

| | whole sample | surge | defl. times | drop | 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 | 10,232 | 23,877 | 4,520 | 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% |
| share inflation will increase more rapidly | 27.5% | 52.0% | 13.9% | 27.4% | 28.5% |
| inflation at least constant | 65.8% | 85.6% | 47.7% | 62.1% | 68.9% |
| share $\pi_{i,t}^e > 0$ (EM) | 81.2% | 95.0% | 65.2% | 91.9% | 83.6% |
| average π^e conditionally on $\pi_{i,t}^e > 0$ (IM) | 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% | 12.3% | 2.1% |
| average households' nom. i_t | 4.8% | 2.4% | 5.1% | 5.0% | 4.7% |

Time series moments

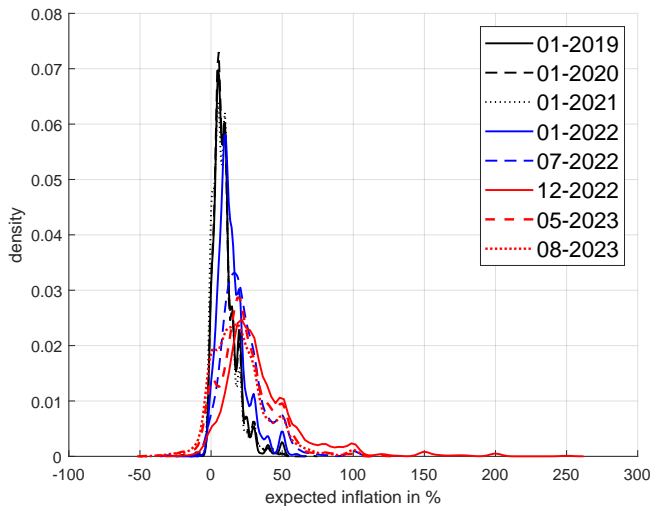
Distributional moments of π_t^e in Slovakia over time



larger upward bias

Distribution of $\pi_{i,t}^e$ over time

Kernel density estimation



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**.

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

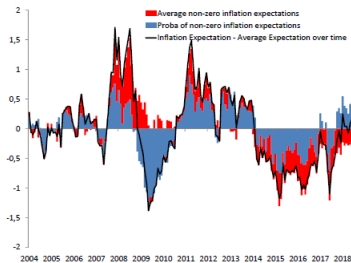
$$em_t = (fr_t^e - \bar{fr}_t^e) \cdot \bar{dp}_t^e$$

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

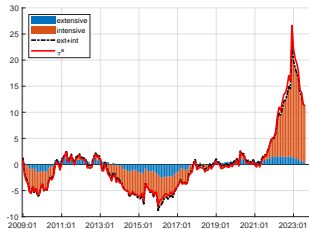
$$\pi_{t|t+1}^e - \bar{\pi}^e = em_t + im_t + \mathcal{O}_t$$

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

Variance decomposition of π^e

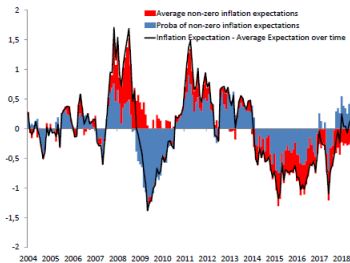


France
75% extensive margin

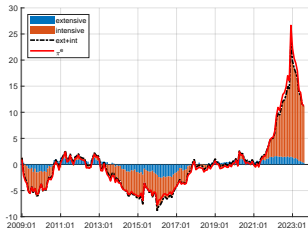


Slovakia
33% extensive margin

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?

Consumption and savings

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 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% |
| 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*** (0.097) | 0.040*** (0.086) | 0.013 (0.116) | 0.014 (0.087) | 0.035*** (0.092) |
| (B) at least constant inflation | 0.011*** (0.096) | 0.038*** (0.084) | 0.019** (0.117) | -0.010 (0.087) | 0.008* (0.090) |
| (C) EM_{AGM} | 0.014*** (0.096) | 0.011 (0.082) | 0.024** (0.117) | 0.031 (0.088) | 0.011** (0.090) |
| (D) IM_{AGM} | 0.001*** (0.088) | 0.002*** (0.080) | 0.001 (0.106) | 0.001*** (0.099) | 0.001*** (0.086) |
| 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 | 10,232 | 23,877 | 4,520 | 81,003 |
| No. obs. IM | 96,945 | 9,717 | 15,579 | 3,927 | 67,722 |

McFadden's Pseudo- R^2 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. Standard errors are clustered at the quarter level. 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.

"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.

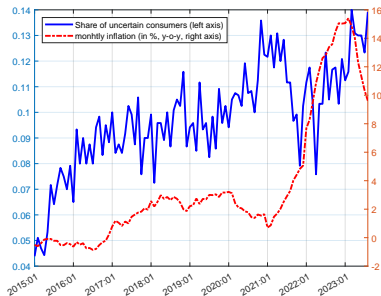
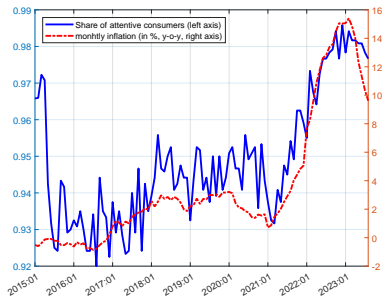
| | whole sample (1) | surge (2) | defl. times (3) | drop (4) | normal times (5) |
|------------------------|----------------------|----------------------|--------------------|----------------------|----------------------|
| Right time to purchase | | | | | |
| π_{DHW}^e | 0.034*** (0.098) | 0.044*** (0.086) | 0.013 (0.116) | 0.018 (0.103) | 0.036*** (0.093) |
| $\pi_{Don't\ know}^e$ | -0.035*** (0.097) | -0.056*** (0.082) | -0.012 (0.116) | -0.038*** (0.090) | -0.033*** (0.091) |
| 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 | 10,757 | 24,533 | 4,530 | 82,861 |

McFadden's Pseudo- R^2 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.
- They might be driven by a precautionary savings motive due to higher uncertainty.

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.
- It is important to differentiate between *qualitative* anticipated inflation regimes and expected *quantitative* levels.
- 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.
 - ▶ The impact of inflation expectations on private consumption happens particularly through the extensive margin and its components.
 - ▶ Possible ways to model the regime-specific impact: preference regimes, models of endogenous information acquisition endogenizing also the strength of the π^e channel
- Implications for monetary policy
 - ▶ Communicating qualitatively about inflation might affect consumption choices more strongly.
 - ▶ Stronger intervention during periods of surging inflation.
 - ▶ Discussions about anchoring inflation expectations should consider the dispersion of anticipated qualitative inflation regimes.

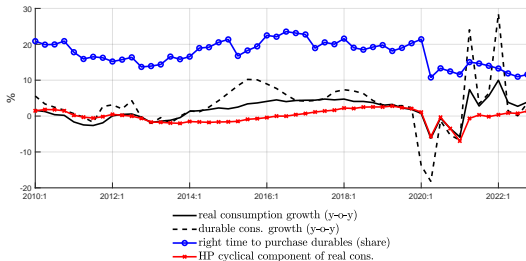
Thank you for your attention!

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Durable consumption decisions

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



- Correlations

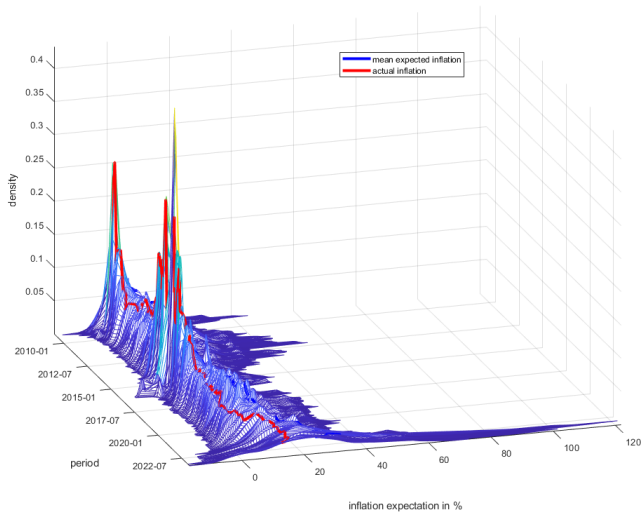
| | right time to purchase durable goods | |
|-------------------------------------|--------------------------------------|-------------|
| | 2010-2019 | 2010-2022 |
| overall cons. growth | 0.72 | 0.37 |
| durable cons. growth | 0.58 | 0.22 |
| overall cons. HP-cyclical component | 0.37 | 0.45 |

Comparing the full sample with the selected sample

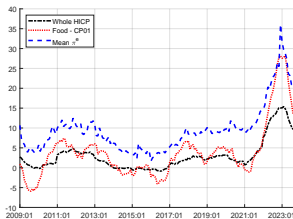
- The various steps involved in sample selection reduce the number of observations from 191,081 to 119,387, retaining 62.5% of the raw observations.
- Despite losing a significant portion of observations, both the full and selected samples are still remarkably comparable in terms of demographic dimensions (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% |

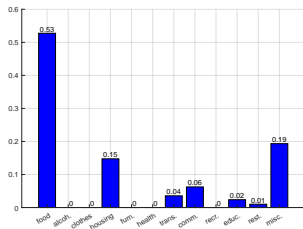
Distribution of $\pi_{i,t}^e$ over time



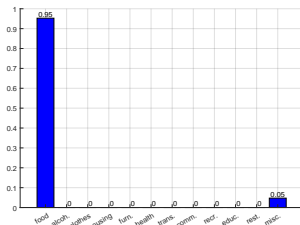
Attention to food prices explains the rise in the upward bias



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

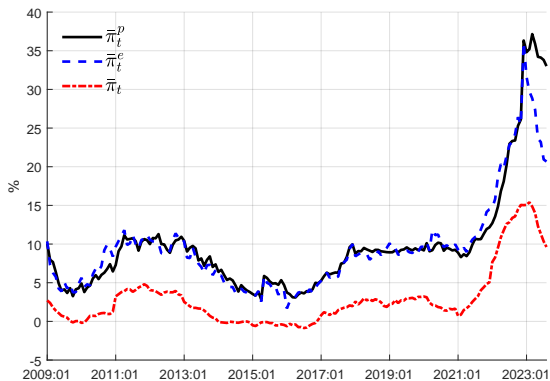


pre-inflation surge period



surge period

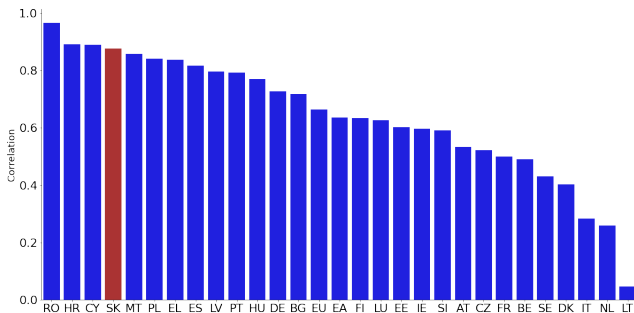
Co-movement of perceptions and expectations



cross-country evidence

Cross country evidence on co-movement of *qualitative* inflation perceptions and expectations

time sample 2003:05 - 2022:12



quite heterogeneous evidence across countries

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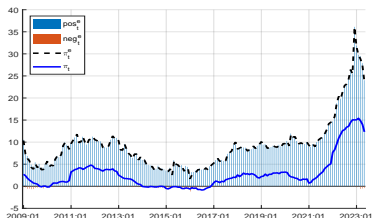
It is about positive inflation expectations

- share of people expecting non-zero inflation is basically the share of people expecting positive inflation
- consider another decomposition proposed by Klenow and Kryvtsov (QJE, 2018)

$$\pi_t^e = fr_t^{e+} dp_t^{e+} - fr_t^{e-} dp_t^{e-},$$

$$var(\pi_t^e) = \underbrace{var(fr_t^{e+} dp_t^{e+}) - cov(fr_t^{e+} dp_t^{e+}, fr_t^{e-} dp_t^{e-})}_{\text{POS term}} + \underbrace{var(fr_t^{e-} dp_t^{e-}) - cov(fr_t^{e+} dp_t^{e+}, fr_t^{e-} dp_t^{e-})}_{\text{NEG term}}.$$

- the POS term accounts for 98% of the $var(\pi_t^e)$



Notes: fr_t^e = the share of individuals expecting non-zero inflation, fr_t^{e+} = the share expecting a positive inflation, fr_t^{e-} = the share expecting a negative inflation. dp_t^{e+} and dp_t^{e-} denote the average magnitudes of increases and decreases, respectively.

Potential 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 \rightarrow no observation of changes in expected level of inflation.

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Intertemporal consumption choices

- Ambiguous predictions of the economic theory on how higher π^e affect the consumption/savings trade-off.
- Effect of higher π^e on consumption:

| | |
|---|---|
| Euler equation | + |
| negative wealth and income effects | - |
| anticipating monetary policy reaction (Carvalho and Nechio, 2014) | - |
| precautionary savings motive | - |
| association of higher inflation with bad economic times (Coibion et al., 2023) | - |
| | |

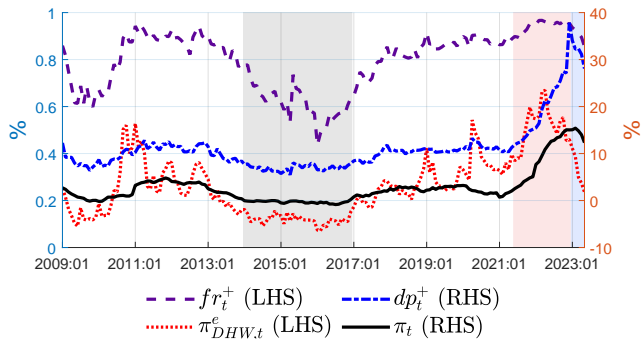
- Literature stand inconclusive.

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% |
| savings good times | worsens substantially | 10.0% | 8.3% |
| | 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% |
| | worsens a lot | 38.1% | 26.3% |
| expected unemployment rate | 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% |

Various measures of inflation expectations and actual inflation



Predictive power of various indicators of π^e in relation to actual inflation

| | Effect on current inflation | | | |
|-----------------|-----------------------------|---------------------|---------------------|----------------------|
| | (1) | (2) | (3) | (4) |
| π_{t-1} | 0.911*** (0.035) | 0.968*** (0.085) | 0.969*** (0.010) | 1.0238*** (0.033) |
| π_t^e | 0.065*** (0.022) | | | |
| $EM_{AGM,t}$ | | 0.724** (0.339) | | -1.889*** (0.044) |
| $IM_{AGM,t}$ | | 0.020 (0.023) | | -0.029 (0.021) |
| $\pi_{DHW,t}^e$ | | | 1.869*** (0.276) | 3.204*** (0.409) |
| R^2 | 0.987 | 0.986 | 0.989 | 0.990 |
| No. obs. | 172 | 172 | 172 | 172 |

Standard errors in parentheses.

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

Notes: This table shows the result of OLS regressions of the Slovak HICP y-o-y inflation at date t on its own lag, π_{t-1} , and time series variables constructed from micro data of the household survey. The time period comprises the whole sample period between January 2009 and May 2023. In column (1), the regressor is the average of all inflation expectations measured at date t , π_t^e . In column (2), the explanatory variables are the share of households expecting positive inflation and the average inflation expectation calculated among households expecting positive inflation, i.e. the extensive and the intensive margin of inflation expectations à la Andrade et al. (2023), respectively. In column (3), the regressor is the share of households expecting higher inflation than during past 12 months, i.e. the expectations measure of D'Acunto et al. (2022). In column (4), all inflation expectations measures are used in parallel.