Inflation expectations at times of high and low inflation*

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Abstract

This paper provides new evidence on the dynamics and implications of inflation expectations during periods of high and low inflation by examining a novel dataset of subjective inflation expectations of households in Slovakia. Propensity for durable consumption, conditional on expecting higher inflation, is 70% higher during periods of high inflation (around 12%) than at times of low inflation (around 0%). The share of consumers expecting non-zero inflation (extensive margin) explains a substantial part of the expectation fluctuations only at times of low and stable inflation (2-3%). When inflation is higher or lower than 2-3%, it is the level of inflation expectations (intensive margin) which drives the magnitude and volatility of inflation expectations.

Keywords: inflation, expectations, consumption, savings, survey micro data.

JEL-Codes: D1, D8, E3, E5, E6, E7, J1.

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1 Introduction

During the last decade the influx of data on individual inflation perceptions and expectations of consumers has significantly improved our understanding how people perceive inflation, how they build their inflation expectations and whether, if at all, those matter for individual economic choices such as consumption. The current stand of empirical evidence points to a substantial role of inflation expectations in influencing decisions of households (D'Acunto, Malmendier, and Weber, 2022; Weber, D'Acunto, Gorodnichenko, and Coibion, 2022). The existing empirical evidence, however, focuses on times of low and stable inflation.

This paper provides insight into the role of inflation expectations during low and high inflation. It relies on a novel large dataset of inflation expectations in Slovakia from the harmonized European Commission (EC) consumer survey. This dataset has been already successfully used to estimate the impact of inflation expectations for durable spending. Using this survey for Germany, France, UK and Sweden, D'Acunto, Hoang, and Weber (2021) for the period 2000-2016 find for all four countries that consumers who expect increasing inflation over the following 12 months are more likely to answer that it is a good time to buy durables compared to individuals who expect constant or decreasing inflation. Andrade, Gautier, and Mengus (2022), using the same French data but for the period 2004-2018, document a crucial role of the extensive margin, i.e. the share of households expecting non-zero inflation, in explaining the fluctuations in average inflation expectations.

The inflation dynamics in these countries are illustrated in Figure 1. The gray shaded area in the figure highlights the samples covered by the aforementioned studies focusing on times of stable and rather low inflation. The data for Slovakia used in this paper start in January 2009, when Slovakia joined the Eurozone,

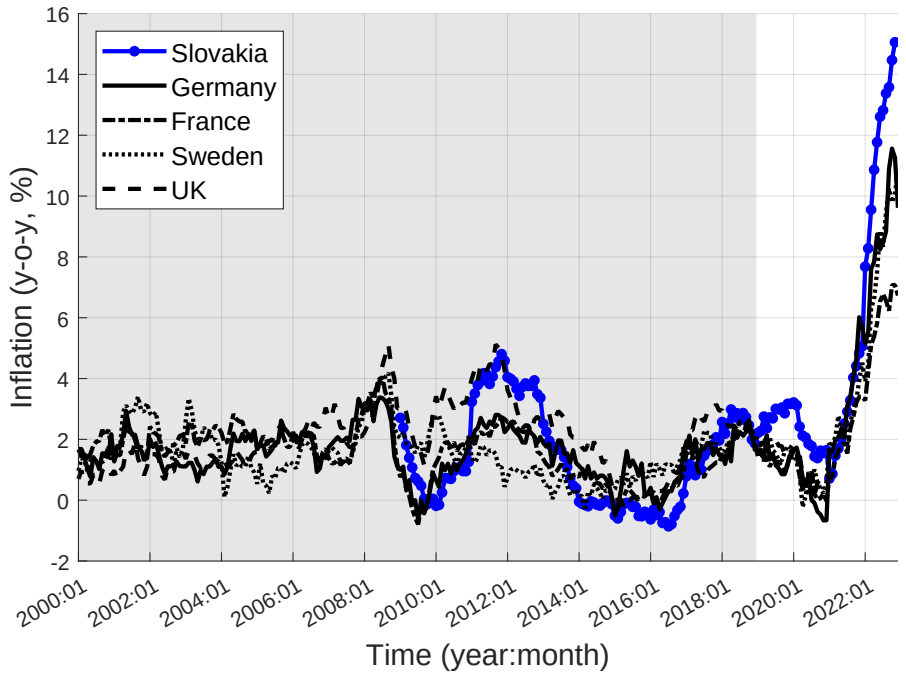


Figure 1: Periods covered by country studies

Notes: The gray shaded area highlights the samples covered by the other studies using data for Germany, France, Sweden and the UK. The Slovak data used in this paper start in January 2009. All inflation rates are the monthly HICP y-o-y inflation rates in %.

and end in December 2022. Over that fourteen-year period, the rate of increase in the official harmonized index of consumer prices (HICP) was in line with the experience in other European countries.[1]

It is worth noting that Slovakia experienced a minor but persistent deflationary period over the years 2014-2016 and that the inflation peak during the still ongoing inflation surge is among the highest in Europe. Given these considerable fluctuations and especially the sample span reaching up to December 2022, this dataset allows us to document the inflation expectations dynamics at various levels of inflation while still focusing on an economy comparable to countries for which some evidence on inflation expectations already exists.[2]

[1] Table 4 in the appendix summarizes the moments of the inflation times series for the different countries.

[2] Slovakia is a member of OECD since 2000, a member of the European Union since 2004 and

Using the micro data from the EC Consumer Survey for Slovakia we first observe that the main four stylized facts from the literature on developed economies and low inflationary times (D'Acunto et al., 2022; Weber et al., 2022; D'Acunto et al., 2021) do hold also under Slovak conditions. In particular, we first observe that subjective inflation expectations are upward biased, dispersed and volatile, second that they differ systematically across demographic groups, third that they reflect the specific price changes individuals observe in their daily lives and fourth that, in fact, the expectations do affect economic decisions.

However, digging deeper into the properties and implications of expectations we find some novel facts as well as several important differences to other countries. First, conditional on expecting higher inflation, consumers do tend to increase their durable consumption which is in line with the evidence for Germany, UK, Sweden, France (D'Acunto et al., 2021; Andrade et al., 2022) and the US (Crump, Eusepi, Tambalotti, and Topa, 2022).[3] However, when examining the strength of this relationship over time we find that the overall level of inflation matters. At times of low inflation, in particular during the deflationary period 2014-2016, the probability to answer that it is a good time for purchasing durable goods conditional on expecting higher inflation is only 1.1 times higher than the probablity to state that it is not a good time for durable consumption instead of 1.9 times higher during the recent inflation surge 2021-2022.

Second, we find that the extensive margin plays a much smaller role in explaining the variance of expectations than it is the case for France (Andrade et al., 2022). Especially during inflationary times when the share of people expecting positive inflation is large and given that there is a natural upper bound how much the extensive margin can explain, it is exactly the intensive margin which mat-

an Eurozone member since 2009.

[3]Coibion, Georgarakos, Gorodnichenko, and van Rooij (2019) show that Dutch households decrease their durable consumption.

ters for explaining the level of expectations. Third, we document a very strong co-movement of inflation perceptions and expectations both during low and high inflation. However, when considering the cross-country evidence from the harmonized EC consumer survey utilizing the qualitative inflation expectations and perceptions, there are striking cross-country differences with several countries observing only a very modest degree of co-movement.

Are these results relevant for monetary policy? We argue that yes for several reasons. Based on the evidence from this paper when examining the role of inflation expectations for economic choices, the level of trend inflation matters. If people tend to increase their propensity for durable consumption in the light of higher inflation which is on its own an inflationary phenomenon, a more harsh monetary policy response might be needed. Second, the evidence on the intensive and extensive margins induces important implications for central banks' communication. During low and stable inflation, communicating the overall tendency whether inflation will rise, stay stable or decline might be more effective than communicating the level of inflation. However, during times of high inflation it seems to be important to communicate the level of expected inflation. And last but least, our evidence on the heterogeneity of the co-movement of inflation perceptions and expectations matters for managing inflation expectations in different countries. In countries with a larger role of perceptions as a determinant of expectations, a faster monetary policy response might be more important than in countries in which other determinants play a role too. These results point to substantial challenges in managing inflation expectations by monetary authorities, in particular in heterogeneous monetary unions such as the Eurozone.

The remainder of the paper is organized as follows. Section 2 describes in detail the data used in this paper. Section 3 derives the stylized facts of inflation

expectations for Slovakia and compares them to the empirical evidence in the literature. Section 4 is the key section in which we present the empirical evidence of the impact of the level of inflation on consumption and savings choices. Section 5 concludes.

2 Data

Our main data source both on individual inflation expectations and consumption and borrowing propensities are the confidential micro data from the harmonized European Commission (EC) consumer survey program for Slovakia.[4] Data from this survey but for other countries have been already successfully used in other research works. In particular D'Acunto et al. (2021) use the data for Germany, France, UK and Sweden, D'Acunto, Hoang, Paloviita, and Weber (2022) for Finland or recently in Andrade et al. (2022) for France again.

In Slovakia, the survey is conducted on a monthly basis as a non-repeated cross-section of 1,200 consumers. The survey is run as a personal interview during the first ten days of each month. The respondents are asked questions which range from assessing their own financial conditions, inflation expectations, the willingness to spend and consume up to their perceptions and expectations concerning the economic development of the whole economy. All twelve monthly survey questions are listed in the appendix in Section D.2.

It is worth noting that the survey results for all participating countries are publicly available on a monthly basis but only as aggregated answers for different groups as well as the aggregates for the whole country. However, average answers for the elicited quantitative inflation perceptions and expectations are publicly available

[4]This survey is conducted by the Statistical office of the Slovak republic on behalf of the Directorate General for Economic and Financial Affairs of the European Commission as part of the European Commission's harmonized consumer survey program.

only as an average of all participating countries but not on the country level.

The data provided to us by the Statistical office of the Slovak republic can be divided into two datasets. The first one consists of confidential average quantitative inflation perceptions and expectations for different socio-economic groups for the period March 2003 until December 2022.[5] The different groups are based on the income level, education, age, employment status and gender. The second dataset is the dataset of individual responses of 1,200 consumers per month for the period January 2009 until December 2022 including the quantitative answers on inflation perceptions and expectations. In what follows we will use the longer sample of aggregates whenever possible but when moments of the distribution of inflation expectations will be needed or when estimating the impact of inflation expectations on consumption and savings patterns we utilize the rich micro data. The backbone of our analysis are the following four questions which capture the spending and savings plans and qualitative and quantitative inflation expectations:

Question 5 How do you think consumer prices have developed over the last 12 months? They have ...

Respondents can answer: "Risen a lot," "Risen moderately," "Risen slightly," "Stayed about the same," "Fallen," "Don't Know."

If the answer it not "Stayed about the same" or "Don't know," the respondent will be asked for a point estimate.

Question 5A By what percentage do you think consumer prices have changed over the last 12 months?

Respondents can answer numbers between -100 and 100 with one decimal point. In a similar vein the inflation expectations get elicited in Question 6.

[5]The subjective quantitative inflation perceptions and expectations have been elicited within the EC consumer survey for all countries only since March 2003.

Question 6 Which development of consumer prices do you expect over the next 12 months? They will ...

Respondents can answer: "Increase more rapidly," "Increase at the same rate," "Increase at a slower rate," "Stay about the same," "Fall," "Don't Know."

If the answer it not "Stay about the same" or "Don't know," the respondent will be asked for a point estimate.

Question 6A By what percentage do you think consumer prices will change over the next 12 months?

Respondents can answer numbers between -100 and 100 with one decimal point.

Question 8 In view of the general economic situation in Slovakia, do you think that now it is the right moment for people to buy durable goods such as furniture, home appliances, cars, etc.?

Respondents can answer, "It's neither a good nor a bad time," "No, it's a bad time," or "Yes, it's a good time."

Question 10 In view of the general economic situation in Slovakia, do you think that now is:
A very good time to save?
A fairly good time to save?
Not a good time to save?
A very bad time to save?
Don't Know?

In addition, we use qualitative questions regarding expectations about general macroeconomic variables, personal income and unemployment, and a rich set of socio-demographics which include gender, age, household size, and education levels. We now turn to document the facts about inflation expectation dynamics in Slovakia and draw some cross-country comparisons.

3 Stylized facts

In the following section we discuss a set of facts from different domains. We start by focusing on the properties of inflation expectations over time and in a cross section. We continue by estimating the determinants of households' inflation expectations. In turn, in Section 4 we estimate how inflation expectations matter for durable consumption and savings.

3.1 Time-series moments

We start by examining the aggregate moments of the distribution of inflation expectations over time as shown in Figure 2. There are several important observations to be made from the time series evidence. First, there is a substantial upward bias. Between January 2009 and December 2022, the average inflation in Slovakia (black dashed line) amounted to 2.4% while the average expected inflation (blue solid line) was higher by more than 6 percentage points at 8.64%.

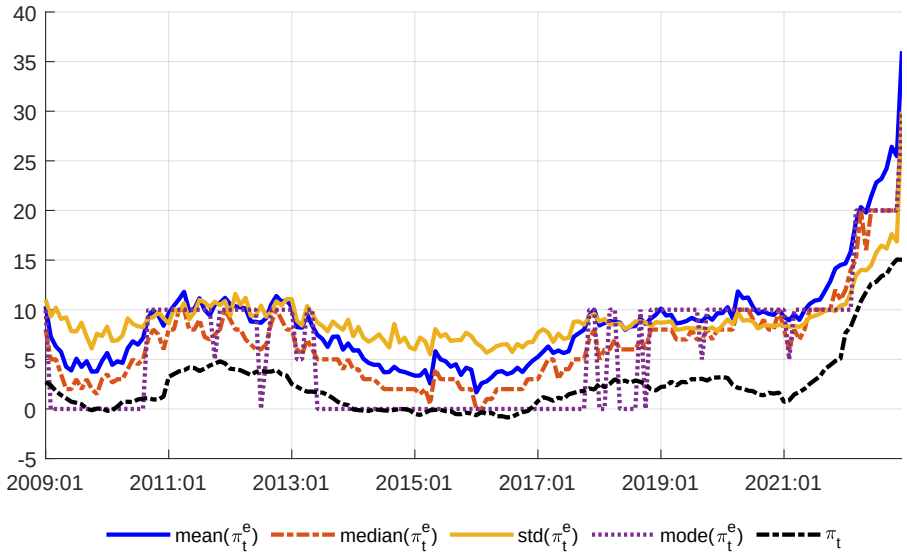


Figure 2: Time series inflation expectations moments

Notes: Monthly HICP y-o-y inflation rate in %.

Second, the moments of the distribution closely mirror the changes in inflation. Hence, despite the upward bias, consumers tend to change their expectations as inflation varies. We come back to this point when we discuss the determinants of inflation expectations in Section 3.3 and discuss the important role of inflation perceptions.

Third, the distribution of inflation expectations is systematically skewed to the right with the mean monthly expected inflation being about 2 percentage points higher than the median. D'Acunto et al. (2022) report that the mean for the US consumers' inflation expectations is 1 percentage point above the median.

The fourth stylized fact concerns the disagreement among consumers about expected price level growth, an argument known at least since Mankiw, Reis, and Wolfers (2003). D'Acunto et al. (2022) and Weber, Gorodnichenko, and Coibion (2022) show that in the US during the COVID pandemic the 25th and 75th per-

centiles moved in opposite directions. This observation does not hold true for Slovakia since neither the inter quartile range, the skewness nor the kurtosis had raised prior to the mean or the median of inflation expectations.

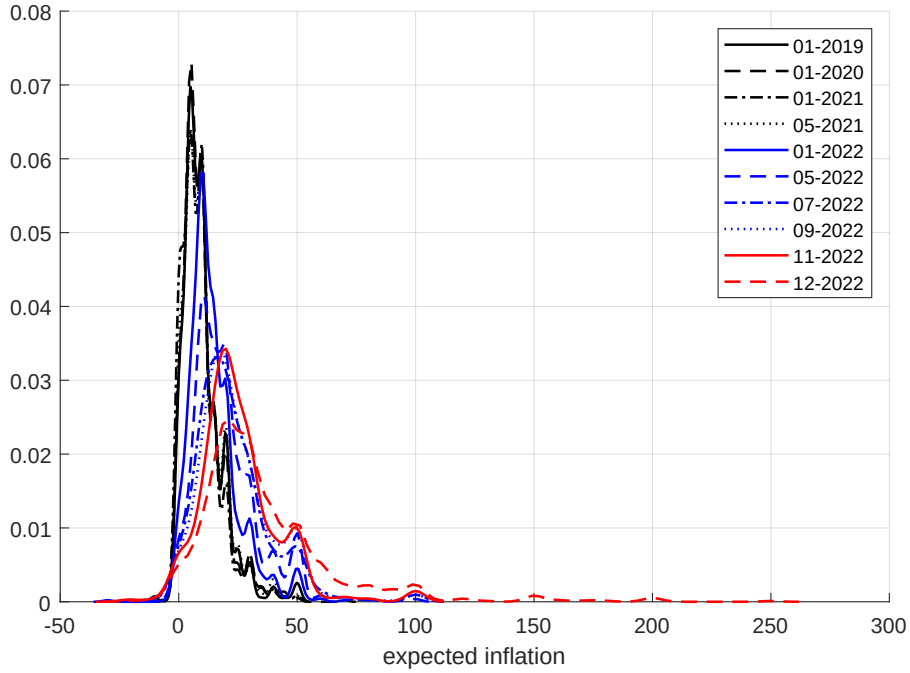


Figure 3: Distribution of inflation expectations over time

Figure 3 shows the distribution of inflation expectations over time since the beginning of 2019. As can be seen from the figure the distribution has recently undergone a substantial shift to higher levels of expected inflation during the recent inflation surge which might suggest that inflation expectations become de-anchored. Since we lack data on inflation expectations beyond one-year ahead horizon, it is difficult to tackle the question of de-anchoring in more detail. However, as shown by Weber et al. (2022), when households revise their short-term expectations they do so for longer-term expectations too. This is true also for firms and professional forecasters. This argument and evidence strengthens the threat of de-anchoring of Slovak inflation expectations given the rightward shift of the distribution of short-term inflation expectations.

Extensive vs intensive margin What is driving inflation expectations, the share of people expecting non-zero inflation (extensive margin) or the level of expectations conditional on expecting non-zero inflation (intensive margin)? To this end we apply the decomposition of perceptions and expectations proposed for price changes by Klenow and Kryvtsov (2008) and applied to inflation expectations in Andrade et al. (2022). Using data from the same survey but for France (2004-2018) the authors show evidence for the extensive margin accounting for 75% of the total variance of the average inflation expectation over time. Following their analysis we apply the decomposition à la Klenow and Kryvtsov (2008) to the Slovak data.

Let's denote the share of people expecting non-zero inflation by fr_t^e and the average size of inflation expectation conditional on expecting non-zero inflation by dp_t^e. This implies that the expected inflation is defined as the product of these two variables

$$\pi_t^e = fr_t^e \cdot dp_t^e. \tag{1}$$

By following Andrade et al. (2022) we define extensive and intensive margins in inflation expectations as

$$em_t^e = (fr_t^e - \bar{fr}_t^e) \cdot \bar{dp}_t^e, \tag{2}$$

$$im_t^e = (dp_t^e - \bar{dp}_t^e) \cdot \bar{fr}_t^e. \tag{3}$$

Figure 4 illustrates the co-movement of the intensive and extensive margin of inflation expectations with the de-meaned inflation.

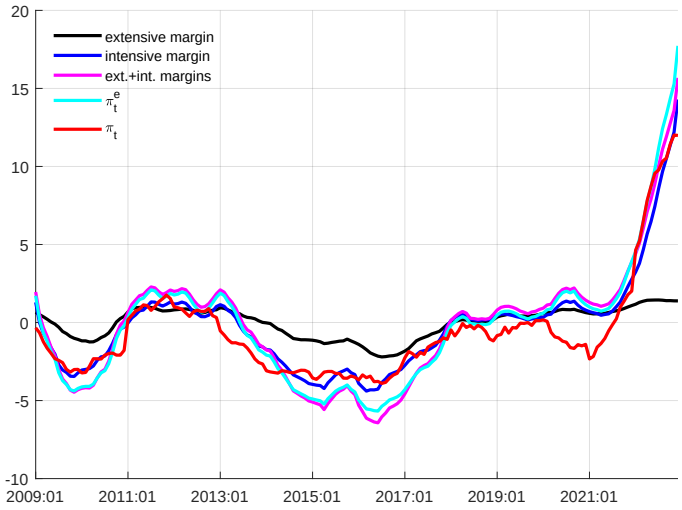


Figure 4: Intensive vs extensive margin of inflation expectations

Notes: De-meaned HICP inflation for Slovakia, y-o-y in %.

It follows that the expected inflation is thus $em^e_t + im^e_t$. Using this relationship yields the decomposition in Figure 5.

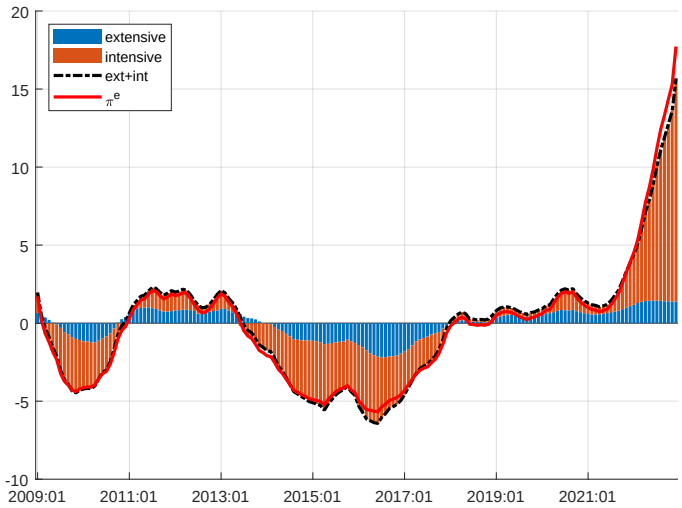


Figure 5: Decomposition of inflation expectations into the intenstive and extensive margin

The decomposition of the expected inflation can be used to further decompose the

variance of inflation expectations:

$$var(\pi_t^e) = \underbrace{var(dp_t^e)\overline{fr^e}^2}_{\text{IM term}} + \underbrace{var(fr_t^e)\overline{dp^e}^2 + 2\ \overline{fr^e}\ \overline{dp^e}\ cov(fr_t^e, dp_t^e) + \mathcal{O}_t}_{\text{EM terms}}, \qquad (4)$$

where dp_t^e is the average expected inflation rate over the next 12 months, fr_t^e is the share of consumers expecting non-zero inflation and the values with a bar correspond to time averages. $\mathcal{O}_t$ are higher-order terms that are functions of fr_t^e. This decomposition yields that in Slovakia 60% of perceptions variance can be attributed to the intensive margin and remaining 40% to the extensive margin over the period 2009 - 2022. Nevertheless it can be also noted that the share of intensive margin becomes particularly important when inflation departs from its long-term mean (the zero line) which lies in Slovakia at 2.4%. In other words, at times of stable inflation around the long-run average which for Slovakia as an emerging economy is slightly above the ECB inflation target of 2%, the extensive margin plays an important role in explaining the fluctuations of inflation expectations.

We can further observe that $fr_t^e = fr_t^{e+} + fr_t^{e-}$ where fr_t^{e+} and fr_t^{e-} denote the shares of respondents expecting positive and negative inflation, respectively. Similarly, in what follows, we denote by dp_t^{e+} and dp_t^{e-} the average size of positive and negative inflation expectations, respectively.

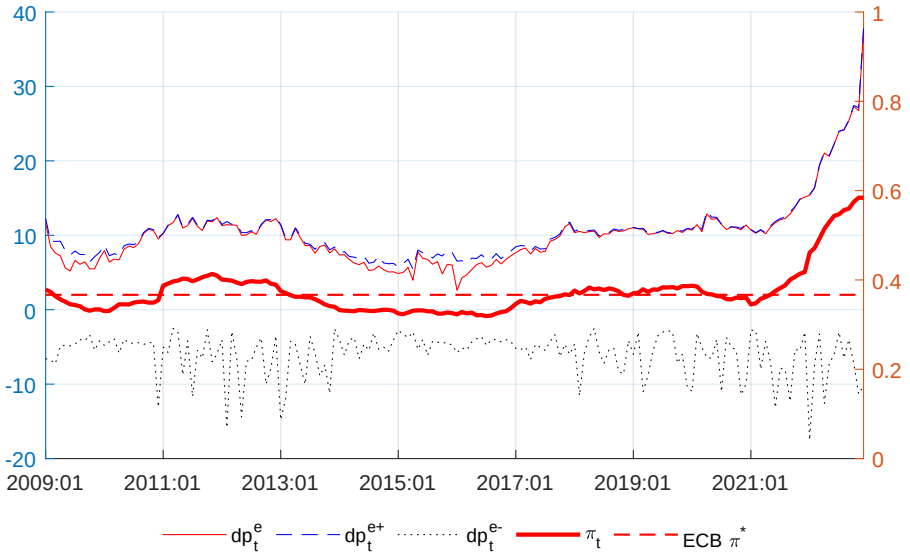


Figure 6: Decomposition of the intensive margin of inflation expectations

Notes: dp_t^e = the average of expected inflation expectations, dp_t^{e+} = magnitude of positive inflation expectations, dp_t^{e-} = magnitude of negative inflation expectations.

Figure 6 and Figure 7 show the components of the intensive and extensive margins. As we can see, it is especially the magnitude of positive inflation expectations driving the intensive margin and for the extensive margin it is the combination of shares of people expecting positive and zero inflation which is driving the extensive margin.

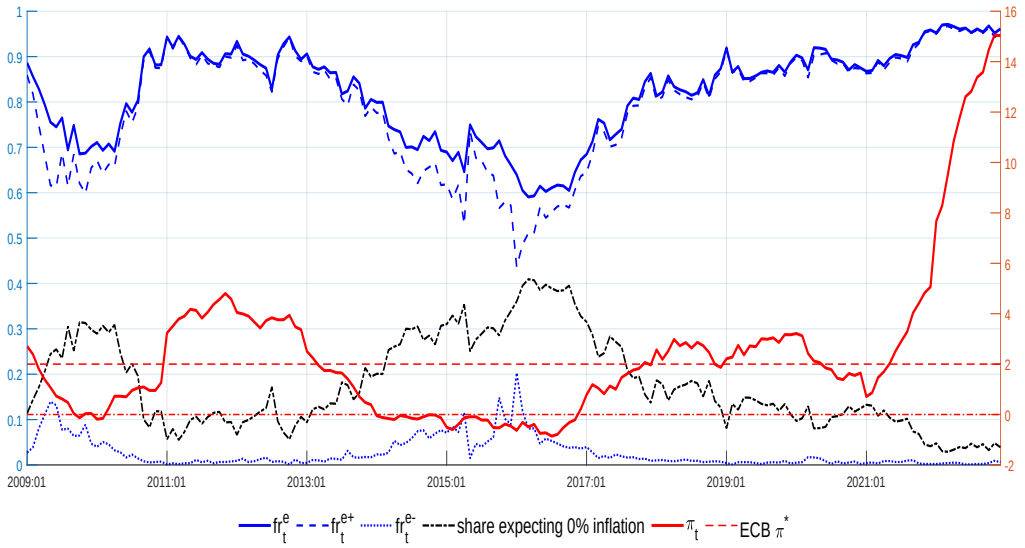


Figure 7: Decomposition of the extensive margin of inflation expectations

Notes: fr_t^e = the fraction of consumers expecting non-zero inflation, fr^{e+} = fraction of consumers expecting positive inflation, fr^{e-} = fraction of items expecting negative inflation.

It is interesting to observe, Figure 8, that the share of people expecting negative inflation is virtually zero when the actual inflation is above 1%.

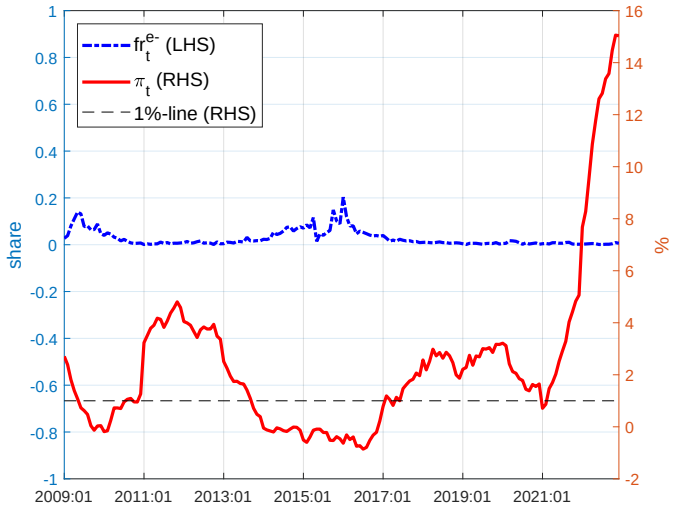


Figure 8: Share of consumers expecting negative inflation vs. inflation

For completeness, we also consider another decomposition proposed by Klenow

and Kryvtsov (2008) which helps us to address the question whether fluctuations in expected inflations are the consequences of positive or negative inflation expectations. The expected inflation can be written as

$$\pi_t^e = fr_t^{e+} dp_t^{e+} - fr_t^{e-} dp_t^{e-}, \tag{5}$$

where dp_t^{e+} and dp_t^{e-} denote the average magnitudes of increases and decreases. With the help of equation (5), the variance of inflation expectations can be expressed in the following way

$$\begin{aligned} var(\pi_t^e) = & \underbrace{var(fr_t^{e+} dp_t^{e+}) - cov(fr_t^{e+} dp_t^{e+}, fr_t^{e-} dp_t^{e-})}_{\text{POS term}} \\ & + \underbrace{var(fr_t^{e-} dp_t^{e-}) - cov(fr_t^{e+} dp_t^{e+}, fr_t^{e-} dp_t^{e-})}_{\text{NEG term}}. \end{aligned} \tag{6}$$

As shown in Figure 9, the variance of inflation expectations is virtually completely dominated by changes in the level of the expected inflation increases.

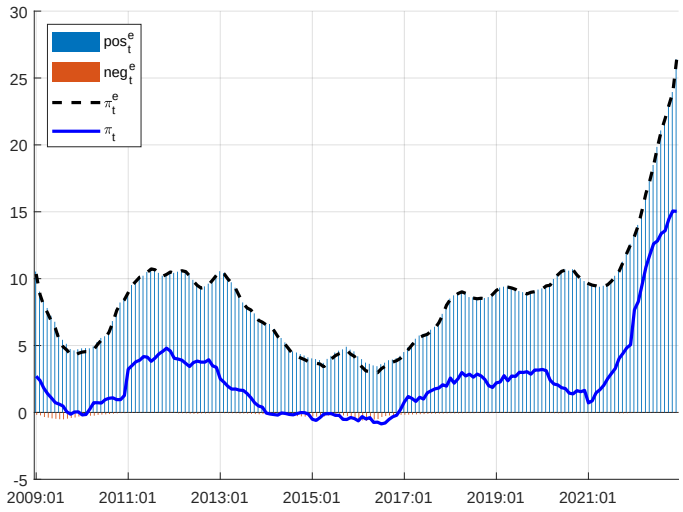


Figure 9: Decomposition of inflation into the terms associated with positive (POS) and negative (NEG) inflation expectations

	Perceived			Expected		
	mean	median	std	mean	median	std
TOT	9,73	9,31	4,60	9,93	9,36	5,05
RE1	11,10	10,52	4,96	11,13	10,50	5,30
RE2	9,96	9,61	4,61	10,07	9,58	5,07
RE3	9,34	9,21	4,44	9,53	8,86	4,87
RE4	8,31	8,05	4,34	8,56	8,03	4,72
AG1	8,84	8,59	4,26	8,96	8,41	4,80
AG2	9,47	9,02	4,55	9,67	9,09	4,95
AG3	10,11	9,73	4,81	10,36	9,76	5,17
AG4	11,07	10,69	5,16	11,23	10,75	5,64
ED1	10,66	10,13	4,84	10,58	9,99	5,24
ED2	9,58	9,33	4,49	9,80	9,34	4,95
ED3	8,41	8,21	4,55	8,78	8,21	4,89
MAL	9,43	9,12	4,46	9,62	9,07	4,90
FEM	9,80	9,42	4,68	9,99	9,33	5,11
EMP	9,62	8,94	4,67	9,82	9,08	5,12
UNEMP	11,93	11,62	4,89	11,96	11,34	5,39

Table 1: Inflation expectations in different socio-economic groups

Notes: TOT denotes the overall sample. RE1 - RE4 denote the income groups where RE1 being the lowest income quartile. AG1-AG4 are the age groups where AG1 denotes 16-29 years old, AG2 30-49, AG3 50-64 and AG4 65+. ED1-ED3 are the educational levels where ED1 denotes the highest attained educational level to be the primary one and ED3 the tertiary one. MAL and FEM denote males and females, respectively. EMP and UNEMP denote employed and unemployed, respectively.

3.2 Cross-sectional facts

In line with D'Acunto et al. (2022) we document the following stylized facts for Slovakia. First, women hold systematically higher inflation expectations than men. Second, older people expect higher inflation. Third, poorer households expect higher inflation. Fourth, less educated people expect higher inflation. And fifth, unemployed people expect higher inflation. The same facts apply to inflation perceptions.

Table 1 provides an overview about the mean, median and standard deviation of the inflation expectations times series for different socio-economic groups.

Hence, the results for Slovakia confirm the empirical evidence in the literature for a substantial cross-sectional dispersion in households' inflation expectations which is systematically correlated with a set of socio-demographic characteristics. Therefore it is crucial to understand the determinants of households' inflation, a point to which we turn next.

3.3 Formation of subjective inflation expectations

In the previous chapter we presented evidence for the behavior of inflation expectations over time and across different socio-economic groups. In this section we shed light on how expectations tend to be formed in Slovakia. We observe that especially the perception of inflation strongly co-move with the expected level of inflation. Figure 10 shows the co-movement of the mean, median, mode and standard deviation of inflation expectations and perceptions, respectively.

Another possible view at the strong relationship between how households perceive and expect inflation is provided in Figure 11. The left panel shows the de-meaned levels of inflation, perceptions and expectations of Slovak households. The take-aways is that even though their expectations are remarkably above the actual level of inflation, as can been from Figure 11 their decision of which inflation rate to expect is in fact driven by the current perceived inflation. The right panel of Figure 11 shows the averages of inflation perceptions and expectations over time in a yearly scatter plot. The regression line above the 45-degree line suggests that people tend to expect a slightly higher inflation than the one perceived, yet this difference is not significant. It is remarkable that even in 2022 when the inflation sky-rocketed, perceptions and expectations moved hand in hand.

Is the co-movement of inflation perceptions and expectations a Slovak phenomenon which does hold only when considering quantitative expectations and perceptions? To address this question we utilize the questions on *qualitative* perceptions and

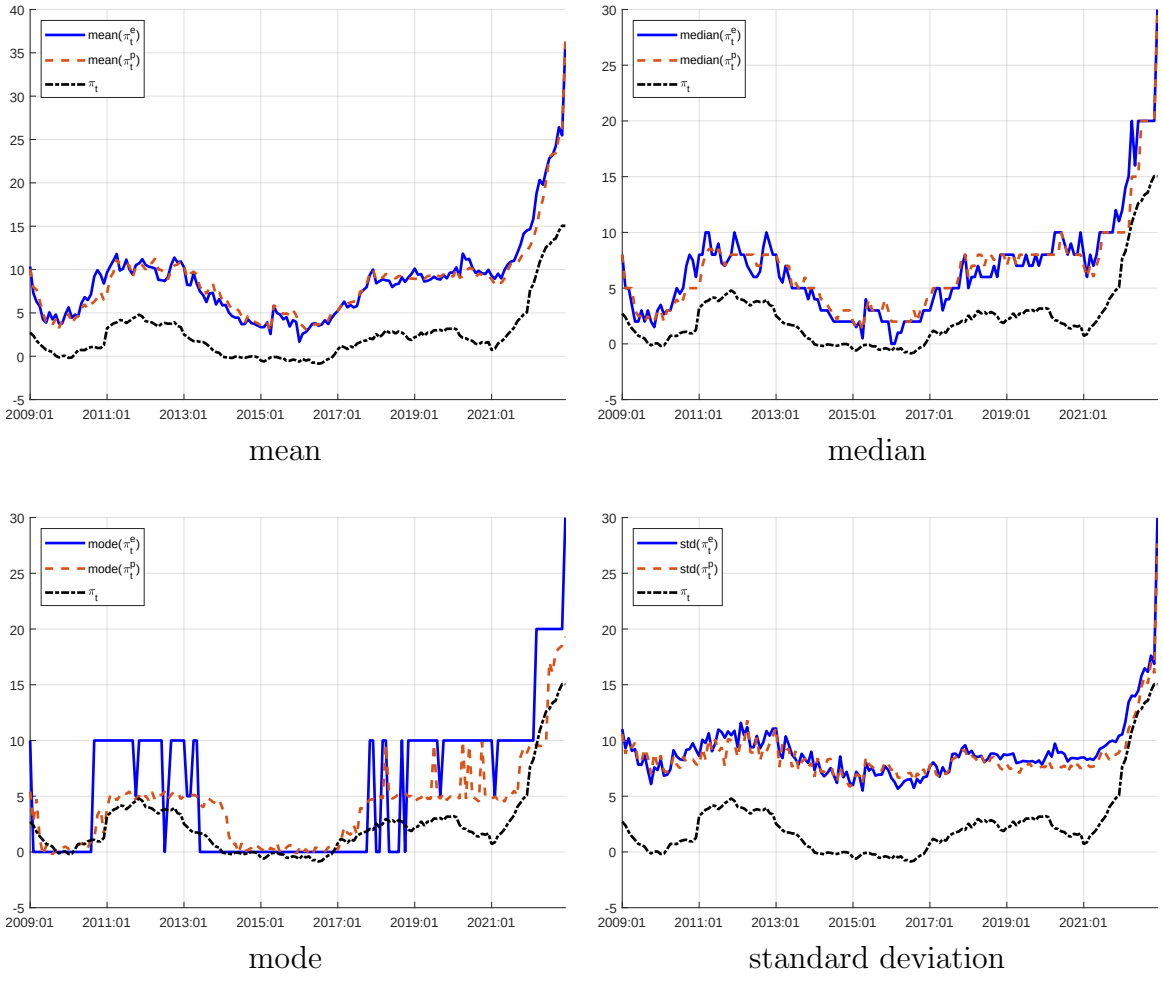


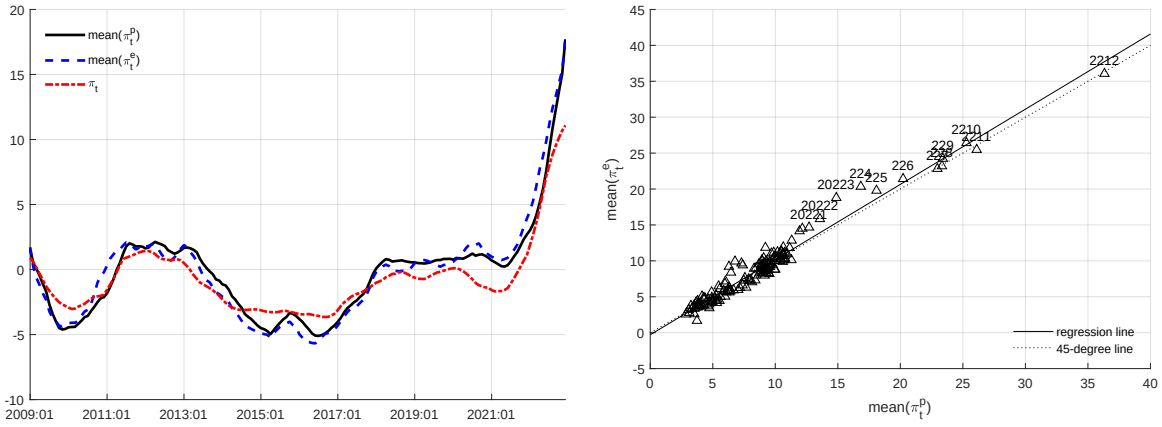
Figure 10: Moments of inflation perceptions vs expectations

expectations, i.e. questions 5 and 6 discussed in Section 2. In particular, we use the balance of the answers as provided by the EC. This balance, not seasonally adjusted, is defined as

$$Balance = PP + P/2 - M/2 - MM, \tag{7}$$

where PP stays for "risen a lot/increase more rapidly," P for "risen moderately/increase at the same rate," M for "stayed about the same/stay about the same" and MM for "fallen/fall."

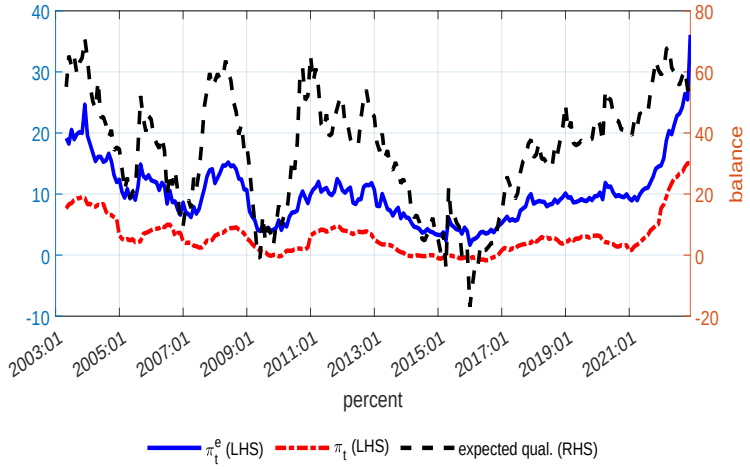
The two panels of Figure 12 show the relationships between qualitative and quan-



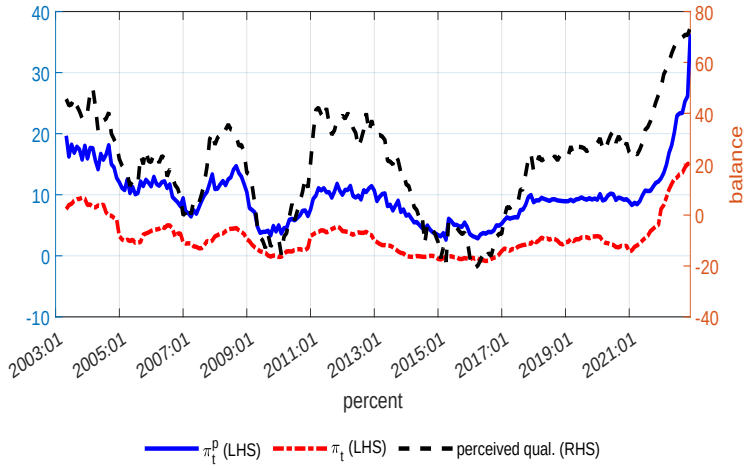
de-meaned almost 1:1 relationship

Figure 11: Co-movement of perceptions and expectations

titative perceptions, expectations and the actual inflation, respectively. As we can see both qualitative as well as quantitative expectations and perceptions as elicited within the EC consumer survey strongly correlate with the actual inflation rate and with each other.



expectations



perceptions

Figure 12: Co-movement of qualitative and quantitative inflation perceptions and expectations

Figure 13 shows the correlations between qualitative and quantitative perceptions and expectations across different socio-economic groups. The strength of the relationship is slightly stronger for perceptions than for expectations, but overall the correlations range on average between 0.8 and 0.9 and imply thereby a strong co-movement of qualitative and quantitative replies.

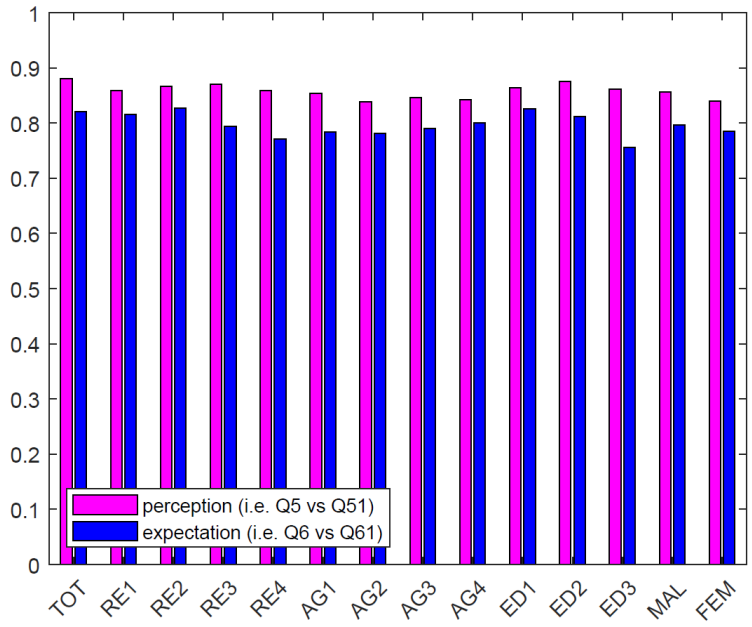


Figure 13: Correlation between qual. and quant. expectations among groups

Notes: TOT denotes the overall sample. RE1 - RE4 denote the income groups where RE1 being the lowest income quartile. AG1-AG4 are the age groups where AG1 denotes 16-29 years old, AG2 30-49, AG3 50-64 and AG4 65+. ED1-ED3 are the educational levels where ED1 denotes the highest attained educational level to be the primary one and ED3 the tertiary one. MAL and FEM denote males and females, respectively. EMP and UNEMP denote employed and unemployed, respectively.

Having discussed the co-movement of qualitative and quantitative answers, we now turn to using this strong link to document a strong co-movement of qualitative inflation perceptions and expectations. As can be seen from Figure 14, the observation of a strong co-movement of inflation perceptions and expectations is robust to using both qualitative as well as quantitative answers.

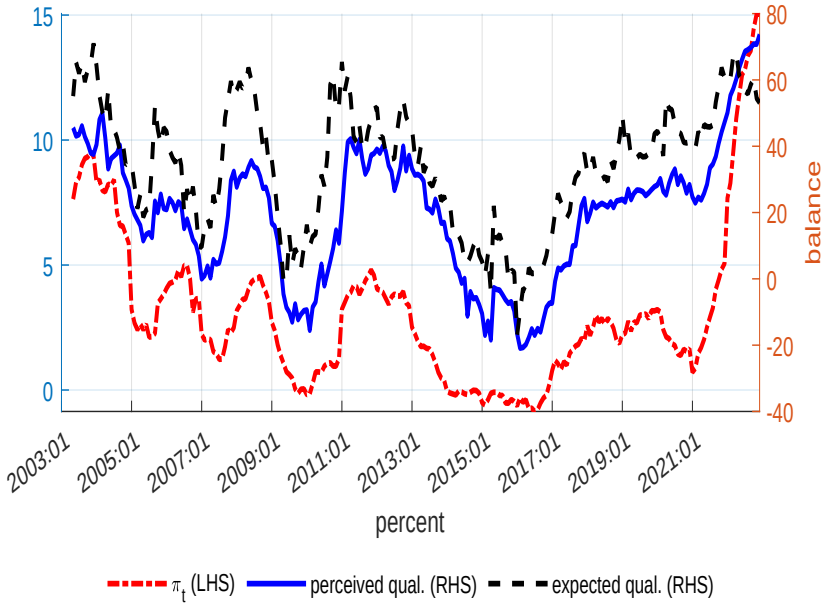


Figure 14: Relationship between qualitative inflation expectations and perceptions

Because the balances of qualitative perceptions and expectations are publicly available for all participating countries, we can assess how strongly perceptions and expectations move together across countries. Figure 15 shows the distribution of correlations between qualitative inflation perceptions and expectations across countries. This distribution is strikingly non-uniform. It is worth noting that Slovakia is not an outlier regarding a strong link between perceptions and expectations. On the other side of the distribution there are countries such as Italy, the Netherlands or Latvia with a very low correlation between perceptions and expectations. This result points to a significantly heterogeneous evidence across countries on the co-movement of inflation perceptions and expectations.

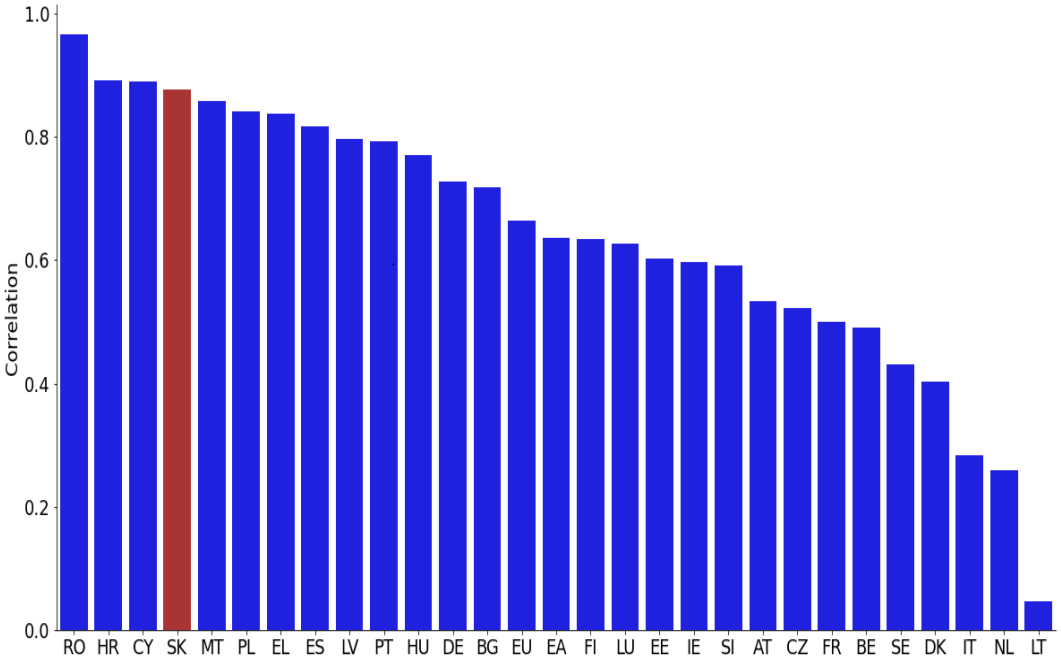


Figure 15: Cross country evidence on co-movement of inflation perceptions and expectation

4 Inflation expectations and economic choices

Studying subjective inflation expectations is an useful undertaking if it helps to understand and forecast inflation dynamics, if expecting higher inflation does in fact have an effect on consumption and savings choices of households and thus matters for the transmission of monetary policy. There is a growing evidence that indeed inflation expectations affect various households' decisions. Recently D'Acunto et al. (2022) and Weber et al. (2022) provide summaries of the literature. Our contribution to this discussion is twofold. First, we provide an additional evidence on the negative association of inflation with economic development across countries already noted in the literature by using the qualitative answers for all participating countries in the EC consumer survey. We find that the extent to which consumers associate inflation with bad times varies considerably among

countries. Second, using the micro survey data for Slovakia we estimate the impact of expecting higher inflation on consumption and savings plans of households. It turns out that the level of inflation does have an effect on how strongly households tend to act on higher inflation expectations.

4.1 Negative association of inflation with economic development

An important channel how perceiving and expecting higher inflation might affect households is their sentiment about how the inflation relates to the overall economic development. If households associate inflation with economically bad times, they might tend to lower their demand as well. In this vein Candia, Coibion, and Gorodnichenko (2020) provide compelling evidence of a negative association of inflation with economic growth by consumers and firms which is at odds with the evidence for professional forecasters.

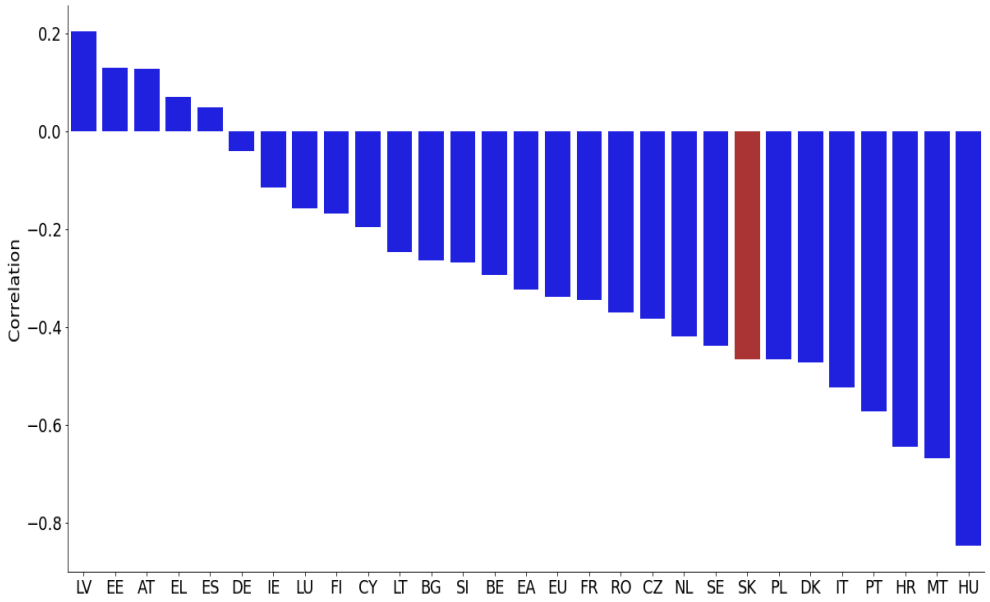


Figure 16: Cross-country evidence on the association of past inflation with past economic growth

Notes: EC consumer survey. Past economic development vs π perception.

Using the qualitative perceptions and expectations about inflation and the overall economical environment across countries from the harmonized EC consumer survey we can derive a similar picture. Figure 16 shows the correlation between the question 5 (perceived inflation over the last 12 months) and the question 3 (perceived economic development of the country over the last 12 months) over the sample period between May 2003 and December 2022. Figure 16 shows the correlation between the question 6 (expected inflation over the next 12 months) and the question 4 (expected economic development of the country over the next 12 months). The message of both pictures is the same. Overall a negative association of inflation with positive economic development prevails which in line with the evidence of Candia et al. (2020) and Kamdar (2019) but the evidence across countries is heterogeneous.

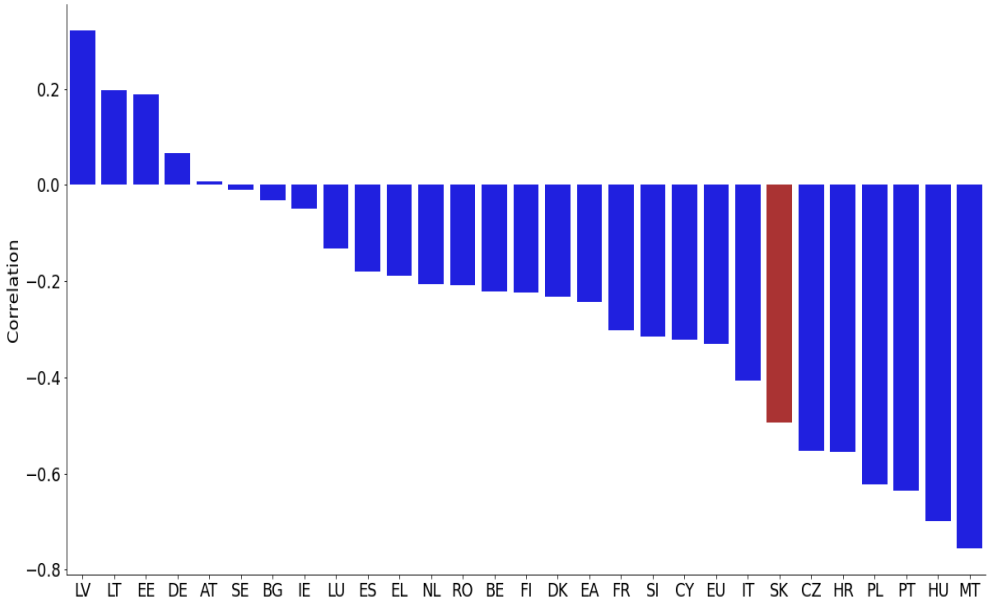


Figure 17: Cross-country evidence on the association of expected inflation with expected economic growth

Notes: EC consumer survey. Expected economic growth vs π expectation.

Our sample of countries and the one in Candia et al. (2020) partly overlap. The following countries are in both samples: Germany, Italy, Spain, France and the Netherlands. Except for Germany where the correlation is slightly positive we find the same results as Candia et al. (2020). Given that they use another survey, the Consumer expectation survey of the ECB, our finding can be considered as an additional evidence from the EC consumer survey.

4.2 How do inflation expectations affect consumption and savings choices of households?

This is an empirical question since according to the economic theory higher subjective inflation expectations can affect the intertemporal consumption decisions

in various ways. The reduction of the subjectively perceived real interest rate via the Fisher equation might mitigate the savings motive and strengthen the consumption incentive via the consumer Euler equation. Negative wealth and income effects can, however, counteract the positive influence of higher π^e on current consumption. Anticipating monetary policy reaction (Carvalho and Nechio, 2014), i.e. higher nominal rates, might imply a decrease in current consumption too. Precautionary saving motive in times of higher uncertainty might further reduce current consumption. And last but least individuals might have a supply-side view of the economy and associate higher inflation with bad economic times and decrease their demand for consumption accordingly.

To empirically assess the question how inflation expectations affect real consumption choices of households is not straightforward due to the curse of endogeneity. It might very well be that households perceive and in turn expect higher inflation because of own larger spending. D'Acunto et al. (2021), Dräger and Nghiem (2021) and Crump et al. (2022) find a positive relationship between current consumption and inflation expectations. In addition to finding a positive relationship in general for Germany, Sweden, UK and France, D'Acunto et al. (2021) utilize a natural experiment in Germany, an early announced VAT increase, to break potential endogeneity and their find a positive and significant causal effect of higher inflation expectations on consumption.

Using a similar argument Bachmann, Born, Goldfayn-Frank, Kocharkov, Luetticke, and Weber (2021) exploit an unexpected temporary cut in the value added tax combined with customized survey and household scanner data and find as well a strong causal effect of higher inflation expectations on durable, semi- as well as non-durable spending.

Another approach to break the potential curse of endogeneity is the utilization of randomized information-provision experiments as done by Coibion et al. (2019) or

Coibion, Georgarakos, Gorodnichenko, and Weber (2020). Coibion et al. (2019) estimate a small effect of inducing higher inflation expectations on non-durable spending among Dutch households and a negative effect on durable spending. They rationalize this result with a sharp decrease in real income and aggregate demand expectations for households who update upwards their inflation expectations, which is consistent with the stagflationary view discussed above.

Assessing the consumption/savings trade-off in the light of higher inflation expectations in Slovakia To this end we follow D'Acunto et al. (2021) and exploit the qualitative answers on inflation expectations. In particular we create a dummy variable which equals one when households answered "Prices will increase more" relatively to the last 12 months to get a measure of higher expected inflation. This approach targets the non-causal relationship between consumption plans and inflation expectations.

We run a series of logit regressions to estimate the effect of higher inflation expectations on the readiness to spend on durable consumption goods or to save. The random variable can take two values, $\{0, 1\}$: one denotes a good time to purchase durable goods/to save, zero otherwise.

As discussed above, our sample period ranges from January 2009 until December 2022. Number of raw monthly observations over this time span is 195,211 replies. After removing data replying "don't know" the number of observations gets reduced to 143,934.

4.3 Estimation results

Table 2 presents our results of regressing the propensity to save on higher inflation expectations in four different settings. In column 1, the inflation-increase dummy is the only explanatory variable. In column 2 we control for the alternative of

	Baseline	Controls	Controls + FE	Controls + interacting FE
	(1)	(2)	(3)	(4)
β^{π^e}	0.91***	0.98	1.05***	1.02
optimal time to save		2.12***	2.12***	2.12***
saving a lot		3.34	3.04	2.69
saving little		1.61	1.46	1.29
hand-to-mouth		0.87	0.79	0.70
dissaving		0.65	0.57	0.51
indebted		0.90	0.60	0.71
$D^{\pi\ surge}$			0.61***	0.54***
$D^{\pi\ surge} \cdot \beta_{\pi^e}$				1.28***

*** denote 99% confidence bounds.

Table 2: Regression results of propensity to purchases durable goods conditional on higher inflation

Notes: $D^{\pi\ surge}$ denotes the dummy for the time period of the recent inflation surge, i.e. June 2021 - December 2022.

stating that the current time is ideal for saving and for the financial situation of the household which is question 12 in the survey. In the third column we introduce a fixed effect for the period of inflation surge between June 2021 and December 2022. In the fourth column we let the dummy for the inflation surge period to interact with the higher inflation expectation dummy. We report the odds ratios of response vs non-response, i.e. how many times higher is the probability to respond that it is a good time to purchase durable goods than not to respond that it is a good time for durable consumption if the person expects higher inflation. Numbers larger than one thus imply that the probability is higher such that higher inflation expectations induce a higher propensity to purchase durable goods.

As can be seen from Table 2 the regression setup plays an important role. Without controlling for the optimality of saving, the financial situation of the consumer and the period of the inflation surge, there is an insignificant and even a negative

impact of higher inflation expectation on the propensity for durable consumption. However, when controlling for the period of high inflation we indeed find a general positive relationship which gets much stronger during the inflationary period. In particular, at times until June 2021 the probability to respond that it is an optimal time for durable consumption is 1.05 times higher for persons expecting higher inflation. During periods of high inflation this probability increases further given the significance of the coefficient on the surge dummy.

This probability becomes higher when considering an interaction between the time dummy for inflation surge and the higher inflation expectation in column 4. In this setting the probability to increase durable spending during inflation surge is estimated to be 1.82 higher conditional on expecting higher inflation than at times before the inflation surge.

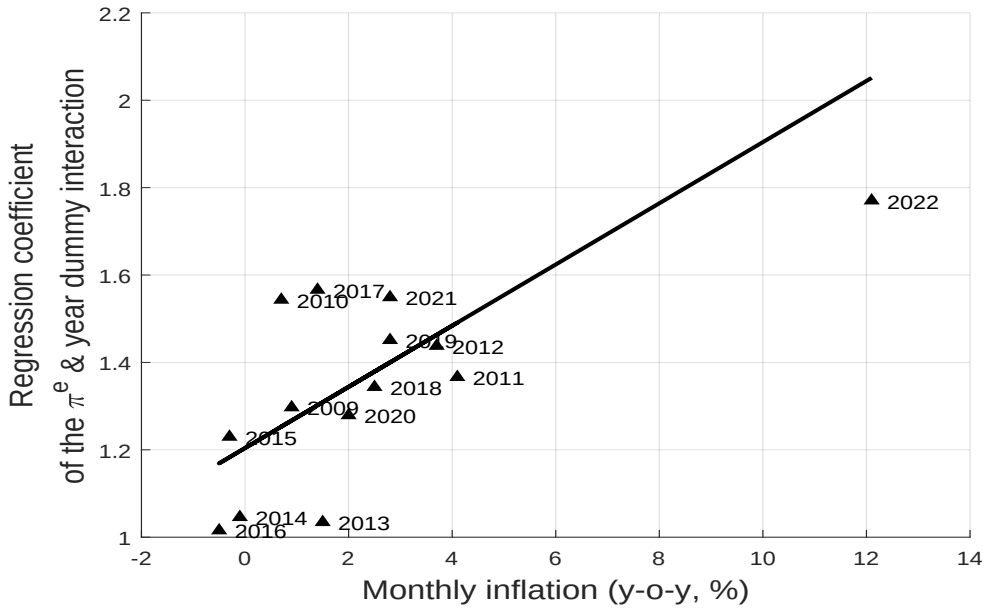


Figure 18: Effect of the inflation level on the propensity for durable consumption

Alternatively to considering a dummy for the period of inflation surge we can also consider yearly fixed effects. This setting yields coefficients on the interaction terms of yearly fixed effects with the higher inflation expectation. Figure 18 shows

	Baseline	Controls	Controls + FE	Controls + interacting FE
	(1)	(2)	(3)	(4)
β^{π^e}	0.75***	0.78***	0.78***	0.76***
optimal time for dur. cons.		2.12***	2.12***	2.12***
saving a lot		7.23	7.03	6.72
saving little		2.46	2.40	2.29
hand-to-mouth		0.63	0.62	0.59
dissaving		0.50	0.48	0.46
indebted		0.42	0.41	0.39
$D^{\pi\ surge}$			1.01	0.94***
$D^{\pi\ surge} \cdot \beta_{\pi^e}$				1.18***

*** denote 99% confidence bounds.

Table 3: Regression results of propensity to save conditional on higher inflation

Notes: $D^{\pi\ surge}$ denotes the dummy for the time period of the recent inflation surge, i.e. June 2021 - December 2022.

the size of these interaction terms against the level of inflation in the given year. We observe that during the year 2022 the coefficient on the interaction of the yearly dummy and the higher inflation is higher than for other years which indicates that consumers substantially increased their propensity to purchase durable goods in the light of the record-high inflation.

It is worth noting that during the deflationary years 2014-2016 the interaction terms are particularly low. This is an indication that consumers take the level of inflation into account when considering times as good or bad for durable consumption. In year 2022 the probability of indicating that it is a good time for durable consumption is 1.9 times higher conditional on expecting higher inflation which is more than just 1.1 times higher in year 2016 which was a deflationary year (average monthly HICP y-o-y inflation was -0.5%).

Logit results for the propensity to save Table 3 shows the counterpart results when instead of considering the question 8 on the desirability of durable consumption we focus on question 10 whether it is currently an optimal time to save. The results indicate that conditional on expecting higher inflation consumers in Slovakia tend to lower their savings propensity but not during the inflation surge. During the recent inflation surge consumers increase the probability to answer that it is optimal to save when expecting higher inflation. In particular, the probability to answer that it is an optimal time to save is 2.12 times higher when expecting higher inflation during the inflation surge instead of 0.76 times before June 2021.

5 Conclusion

This paper provides insight into the relationship between inflation expectations and the level of inflation in the economy. Using confidential micro survey data from the EC consumer survey for Slovakia featuring subjective inflation expectations we document that the impact of higher inflation expectations on consumption and savings choices depends positively on the level of inflation in the economy. Hence, the higher the level of inflation, the more inflation expectations increase the propensity for durable consumption. We also find a positive effect of inflation expectations on savings decisions during inflationary periods whereas we estimate a negative effect otherwise.

This state-dependent impact of inflation is accompanied by additional results on changing dynamics of inflation expectations at times of low and high inflation. During periods of rather low and stable inflation (2-3%), the extensive margin, i.e. the share of people expecting non-zero inflation, explains a substantial part of the fluctuations of inflation expectations. However, at times of higher or lower inflation levels than 2-3% it is the intensive margin which plays a crucial role.

These results have first-order implications for monetary policy. If people tend to react stronger on inflation expectations at times of high inflation, central banks might need to react more strongly to combat inflation. The results on the extensive and intensive margins imply that central banks might be more effective in steering inflation expectations by communicating precise levels of expected inflation during periods with higher or lower inflation than 2-3% while during such periods communicating the overall tendency of inflation to stay constant, to decrease or to decrease might be sufficient.

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D Appendix

D.1 Inflation moments in different studies

Country	Mean	Median	Std
D'Acunto et al. (2021): Jan 2000 - Feb 2016			
Germany	1.57	1.55	0.80
France	1.65	1.80	0.90
Sweden	1.50	1.37	0.90
UK	2.05	1.93	1.17
Andrade et al. (2022): Jan 2000 - Dec 2016			
France	1.4996	0.1.6027	0.0.97193
This paper Jan 2009 - Dec 2022			
Slovakia	2.401	1.772	3.1555
Germany	1.9045	1.5313	2.1981
France	1.5285	1.2554	1.5219
Sweden	1.8292	1.5118	1.9826

Table 4: Inflation moments in different studies

D.2 Survey questions

1. How has the **financial situation of your household** changed over the last 12 months? It has ...
    - Got a lot better
    - Got a little better
    - Stayed the same

- Got a little worse
- Got a lot worse
- Don't Know

2. How do you expect the financial position of your household to change over the next 12 months? It will ...
   - Get a lot better
   - Get a little better
   - Stay the same
   - Get a little worse
   - Get a lot worse
   - Don't Know
3. How do you think the **general economic situation in Slovakia** has changed over the past 12 months? It has ...
   - Got a lot better
   - Got a little better
   - Stayed the same
   - Got a little worse
   - Got a lot worse
   - Don't Know
4. How do you expect the general economic situation in Slovakia to develop over the next 12 months? It will ...
   - Get a lot better

- Get a little better
- Stay the same
- Get a little worse
- Get a lot worse
- Don't Know

5. 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

6. 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

7. How do you expect the **number of people unemployed** in this country will change over the next 12 months? The number will ...

- Increase sharply
- Increase slightly
- Remain the same
- Fall slightly
- Fall sharply
- Don't Know

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**?
    - 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
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? I will aspend ...
    - Much more
    - A little more
    - About the same
    - A little less
    - Much less
    - Don't Know
10. In view of the general economic situation, do you think that now is?

- A very good time to save
- A fairly good time to save
- Not a good time to save
- A very bad time to save
- Don't Know

11. Over the next 12 months, how likely will you be to save any money?

    - Very likely
    - Fairly likely
    - Not likely
    - Not at all likely
    - Don't Know

12. Which of these statements best describes the current financial situation of your household?

    - We are saving a lot
    - We are saving a little
    - We are just managing to make ends meet on our income
    - We are having to draw on our savings
    - We are running into debt
    - Don't Know