Inflation Expectations in CESEE: The Role of Sentiment and Experiences

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Abstract

This paper focuses on the formation of inflation expectations of consumers in 9 Central, Eastern and Southeastern European (CESEE) countries. Using data from the OeNB Euro Survey, a large cross-country consumer survey, we show that the difference between realized inflation and reported inflation expectations is considerably higher in CESEE countries than in 7 euro area countries. Moreover, we find that estimation results for the CESEE countries are in line with the existing literature on large Western economies: older, female and lower income respondents have relatively higher inflation expectations. Also, respondents with lower trust in institutions and a more pessimistic view regarding the economic outlook have substantially higher inflation expectations, as do those who were negatively financially affected by the COVID-19 pandemic or have experienced high inflation periods in the past. When interacting economic sentiment and experiences we find that differences in economic sentiment can partially explain the significant correlation between COVID-19 experiences and inflation expectations. Furthermore, respondents who remember high inflation in the past report a stronger effect of economic sentiment on inflation expectations than others.

JEL codes: D12, D84, E31, E52

Keywords: inflation expectations, economic sentiment, CESEE, household survey

Non-Technical Summary

In recent years, the interest of policy makers and researchers in inflation expectations has increased substantially. Inflation expectations are important from a central bank perspective as they can predict the future evolution of inflation and help central banks assess the credibility of their policies. In this paper, we investigate inflation expectations of consumers in 9 CESEE countries (6 EU countries and 3 EU candidate countries). Using data collected in the 2020 wave of the OeNB Euro Survey, a large-scale annual consumer survey conducted by the OeNB, we shed light on the relationship between individuals' inflation expectations and their economic sentiment and experiences.

To our knowledge, this is the first study that collects and analyses quantitative inflation expectations for a large set of CESEE countries. Thus, we first investigate the socioeconomic determinants of individuals' inflation expectations and find that older and female respondents and those with lower income levels have relatively higher inflation expectations. This confirms the basic results of the literature on the determinants of individual inflation expectations found for Western countries.

As the next step, we study the relation between respondents' optimism/pessimism regarding economic developments (economic sentiment) and inflation expectations. In line with other studies in this small, but growing literature, we find that most CESEE respondents regard inflation as a negative economic phenomenon that occurs together with worsening economic conditions, i.e. they hold a supply-side view of inflationary shocks.

In addition to economic sentiment, recent and past experiences of individuals determine their inflation expectations. We find that respondents who were (financially) more negatively affected by the COVID-19 pandemic report higher inflation expectations. Interestingly, these respondents are also more pessimistic about the economic outlook, so there is likely an indirect effect of recent experiences shaping economic sentiment which ultimately affects inflation expectations. Additionally, also more distant experiences such as memories of high inflation in the past affect people's inflation expectations. We find that respondents who claim to remember episodes of high inflation report significantly higher inflation expectations than others. We can also show that the effect of economic sentiment on expectations is stronger for respondents with inflation memory. This implies that people's inflation memory is not only persistent but might contribute to a de-anchoring of inflation expectations in times of economic turbulence, which is concerning from a policy perspective.

1 Introduction

Over the past decade the interest of policy makers and researchers in inflation expectations has increased substantially. Inflation expectations are especially relevant from a central bank perspective as they can be used to predict the future evolution of inflation and help central banks assess the credibility of their policies. Furthermore, they determine the real interest rate, thus affecting the transmission of monetary policy to the real economy. Recently, the interest in inflation expectations was further fueled by the sharp acceleration of inflation, which has added additional urgency to better understand how households and firms form inflation expectations and how these expectations affect their economic decisions.

Investigating inflation expectations is particularly interesting for the former transition economies of Central, Eastern and South-Eastern Europe (CESEE) as these countries are characterized by different macroeconomic performances and institutional settings, albeit sharing many cultural and historical commonalities. In our analysis, we use data collected in October 2020 in the OeNB Euro Survey, a large-scale annual consumer survey conducted by the OeNB in 10 CESEE countries. In this survey, the questions on inflation expectations have been harmonized with other surveys for Western European countries in order to facilitate comparisons across surveys.[1]

Our main hypothesis is that the formation of economic expectations is based to a large extent on individuals' attitudes, beliefs and sentiment which are strongly influenced by psychological, cultural and personal factors. From the rich set of variables on different macroeconomic expectations, trust and experiences available in our survey we construct some measures of these factors which we then relate to individuals' inflation expectations. The country dimension of our study also allows us to investigate in a harmonized framework whether the determinants of inflation expectations are, as we suppose, similar across countries rather than predominantly country specific.

Our study adds to the existing literature and policy discussion in several ways. First, to our knowledge, this is the first study that collects and analyses quantitative inflation

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[1]The OeNB Euro Survey covers 10 CESEE countries that had not yet adopted the euro as their currency at the time of the survey. These are six EU countries (Bulgaria (BG), Croatia (HR), Czechia (CZ), Hungary (HU), Poland (PL) and Romania (RO)) and four EU candidate countries (Albania (AL), Bosnia and Herzegovina (BA), North Macedonia (MK) and Serbia (RS)). Unfortunately, due to major concerns regarding the inflation data (see section on data) we had to exclude Albania from our analysis.

expectations for a large set of CESEE countries. So far, most published studies on CESEE have either covered only one country (e.g. Gabriel et al., 2014; Martin, 2020; Lolic and Soric, 2017) or used quantification methods on qualitative inflation questions – mostly from the European Commission's Business and Consumer Surveys (Benkovskis et al., 2008; Pop, 2016; Szyszko and Rutkowska, 2019). Thus, our first step is to check – in regression analysis – whether the socioeconomic determinants of individuals' inflation expectations found in the international literature also applies to the CESEE countries. In this regard, our results are in line with those of the existing literature, as we find that older and female respondents and those with lower income levels have relatively higher inflation expectations.

Second, we add to the small, but growing literature on the relation between respondents' optimism/pessimism regarding economic developments and inflation expectations (Andre et al., 2019; Kamdar, 2019; Candia et al., 2020). We study how inflation expectations are related to several economic sentiment variables from the OeNB Euro Survey. Interestingly, our regressions show a strong correlation between expectations of depreciating exchange rates and rising inflation. We proceed to use Multiple Correspondence Analysis (MCA) to extract a common economic sentiment component from all sentiment variables. Using this measure of "optimism" or "economic sentiment" in a regression, our results are in line with other studies that used US data applying similar methods: Most CESEE respondents regard inflation as a negative economic phenomenon and, thus, expect higher inflation when economic conditions worsen. This is consistent with the view of an inflation increase due to an adverse supply shock.

We further add to the literature by studying economic sentiment jointly with experiences of the respondent. In line with previous studies which have shown that personal experiences can shape macroeconomic expectations, we find that respondents who were (financially) more negatively affected by the COVID-19 pandemic had higher inflation expectations at the time of the interview. We hypothesize that a large part of the channel runs via differences in overall economic sentiment. However, our results suggest that economic sentiment explains only part of the correlation between COVID-19 affectedness and inflation expectations, leaving room for other potential explanations (e.g. paying more attention to price increases when being financially constrained).

Finally, we investigate how respondents' inflation experience affects their inflation expectations. Studying this for the CESEE region where a large share of the population lived through high inflation episodes in the 1990s is particularly interesting from a policy

perspective. We find that respondents who claim to remember episodes of high inflation and strong currency depreciation in the past report significantly higher inflation expectations than others. This is in line with papers such as Malmendier and Nagel (2011, 2016); Andre et al. (2019); Conrad et al. (2022). Using our constructed economic sentiment variable we can show that the effect of economic sentiment on expectations is stronger for respondents with inflation memory. While this is only tentative evidence that should be further investigated with more suitable data, the finding that people's inflation memory is not only persistent but might contribute to a de-anchoring of inflation expectations in times of economic turbulence is concerning from a policy perspective.

The remainder of the paper is structured as follows: Section 2 discusses the data and presents descriptive results on inflation expectations and perceptions in CESEE countries. Section 3 outlines the empirical strategy and the main hypotheses jointly with the existing literature on these hypothesis. Section 4 presents the regression results as well as a robustness analysis of the results. Section 5 summarizes the main results and draws some policy conclusions. The paper also contains several Appendices that discuss background information and technical details.

2 Data

The main data source for this study is the 2020 wave of the OeNB Euro Survey -– a repeated cross-sectional face-to-face survey of individuals, aged 18 or older. The survey covers six non-euro area EU member states (CESEE-EU: Bulgaria, Croatia (at the time of the survey), Czechia, Hungary, Poland and Romania) and four EU candidates (CESEE-EUC: Albania, Bosnia and Herzegovina, North Macedonia, and Serbia). In each survey wave, a sample of 1,000 individuals is polled in each country based on multistage random sampling procedures. These samples reflect the countries' population characteristics in terms of age, gender, region and ethnicity.[2]

The 2020 wave of the OeNB Euro Survey was conducted during an intense phase of the COVID-19 pandemic.[3] It included qualitative and quantitative questions on inflation

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[2]Weights are only used in the calculation of some aggregate statistics and are calibrated on census population statistics for age, gender, region and, where available, on education and ethnicity.

[3]Despite the fact that the interviews took place during the COVID-19 pandemic, routine data quality checks of the OeNB Euro Survey have, overall, shown a surprisingly stable sample composition compared to previous waves. However, we cannot rule out that the 2020 sample is different from previous samples as

expectations over the next 12 months. Equivalent questions were also asked for inflation perceptions, i.e. perceived price changes over the past 12 months. The exact wording of these questions is shown in Table A in Appendix A. Unfortunately, the inflation expectations and perceptions collected in Albania had to be excluded from the study due to serious quality issues.

There is a large literature on the advantages and disadvantages of eliciting inflation expectations in surveys in a certain manner (Stanisławska and Paloviita, 2021; Andrade et al., 2020; Armantier et al., 2017). Key aspects in this literature are for instance, how best to address uncertainty, the advantages and disadvantages of qualitative versus numeric point versus numeric probabilistic questions, and differences between asking respondents for changes in prices versus asking directly for inflation.[4]

We choose to use the same questions as in the ECB Consumer Expectations Survey which asks for a point estimate of the expected change in prices in general. These questions have been validated and used in other research papers (e.g. Bańkowska et al., 2021) which allows us to compare our data with those from other countries. Nonetheless, our survey also has some caveats. A major drawback is that the survey data is a repeated cross-section and doesn't allow to identify individuals over time. A panel structure would be particularly relevant for comparing results from the COVID-19 period with normal times. Furthermore, questions about percentage changes of an economic variable can be complicated for some respondents, which can lead to higher non-response in surveys (see, e.g., Arioli et al., 2017). We discuss the issue of missing data in more depth in Appendix C and other caveats related to our sample throughout the paper and in the robustness section, where relevant.

Besides our main variable of interest, the OeNB Euro Survey also collects data on a rich set of socioeconomic characteristics, such as income and education, but also information about other expectations (e.g. on income, the macroeconomic development), beliefs and trust in various institutions, financial literacy and indicators of wealth, indebtedness and

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regards unobserved characteristics of respondents that could also have implications for inflation expectations. For instance, roughly half of the survey institutes (in Croatia, Czechia, Hungary, Poland, Bosnia and Herzegovina) reported much higher numbers of refused interviews than in the preceding waves.

[4]This literature also touches upon the question what exactly reported inflation expectations of individuals capture. Some individuals may use information they have on the official inflation rate or economic developments to answer questions on expected changes in "prices in general". Others might rely on experienced price changes of certain reference products, often regularly consumed goods with frequent price changes such as milk, bread, gasoline, etc. Not knowing which concept the respondents had in mind (i.e. overall inflation or experienced inflation of selected products) and which information was used to form their expectations is a caveat when such data is not available in the survey.

income shocks as well as the extent of being affected by the COVID-19 pandemic. Table A in Appendix A provides a definition of all variables used in this study. Table A2 shows the summary statistics of our main socioeconomic and other variables of interest.

2.1 Quantitative inflation expectations and perceptions for CESEE countries

Inflation perceptions and expectations reported by respondents of the OeNB Euro Survey in fall 2020 are quite heterogeneous across and within countries and are also very high compared to realized inflation rates. The latter is a standard finding in the literature and is often called the perception or expectation bias (see e.g. Capistrán and Timmermann, 2009). As shown in Table 1, mean inflation expectations in fall 2020 ranged from 17.7% and 17.0% in Romania and Poland to 6.8% in Bosnia and Herzegovina. This is substantially above realized inflation rates one year later (in Q3 2021) which ranged from 2.4% in Bosnia and Herzegovina to 5.1% in Poland and 5.0% in Hungary. Mean inflation perceptions were even higher than expectations, ranging from 19.6% in Poland to 7.7% in Bosnia and Herzegovina, even though actual inflation at the time of the survey was quite low (penultimate column of Table 1).

The variation in inflation expectations and perceptions across countries can only partly be explained with the variation in actual inflation rates as the latter are far less diverse across countries than inflation expectations and perceptions. The rank correlation of mean inflation expectations with actual inflation rates across countries is only about 0.3 and the rank correlation of mean inflation perceptions with actual inflation rates is 0.4. Thus, there must be other reasons for the variation across countries than different actual inflation rates. Also visible from the table, means – even though they are calculated from winsorized data – are always higher than medians which points to an asymmetric distribution with a fat right tail (see also Figure A1 in Appendix A).

Table 1: 12-months inflation expectations and perceptions in CESEE countries (in %)

| | Expectations | | | | Perceptions | | | | Actual inflation | |
	mean	med.	sd	N	mean	med.	sd	N	Q3 2020	Q3 2021
Bosnia and H.	6.8	2.9	9.2	820	7.7	3.6	9.7	853	-1.4	2.4
Bulgaria	15.4	11.6	13.0	720	16.1	13.0	16.1	808	0.6	2.9
Croatia	11.0	8.9	10.8	980	12.2	9.9	11.0	991	-0.5	3.1
Czechia	7.9	5.5	7.2	771	8.7	5.5	8.4	841	3.5	3.3
Hungary	10.9	9.4	8.8	828	13.9	11.3	10.0	883	3.8	5.0
N. Macedonia	12.1	9.3	14.6	899	12.4	9.3	13.6	926	2.0	3.4
Poland	17.0	11.0	17.0	842	19.6	15.2	16.7	847	3.7	5.1
Romania	17.7	12.2	6.7	879	18.2	14.4	17.2	928	2.4	4.3
Serbia	8.8	5.1	10.8	858	9.7	5.9	11.5	896	2.0	4.3

Notes: Data are weighted. Means are calculated from winsorized data at the 2nd and 98th percentiles. Medians are interpolated to account for rounding (bunching at integer values or multiples of 5) according to the method proposed by Cox (2019); for more details, see Appendix B.
Source: OeNB Euro Survey wave 2020, Eurostat.

For a graphical comparison of mean, median and actual inflation rates across countries and a more detailed discussion of these descriptive results, see Appendix B. In this Appendix we also discuss the inflation history and exchange rate regimes in the CESEE countries. Moreover, we compare perceived and expected inflation rates for CESEE countries from the OeNB Euro Survey with those of other surveys for Western European countries that have used the same or similar questions. We find that – despite some heterogeneity also among Western countries – they are consistently lower in Western euro area countries than in CESEE countries. Also the expectation and perception bias is lower in Western euro area countries than in CESEE countries.

3 Empirical approach

In this section we discuss our main hypotheses and how they relate to the existing literature and describe our estimation strategy.

3.1 Estimation strategy

Our econometric model explains the cross-sectional variation in inflation expectations as a function of individuals' socioeconomic characteristics, beliefs and experiences and includes country dummies to capture variation across countries. We decided to pool the countries in the estimation as single-country regressions in some cases include too few observations that make the results themselves and differences between the countries hard to interpret. Moreover, given that our main hypotheses are on economic sentiment, we think that the human component in explaining inflation expectations outweighs the national component. However, we show the country regressions and also regressions by country groups (EU Member States, EU Candidates, countries with inflation targeting and countries without inflation targeting) in Appendix F.

We estimate the following equation:

$$y_i = \alpha + \beta X_i + \varepsilon_i \tag{1}$$

where y_i denotes individual i's inflation expectation, X_i a vector of explanatory variables and ε_i an error term. In the baseline regressions we use (uncensored) quantitative inflation expectations as the dependent variable. In the robustness section and Appendix G we also use some alternative dependent variables, such as categorical inflation expectations and (implicitly) expected changes in inflation.

We estimate the model with OLS given that the dependent variable is continuous[5] using clustered standard errors at the primary sampling unit (PSU) level to account for the sampling design (Abadie et al., 2017). In our case, the PSU is the location from where the interviewer starts his/her random route to conduct interviews.

Throughout most of the paper we work with complete case analysis.[6] Appendix C briefly discusses the issue of missing data and concludes that the sample of respondents who provide full information on our variables of interest might not be fully representative for the whole populations in the CESEE countries.

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[5]For specifications using categorical dependent variables discussed in the robustness section, appropriate non-linear models are used.

[6]Except for the income variable for which we include don't know/no answer responses as a separate category. Given that such dummy-approaches have been shown to potentially bias the estimated coefficients, we show in the robustness section that even if we set these responses to missing, our results do not change much.

3.2 Economic sentiment and inflation expectations

Our main hypothesis in this paper is that economic sentiment in a broad sense is a major driver of inflation expectations. A number of papers have documented that on average individuals tend to think of inflation as something "bad" that occurs together with other negative economic developments, such as unemployment or lower growth. In economic terms, this implies that most people hold the view that the economy is dominated by supply rather than demand shocks affecting inflation. Studies in this literature have taken different approaches, e.g. looking at how inflation expectations developed during crises/macroeconomic downturns or in relation to output and unemployment expectations (Ehrmann et al., 2017; Knotek et al., 2020; Binder, 2020; Candia et al., 2020; Detmers et al., 2022; Dietrich et al., 2022). Some papers have also gone a step further and investigated the heterogeneity of beliefs (e.g. Armantier et al., 2021) and what causes individuals to expect higher inflation when the economy contracts. This literature has found that both differences in information but also different processing of available information are relevant (e.g. Andre et al., 2019; Candia et al., 2020).

Our approach is somewhat different and more similar to Kamdar (2019). She shows that there is a strong common component in expectations variables and argues that "sentiment" drives much of individuals' expectations. As negative supply-side shocks are particularly detrimental for households, the correlation between inflation and other negative economic expectations results from individuals being "rationally inattentive". We adhere to this view and also argue that economic sentiment (optimism/pessimism) drives a lot of the correlation between expectations variables. We thus proceed similarly to Kamdar (2019) and use Multiple Correspondence Analysis (MCA) to extract a common component from a number of sentiment variables that measures the overall economic sentiment of the respondent. The MCA methodology is discussed in Appendix D.

We use for the first time the expectations in the OeNB Euro Survey to construct measures of economic sentiment. Specifically, we use expectations on the financial situation of the household, on the stability of the financial system, the expected economic situation of the country and the stability of the local currency. The latter is a variable that is not often included in surveys and we are not aware of papers that have explicitly linked individuals' inflation and exchange rate expectations. This relationship is particularly interesting in the context of an international survey conducted in countries with different exchange rate

regimes and a history of strong currency devaluations (see Appendix B).

A major difference to Kamdar (2019) is that she includes inflation expectations in the Principal Component Analysis (PCA) and MCA to show the strength of the sentiment component including inflation expectations. In contrast, we use the economic sentiment index excluding inflation expectations in our regression. This allows us to show how large and significant the coefficients on the economic sentiment variable are compared to other regressors when explaining inflation expectations. What we measure is a correlation, even though, theoretically, it makes sense to assume that in low inflation periods the effects from a multi-faceted sentiment variable on inflation expectations are stronger than vice versa. In higher inflation periods the effects from inflation perceptions and expectations to sentiment are likely substantial. Including sentiment as a regressor, furthermore, allows us to study how economic sentiment interacts with experiences (as discussed below).

We construct one more variable with MCA that we view to be closely related to economic sentiment: trust in institutions. We show in Appendix D that the correlations between trust variables themselves and between trust and sentiment variables are high.[7] It seems likely that trust affects expectations and vice versa and we also discuss the results of a joint MCA on trust and expectations variables in Appendix D. In the regressions presented, we decided to include trust and sentiment separately, expecting that individuals with higher levels of institutional trust have lower inflation expectations.

3.3   The role of experiences

A common driver of economic sentiment are actually past and present experiences. To study the role of experiences for inflation expectations, we make use of two types of experiences that can be elicited from the OeNB Euro Survey wave 2020: financial shocks during the COVID-19 pandemic and past experiences with high inflation episodes. Both have been shown to have an impact on inflation expectations in the literature. Regarding the first, some studies have demonstrated that personal experiences affect macroeconomic expectations (e.g. Kuchler and Zafar, 2019; Tsiaplias, 2021). Given the available variables, OeNB Euro Survey data provide a good context to study how the negative financial impact

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[7]For this reason, we do not claim to investigate the relationship between trust in the central bank and inflation expectations (as e.g. Christelis et al., 2020; Mellina and Schmidt, 2018; Rumler and Valderrama, 2020). This particular relationship seems only interesting, when causality can be identified, which is beyond the scope of this paper.

of the COVID-19 pandemic relates to respondents' inflation expectations.[8] While this has already been studied in some papers for large Western economies (e.g. Cato and Schmidt, 2023, for Germany), we are not aware of any papers on the CESEE region.

We also study if economic sentiment of the respondents drives the potentially existing link between inflation expectations and personal financial outcomes. Recently, Tsiaplias (2021) used data from the Australian Survey of Consumer Inflation Expectations, a long-running monthly cross-sectional survey, to show that respondents' inflation expectations are negatively linked to their income changes. These findings held even when controlling for the economic situation and expectations thereof. Nonetheless, we expect in our context and with our broad economic sentiment measure that the correlation between adverse financial effects from COVID-19 should weaken once we control for economic sentiment.

Regarding respondents' longer-term experiences in the inflation expectations literature, e.g. Malmendier and Nagel (2016), use a long time series on US consumers to show the lifetime experience of inflation strongly predicts differences in inflation expectations. Andre et al. (2019) conclude that respondents are more likely to recall economic propagation mechanisms that they have personally experienced. Conrad et al. (2022) find that respondents' lifetime experience of inflation is positively correlated with expected inflation, conditional on respondents' perceived inflation.

In the context of the CESEE region, these findings would imply that respondents who lived through the transition period in the 1990s should have a strong memory of high inflation going hand in hand with sharp economic contractions. We are in a relatively unique situation as we can not only use age or a constructed measure of lifetime inflation experiences, as usually done in the literature. Our survey also contains a variable that captures the subjective experience of the respondents with high-inflation periods. Moreover, we are most interested in testing whether the link between the overall economic sentiment of respondents and their views on inflation is stronger for people who recall high inflation periods. To our knowledge, this has not been done in previous papers.

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[8]A higher frequency survey, a time series and/or a (rotating) panel would clearly be an advantage in this respect. Since we have neither, we cannot draw conclusions regarding the impact of the COVID-19 pandemic per se on inflation expectations.

4 Results

This section presents and discusses the estimation results and also includes a robustness analysis in the final subsection. Further robustness checks can also be found in the Appendix.

4.1 Baseline: Socioeconomic variables

To set the stage for the further analysis and also to compare our data with the basic findings of other papers in the literature, we start with a baseline specification that includes only a set of common socioeconomic variables and country dummies. These include the age, gender, personal income and education (both summarized in terciles), the employment status (unemployed dummy) of the respondent, the size of the household and the condition of the respondent's dwelling as well as a measure of the financial literacy of the respondent.

This list is inspired by a substantial international literature on socioeconomic characteristics and inflation expectations. Papers in this literature usually find that female and older respondents and those with lower income and/or less formal education have relatively higher inflation expectations than other respondents (see e.g. Bruine de Bruin et al., 2010; Ehrmann et al., 2017; Weber et al., 2022). Given that our study is – to our knowledge – the first on quantitative inflation expectations in a large subset of CESEE countries, we consider it important to first test whether these stylized facts established mostly for the US and large Western European countries, apply to the CESEE region as well.

The results of our regression only with key socioeconomic variables on the full sample of countries are shown in Table 2, column 1. We find largely consistent results with the international literature: Respondents who are female[9], relatively older and have lower income levels report significantly higher inflation expectations. Respondents living in a dwelling in poor condition or being unemployed also have relatively higher inflation expectations. Both of these variables can be seen as proxies for poverty.

Education and financial literacy are insignificant in our pooled regressions, contrary to the papers that find higher education to be correlated with lower inflation expectations

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[9]As for higher inflation expectations of women, D'Acunto et al. (2021) find that it is not gender per se that affects inflation expectations but the question who is the primary grocery shopper in the household. Once this is controlled for, inflation expectations of men and women are no longer significantly different.

(see e.g. Bruine de Bruin et al., 2010; Rumler and Valderrama, 2020.) Digging deeper and looking at country regressions presented in Appendix F, reveals that these two variables, contrary to other variables, have opposing signs across countries. This could possibly be related to different educational systems and related measurement problems. For financial literacy, it has to be kept in mind that the measure is based on only 3 questions (numeracy, real vs. nominal concepts and exchange rate risk), which is a rather crude way of measuring the financial and economic literacy of respondents. Moreover, while the evidence for higher income being related to lower expectations is quite undisputed, the relationship with educational attainment is not entirely straightforward. Some papers have found that it is not education, but cognitive abilities that matter (e.g. D'Acunto et al., 2022), other papers have emphasized the importance of special knowledge of economic and financial matters rather than broad educational attainment (Bruine de Bruin et al., 2010; Burke and Manz, 2014; Rumler and Valderrama, 2020; Van der Cruijsen et al., 2015).

When running the regressions on groups of countries (CESEE-EU, CESEE-EUC, inflation targeters, non-inflation-targeters) we generally find similar coefficients for all groups, even though for the group of countries that are not inflation targeters and the CESEE-EUC countries fewer coefficients are significant, which could also be due to the fact that these subsamples include fewer countries and thus fewer observations (see Table F6 in Appendix F). The number of observations and significance is further reduced when running regressions on individual countries. Age is the most robust coefficient, being significant in five out of ten countries, while the other characteristics mentioned above are largely only significant in less than three countries (see Table F5 in Appendix F).

4.2 Economic sentiment and trust

As noted in section 3.2, we expect to find that other expectations variables and overall economic sentiment have a strong correlation with inflation expectations. We include various variables related to economic sentiment and trust as dummies into the regression shown in column 2 of Table 2.[10]

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[10]The difference in the significance of the coefficients of some socioeconomic variables compared to column 1 has various causes. For some variables (unemployment, building condition) the significance changes due to the inclusion of additional variables measuring sentiment and trust. For others (income, education, financial literacy) the changes are likely the result of different sample compositions (i.e. fewer low educated people in the complete-case-analysis sample) coupled with changing relative numbers of observations per country (which is particularly relevant in cases where coefficients differ across countries, as discussed above for education and financial literacy.)

Table 2: Results of OLS regressions on quantiative inflation expectations

	(1) Baseline		(2) Sentiment - long		(3) Sentiment - MCA	
Log of age	2.131***	(0.538)	1.699***	(0.599)	1.612***	(0.619)
Female	0.858**	(0.345)	0.989**	(0.386)	1.127***	(0.393)
Size of HH	0.276	(0.179)	0.231	(0.194)	0.211	(0.196)
Income - no answer	-1.075*	(0.593)	-0.544	(0.656)	-0.776	(0.681)
Income low	2.055***	(0.607)	1.649**	(0.703)	1.148	(0.710)
Income high	-0.479	(0.542)	-0.680	(0.549)	-0.492	(0.560)
Low education	-1.076	(0.870)	-1.786***	(0.627)	-1.551**	(0.623)
High education	-0.269	(0.458)	-0.397	(0.530)	-0.336	(0.535)
Financial literacy	0.332	(0.246)	0.290	(0.276)	0.513*	(0.286)
Poor building condition	1.621**	(0.711)	1.204	(0.864)	0.979	(0.848)
Unemployed	1.707**	(0.699)	1.423*	(0.759)	1.384*	(0.775)
Econ. sit. improve			-2.745***	(0.527)		
Local curr. stable			-1.340***	(0.474)		
Local curr. depreciate			6.407***	(0.537)		
Stable fin. system			-0.800	(0.662)		
Fin. sit. of HH improve			0.125	(0.519)		
Trust in government			-1.181**	(0.482)		
Trust in police			-0.482	(0.536)		
Trust in CB			1.000*	(0.568)		
Trust domestic banks			0.048	(0.619)		
Trust foreign banks			-0.374	(0.659)		
Trust in ECB			-0.463	(0.575)		
Trust in EU			0.085	(0.516)		
MCA (dim1) sentiment					-3.464***	(0.254)
MCA (dim1) trust					-0.992***	(0.374)
Constant	5.669**	(2.621)	7.625**	(2.987)	7.493**	(3.056)
Observations	7441		5074		5074	
Adjusted R^2	0.062		0.166		0.156	

Notes: Unweighted OLS regressions. Standard errors in parentheses. Medium income and medium education are reference groups for income and education dummies. Country dummies included but omitted from table. MCA variables are continuous ranging from around -2.5 to +2.5 for sentiment and -3 to 1.3 for trust. Complete case analysis, except for income, where "don't know/no answer" is included as dummy. Sample is harmonized for regressions (2) and (3) and regressions in following tables. * $p - value < 0.10$, ** $p - value < 0.05$, *** $p - value < 0.01$.
Source: OeNB Euro Survey wave 2020.

We find that respondents who agree with the statement that the economic situation in their country will improve over the next 5 years have significantly lower inflation expectations. Respondents, who agree that the exchange rate of the local currency will be stable over the next 5 years also have significantly lower inflation expectations. Moreover, when asked whether they expect that the value of the local currency vis-à-vis the euro will appreciate or depreciate, respondents who expect a depreciation have significantly higher inflation expectations (+6 percentage points) compared to others. It is interesting to note that in the same regressions on country-level, this coefficient is positive, high and significant in all countries except Poland where it is insignificant (results available upon request). This is remarkable given the differences in exchange rate regimes and thus opens a potential avenue for further research.[11]

The current stability of the financial system is insignificant in the pooled regression including all sentiment variables and so is the respondents' expectation regarding the financial situation of their household. When included alone, however, expectations regarding the household's financial situation are significant – similar to approaches pursued and results obtained in other papers on Western economies, e.g. Ehrmann et al. (2017).

The difference in significance of coefficients between the regressions with many sentiment variables and only one sentiment variable is unsurprising given the likely substantial correlation between most sentiment variables in our sample. In fact, including the variables this way is not our preferred specification. Instead, we use Multiple Correspondence Analysis (MCA) to extract common dimensions from the five economic sentiment variables previously included as dummies in column 2 (for a discussion of the MCA approach and detailed results in our application, see Appendix D).

The first dimension of the MCA explains 47% of the total variation (in MCA called total inertia). When looking at the MCA plot and the loadings shown in Figure D6 in Appendix D, the first dimension seems to correspond to the optimism/pessimism of the respondents regarding future economic and financial developments. We therefore use this dimension as a proxy for overall economic sentiment in our regressions.

Column 3 in Table 2 shows that economic sentiment has a strong negative coefficient. A one unit increase in sentiment, which broadly ranges from -2.5 (very pessimistic) to +2.5 (very optimistic) in our sample, decreases inflation expectations by almost 3 percentage

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[11]Coefficients on other sentiment and trust variables vary more across countries in terms of significance and, in one case, even sign.

points. This is in line with the results of other researchers who find that individuals tend to see inflation as something that occurs together with other negative economic developments. Moreover, including overall sentiment raises the R-squared compared to the baseline regression by almost 10 percentage points.

As discussed in 3.2, we also add institutional trust, even though it is not our main variable of interest due to the limited ability to draw policy conclusions without addressing reverse causality concerns. Column 2 shows that when including trust dummies separately, trust in the government is significant with the expected sign, i.e. people who trust the government have lower inflation expectations. Trust in the central bank is weakly significant with an unexpected sign, likely due to the correlation between the trust variables. Given that trust variables are strongly correlated and likely have a common component, we additionally run an MCA on all available trust variables (see Appendices A and D). The first dimension, which according to the MCA plot and loadings most likely represents the respondents' overall institutional trust, has the expected negative and significant coefficient. Thus, it seems that common trust in various institutions rather than trust in any single institution drives the relationship between trust and inflation expectations.

4.3   Experiences and sentiment

After having discussed expectations and sentiment, in this section we investigate how present and past experiences affect the level of respondents' inflation expectations and the interactions with economic sentiment.

4.3.1   COVID-19 experiences

We first focus on the negative financial repercussions COVID-19 might have had on respondents. Table 3 shows regressions when adding two variables that capture COVID-related shocks to the respondents' finances. The first "income shock" is a dummy that is one if the respondent reported an unexpected reduction of household income over the past 12 months. In addition, we add a proxy for the negative impact of the COVID-19 pandemic on the respondents' financial situation. For this purpose, we use the question that contains 16 items of possible ways the respondent might have been affected by COVID-19 including, for instance, reductions in consumption/savings, delaying (debt) payments, taking on more

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debt or losing one's job. We count the number of mentioned items for each respondent and group them into four categories: 0 items (not affected), 1-2 items (little affected), 3-4 items (somewhat affected), more than 4 items (considerably affected). The number of COVID-19 items is not a perfect but likely a reasonable proxy for COVID-19 affectedness when taken together with the income shock and socioeconomic characteristics (see Scheiber and Koch, 2022, for a detailed analysis of the COVID-19 variable).

Table 3: Results of OLS regressions on inflation expectations including income shocks and COVID-19 experiences

	(1)		(2)		(3)	
	Income shock		Both shocks		Shocks and sentiment	
Unemployed	1.500*	(0.779)	1.579**	(0.774)	1.340*	(0.767)
HH income shock	2.109***	(0.557)	0.651	(0.554)	0.090	(0.526)
Affected by COVID-19:						
little			1.268**	(0.566)	0.894*	(0.535)
somewhat			1.398**	(0.645)	0.878	(0.619)
considerably			4.895***	(0.959)	3.925***	(0.930)
MCA (dim1) sentiment					-3.389***	(0.250)
MCA (dim1) trust					-0.891**	(0.371)
Constant	3.479	(3.153)	1.789	(3.187)	5.727*	(3.114)
Observations	5074		5074		5074	
Adjusted R^2	0.086		0.095		0.163	

Notes: Unweighted OLS regressions. Standard errors in parentheses. Medium income, medium education and not being financially affected by COVID-19 are reference groups for income, education and COVID dummies. Country dummies and sociodemographic variables (as in baseline) included but omitted from table. MCA variables are continuous ranging from around -2.5 to +2.5 for sentiment and -3 to 1.3 for trust. Complete case analysis, except for income, where "don't know/no answer" is included as dummy. * $p-value < 0.10$, ** $p-value < 0.05$, *** $p-value < 0.01$.
Source: OeNB Euro Survey wave 2020.

The income shock is significant in column 1 of Table 3, when COVID-19 dummies are not yet included. However, it becomes insignificant once we add these dummies: The more a respondent was (economically) affected by COVID-19, the higher his/her inflation expectations. Thus, our results show that negative financial experiences are correlated

with higher inflation expectations, in line with results by, e.g. Tsiaplias (2021).[12]

However, we are also interested in combining negative financial experiences with economic sentiment measures to investigate, whether the channel between personal experiences and inflation expectations runs primarily via differences in general economic sentiment/ optimism of these respondents. In column 3 we add economic sentiment and institutional trust to the regression with the financial shock variable. Including these variables reduces the size and significance of all shock variables.[13] Thus, it seems that differences in economic sentiment can partly, but not fully, explain higher inflation expectations of individuals who recently had negative financial experiences. However, there might be also other channels between financial shocks and inflation expectations, possibly related to the consumption behavior of these respondents or an increased awareness of price increases due to financial constraints.

4.3.2 Memory of high inflation episodes

Besides recent personal experiences, also more distant memories/personal experiences, particularly with high inflation, have been shown to affect people's inflation expectations. The previous literature has largely used "objective" lifetime experiences of inflation rather than a subjective measure of crises experiences. In our sample, this would be difficult, as due to the transition period and crises in the 1990s in the region, age is almost perfectly correlated with the respondents' objective experience of inflation. Thus, looking just at the significant coefficient on age in the previous tables, we could not disentangle crisis memory from other potential age-related factors.

However, in the OeNB Euro Survey wave 2020 respondents were also asked to express their (dis-)agreement with the following statement on a 6-point scale: "I remember periods of high inflation during which the value of the [local currency] dropped sharply." We recode the subjective variable to a dummy that takes the value 1 if the respondent agreed and 0 if he/she disagreed. This subjective inflation and currency depreciation memory is used in

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[12]Following Kuchler and Zafar (2019) who report that individuals with lower education are more likely to use recent personal experiences to shape macroeconomic views, we checked if this is also the case in our sample. However, we do not find any significant interactions between education and recently experienced shocks (results are available upon request).

[13]Interactions between shock variables and sentiment are insignificant, on the other hand, suggesting that respondents who faced adverse financial shocks do not show a stronger link between economic sentiment and inflation expectations. Results are available upon request.

Table 4, jointly with age.

Table 4: Results of OLS regressions on inflation expectations including inflation memory

	(1) Inf. memory		(2) Inf. memory and sentiment		(3) All variables	
Log of age	1.024	(0.674)	0.017	(0.663)	0.133	(0.664)
Remember high inf. periods	2.629***	(0.496)	3.100***	(0.484)	2.962***	(0.485)
Inf. memory x sentiment			-1.791***	(0.430)		
MCA (dim1) sentiment			-2.368***	(0.358)	-3.461***	(0.249)
MCA (dim1) trust			-0.994***	(0.370)	-0.889**	(0.368)
HH income shock					0.024	(0.525)
Affected by COVID-19:						
little					0.889*	(0.527)
somewhat					0.827	(0.612)
considerably					3.804***	(0.922)
Constant	7.703**	(3.146)	11.30***	(3.099)	9.769***	(3.166)
Observations	5074		5074		5074	
Adjusted R^2	0.088		0.168		0.171	

Notes: Unweighted OLS regressions. Standard errors in parentheses. Medium income, medium education and not being financially affected by COVID-19 are reference groups for income, education and COVID dummies. Country dummies and sociodemographic variables (as in baseline) included but omitted from table. MCA variables are continuous ranging from around -2.5 to +2.5 for sentiment and -3 to 1.3 for trust. Complete case analysis, except for income, where "don't know/no answer" is included as dummy.
* $p - value < 0.10$, ** $p - value < 0.05$, *** $p - value < 0.01$.
Source: OeNB Euro Survey wave 2020.

The coefficients on inflation memory are positive and highly significant in all three columns of Table 4. This is in line with our hypothesis that experiences of high inflation episodes in the past are associated with higher contemporary inflation expectations. It should be noted that including this dummy renders the coefficients on age insignificant, which suggests that it might be that inflation experience is fully driving the correlation between age and inflation expectations in our sample. We discuss some of the caveats of the subjective variable and its relationship with age in Appendix E and corresponding

regional and country-specific results in Appendix F.

We are also interested in how economic sentiment and experiences jointly affect inflation expectations: does inflation experience change the relationship between economic sentiment and inflation expectations? To investigate this, we add the interaction between sentiment and inflation experiences (column 2). The coefficient of this interaction is negative and significant, which is in line with our hypothesis that the effect of overall economic sentiment on inflation expectations is stronger for respondents that have experienced high inflation in their lives. Thus, respondents with inflation experiences seem to be even more prone to holding a strong supply-shock interpretation of the economy.

One question that is difficult to answer with our one-off survey is, whether respondents with inflation memory have a permanently higher level of inflation expectations (given the same level of economic optimism) or whether they also may "overreact" to negative economic news with stronger increases in expected inflation compared to other respondents. The latter would be bad news for central banks, as it implies that past crises might have decade-long negative implications for the anchoring of individuals' inflation expectations in current crises. The regressions shown in Appendix G suggest that this could be an issue. They show that even when controlling for the current perceived level of inflation, the interaction between sentiment and inflation memory remains significant. Thus, respondents with inflation memory seem to have higher inflation expectations given similar levels of economic optimism and perceived inflation.

Finally, we also add the financial and COVID-19 shock variables to the regression (last column of Table 4). We find that these variables are somewhat less significant once inflation memory is included, with the exception of the dummy for the most strongly affected people by COVID-19 which continues to be highly significant.

4.4   Robustness of the results

In this section, we investigate whether our results hold up for different ways of defining inflation expectations, i.e. for different dependent variables, and also when using somewhat different explanatory variables. As mentioned before, inflation expectations elicited from household surveys are usually characterized by a substantial bias compared to actual inflation and also compared to experts' forecasts. This bias in the mean and median of expectations is mostly driven by agents who expect very high levels of inflation. Indeed,

there seems to be a fraction in each population of numerically illiterate people who have problems interpreting numbers in percentage terms. These people very often report implausibly high (or low) numbers in expectations surveys when asked for percentage changes (D'Acunto et al., 2022). Thus, a natural start to check the robustness of our results is to exclude implausibly high and low numbers from the set of reported quantitative inflation expectations.

Table 5 shows the regression results for inflation expectations trimmed at the value of $\pm 25\%$ (in columns 1 and 2) and at $\pm 50\%$ (in columns 3 and 4). For both cases, the baseline specification (as in column 1 of Table 2) and the specification including inflation memory and sentiment variables (as in column 2 of Table 4) are shown. We can clearly see that the regression that excludes inflation expectations higher and lower than $\pm 50\%$ produces quite similar results to the baseline case where all expectations are included. This is little surprising as only about 2% of all observations are excluded by this restriction.[14] In contrast, in the specification that excludes all expectations higher and lower than $\pm 25\%$, which removes about 12% of all observations, the dummies for females and low income as well as the MCA trust variable are no longer significant, while the variable capturing the level of financial literacy of the respondents becomes positively significant – as already in some benchmark regressions. When interpreting these results, however, we have to bear in mind that trimming all inflation expectations above 25% is a quite strong adjustment of the dependent variable and therefore should be expected to have some effect on the results.

The two rightmost columns of Table 5 show the results for the regressions where the "no answer" category of the income question is treated as missing instead of including it as a separate category, i.e. we limit our sample to only complete cases. This reduces the number of observations by about 25%. Reassuringly, despite the substantial loss of cases, the central results of the baseline equation, in particular concerning the effect of age, gender, income, inflation memory and sentiment on inflation expectations persist. For a further discussion of issues related to missing observations of the dependent and/or other variables, see Appendix C.

An alternative way of eliciting inflation expectations in consumer surveys is to ask about the expected change in prices or the price level in a qualitative way. In addition to the quantitative question, the OeNB Euro Survey also asks whether respondents expect

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[14]There are no inflation expectations smaller than -50% in our data.

Table 5: Regression results with trimmed inflation expectations and complete case analysis

| | trimmed at $\pm 25\%$ | | trimmed at $\pm 50\%$ | | complete case analysis | |
	Baseline	Inf. memory + sentiment	Baseline	Inf. memory + sentiment	Baseline	Inf. memory + sentiment
Log of age	1.258***	0.156	1.454***	-0.486	1.767***	-0.447
	(0.285)	(0.395)	(0.441)	(0.555)	(0.646)	(0.766)
Female	-0.090	-0.076	0.453*	0.686**	1.350***	1.501***
	(0.188)	(0.214)	(0.274)	(0.299)	(0.395)	(0.441)
HH size in persons	-0.016	-0.029	0.219	0.138	0.299	0.195
	(0.085)	(0.097)	(0.137)	(0.157)	(0.223)	(0.241)
Income - no answer	-0.529	-0.770*	-0.823*	-0.856		
	(0.343)	(0.408)	(0.483)	(0.541)		
Income low	0.254	-0.123	1.102**	0.831	2.076***	1.308*
	(0.276)	(0.322)	(0.441)	(0.511)	(0.626)	(0.726)
Income high	-0.456*	-0.552*	-0.905**	-0.725*	-0.548	-0.580
	(0.267)	(0.304)	(0.386)	(0.429)	(0.555)	(0.569)
Low Education	-0.552*	-0.412	-0.983**	-0.585	-0.708	-1.464**
	(0.310)	(0.353)	(0.497)	(0.525)	(1.079)	(0.746)
High Education	0.065	0.040	-0.169	-0.199	-0.250	-0.212
	(0.251)	(0.287)	(0.373)	(0.407)	(0.537)	(0.604)
Financial literacy	0.776***	0.777***	0.495***	0.534***	0.406	0.560*
	(0.124)	(0.142)	(0.178)	(0.200)	(0.283)	(0.323)
Poor building cond.	0.546*	0.043	1.588***	0.574	1.309*	0.999
	(0.325)	(0.382)	(0.499)	(0.553)	(0.775)	(0.893)
Unemployed	-0.069	0.044	0.579	0.307	1.479*	0.982
	(0.292)	(0.339)	(0.469)	(0.526)	(0.874)	(0.913)
Remember high inf. periods		1.322***		2.311***		3.220***
		(0.295)		(0.393)		(0.545)
Inf. memory x sentiment		-0.797***		-1.211***		-1.496***
		(0.251)		(0.370)		(0.476)
MCA (dim1) sentiment		-1.698***		-2.542***		-2.361***
		(0.225)		(0.311)		(0.387)
MCA (dim1) trust		0.104		-0.285		-1.089**
		(0.156)		(0.233)		(0.439)
Constant	4.283***	8.382***	7.642***	13.633***	6.492**	11.921***
	(1.337)	(1.751)	(2.097)	(2.548)	(3.136)	(3.579)
Observations	6582	4519	7314	4989	5811	4009
Adjusted R^2	0.066	0.162	0.080	0.185	0.060	0.160

Notes: Unweighted OLS regressions. Standard errors in parentheses. Medium income and medium education are reference groups for income and education dummies. Country dummies included but omitted from table. MCA variables are continuous ranging from around -2.5 to +2.5 for sentiment and -3 to 1.3 for trust. * $p - value < 0.10$, ** $p - value < 0.05$, *** $p - value < 0.01$.
Source: OeNB Euro Survey wave 2020.

Table 6: Results of ordered probit regressions on qualitative inflation expectations

	Baseline		Inf. memory and sentiment	
Log of age	0.267***	(0.053)	0.073	(0.059)
Female	0.038	(0.034)	0.062*	(0.036)
Size of HH	0.032**	(0.015)	0.029*	(0.015)
Income - no answer	-0.126**	(0.060)	-0.159***	(0.060)
Income low	0.059	(0.051)	0.036	(0.051)
Income high	-0.116**	(0.047)	-0.092*	(0.048)
Low Education	-0.119**	(0.057)	-0.045	(0.058)
High Education	0.023	(0.044)	0.051	(0.044)
Financial literacy	0.170***	(0.023)	0.161***	(0.023)
Poor building cond.	0.264***	(0.063)	0.158**	(0.062)
Unemployed	0.069	(0.054)	0.046	(0.058)
Remember high inf. periods			0.244***	(0.044)
Inf. memory x sentiment			-0.123***	(0.040)
MCA (dim1) sentiment			-0.332***	(0.037)
MCA (dim1) trust			-0.032	(0.025)
Observations	5074		5074	
Pseudo R^2	0.044		0.105	

Notes: Ordered probit regressions on qualitative inflation expectations (with higher values indicating stronger expected increase in prices). Standard errors in parentheses. Medium income and medium education are reference groups for income and education dummies. Country dummies included but omitted from table. MCA variables are continuous ranging from around -2.5 to +2.5 for sentiment and -3 to 1.3 for trust. * $p-value < 0.10$, ** $p-value < 0.05$, *** $p-value < 0.01$.
Source: OeNB Euro Survey wave 2020.

prices on average over the next 12 months to "increase a lot", "increase a little", "remain constant", "decrease a little" or "decrease a lot". This question has the advantage that only about 6% of the respondents drop out – compared to more than 16% in the case of the quantitative question – but we cannot directly infer a numerical value from these responses. Nevertheless, we can exploit the ordering of response categories (from "increase a lot" as highest to "decrease a lot" as lowest) to run ordered multinomial regressions. Specifically, we run an ordered probit model on the qualitative inflation expectations variable including the same explanatory variables as before. The results for the baseline specification and the specification including inflation memory and sentiment variables are shown in Table 6.

Apart from the fact that the size of the coefficients have a different interpretation now – the odds of moving to a higher category by a unit increase in the predictor – the results are quite similar to the benchmark case. One notable difference is that the unemployment dummy is no longer significant in these regressions and education as well as financial literacy are significantly and positively related to inflation expectations, but for all other variables we can confirm the main results of Tables 2 to 4.

Overall, our robustness analysis suggests that the results presented in the previous sections are quite robust with respect to different versions of the dependent variable, i.e. trimmed inflation expectations and using qualitative instead of quantitative expectations. They are also robust with respect to removing part of the sample to consider only complete cases for all variables.

5   Conclusions

Inflation expectations are a key indicator of monetary policy as they can be used to predict future inflation and they also affect the transmission of monetary policy through individuals' real interest rates. In this study, we show for the first time comparable survey data on quantitative inflation expectations for a large set of CESEE countries – including EU Candidates – collected in the OeNB Euro Survey wave in 2020.

We first characterize the collected data in terms of descriptive statistics and make a comparison with data from other surveys on Western EU countries that used the same survey question. We find that in Q3 2020 mean and median inflation expectations as well as the differences with realized inflation rates were higher in all CESEE countries

than in the Western EU countries. In regression analysis on our CESEE sample, we find similar results as the existing literature regarding the correlations between socioeconomic characteristics and inflation expectations: Relatively older and female respondents and those with lower income levels have higher inflation expectations than others.

In the main part of the paper, we study the role of economic sentiment and experiences for inflation expectations. We first include economic sentiment variables separately and document a particularly strong correlation between exchange rate and inflation expectations. To our knowledge, this has not been shown before and is an interesting avenue for further research, particularly in the cross-country setting of the OeNB Euro Survey. Given the high correlation between the sentiment variables and our primary interest in broad economic sentiment rather than specific variables, we then extract a common component from various economic sentiment variables included in the OeNB Euro Survey and use this component in regressions.

Despite employing a somewhat different methodology than previous papers, our results are in line with the established findings from the literature on large Western economies that inflation expectations are higher when respondents have negative views on the economy. Moreover, our approach suggests that economic sentiment can explain much more of the variation in inflation expectations than, for instance, socioeconomic characteristics.

One additional reason for creating a sentiment index is our interest in its interaction with experience variables. We report that both negative personal financial experiences and long-term inflation memory are correlated with higher inflation expectations, as has been documented with different methods in the literature for other countries. Regarding inflation memory, we use the relatively unique feature of the OeNB Euro Survey that we can proxy inflation memory both in an objective and subjective manner.

In addition, we show that the channel from negative personal financial experiences during the COVID-19 pandemic to inflation expectations does partly, but not exclusively run via differences in the level of economic sentiment. Which other factors play a role (e.g. potentially a higher attentiveness to price increases when financially constrained), is certainly an interesting potential topic for further research.

When interacting the economic sentiment variable with our inflation memory variable, we document that the relationship between economic sentiment and inflation expectations is stronger for individuals with experiences of high inflation. Tentative evidence from

regressions for the expected change in inflation suggest that respondents with crises memory might be more prone to a de-anchoring of their inflation expectations in times of worsening economic outcomes.

Despite making some important contributions, our paper has some caveats and leaves open several questions which can be avenues for future research. One major drawback of our data is that respondents cannot be tracked over time. This would be particularly interesting to perform a before- and after-COVID comparison and also to investigate how individual expectations evolve over time. Apart from this, some of the variables we are using are only imperfect proxies of what they should measure, for instance, the financial literacy variable or the variables capturing how strongly respondents haven been (economically) affected by the COVID-19 pandemic. Moreover, further research could be devoted to the cross-country differences, for instance, regarding the different exchange rate regimes and the link between expected inflation and exchange rate depreciation. Furthermore, the precise mechanisms behind the links between inflation expectations and other expectations, economic sentiment and experiences are still largely unexplored.

References

Abadie, A., Athey, S., Imbens, G. W., and Wooldridge, J. (2017). When should you adjust standard errors for clustering? NBER Working Paper 24003, National Bureau of Economic Research.

Andrade, P., Gautier, E., and Mengus, E. (2020). What matters in households' inflation expectations? Working papers 770, Banque de France.

Andre, P., Pizzinelli, C., Roth, C., and Wohlfart, J. (2019). Subjective models of the macroeconomy: Evidence from experts and representative samples. Cesifo Working Paper Series 7850, CESifo.

Arioli, R., Bates, C., Dieden, H., Duca, I., Friz, R., Gayer, C., Kenny, G., Meyler, A., and Pavlova, I. (2017). EU consumers' quantitative inflation perceptions and expectations: An evaluation. ECB Occasional Paper 186, ECB.

Armantier, O., Koşar, G., Pomerantz, R., Skandalis, D., Smith, K., Topa, G., and Van der Klaauw, W. (2021). How economic crises affect inflation beliefs: Evidence from the Covid-19 pandemic. *Journal of Economic Behavior & Organization*, 189:443–469.

Armantier, O., Topa, G., Van der Klaauw, W., and Zafar, B. (2017). An overview of the survey of consumer expectations. *Economic Policy Review*, (23-2):51–72.

Asselin, L.-M. (2009). *Analysis of multidimensional poverty: Theory and case studies*, volume 7. Springer Science & Business Media.

Bańkowska, K., Borlescu, A. M., Charalambakis, E., Dias Da Silva, A., Di Laurea, D., Dossche, M., Georgarakos, D., Honkkila, J., Kennedy, N., Kenny, G., Kolndrekaj, A., Meyer, J., Rusinova, D., Teppa, F., and Törmälehto, V.-M. (2021). ECB consumer expectations survey: An overview and first evaluation. ECB Occasional Paper Series No 287, European Central Bank.

Benkovskis, K. et al. (2008). The role of inflation expectations in the new EU member states: Consumer survey based results. *Czech Journal of Economics and Finance (Finance a Uver)*, 58(07-08):298–317.

Binder, C. (2017). Measuring uncertainty based on rounding: New method and application to inflation expectations. *Journal of Monetary Economics*, 90:1–12.

Binder, C. (2020). Coronavirus fears and macroeconomic expectations. *Review of Economics and Statistics*, 102(4):721–730.

Bruine de Bruin, W., Vanderklaauw, W., Downs, J. S., Fischhoff, B., Topa, G., and Armantier, O. (2010). Expectations of inflation: The role of demographic variables, expectation formation, and financial literacy. *Journal of Consumer Affairs*, 44(2):381–402.

Burke, M. A. and Manz, M. (2014). Economic literacy and inflation expectations: Evidence from a laboratory experiment. *Journal of Money, Credit and Banking*, 46(7):1421–1456.

Candia, B., Coibion, O., and Gorodnichenko, Y. (2020). Communication and the beliefs of economic agents. NBER Working Papers 27800, National Bureau of Economic Research.

Capistrán, C. and Timmermann, A. (2009). Disagreement and biases in inflation expectations. *Journal of Money, Credit and Banking*, 41(2/3):365–396.

Cato, M. and Schmidt, T. (2023). Households' expectations and regional COVID-19 dynamics. Discussion Papers 02/2023, Deutsche Bundesbank.

Christelis, D., Georgarakos, D., Jappelli, T., and van Rooijd, M. (2020). Trust in the central bank and inflation expectations. *International Journal of Central Banking*, 65:1–38.

Conrad, C., Enders, Z., and Glas, A. (2022). The role of information and experience for households' inflation expectations. *European Economic Review*, 143:104015.

Cox, N. (2019). Software update: Distribution function plots. *Stata Journal*, 19(1):260.

Detmers, G.-A., Ho, S.-J., and Karagedikli, Ö. (2022). Understanding consumer inflation expectations during the COVID-19 pandemic. *Australian Economic Review*, 55(1):141–154.

Dietrich, A. M., Kuester, K., Müller, G. J., and Schoenle, R. (2022). News and uncertainty about COVID-19: Survey evidence and short-run economic impact. *Journal of Monetary Economics*, 129, Supplement:S35–S51.

D'Acunto, F., Hoang, D., Paloviita, M., and Weber, M. (2022). IQ, expectations, and choice. *The Review of Economic Studies*, forthcoming.

D'Acunto, F., Malmendier, U., and Weber, M. (2021). Gender roles produce divergent economic expectations. Proceedings of the National Academy of Sciences 118/21.

Ehrmann, M., Pfajfar, D., and Santoro, E. (2017). Consumers' attitudes and their inflation expectations. *International Journal of Central Banking*, 13(1):225–259.

Fritzer, F. and Rumler, F. (2015). Determinants of inflation perceptions and expectations: An empirical analysis for Austria. *Monetary Policy and the Economy*, Q1/2015:11–26.

Gabriel, P., Rariga, J., and Varhegyi, J. (2014). Inflation expectations in Hungary. MNB Occasional Papers 113, Magyar Nemzeti Bank.

Greenacre, M. and Blasius, J. (2006). *Multiple correspondence analysis and related methods*. Chapman and Hall/CRC.

Greenacre, M. J. (1984). *Theory and applications of correspondence analysis*. London (UK) Academic Press.

Heckman, J. (1979). Sample selection bias as a specification error. *Econometrica*, 47:153–161.

Kamdar, R. (2019). The inattentive consumer: Sentiment and expectations. 2019 Meeting Papers 647, Society for Economic Dynamics.

Knotek, E. S., Schoenle, R., Dietrich, A., Kuester, K., Müller, G., Myrseth, K. O. R., and Weber, M. (2020). Consumers and COVID-19: A real-time survey. Economic Commentary 2020-08, Federal Reserve Bank of Cleveland.

Kolenikov, S. and Angeles, G. (2004). The use of discrete data in PCA: Theory, simulations, and applications to socioeconomic indices. *Chapel Hill: Carolina Population Center, University of North Carolina*, 20:1–59.

Kuchler, T. and Zafar, B. (2019). Personal experiences and expectations about aggregate outcomes. *The Journal of Finance*, 74(5):2491–2542.

Lolic, I. and Soric, P. (2017). Disentangling the relationship between news media and consumers' inflation sentiment: The case of Croatia. *Czech Journal of Economics and Finance (Finance a Uver)*, 67(3):221–249.

Malmendier, U. and Nagel, S. (2011). Depression babies: Do macroeconomic experiences affect risk taking? *The Quarterly Journal of Economics*, 126(1):373–416.

Malmendier, U. and Nagel, S. (2016). Learning from inflation experiences. *The Quarterly Journal of Economics*, 131(1):53–87.

Martin, V. (2020). Development of inflation expectations in Serbia and a comparative analysis. *Journal of Central Banking Theory and Practice*, 9(1):61–79.

Mellina, S. and Schmidt, T. (2018). The role of central bank knowledge and trust for the public's inflation expectations. Discussion Papers 32/2018, Deutsche Bundesbank.

Pop, R.-E. (2016). Consumer inflation expectations in CEE countries. *Journal of Economics Studies and Research*, 2016:f1–16.

Rumler, F. and Valderrama, M. T. (2020). Inflation literacy and inflation expectations: Evidence from Austrian household survey data. *Economic Modelling*, 87:8–23.

Scheiber, T. and Koch, M. (2022). Mitigating the impact of the pandemic on personal finances in CEESE: Descriptive evidence for 2020. *Focus on European Economic Integration*, (Q2/22):63–96.

Stanisławska, E. and Paloviita, M. (2021). Medium- vs. short-term consumer inflation expectations: Evidence from a new euro area survey. Working Paper 338, Narodowy Bank Polski, Economic Research Department.

Szyszko, M. and Rutkowska, A. (2019). Inflation expectations of European consumers after the crisis. Do macro variables drive expectations? *Eastern European Economics*, 57(4):271–294.

Tsiaplias, S. (2021). Consumer inflation expectations, income changes and economic downturns. *Journal of Applied Econometrics*, 36(6):784–807.

Van Buuren, S. (2018). *Flexible imputation of missing data.* CRC Press.

Van der Cruijsen, C., Jansen, D.-J., and de Haan, J. (2015). How much does the public know about the ECB's monetary policy? Evidence from a survey of Dutch households. *International Journal of Central Banking*, 11(4):169–218.

Weber, M., D'Acunto, F., Gorodnichenko, Y., and Coibion, O. (2022). The subjective inflation expectations of households and firms: Measurement, determinants, and consequences. *Journal of Economic Perspectives*, forthcoming.

Appendix A

Variable list and descriptive statistics

Table A1: Variable Definitions

Variable	Definition
12-months inflation expectations and perceptions	
qualitative expectations	"Looking ahead to 12 months from now, what do you think will happen to prices on average? (We are interested in even very small changes.) Prices will increase a lot, increase a little, be on average the same (that is 0 percent change), decrease a little, decrease a lot, don't know, no answer."
quantitative expectations	Respondents who answered increased (decreased) a lot/little, got the quantitative follow-up question: "How much higher (lower) do you think prices in general will be 12 months from now? (Please give your best guess of the change in percentage terms.)"
qualitative perceptions	As first above, but for price changes in general over the past 12 months.
quantitative perceptions	As second above, but for price changes in general over the past 12 months.
socioeconomic variables	
Age	Age of respondent in years.
Female	Dummy variable that is 1 for female respondents and 0 for male respondents.
Household size	Number of household members permanently living in the household, including household members that are temporarily absent (e.g. students).
Income (low, medium, high, no answer)	Dummy variables that take the value 1 for each net household income tercile (low, medium, high) by country. Sample values are used to construct terciles. For those respondents who did not give an answer, an additional dummy variable is defined (income - no answer).
Education (low, medium, high)	Three dummy variables that take the value 1 if the respondent has low/medium/high education, respectively. The classification controls for different national education systems and is harmonized across countries.
Financial literacy	Categorical variable ranging from 0 to 3 depending on the number of correct answers to the three financial literacy questions concerning the respondents' understanding of 1) interest rates, 2) inflation, 3) exchange rate depreciation. "Don't know" responses are counted as incorrect answers, "No answer" responses missing.

Table A1: Variable Definitions

Variable	Definition
Condition of residence: poor	Dummy variable defined by interviewer based on the answer to the following question "Could you describe the condition of the dwelling? Excellent and well maintained; good, needs some minor repairs; poor, needs major work; very poor, some walls, ceilings need replacement." Categories "poor, needs major work" and "very poor, some walls, ceilings need replacement" defined as 1, else 0.
Unemployed	Dummy variable that is 1 if respondent is unemployed.
Muslim	Dummy variable that is 1 for respondents that stated that they are muslim (mostly relevant in Bosnia and Herzegovina, North Macedonia and, to a lesser extent, in Bulgaria).
Other expectations and trust variables	
Economic situation improve	Dummy that is 1 if the respondent answers strongly agree, agree or somewhat agree to the question: "Over the next five years, the economic situation of [my country] will improve." Zero if respondent answers strongly disagree, disagree or somewhat disagree.
Local currency stable	Defined as economic situation of country, but for question: "Over the next five years, the [local currency] will be very stable and trustworthy."
Local currency to depreciate	Dummy that is 1 if the respondent noted that over the next 5 years he/she expects the value of the local currency vis-a-vis the euro to depreciate - rather than appreciate or stay unchanged.
Stable financial system	Defined as economic situation of country, but for question: "Currently, banks and the financial system are stable in [my country]."
Financial situation of household improve	Defined equivalently to economic situation of country but for the question: "Over the next 12 months, I expect the financial situation of my household to get better."
Trust in government	Dummy variable based on the following question "Please tell me how much trust you have in the following institutions: (government...). For each of the institutions, please tell me if you tend to trust it or tend not to trust it." 1 means "I trust completely", 2 means "I somewhat trust", 3 means "I neither trust nor distrust", 4 means "I somewhat distrust" and 5 means "I do not trust at all". Answers 1 and 2 are coded as 1, answers 3 to 5 as zero.
Trust in police	As above, applied to police.
Trust in central bank	As above, applied to central bank.
Trust in domestic banks	As above, applied to domestic banks.
Trust in foreign banks	As above, applied to foreign banks.
Trust in ECB	As above, applied to ECB.
Trust in EU	As above, applied to EU.

Table A1: Variable Definitions

Variable	Definition
MCA (dim 1) sentiment	Rowscores of the first dimension/axis resulting from a Multiple Correspondence Analysis (MCA) on the five expectations/sentiment variables listed above in their original coding ranging from 1 (strongly agree) to 6 (strongly disagree) and 1 (lose value) to 3 (gain value), respectively.
MCA (dim 2) sentiment	Rowscores of the second dimension of the MCA discussed above.
MCA (dim 1) trust	Rowscores of the first dimension resulting from an MCA on seven institutional trust variables in their original coding ranging from 1 (trust completely) to 5 (do not trust at all). Institutions included are: government, police, central bank, domestic banks, foreign banks, ECB, EU.
MCA (dim 2) trust	Rowscores of the second dimension of the MCA discussed above.
Inflation memory	Dummy variable that is 1 if the respondent answered "strongly agree", "agree" or "somewhat agree" to the statement: "I remember periods of high inflation during which the value of the [local currency] dropped sharply."
Shock variables	
Income shock	Dummy variable that is 1 if the respondent answered "yes" to the question: "Did your household experience an unexpected significant reduction of its income over the past 12 months?"
COVID-19 affectedness	Categorical variable ranging from 0 to 3 depending on the number of items the respondent mentioned in response to the following question "If you think about your economic and financial situation, since the outbreak of the Corona crisis have you been affected in any of the following ways?" ("I had to reduce the amount spent on everyday expenses, reduce or postpone larger expenditures, reduce money set aside for savings, reduce help to friends or relatives whom I helped before, utilize savings or sold possessions, take out a loan from a bank, over-draft bank account, borrow money from family and friends or from another source, delay payment of rent or other bills, receive social benefits or other financial aid from the state, decrease work hours and receive a reduced salary, I was laid off from a job, I was forced to move." Categories are: not affected (0 items), little affected (1-2 items), somewhat affected (3-4 items), considerably affected (5 or more items).

The whole questionnaire of the 2020 wave is available on the OeNB website: OeNB Euro Survey Questionnaire Wave 2020

Table A2: Summary statistics of the variables used in the analysis

	All available observations			Sample with complete cases		
	Mean	Median	Obs.	Mean	Median	Obs.
Inflation expectations	12.3	10.0	7597	11.9	10.0	4941
Inflation perceptions	13.5	10.0	7973	13.2	10.0	4941
Age (years)	47.5	47.0	9067	47.4	47.0	4941
Female dummy (0/1)	0.5	1	9071	0.5	1	4941
Size of HH	2.8	3.0	9063	2.9	3.0	4941
Income - no answer (0/1)	0.25	0	9071	0.21	0	4941
Low income (0/1)	0.24	0	9071	0.22	0	4941
Medium income (0/1)	0.26	0	9071	0.29	0	4941
High income (0/1)	0.24	0	9071	0.28	0	4941
Low education (0/1)	0.13	0	9064	0.11	0	4941
Medium education (0/1)	0.69	1	9064	0.69	1	4941
High education (0/1)	0.18	0	9064	0.20	0	4941
Financial Literacy (0/3)	1.8	2.0	8925	1.9	2.0	4941
Poor building condition (0/1)	0.1	0	9071	0.1	0	4941
Unemployed dummy (0/1)	0.1	0	9000	0.1	0	4941
Econ. sit. of country improve (1/6)	3.8	4.0	8541	3.7	4.0	4941
Exchange rate stable (1/6)	3.6	4.0	8155	3.6	4.0	4941
Currency to depreciate (0/1)	0.5	0	7938	0.5	1	4941
Fin. system currently stable (1/6)	3.0	3.0	8592	3.0	3.0	4941
Fin. sit. of HH improve (1/6)	3.7	4.0	8257	3.6	3.0	4941
Trust in government (1/5)	3.4	3.0	8883	3.4	3.0	4941
Trust in police (1/5)	2.8	3.0	8910	2.8	3.0	4941
Trust in central bank (1/5)	2.8	3.0	8670	2.8	3.0	4941
Trust in domestic banks (1/5)	2.8	3.0	8816	2.8	3.0	4941
Trust in foreign banks (1/5)	3.0	3.0	8685	2.9	3.0	4941
Trust in ECB (1/5)	2.9	3.0	8155	2.8	3.0	4941
Trust in EU (1/5)	2.9	3.0	8812	2.8	3.0	4941
MCA (dim1) sentiment	0.00	0.04	6653	0.03	0.06	4941
MCA (dim2) sentiment	0.00	-0.18	6653	-0.00	-0.19	4941
MCA (dim1) trust	0.00	0.25	7830	0.02	0.26	4941
MCA (dim2) trust	0.00	-0.10	7830	0.06	-0.05	4941
Inflation memory (0/1)	0.62	1	8276	0.61	1	4941
HH income shock (0/1)	0.29	0	8760	0.28	0	4941
COVID-19: not affected (0/1)	0.31	0	9042	0.30	0	4941
COVID-19: little affected (0/1)	0.31	0	9042	0.30	0	4941
COVID-19: somewhat affected (0/1)	0.23	0	9042	0.24	0	4941
COVID-19: considerably affected (0/1)	0.16	0	9042	0.16	0	4941

Notes: Unweighted data. Complete case sample includes observations without missing cases for any of the variables. Variables include perceived inflation (see Appendix G) and therefore sample differs from that in main regressions. MCA variables are continuous ranging from -2.5 to +2.5 for sentiment and -3 to 1.3 for trust.
Source: OeNB Euro Survey wave 2020.

Figure A1: Histogram of inflation expectations (pooled)

Source: OeNB Euro Survey wave 2020. Expected inflation >100% (3 observations) cut off.
Bin width is 1.
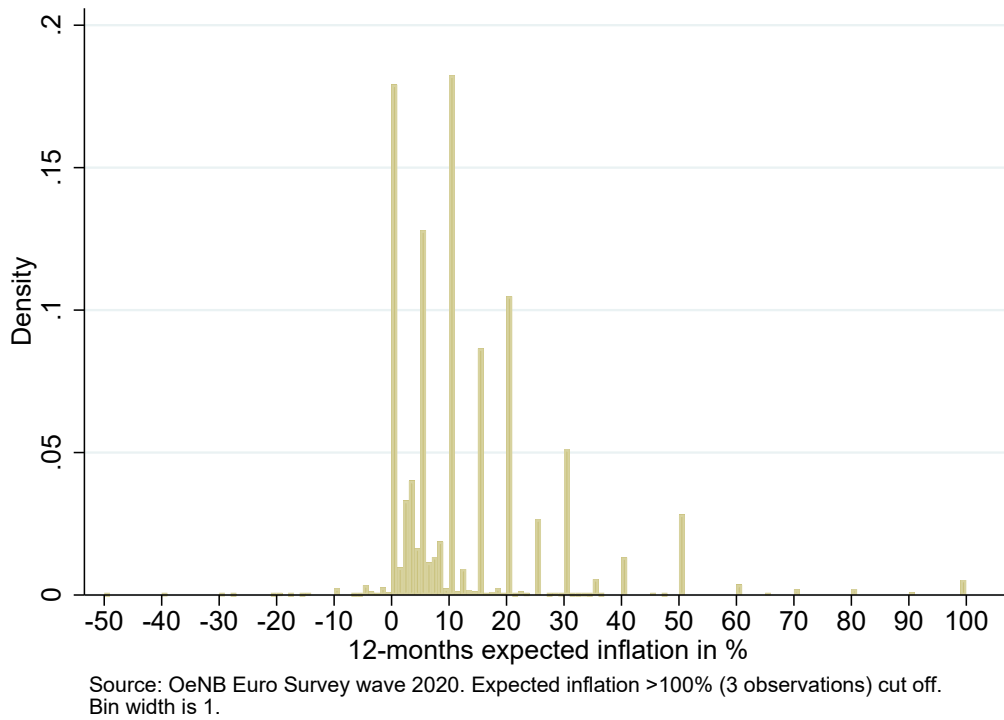
Appendix B

Inflation expectations and perceptions from the OeNB Euro Survey and comparable surveys

This Appendix briefly discusses and shows some descriptive evidence on both macroeconomic inflation data for the countries considered as well as data collected in the wave 2020 of the OeNB Euro Survey. It also contrasts the data we collected with survey data for other EU countries from the ECB Consumer Expectations Survey (CES).

The countries in our sample had rather diverse inflation records over the past 30 years. Figure B2 illustrates this. Most countries experienced high inflation periods in the 1990s – these periods had different lengths and inflation peaked at different levels. The highest annual figures over the period were recorded in Bulgaria (1,300% year-on-year in 1997)

and Croatia (1,400% year-on-year in 1993). In Romania and Serbia, high inflation was most persistent and decelerated slowly: annual inflation in Serbia had two peaks, one in 1996 and one in 2001, both around 130% year-on-year. In Romania inflation peaked at around 170% in mid-1997, but took some time to decelerate.

On the moderate side, Czechia stands out with the lowest average inflation in the period 1993-1998 and low and stable inflation since then. Moreover, in all countries inflation stabilized and was low or moderate in the past 20 years and in many countries on a declining path until 2019/20.

Figure B2: Inflation rates in CESEE in different time periods

Average HICP - CESEE-EU
% yoy

273.3   294.1   116.4
11.3   21.0   23.8

BG   HR   CZ   HU   PL   RO

■ 1993-1998   ■ 1999-2002   ■ 2003-2006
■ 2007-2010   ■ 2011-2014   ■ 2015-2019
■ 2020-2021

Source: Eurostat. Note: Period 1993-1998 CPI inflation.

Average CPI - CESEE-EUC
% yoy

57.9   59.7
29.8
15.7

BA   MK   RS

■ 1993-1998   ■ 1999-2002   ■ 2003-2006
■ 2007-2010   ■ 2011-2014   ■ 2015-2019
■ 2020-2021

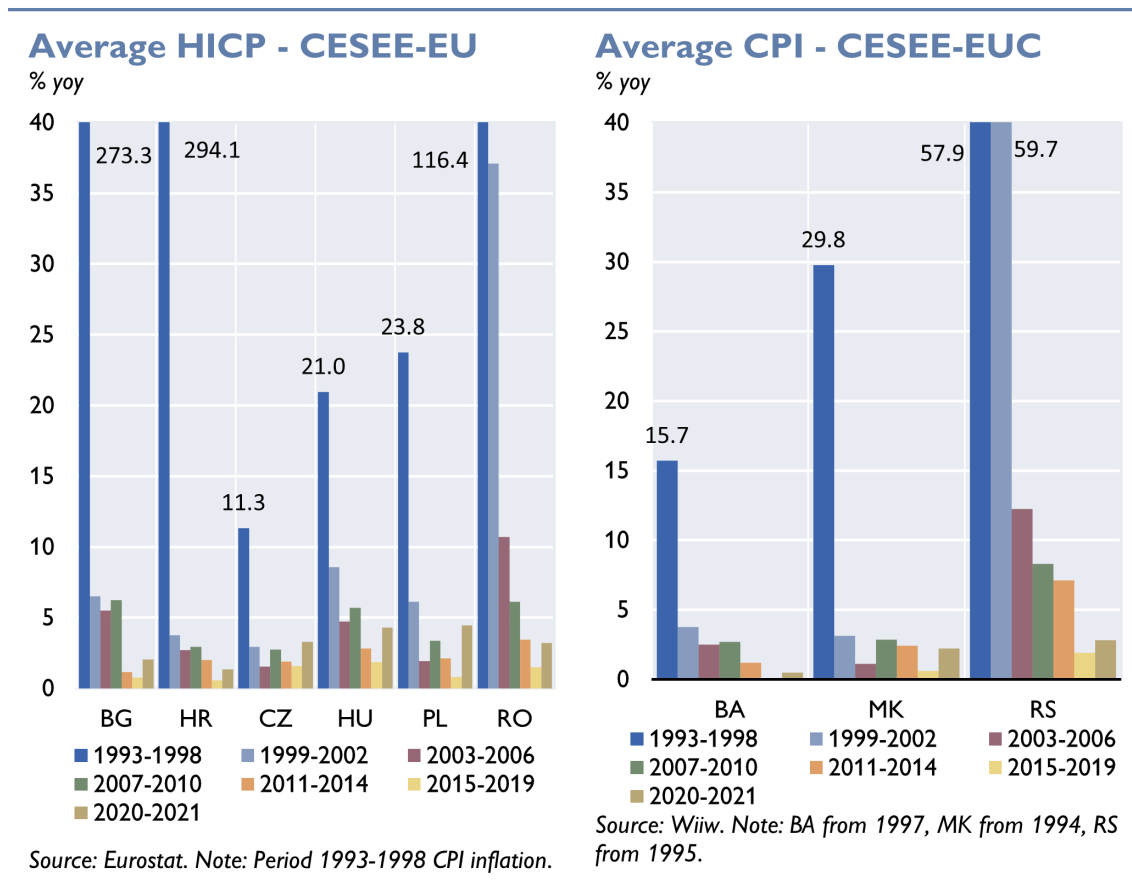*Source: Wiiw. Note: BA from 1997, MK from 1994, RS from 1995.*

Figure B3 shows monthly inflation from 2019 to 2021. In the period September-November 2020, when the OeNB Euro Survey was in the field, Croatia and Bosnia and Herzegovina

were reporting deflation, while all other countries reported inflation ranging from a low of 0.5% y-o-y in Bulgaria to already more elevated levels above 3% in Poland, Czechia and Hungary. Compared to the same period one year before, inflation had decelerated in four countries (Bulgaria, Croatia, Romania and Bosnia and Herzegovina), remained roughly unchanged in three countries (Hungary, Czechia and Serbia) and had accelerated in two countries (Poland and North Macedonia). Between the field phase of the survey and end-2021, inflation had accelerated sharply across the region and annual inflation for 2021 ranged from 4.9% in North Macedonia to 8% in Poland.

Figure B3: Monthly inflation rates in CESEE 2019-2021

HICP - CESEE-EU
% yoy

HICP - CESEE-EUC
% yoy

Source: Eurostat.
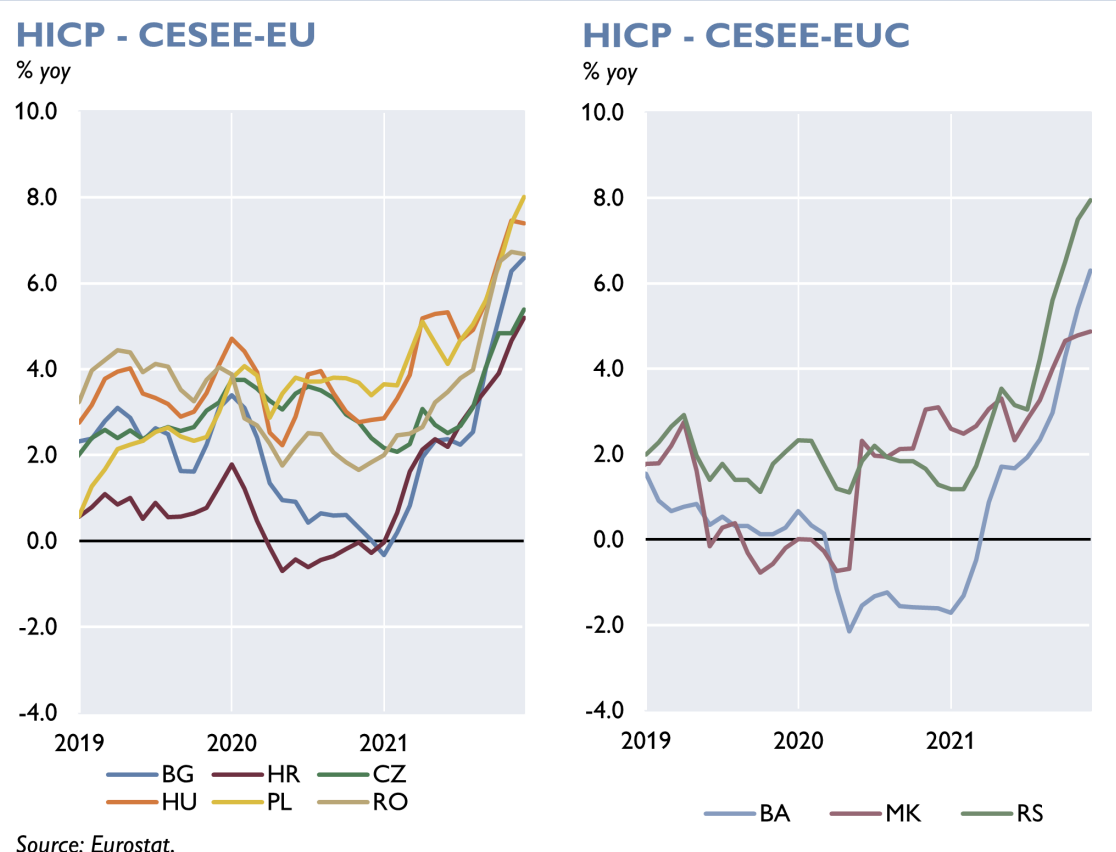
It should also be pointed out that not all of the countries in our sample pursue inflation targeting as their monetary policy strategy. The inflation targeting central banks are the

Czech (since 1998), the Polish (since 1999), the Hungarian (since 2001), the Romanian (since 2005) and the Serbian (since 2009) central bank. Bosnia and Herzegovina and Bulgaria have had currency board arrangements since 1997. At the time of the survey, Croatia (since 1993) and North Macedonia (since 1995) pursued exchange rate stability with the Euro (and previously Deutsche Mark). Both Croatia and Bulgaria have been participating in the European Exchange Rate Mechanism II since July 2020 and Croatia has adopted the euro as its national currency on 1 January 2023.

As Figure B4 illustrates, means of expectations and perceptions – even though they are calculated from winsorized data – are substantially higher than medians, which is due to the fact that some respondents report very high rates.[15] Overall, there are very few respondents that perceive/expect deflation (77 of 8,913 / 115 of 8,529 observations, respectively). Moreover, there is strong clustering of values that are multiples of 5, which is a common feature also in other surveys (Bańkowska et al., 2021; Binder, 2017). Almost 75 percent of respondents answered in multiples of 5 (including those that said that prices remained/will remain unchanged (0% inflation)). Figure A1 shows a histogram of pooled inflation expectations.
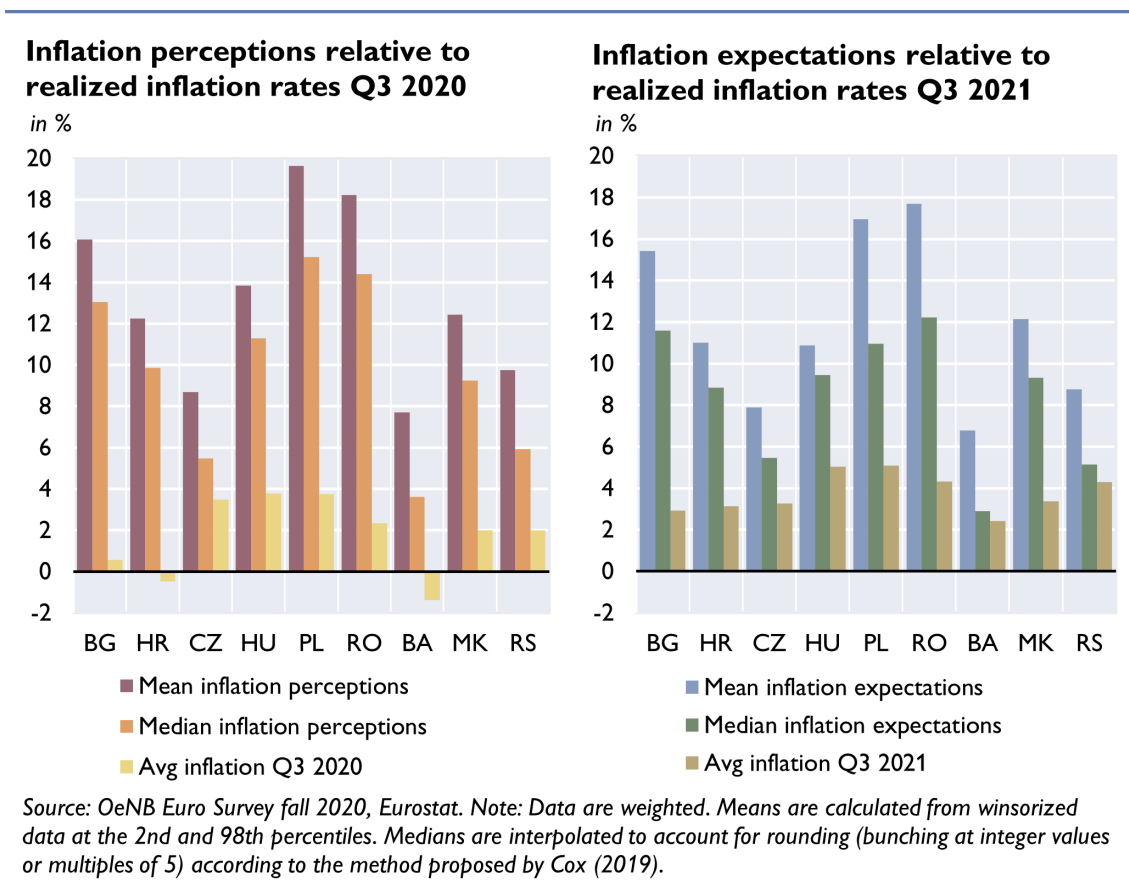
The countries with the largest differences between mean expectations and realized inflation (>10 percentage points difference) are Romania, Poland and Bulgaria, while the smallest difference was reported in Czechia, Bosnia and Herzegovina and Serbia (with approximately 4.5 percentage points).[16] Results are relatively similar for inflation perceptions. Appendix G also briefly discusses descriptive statistics of the expected changes in inflation, i.e. the difference between expected inflation in 1 year and current perceived inflation.

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[15]For better presentability and comparability with other surveys, the means shown in Figure B4 are calculated from winsorized data at the 2nd and 98th percentiles and medians are interpolated according to the method of Cox (2019) to account for bunching at integer values and multiples of 5.

[16]Since most interviews for the Euro Survey (around 95%) have been conducted in October 2020, we compare the resulting inflation perceptions with the realized inflation rate in Q3 2020, which is the average year-on-year inflation over the three months preceding the interviews. 1-year inflation expectations are compared with realized inflation one year later, i.e. average inflation in Q3 2021.

Figure B4: Inflation expectations and perceptions in the OeNB Euro Survey versus realized inflation

Inflation perceptions relative to realized inflation rates Q3 2020

in %

- Mean inflation perceptions
- Median inflation perceptions
- Avg inflation Q3 2020

Inflation expectations relative to realized inflation rates Q3 2021

in %

- Mean inflation expectations
- Median inflation expectations
- Avg inflation Q3 2021

Source: OeNB Euro Survey fall 2020, Eurostat. Note: Data are weighted. Means are calculated from winsorized data at the 2nd and 98th percentiles. Medians are interpolated to account for rounding (bunching at integer values or multiples of 5) according to the method proposed by Cox (2019).

To see whether inflation perceptions and expectations in CESEE countries are systematically different from other European countries, we compare the descriptive statistics elicited from the Euro Survey with perceptions and expectations for seven euro area countries obtained from the new Consumer Expectations Survey (CES) of the ECB and from the OeNB Barometer (for Austria). The CES is an internet survey conducted by the ECB since April 2020 at monthly frequency for the six largest euro area countries (Germany, France, Italy, Spain, Netherlands and Belgium).[17] Aggregate indicators, including winsorized means and interpolated medians of inflation perceptions and expectations, are publicly available for these six countries. The OeNB Barometer is a survey among 1,400 Austrian

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[17]For more information on the Consumer Expectations Survey of the ECB, see the website.

households conducted bi-annually by the OeNB. All three surveys, the Euro Survey, the CES and the OeNB Barometer, include almost identical questions on qualitative and quantitative inflation perceptions and short-run (12 months ahead) inflation expectations. To ensure a consistent comparison also in terms of timing, we choose the results from the CES round in October 2020 to be compared with the Euro Survey which was also predominantly conducted in October 2020. For the OeNB Barometer, which was conducted in late spring (May to beginning of July) 2020, the timing is somewhat different.
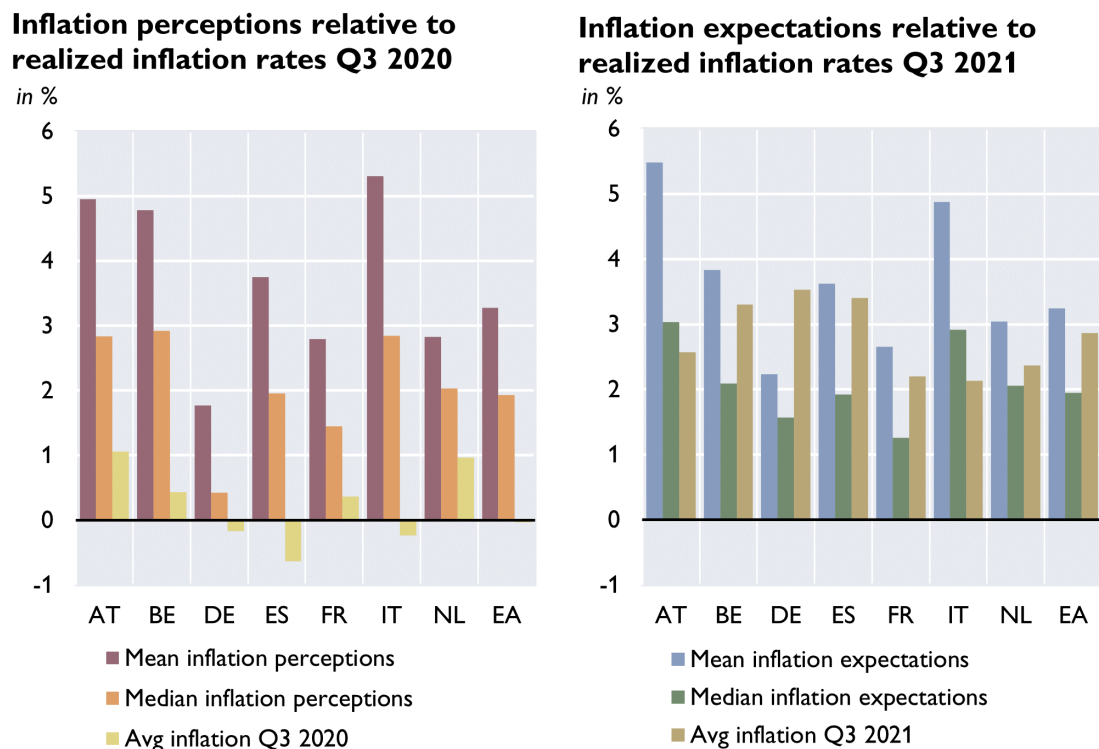
Figure B5 shows mean and median inflation perceptions along with realized inflation in Q3 2020 (left panel) and 12-months inflation expectations together with realized inflation one year later (right panel) for Austria and the six euro area countries included in the CES plus the euro area aggregate based on these countries. Note that for Austria the realized inflation raters refer to Q2 2020 in the left panel and Q2 2021 in the right panel as the survey was already conducted in spring 2020. For euro area countries, 1-year inflation expectations are quite close to ex-post realized inflation rates (most medians are even smaller), but this more likely reflects a surprise increase in inflation during 2021 than a possible reversal of the expectations bias.

Comparing Figures B4 and B5 we see that perceived and expected inflation rates – both in terms of means and medians – tend to be consistently lower in euro area than in CESEE countries. For some countries such as Czechia, Hungary, Poland and Romania this is partly explained by higher realized inflation rates than in the euro area (in particular in 2020) but the perception and expectations bias, i.e. the deviation of perceptions and expectations from realized inflation, is still much higher in the CESEE countries. Similar results are obtained by Arioli et al. (2017), with the average inflation expectations and perceptions calculated from the quantitative expectations in the European Commission's Consumer Survey from January 2004 to July 2015.[18] They also show that the CESEE-EU countries have much higher differences between realized inflation and perceived/expected inflation than the six largest euro area countries and Austria.

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[18]The quantitative inflation expectations in the EC Consumer Survey are considered "experimental" data and are thus not publicly available.

Figure B5: Inflation expectations and perceptions of euro area countries versus realized inflation

Inflation perceptions relative to realized inflation rates Q3 2020

in %

Inflation expectations relative to realized inflation rates Q3 2021

in %

■ Mean inflation perceptions
■ Median inflation perceptions
■ Avg inflation Q3 2020

■ Mean inflation expectations
■ Median inflation expectations
■ Avg inflation Q3 2021

Source: CES of the ECB (Oct 2020), OeNB Baromter (spring 2020), Eurostat. Note: Data are weighted. Means are calculated from winsorized data at the 2nd and 98th percentiles. Medians are interpolated to account for rounding (bunching at integer values or multiples of 5) according to the method proposed by Cox (2019).

Appendix C

Analysis of missing data

Given that expectation questions are among those in our survey with the highest non-response rate (jointly with income), we dedicate this section to the discussion of potential consequences. Generally speaking, missing item responses or completely missing responses can cause two major concerns: a potential loss in efficiency of estimates and, more severely, a potential bias in estimates. Firstly, if too much data are missing, then coefficients that

should be significant might become insignificant due to a lack of statistical power. Secondly, if data are not missing completely at random (MCAR), then the statistical inference we draw may not be representative for the full population.

Appendix A and the regression tables in the main text show that in the model including all regressors we lose half of our sample with complete case analysis (for all variables except income). One best-practise way to deal with missing data in surveys are multiple imputation techniques. However, these techniques work only if data are missing at random (MAR) or completely at random (MCAR). MAR implies that the probability of whether a variable is missing is related to the covariates in the model of analysis, but not to the values of the missing variable itself. In practical terms, we would need a set of variables that are strong predictors of the distribution and the likelihood of being missing of the variable that needs to be imputed. Otherwise imputation can cause more harm than good (Van Buuren, 2018). With expectation variables and our data set it seems unlikely that the necessary conditions for imputation are fulfilled and more likely that data are missing not at random (MNAR). Expectations are likely shaped by a variety of factors (IQ, culture, experiences, etc.) that we cannot adequately capture even when using all available paradata for the OeNB Euro Survey to impute.

Nonetheless, we can at least study the missingness in the outcome variable in some more detail to see which observable characteristics are correlated with non-response. In our sample, we do not observe quantitative inflation expectations for 15% of the respondents. When running t-tests and Pearson chi-squared tests on the socioeconomic variables, we find that for the majority of variables the means/shares differ significantly between respondents that did and did not answer the quantitative inflation question.[19]

We run a probit regression on a dummy that takes the value 1 if the respondent answered the quantitative inflation question and 0 otherwise. The regression shows that respondents that are female, have lower income (or refused to answer the income question), lower education and lower financial literacy are significantly less likely to answer the quantitative inflation question than other respondents.

One could think of the missing values as a form of selection bias, in the sense that part of the data are missing due to observable and unobservable characteristics of the respondent that make him/her unwilling or unable to provide quantitative inflation estimates. Heckman

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[19]Exceptions, where the difference in means/shares are not significantly different from zero are age, the low income dummy and the unemployment dummy.

([1979](#)) selection models can potentially address missing data in the outcome variable if there is an identifying variable available that influences whether inflation expectations are observed, but not the level of inflation expectations. We tried different paradata as potential identifying variables: a dummy variable, whether the respondent was apprehensive before the survey, all interviewer characteristics, duration of the interview and share of questions the respondent did not answer. None turned out to be suitable as identifying variables.[20] We interpret this as further confirmation that expectations data are rather complex and likely MNAR in our sample.

More generally, we conclude that respondents, who did not answer the inflation expectations question are likely different from other respondents in terms of observed and unobserved characteristics. Despite the fact that the OeNB Euro Survey aims to be representative for the populations in the surveyed countries, our results may only be valid for the subset of individuals which have given complete answers to the survey questions of interest. Thus, we cannot tell with precision to what extent the results can be generalized to the broader population.

Appendix D

Measuring economic sentiment/optimism with OeNB Euro Survey data

This section compares different approaches to measuring economic sentiment with OeNB Euro Survey data and shows that the results of the main text are robust to the choice of measure. Moreover, it provides evidence on summary statistics for groups of economically optimistic and pessimistic respondents.

We use a number of variables that might give us an idea of the respondents' economic sentiment. We use four variables coded on a scale from 1 (strongly agree) to 6 (strongly disagree): the expectation of the economic situation and the stability of the local exchange rate five years ahead, the financial situation of the household in one year, and views regarding the current stability of the financial system. We also use the question which asks whether the value of the local currency vis-à-vis the euro will increase, decrease or stay the

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[20]Results are available upon request.

same over the next 5 years. Moreover, we use variables regarding trust in the following institutions: the government, the police, the central bank, foreign banks, domestic banks, the EU and the ECB. These are coded on a scale from 1 (trust completely) to 5 (do not trust at all) – for more details on the questions see Appendix A.

This is a large set of potential explanatory variables that are closely correlated among each other. For instance, trust in the central bank has a correlation coefficient with other trust variables ranging from 50% to 73%. The correlation of the economic situation variable with the other similarly coded sentiment variables ranges from 30% to 50%. There is also a non-negligible correlation between trust and sentiment variables, with correlations from 22% to 42% between different trust and sentiment variables. Thus, including these variables jointly in a regression model could lead to multicollinearity issues. Moreover, in line with Kamdar (2019), we think that consumers current optimism or pessimism regarding the economic and financial situation is a key driver of the answers given on individual trust and sentiment questions. In addition, if we want to investigate interactions, e.g. between sentiment and inflation memory, we need to reduce the number of variables included in the analysis.

For this purpose, we choose to conduct a Multiple Correspondence Analysis (MCA). MCA is similar to Principal Component Analysis (PCA) in its aim to summarize the information contained in a large set of variables in few components (called "axes" or "dimensions" in MCA). While (standard) PCA is applied to continuous data, MCA was designed for categorical data.[21] We run the MCA on the Burt Matrix using standard normalization.

We run several different MCAs on our data. First, we run an MCA on all five economic sentiment variables. The results for the first two axes are visualized in Figure D6. The first axis explains 55% of the total inertia (roughly equivalent to total variation in PCA with continuous variables), while the second axis explains an additional 24%. The categories of the four identically coded sentiment variables are strongly clustered. The first axis seems to reflect the respondent's economic sentiment. Negative values seem to reflect pessimism as they contain the negative views regarding economic and financial variables, including the expectation of exchange rate depreciation. Positive values seem to indicate optimism. The

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[21]Some forms of PCA can be applied to categorical or mixed categorical and continuous datasets (Kolenikov and Angeles, 2004). Details regarding the workings and origins of MCA can be found, e.g., in Greenacre and Blasius (2006) or in Asselin (2009) with an application to poverty data.

second axis is harder to interpret. Overall, the categories show a horseshoe shape, which is quite common in MCA analysis and in itself has triggered quite a substantial body of research (Greenacre, 1984). In applications of MCA to survey data, the second axis often separates common from rarer categories. In MCA, the latter are located further away from the origin. In our case, rare categories are more extreme answers (strongly agree/disagree).

Figure D6: MCA Plot - economic sentiment variables
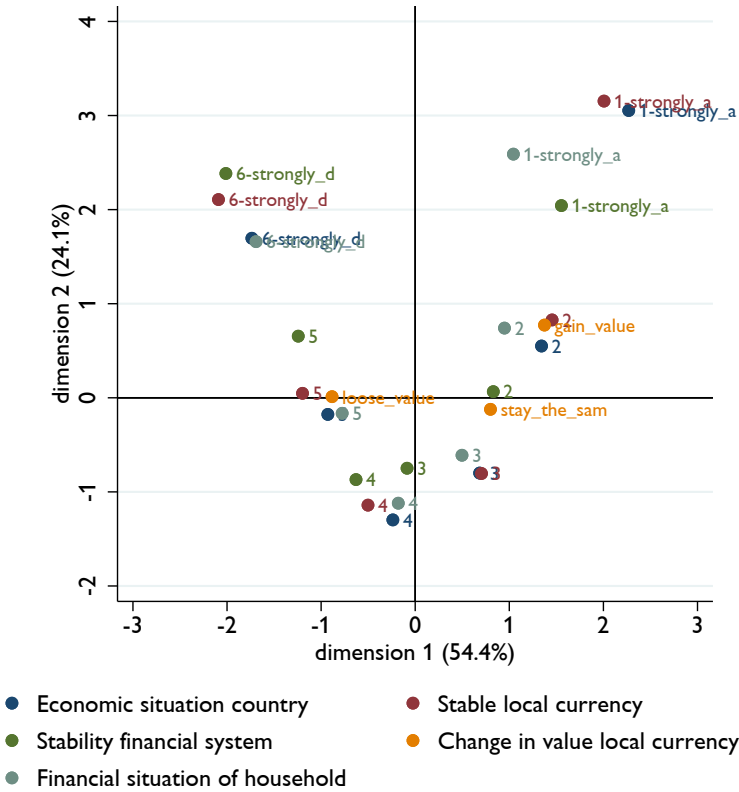
Note: Coordinates on first and second axes from MCA on five economic sentiment variables: four with an original coding from 1 (strongly agree) to 6 (strongly disagree), one (value of local currency) with three categories (lose value/ stay the same/ gain value). Points reflect categories of answers.

We also perform MCA on the various trust variables and results are shown in Figure D7. The share of inertia explained by the first and second dimension as well as the interpretation of the axes is relatively similar to the MCA on the sentiment variables. Given that the results look fairly similar and the positive correlation between trust and sentiment variables,

we also run an MCA on the trust and sentiment variables jointly. The results (available upon request) are again similar to those of the above two analyses.

Figure D7: MCA Plot - trust variables

Note: Coordinates on first and second axes from MCA on seven trust variables with categories from 1 (trust completely) to 5 (do not trust at all). Points on the grid reflect categories of answers.
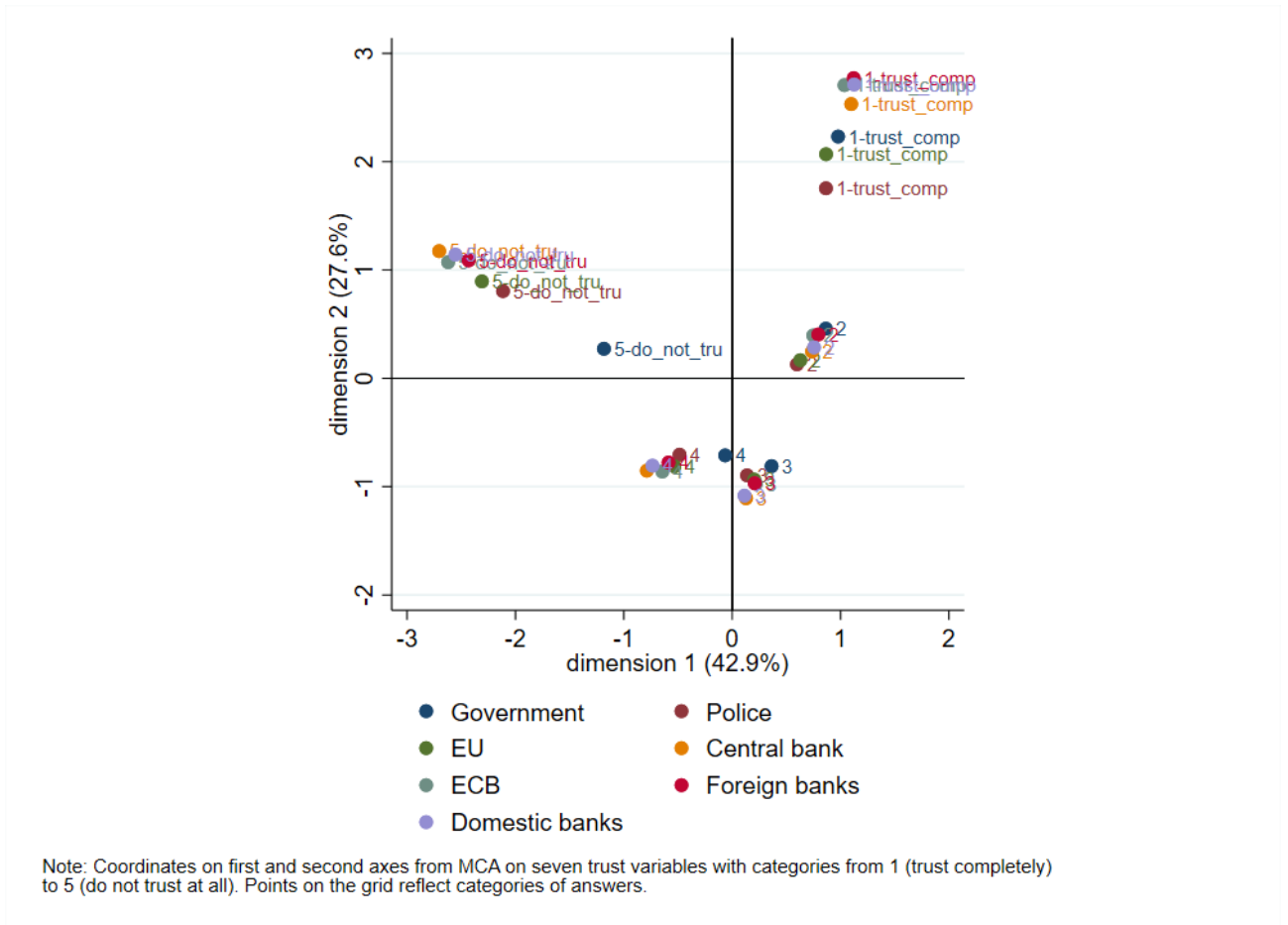
We calculate the rowscores for the first two dimensions of the three MCAs dicussed above and subsequently use them in the regressions reported in Table D3.

Table D3 presents estimation results using different ways of adding expectations and trust variables to the baseline regression presented in Table 2 in the main text. For comparability of the results, we keep the sample fixed. Column 1 adds expectations and trust variables separately as dummies. Column 2 includes only the first axis of the MCAs on sentiment and on trust, which can be more easily interpreted than the second axes.

Table D3: Results of OLS regressions on inflation expectations including different sentiment variables

	(1) Dummies		(2) MCA one dim.		(3) MCA two dim.		(4) MCA combined	
Econ. sit. improve	-2.75***	(0.53)						
Local curr. stable	-1.34***	(0.47)						
Local curr. depreciate	6.41***	(0.54)						
Stable fin. system	-0.80	(0.66)						
Fin. sit. of HH improve	0.13	(0.52)						
Trust in government	-1.18**	(0.48)						
Trust in police	-0.48	(0.54)						
Trust in CB	1.00*	(0.57)						
Trust domestic banks	0.05	(0.62)						
Trust foreign banks	-0.37	(0.66)						
Trust in ECB	-0.46	(0.57)						
Trust in EU	0.09	(0.52)						
MCA (dim1) sentiment			-3.46***	(0.25)	-3.69***	(0.26)		
MCA(dim2) sentiment					1.29***	(0.26)		
MCA (dim1) trust			-0.99***	(0.37)	-0.70*	(0.36)		
MCA (dim2) trust					0.24	(0.25)		
MCA(dim1) combined							-3.22***	(0.36)
MCA(dim2) combined							0.11	(0.28)
Constant	7.63**	(2.99)	7.49**	(3.06)	7.96***	(3.03)	5.19*	(3.04)
Observations	5074		5074		5074		5074	
Adjusted R^2	0.166		0.156		0.164		0.130	

Notes: Unweighted OLS regressions. Standard errors in parentheses. Country dummies and sociodemographic variables (as in baseline) included but omitted from table. MCA variables are continuous ranging from -2.5 to +2.5 for sentiment and -3 to 1.3 for trust. Complete case analysis, except for income, where "don't know/no answer" is included as dummy. * $p-value < 0.10$, ** $p-value < 0.05$, *** $p-value < 0.01$. Source: OeNB Euro Survey wave 2020.

Column 3 includes also the second axes of both MCAs. Finally, column 4 shows the results with the first and second dimension when trust and sentiment variables are included jointly in one MCA.

The main purpose of comparing these results is to justify the choice of the sentiment measure used in the main text. First, we notice that except for column 4, the adjusted R-squared is relatively similar across estimations. Thus, the MCA scores, particularly for the first dimension, explain roughly the same amount of variation in inflation expectations as the sentiment and expectations dummies included separately.[22] Thus, we conclude that the MCA scores condensing the information from the original variables work quite well in the regressions, while at the same time they can be more easily handled in interactions.

We decide to use only the first dimension of the MCAs in the regressions in the main text. This is mostly due to the fact that the second dimensions have no straightforward interpretation and they have only a small effect on R-squared and almost no effect on the size and significance of the baseline coefficients (not shown in the table). The combined MCA of sentiment and trust in column 4 has a noticeably lower R-squared, which is why we continue to run the MCA on trust and sentiment variables separately in the main text.

We considered running the MCAs separately for each country to allow country-specific relationships between variable categories. However, we decided to emphasize the dimension of the individual and thus psychological and personal components of economic sentiment and institutional trust over country-specific idiosyncrasies. Nonetheless we ran by-country MCAs for robustness and found that our central results hold also in this case.[23] We also ran an MCA using only domestic institutions (police, government, central bank, domestic banks) and find almost unaffected results.

Given that we have several hypotheses relating to economic sentiment, Table D4 shows the means for key explanatory variables for the group of people that are classified as optimistic (rowscore of MCA dimension 1 is larger than 0 – the median) or pessimistic as well as the p-value for the t-test on the difference in means. The table shows that besides

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[22]To keep the table readable, we do not show the results when including all sentiment and trust variables with their original codings instead of recoding them as dummies. The R-squared of this regression is higher, close to 0.2.

[23]Coefficient sizes vary to different extents when running by-country versus cross-country MCAs. The significance and sign of coefficients remains unchanged. The only exception is Bosnia and Herzegovina where the MCA on sentiment delivers reversed dimensions, meaning that the second instead of the first dimension of the MCA seems to capture optimism and pessimism. Results are available upon request.

Table D4: Characteristics of optimistic and pessimistic respondents

	Mean pessimistic	Mean optimistic	P-value (from t-test)
Inflation expectations	15.673	8.290	0.000
Age in years	48.281	46.604	0.000
Female	0.506	0.522	0.244
Size of HH	2.826	2.912	0.020
Income - no answer	0.201	0.219	0.116
Low income	0.241	0.206	0.003
Medium income	0.293	0.279	0.278
High income	0.266	0.296	0.015
Low education	0.096	0.121	0.006
Medium education	0.706	0.676	0.022
High education	0.197	0.203	0.638
Financial literacy	1.925	1.807	0.000
Poor building condition	0.103	0.076	0.001
Unemployed	0.134	0.137	0.777
Inflation memory	0.612	0.601	0.424
HH income shock	0.319	0.247	0.000
COVID: not affected	0.272	0.334	0.000
COVID: little affected	0.290	0.309	0.136
COVID: somewhat affected	0.250	0.222	0.021
COVID: considerably affected	0.188	0.135	0.000
Observations	2,448	2,626	

Notes: Unweighted data. Sample for complete case analysis (except for income). Respondents with MCA dimension 1 > 0 are shown as optimistic. Respondents with MCA dimension 1 ≤ 0 are shown as pessimistic. Last column contains the p-value from a t-test for significant differences between the means of each group. Source: OeNB Euro Survey wave 2020.

having much higher inflation expectations, pessimistic respondents are also significantly different from optimistic ones regarding a number of other characteristics. Pessimistic respondents are on average significantly:

- younger (by roughly 1.5 years),
- have lower income and a higher likelihood to live in a dwelling of poor condition,
- are more likely to have secondary rather than primary education and have somewhat higher financial literacy,
- are more likely to have experienced a recent income shock or to report having been financially affected by the COVID-19 pandemic (3 or more items from the list of COVID mitigating measures).

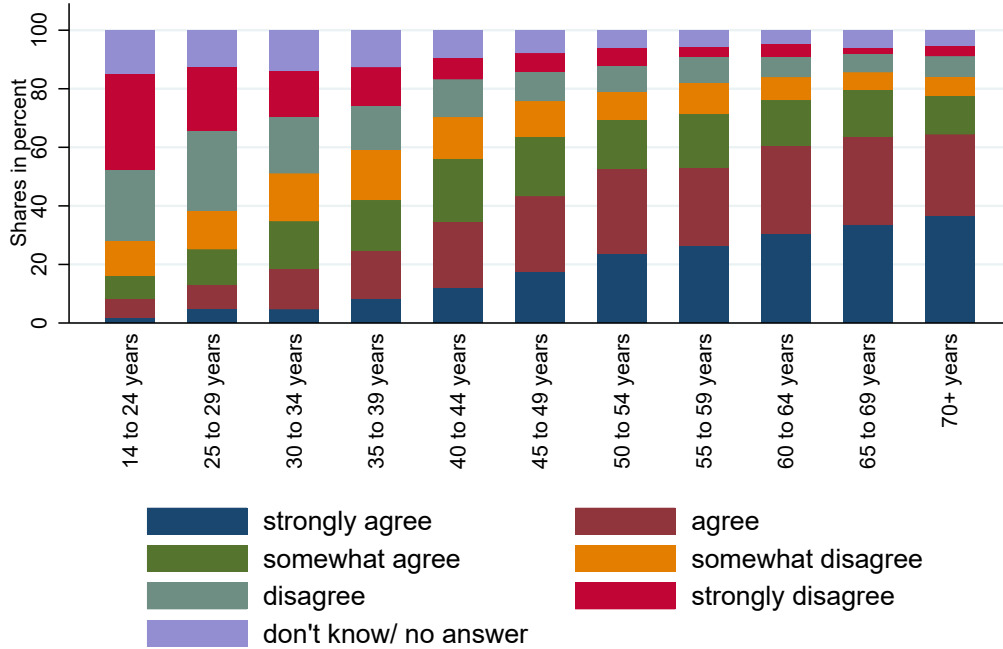## Appendix E

Inflation experience in OeNB Euro Survey data

The OeNB Euro Survey questionnaire of the 2020 wave contained a question on inflation memory. The question asks respondents for their assessment on a 6-point scale from "strongly agree" to "strongly disagree" regarding the statement: "I remember periods of high inflation during which the value of the [local currency] dropped sharply."

In the 2020 wave, 61% of respondents agreed with this statement. This is not surprising given that all countries went through periods of high inflation in the transition period in the 1990s. Figure E8 illustrates that the share of people agreeing to the statement increases with age. Only 15% of respondents younger than 25 state that they have a memory of high inflation – in the mid-1990s these respondents had not been born yet. Of respondents aged 70+, roughly 77% agree that they remember periods of high inflation.

On the one hand, this is quite a strong correlation with age which is re-assuring. On the other hand, one could wonder why in the lower age categories anybody claims to remember periods of high inflation and why some people do not remember high inflation periods in the older age groups. There are several possible explanations, some of which are, unfortunately, impossible to verify.

Regarding younger respondents, several possible explanations come to mind: First, after 20 years of very low inflation rates, for young people rising inflation in 2020 might

Figure E8: Age and subjective inflation memory

have already prompted them to state that they have experienced a high-inflation period. There is some weak evidence that this might be the case, as a t-test shows that, among respondents younger than 35, those with inflation memory have significantly higher means of inflation perceptions (+3.1 percentage points). Second, as the question text refers to "periods of high inflation, in which the value of the [local currency] dropped sharply", it mixes exchange rate volatility with inflation. So, there is a chance that respondents who have experienced periods of exchange rate depreciation, but not high inflation, might express agreement with the statement. Third, it is possible that respondents might feel like they "remember" crises that occurred before they were born or when they were very young. This could be the case if these crises are deeply entrenched in the collective memory of the country or the respondents' family.

On the other hand, we consider it less problematic if older respondents do not recall high inflation periods. The most likely explanation is that they disagree with part of the statement, maybe the adjectives "high" for inflation or "sharply" for depreciation or

a combination of the two. For three countries, the shares of respondents with inflation memory might be downward biased as our question asks for a drop in value of the current currency. This could have led to under-reporting of high inflation/currency depreciation periods in Czechia, Croatia and Bosnia and Herzegovina, where the current currencies were introduced in the mid-1990s. In fact, these three countries have the lowest shares of respondents older than 45 with inflation memory.

Given this discussion, our subjective inflation memory variable is clearly not without issues. Nonetheless, it is still interesting to study this subjective variable, as the existing literature on inflation experience tends to rely on constructed, inferred inflation memories. For instance, Malmendier and Nagel (2011) and, more recently, Conrad et al. (2022) calculate a measure of experienced lifetime inflation in their studies. In this approach, inflation experience is the weighted sum of inflation rates during the individual's lifetime. Weights diminish over time, so that earlier memories receive less weight than more recent memories.

For our sample, age seems like a good proxy for lifetime experienced inflation. First, before the mid-1990s reliable data for inflation are scarce. Moreover, in a calculation of lifetime experienced inflation with declining weights, the pre-1990s experience would likely receive little weight. From the mid-1990s, as Figure B2 shows, calculated inflation experience in our sample clearly would increase with age in all countries. Thus, a calculated inflation experience might not add much information to our regression beyond the information contained in age – especially because differences in means across countries are controlled for by the country dummies.

In fact, Table 4 shows that age becomes insignificant, once inflation memory is included in the regressions. As a robustness check, we also run regressions with age in categories (available upon request). We add age in 5-year intervals, setting the reference category to 30 to 34 years at the time of the interview. Coefficients for younger respondents are insignificant, while those for older respondents are all at least weakly significant and relatively similar – ranging from 1.38 for people aged 65 to 69 years to 1.97 for people aged 40 to 44 years. Thus, it appears that there is a relatively clear cut-off for the effect of age on inflation expectations that is consistent with the respondents' crises experience.

Appendix F

Country regressions

This Appendix shows the results of the baseline regression and the regression including all hypotheses both by individual countries and by regions. The regions are either EU Member States (CESEE-EU) versus EU Candidates (CESEE-EUC) or countries with an inflation targeting (IT) monetary policy regime versus those with a different monetary policy regime (Non-IT).

It should be noted that for some regressions, particularly those at the country level, the number of observations is quite low. For instance, in Table F5 only a few coefficients for socioeconomic characteristics are significant in each regression. However, it is noteworthy that while for some variables the significant coefficients have the same sign across countries (age, gender, household size, low income, building condition, unemployment), for some variables significant coefficients have opposite signs in different country regressions (education, financial literacy).

Table F6 shows that also across regions there are differences in the significance of coefficients, but mostly not in the sign of significant coefficients – except for household size. Only age is significant for all four regions. Generally, the regressions for IT countries and EU countries have more significant coefficients and a higher R-squared. This could be an indication that the countries in these groups are somewhat more homogeneous or that the included variables simply have more explanatory power in these groups than in the other two groups.

When adding additional variables discussed in the main text, we find for the country regressions that 1) inflation memory is significant in Hungary, Romania, Croatia, Bosnia and Herzegovina and North Macedonia. Moreover, age remains significant in Czechia, which was flagged as one of the countries with a potential measurement error in the inflation memory variable in Appendix E. The interaction of memory and economic sentiment is significant in Hungary, Romania and Serbia. Econonomic sentiment in general is at least weakly significant in all countries except Poland and Bosnia and Herzegovina. Trust in institutions is only significant in Poland, Hungary, Bosnia and Herzegovina and Serbia – interestingly, the coefficient has the opposite sign in Hungary. The income shock is weakly

significant in Hungary and Serbia – with opposite signs. Of the COVID-19 dummies, at least one is significant in Bulgaria, Bosnia and Herzegovina and Serbia (see Table F7).

Regarding regions, from Table F8 we can see that inflation memory is significant for all regions. Also, both economic sentiment and its interaction with memory have significant, negative coefficients. The coefficients on overall trust are negative and (weakly) significant for all regions except EU countries. Regarding shocks, the income shock is significant in all columns. So is the dummy for the group that has been affected most by COVID-19, while significance for the other dummies varies across regions. The R-squared is much higher in the regressions including these additional variables and ranges from 0.13 for non-IT countries to 0.21 for IT countries. Interestingly, the difference in R-squared between CESEE-EU and CESEE-EUC countries observed in Table F6 disappears once the additional variables are included.

Furthermore, to test the role of culture for expectation formation, we include a dummy for being muslim for those countries with at least 10% muslim respondents (Bulgaria, Bosnia and Herzegovina, North Macedonia). The coefficient is only negatively significant in North Macedonia.

Table F5: Baseline regression on quantitative inflation expectations by country

	(1) CZ	(2) PL	(3) HU	(4) RO	(5) BG	(6) HR	(7) BA	(8) RS	(9) MK
Log of age	4.84***	-1.16	-0.41	4.06**	3.28*	2.75**	0.20	-0.38	5.89**
	(0.93)	(1.72)	(1.11)	(1.69)	(1.80)	(1.22)	(1.31)	(1.50)	(2.34)
Female	1.38**	1.58	0.57	2.11*	-0.15	0.48	0.85	-1.72	1.63
	(0.69)	(1.13)	(0.59)	(1.19)	(1.23)	(0.75)	(1.26)	(1.07)	(1.06)
Size of HH	0.42	1.76***	0.12	1.44**	0.88*	-0.43	-0.59	-0.54	0.02
	(0.30)	(0.56)	(0.35)	(0.67)	(0.51)	(0.34)	(0.54)	(0.39)	(0.49)
Income - no answer	1.99	-6.34***	1.48	1.26	-0.41	-2.85**	-0.23	-0.27	-3.04
	(1.99)	(1.82)	(1.07)	(2.41)	(1.57)	(1.14)	(1.42)	(1.43)	(1.99)
Income low	1.14	2.46	2.41*	5.59***	0.80	0.95	0.68	2.12	-0.14
	(0.93)	(1.99)	(1.27)	(2.02)	(2.07)	(1.08)	(2.27)	(1.98)	(1.86)
Income high	-0.41	-0.29	-0.67	-2.03	1.74	0.30	1.98	-0.41	-3.19
	(0.76)	(1.56)	(1.25)	(1.44)	(1.84)	(1.03)	(3.58)	(1.36)	(2.35)
Low education	1.40	-1.03	-0.01	-4.96	1.83	2.65*	2.37	-3.05**	-5.76**
	(2.39)	(1.68)	(1.32)	(5.02)	(2.65)	(1.56)	(3.82)	(1.25)	(2.35)
High education	0.09	1.16	-2.20**	-0.92	2.15	-1.35	1.36	-0.05	-0.06
	(0.67)	(1.33)	(1.04)	(1.49)	(1.61)	(0.84)	(1.66)	(0.93)	(2.00)
Financial literacy	-0.10	-2.61***	0.65	1.01	-1.45	0.63	2.08**	1.87***	1.10
	(0.30)	(0.61)	(0.55)	(0.93)	(0.94)	(0.48)	(0.87)	(0.49)	(0.89)
Poor building cond.	1.24	1.61	-0.36	3.57	0.80	2.61	-1.98	2.35	2.13
	(1.06)	(2.59)	(1.69)	(4.37)	(2.39)	(1.73)	(1.33)	(1.42)	(1.68)
Unemployed	0.85	4.98	-2.37	3.85*	-0.80	1.62	0.38	3.14*	2.95
	(2.18)	(3.07)	(1.73)	(2.27)	(1.78)	(1.18)	(1.18)	(1.62)	(2.09)
Muslim					2.55		1.14		-4.25***
					(3.17)		(2.04)		(1.63)
Constant	-12.61***	20.01**	10.56**	-5.31	2.21	-0.16	3.90	9.20	-10.56
	(3.91)	(7.86)	(4.87)	(8.42)	(7.35)	(4.46)	(5.31)	(6.66)	(9.91)
Observations	756	827	817	865	657	969	781	847	879
Adjusted R^2	0.05	0.07	0.01	0.04	0.01	0.04	0.00	0.04	0.05

Notes: Unweighted OLS regressions. Standard errors in parentheses. Medium income and medium education are reference groups for income and education dummies. Complete case analysis, except for income, where "don't know/no answer" is included as dummy. * $p-value < 0.10$, ** $p-value < 0.05$, *** $p-value < 0.01$. Source: OeNB Euro Survey wave 2020.

Table F6: Baseline regression on quantiative inflation expectations by region

	(1) IT		(2) Non-IT		(3) CESEE-EU		(4) CESEE-EUC	
Log of age	1.36*	(0.70)	3.04***	(0.84)	2.16***	(0.61)	2.21**	(1.03)
Female	0.70	(0.44)	0.77	(0.53)	0.91**	(0.40)	0.53	(0.65)
Size of HH	0.82***	(0.25)	-0.27	(0.23)	0.86***	(0.22)	-0.45*	(0.27)
Income - no answer	-0.60	(0.79)	-1.47*	(0.84)	-0.87	(0.72)	-1.23	(0.97)
Income low	3.47***	(0.82)	0.50	(0.89)	2.90***	(0.68)	0.35	(1.17)
Income high	-0.79	(0.57)	0.11	(1.07)	-0.51	(0.53)	-0.89	(1.40)
Low education	-2.36***	(0.84)	0.54	(1.56)	-0.17	(0.94)	-1.84	(1.65)
High education	-0.42	(0.56)	0.01	(0.77)	-0.33	(0.54)	0.05	(0.87)
Financial literacy	-0.03	(0.29)	0.75*	(0.40)	-0.44	(0.27)	1.71***	(0.44)
Poor building cond.	1.94*	(1.01)	0.95	(0.98)	1.74*	(0.99)	1.12	(0.95)
Unemployed	2.89***	(1.10)	1.20	(0.90)	1.94**	(0.89)	1.88*	(1.05)
Muslim			-1.07	(1.13)			-1.77	(1.20)
Constant	-0.59	(3.26)	3.01	(3.64)	5.14*	(2.93)	-0.62	(4.13)
Observations	4112		3276		4921		2502	
Adjusted R^2	0.09		0.04		0.08		0.03	

Notes: Unweighted OLS regressions. Standard errors in parentheses. Medium income and medium education are reference groups for income and education dummies. Complete case analysis, except for income, where "don't know/no answer" is included as dummy. IT includes CZ, PL, HU, RO, RS. Non-IT includes BG, HR, BA, MK. CESEE-EU countries includes BG, CZ, HU, HR, PL, RO. CESSE-EUC countries includes BA, MK, RS. Country dummies included but omitted from table. * $p-value < 0.10$, ** $p-value < 0.05$, *** $p-value < 0.01$.
Source: OeNB Euro Survey wave 2020.

Table F7: Expanded regression on quantitative inflation expectations by country

	(1) CZ	(2) PL	(3) HU	(4) RO	(5) BG	(6) HR	(7) BA	(8) RS	(9) MK
Log of age	4.62**	0.07	-1.91	-0.24	-2.06	0.64	-0.75	1.41	3.86
	(1.11)	(2.75)	(1.29)	(2.29)	(3.09)	(1.51)	(1.57)	(1.53)	(2.71)
Remember high inf.	-0.76	0.96	4.59***	5.46***	3.01	1.70**	4.02**	1.43	3.92***
	(0.83)	(2.33)	(0.78)	(1.82)	(2.58)	(0.86)	(2.03)	(1.29)	(1.21)
MCA (dim1) sent.	-3.06***	-1.67	-2.96***	-2.26*	-5.10**	-3.14***	-0.83	-2.53***	-2.06*
	(0.73)	(1.47)	(0.65)	(1.30)	(2.53)	(0.65)	(1.02)	(0.86)	(1.13)
Memory x sentiment	0.88	-1.48	-1.46*	-3.47**	1.96	-1.16	-3.40	-1.72**	-1.60
	(0.87)	(1.56)	(0.78)	(1.60)	(2.72)	(1.10)	(2.60)	(0.83)	(1.16)
MCA (dim1) trust	0.79	-3.03**	1.85***	-0.12	-0.93	-0.50	-3.03*	-1.95**	0.99
	(0.86)	(1.41)	(0.53)	(1.03)	(1.01)	(0.51)	(1.61)	(0.92)	(1.02)
HH income shock	0.05	0.51	-1.99*	-0.92	-1.89	0.14	-0.29	2.04*	2.08
	(1.38)	(1.60)	(1.14)	(1.89)	(1.51)	(1.07)	(1.42)	(1.09)	(2.11)
Affected by COVID:									
little	0.93	0.34	0.37	-0.16	4.03*	0.10	2.89**	-2.41*	-0.96
	(1.14)	(2.06)	(0.94)	(2.20)	(2.24)	(0.98)	(1.36)	(1.22)	(1.73)
somewhat	-1.58	-0.70	1.90	3.77	5.36**	-0.26	-0.10	-1.89	-1.85
	(1.54)	(2.36)	(1.34)	(2.40)	(2.35)	(1.04)	(1.47)	(1.21)	(2.15)
considerably	-0.52	4.10	3.51	5.66	7.73***	2.21	1.18	2.35	2.34
	(1.83)	(3.85)	(2.32)	(3.58)	(2.76)	(1.54)	(2.28)	(1.94)	(3.21)
Constant	-10.34**	15.32	13.47**	7.14	15.33	5.89	8.75	4.42	-7.06
	(4.79)	(10.36)	(5.49)	(11.57)	(11.65)	(5.33)	(6.85)	(6.04)	(10.91)
Observations	472	465	662	578	309	735	619	625	588
Adjusted R^2	0.12	0.13	0.22	0.15	0.09	0.15	0.14	0.30	0.10

Notes: Unweighted OLS regressions. Standard errors in parentheses. Not being financially affected by COVID-19 is the reference group for the COVID dummies. Socio-demographic variables included but omitted from table. MCA variables are continuous ranging from -2.5 to +2.5 for sentiment and -3 to 1.3 for trust. Complete case analysis, except for income, where "don't know/no answer" is included as dummy.
* $p-value < 0.10$, ** $p-value < 0.05$, *** $p-value < 0.01$.
Source: OeNB Euro Survey wave 2020.

Table F8: Expanded regression on quantitative inflation expectations by region

	(1) IT		(2) Non-IT		(3) CESEE-EU		(4) CESEE-EUC	
Remember high inf.	3.05***	(0.68)	2.86***	(0.70)	2.93***	(0.59)	3.43***	(0.83)
MCA (dim1) sent.	-2.31***	(0.53)	-2.26***	(0.47)	-2.71***	(0.45)	-1.34**	(0.54)
Memory x sentiment	-2.03***	(0.59)	-1.36**	(0.65)	-1.38**	(0.55)	-2.56***	(0.63)
MCA (dim1) trust	-0.90*	(0.49)	-0.91*	(0.54)	-0.45	(0.39)	-1.53**	(0.75)
HH income shock	-0.10	(0.67)	0.31	(0.86)	-0.72	(0.60)	1.51	(0.98)
Affected by COVID:								
little	0.35	(0.75)	1.45*	(0.74)	0.90	(0.66)	0.74	(0.84)
somewhat	1.12	(0.88)	0.54	(0.80)	1.65**	(0.78)	-0.54	(0.93)
considerably	4.25***	(1.26)	3.36**	(1.32)	3.90***	(1.07)	3.13**	(1.55)
Constant	4.77	(4.07)	7.19*	(4.23)	11.19***	(3.83)	2.06	(4.63)
Observations	2802		2245		3231		1828	
Adjusted R^2	0.21		0.13		0.17		0.16	

Notes: Unweighted OLS regressions. Standard errors in parentheses. Not being financially affected by COVID-19 is the reference group for the COVID dummies. Country dummies and socio-demographic variables included but omitted from table. Complete case analysis, except for income, where "don't know/no answer" is included as dummy. IT includes CZ, PL, HU, RO, RS. Non-IT includes BG, HR, BA, MK. CESEE-EU countries includes BG, CZ, HU, HR, PL, RO. CESEE-EUC countries includes BA, MK, RS.
* $p-value < 0.10$, ** $p-value < 0.05$, *** $p-value < 0.01$.
Source: OeNB Euro Survey wave 2020.

Appendix G

Explaining expectations of the change in inflation

In our baseline regressions we do not include perceived inflation over the past 12 months as explanatory variable. This is due to the fact that perceived and expected inflation likely have some common determinants (see Fritzer and Rumler, 2015). In this case, including perceived inflation would mask the determinants of the level of inflation expectations.

However, as a complement to the previous analysis, adding perceived inflation can shed some light on the question: What factors explain inflation expectations controlling for individuals' perceived inflation? In other words, what determines the difference between perceived and expected inflation or expectations regarding the change in inflation. This analysis has one main advantage over studying the level of inflation expectations: Asking for a number in percentage terms may depend on the respondents' cognitive abilities and numeracy skills (D'Acunto et al., 2022). However, even respondents with low cognitive abilities or numeracy should be able to grasp whether one number is (much) higher or lower than another. Thus, looking at the expected change in inflation mitigates the issue of cognition/numeracy to some degree.[24]

In our sample, 36.5% of respondents gave the same answer for quantitative inflation perceptions and expectations. 34.5% of respondents expected inflation to decelerate over the next 12 months and 29% expected that it would accelerate. The distributions varies somewhat across countries. The share of respondents that expect an acceleration of inflation ranged from 20% in Hungary to 37% in North Macedonia, while the share of respondents that expect a deceleration ranged from 23% in Bosnia and Herzegovina to 45% in Poland.

Overall, respondents that expected inflation to decelerate stated, on average, a value for expected inflation that was 10 percentage points lower than for perceived inflation (median: 6 percentage points). For respondents that expected an acceleration the mean difference was 8 percentage points (median: 5 percentage points). On average, the difference between perceived and expected inflation in the sample is negative at around -1 percentage point (median difference: 0 percentage points).

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[24]The mitigating effect is likely largest when using a categorical instead of a continuous variable – we leave this for further research.

Tables G9 to G11 show the same regression results as those in the main text, but additionally including perceived inflation over the past 12 months. Thus, the coefficients shown indicate the effect on the level of inflation expectations given inflation perceptions or can also be interpreted as coefficients on the difference between perceptions and expectations, i.e. the expected change in inflation.

Contrary to the previous regressions, column 1 in Table G9 shows that the significance of the coefficients for socioeconomic characteristics is much lower. Only age and the low income dummy remain weakly significant. However, columns 2 and 3 show that this is not the case for economic expectation and sentiment variables. In column 2 the dummies for the outlook regarding the economic situation of the country and the stability of the currency remain highly significant. So do the coefficients on economic sentiment in column 3. This suggests that a negative economic sentiment not only leads to higher inflation expectations, but also expectations of a stronger increase in inflation relative to the respondents' views on current inflation. Institutional trust variables are all insignificant (except for trust in domestic banks).

Table G10 suggests that having suffered negative financial consequences from COVID-19 is less important for the expected change in inflation than for the level of inflation expectations. Coefficients on the income shock or COVID-19 dummies are largely insignificant. Given that most coefficients are insignificant to begin with, adding economic sentiment and trust has only a very small effect on the significance of the coefficients of shock variables.

Finally, regarding inflation memory, Table G11 shows that this variable has only a weakly significant coefficient when included alone (column 1). When included together with sentiment, the coefficient becomes highly significant. Moreover, similar to our results in the main text, we find that the effect of negative economic sentiment on inflation expectations is significantly stronger for respondents with inflation memory than for those without inflation memory.

One noticeable difference between the results in Tables G9 to G11 and the rest of the paper is that the R^2 in the regressions which include perceived inflation is much higher than in the regressions without perceived inflation. This documents the very strong correlation between inflation perceptions and expectations and is very likely also the main reason why many other variables lose their explanatory power in these regressions.

To conclude, for our sample, we find that differences between perceived inflation and

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Table G9: Explaining the expected change in inflation – baseline regression and economic sentiment

	(1) Baseline		(2) Sentiment - long		(3) Sentiment - MCA	
Inf. perceptions	0.655***	(0.029)	0.635***	(0.030)	0.639***	(0.030)
Log of age	0.760*	(0.407)	0.648	(0.438)	0.594	(0.450)
Female	0.228	(0.233)	0.120	(0.250)	0.186	(0.247)
Size of HH	-0.066	(0.130)	-0.026	(0.123)	-0.041	(0.123)
Income - no answer	-0.489	(0.407)	-0.481	(0.424)	-0.573	(0.429)
Income low	0.815*	(0.420)	0.577	(0.470)	0.347	(0.476)
Income high	0.073	(0.341)	0.086	(0.373)	0.184	(0.375)
Low education	-0.534	(0.548)	-0.084	(0.493)	0.008	(0.491)
High education	0.269	(0.307)	0.370	(0.345)	0.404	(0.345)
Financial literacy	-0.038	(0.154)	-0.094	(0.169)	0.033	(0.170)
Poor building condition	0.855	(0.557)	0.368	(0.652)	0.331	(0.640)
Unemployed	0.210	(0.458)	0.005	(0.526)	-0.003	(0.532)
Econ. sit. improve			-1.292***	(0.368)		
Local curr. stable			-0.916***	(0.342)		
Local curr. depreciate			3.048***	(0.369)		
Stable fin. system			0.051	(0.433)		
Fin. sit. of HH improve			-0.115	(0.332)		
Trust in government			-0.257	(0.361)		
Trust in police			-0.389	(0.391)		
Trust in CB			0.216	(0.424)		
Trust in domestic banks			0.786*	(0.440)		
Trust in foreign banks			-0.062	(0.420)		
Trust in ECB			-0.529	(0.425)		
Trust in EU			0.138	(0.338)		
MCA (dim1) sentiment					-1.642***	(0.198)
MCA (dim1) trust					-0.227	(0.210)
Constant	1.673	(1.926)	1.879	(2.070)	2.092	(2.102)
Observations	7175		5276		5276	
Adjusted R^2	0.503		0.547		0.543	

Notes: Unweighted OLS regressions. Standard errors in parentheses. Medium income and medium education are reference groups for income and education dummies. Country dummies included but omitted from table. Complete case analysis, except for income, where "don't know/no answer" is included as dummy. * $p-value < 0.10$, ** $p-value < 0.05$, *** $p-value < 0.01$.
Source: OeNB Euro Survey wave 2020.

Table G10: Explaining the expected change in inflation - financial situation and COVID-19 experience

	(1) Income shock		(2) COVID and income shock		(3) Shocks and sentiment	
Inf. perception	0.672***	(0.029)	0.670***	(0.029)	0.645***	(0.030)
Unemployed	-0.124	(0.530)	-0.104	(0.529)	-0.138	(0.531)
HH income shock	-0.102	(0.341)	-0.398	(0.333)	-0.612*	(0.328)
Affected by COVID-19:						
little			0.107	(0.393)	0.016	(0.388)
somewhat			-0.520	(0.446)	-0.645	(0.443)
considerably			1.321**	(0.613)	1.025*	(0.612)
MCA (dim1) sentiment					-1.608***	(0.197)
MCA (dim1) trust					-0.190	(0.212)
Constant	0.224	(2.075)	0.133	(2.082)	1.802	(2.102)
Observations	5182		5182		5182	
Adjusted R^2	0.532		0.533		0.546	

Notes: Unweighted OLS regressions. Standard errors in parentheses. Not being financially affected by COVID-19 is the reference group for the COVID dummies. Country dummies and socio-demographic variables included but omitted from table. Complete case analysis, except for income, where "don't know/no answer" is included as dummy. * $p-value < 0.10$, ** $p-value < 0.05$, *** $p-value < 0.01$.
Source: OeNB Euro Survey wave 2020.

expected inflation can mostly be explained by economic sentiment alone and in combination with inflation memory. Socioeconomic characteristics, recent personal financial experiences and institutional trust have only a very limited explanatory power.

Table G11: Explaining the expected change in inflation - inflation memory

	(1) Inf. memory		(2) Inf. memory and sentiment		(3) All variables	
Inf. perception	0.674***	(0.030)	0.643***	(0.031)	0.645***	(0.031)
Log of age	0.498	(0.465)	0.048	(0.472)	0.015	(0.474)
Remember high inf.	0.556*	(0.320)	0.867***	(0.323)	0.854***	(0.322)
MCA (dim1) sentiment			-1.052***	(0.261)	-1.643***	(0.204)
Memory x sentiment			-0.900***	(0.282)		
MCA (dim1) trust			-0.227	(0.218)	-0.215	(0.219)
HH income shock					-0.762**	(0.337)
Affected by COVID-19:						
little					-0.073	(0.394)
somewhat					-0.660	(0.452)
considerably					1.133*	(0.629)
Constant	0.825	(2.169)	2.823	(2.217)	3.188	(2.249)
Observations	4941		4941		4941	
Adjusted R^2	0.537		0.551		0.551	

Notes: Unweighted OLS regressions. Standard errors in parentheses. Not being financially affected by COVID-19 is the reference group for the COVID dummies. Country dummies and socio-demographic variables included but omitted from table. Complete case analysis, except for income, where "don't know/no answer" is included as dummy. * $p-value < 0.10$, ** $p-value < 0.05$, *** $p-value < 0.01$.
Source: OeNB Euro Survey wave 2020.

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