Price expectations in the European Union: is there a consensus?

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Abstract. This study examines the strength of the consensus on the expected prices across the European Union (EU) countries with respect to various factors: seniority in the EU ('old' vs. 'new' EU Member States, i.e. those that joined the community in 2004), the size of the economy (small vs. large) and currency cohesion (eurozone vs. local-currency countries). The results show that the lowest consensus on expected prices and relatively little variation in such a consensus occur in the 'old' EU countries. Opinions on the direction of the expected price changes vary substantially, but this variation remains stable in time. For almost every EU country, the consensus on the expected prices is higher in the 'regular times' subsample than in the 'pandemic and war' subsample, and for many countries, the differences in the strength of the consensus are larger during the 'pandemic and war' subsample. As far as the correlation with the observed price changes is concerned, the highest correlation coefficients are observed for small economies. Analysing correlation coefficients across subsamples shows that during difficult times of the pandemic and war, seniority in the EU helps the respondents to predict the direction of the expected price changes more in line with the actual price developments.

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1. Introduction

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Expectations play a major role in determining the behaviour of economic processes, and price expectations in particular attract special interest of both theorists and applied researchers. Numerous studies on price expectations in the European Union (EU) focus on the prices of specific products or services, such as foodstuffs, tobacco, electricity, pharmaceuticals, housing and emissions trading. However, these studies offer no firm conclusions on the speed or even the occurrence of price adjustments. Such mixed results are expected when considering the prices of diverse products and services. Typically, there is a valid reason for adopting a disaggregated approach to price analysis: studies indicate that aggregation bias can be significant (Wolszczak-Derlacz & De Blander, 2009). Measuring price consensus is one area of scientific inquiry on price expectations where an aggregated approach is, by definition, indispensable.

As Krüger and Nolte (2016) assert, consensus is defined as a measure of agreement expressed in surveys, contrasting it with certainty (or rather uncertainty) delineated by the conditional variance of future values of macroeconomic variables. To the best of my knowledge, the strength of the consensus on the dynamics of economic processes across EU countries has not been addressed yet in any earlier research, and there is no empirical evidence on whether general uncertainty associated with recent macroeconomic shocks (such as the COVID-19 pandemic and the Russian invasion of Ukraine) correlates with the level of agreement (or disagreement) on the expected economic behaviour.

This paper addresses this issue from the point of view of expected price changes. The purpose of the analysis is to verify whether factors such as the recent macroeconomic shocks, the seniority of a country in the EU or its membership in the eurozone are reflected in the degree of the consensus on expected prices.

Section 2 presents a brief review of literature on the EU price expectations, Section 3 describes the consensus measures and the datasets used for empirical analysis, in Section 4, empirical results are discussed and Section 5 presents the conclusions of the study.

2. Literature review

The analysis of price expectations in the EU is a complex task, as evidenced by the extensive body of research on the topic. Since 2004, the majority of studies comparing economies of the EU and the new Member States (NMS) have addressed various aspects of the convergence between the relatively small NMS economies and the much larger one of the whole EU. Analyses of convergence typically focus on long-term productivity, income, foreign direct investment, ecological and energy policy effects and prices. The literature on price adjustments may be broadly classified as studies of nominal price convergence, the synchronisation of inflation across the EU and inflation spillovers, and comparing price dynamics of individual goods or services, particularly those subjected to price controls.

Studies of price convergence constitute perhaps the largest segment of the extensive literature on European price dynamics since the Maastricht Treaty of 1993, and particularly since the accession of ten new members to the EU in 2004. The convergence of prices among the EU countries can be considered as a result – or even as a purpose – of European integration. With respect to the economic, social and territorial cohesion, the Treaty on the Functioning of the EU reads: ‘In particular, the Union shall aim at reducing disparities between the levels of development of the various regions and the backwardness of the least favoured regions’ (a consolidated version of the treaty on the European Union and the treaty on the functioning of the European Union, Article 174).

A comprehensive review of literature on European price convergence can be found in Brož and Kočenda (2018) and a more theory-based approach, focusing on the verification of the Balassa–Samuelson effect and the Engel's Law in Égert (2011), who confirms that the price-convergence process is actually taking place in Europe. However, the process was proven to be nonlinear and dependent on the price differentials (Guerreiro & Mignon, 2013), and its pace differed across EU countries. Hałka and Leszczyńska-Paczesna (2019) found evidence for the 'catching up' effect (faster convergence of countries with price level below the average), but also asserted that for most prices, the convergence process was stalled after 2008. They contributed this result to the decrease in international trade and increase in exchange rates volatility following the 2009–2010 financial crisis. Even within the European Monetary Union (EMU), the pace and consistency of the price-convergence processes differed. Garcia-Hiernaux et al. (2023) determined the relative price convergence for over 80% of the EMU member countries between 2001 and 2011, but observed price divergences after 2012.

Therefore, one can see that empirical results on price convergence quoted in the literature generally support the hypothesis of a long-term price convergence within the EU, albeit pointing out that it is nonlinear, time-varying, and influenced by both universal shocks (e.g. financial crises) and various country-specific factors.

Another branch of the literature focuses on the synchronisation of inflation across EU countries and factors that influence its dynamics; for a comprehensive literature review, see e.g. Szafranek (2021). The wide variety of studies generally confirm the global aspects of inflation but also point to heterogenic and time-dependent factors determining the speed of adjustment and the strength of the connection between the global and the local (country-specific) inflation. Links between the inflation in European countries are also

studied and compared across geographical boundaries by means of dynamic econometrics models, especially multivariate generalised autoregressive conditional heteroskedasticity (MV GARCH) models or time-varying parameter vector autoregression (VAR) models with stochastic volatility (which allow the analysis of the spillover of inflation rates). There is a wide range of studies addressing inflation spillover rates for North American and European countries (Bouri et al., 2023), China and European countries (Elsayed et al., 2021), and the eurozone and European small open economies outside the eurozone (Hałka & Szafranek, 2016).

Still another part of the literature analyses the impact of inflation expectations on various economic aggregates such as spending and saving (Premik & Stanisławska, 2017) or households' reactions to business-cycle shocks and policy interventions (Weber et al., 2022). The latter paper belongs to a broader category of studies on policy uncertainty which also include analyses of the role of aggregated expectations (forecasts) in developing indices of the economic policy uncertainty (Baker et al., 2016) and empirical results on interdependencies between the long- and short-term inflation expectations and levels of policy-related uncertainty (Istrefi & Piloiu, 2014).

3. Methods and data

Several measures of the consensus among survey respondents have been proposed in the economic literature; for a review and discussion of their properties, along with the comparison of their application to Polish business survey data, see Tomczyk and Kowalczyk (2023). The study shows that on the basis of their theoretical and empirical properties, two of the measures, i.e. the variance-based and the Tastle-Wierman measures (Tastle & Wierman, 2007) may be considered particularly useful in evaluating the degree of the consensus

among survey respondents. However, to ensure easier calculations and the consistency in measuring the variability of consensus in time, the variance-based consensus measure is used in this paper.

Let us define the following:

- P^{inc} is the percentage of respondents expecting increasing prices within the forecast horizon specified in the survey;
- P^{const} is the percentage of respondents expecting no change in prices within the forecast horizon specified in the survey;
- P^{dec} is the percentage of respondents expecting decreasing prices within the forecast horizon specified in the survey.

Balance statistic has been traditionally used as an aggregate measure of the respondents' expectations. It is calculated by subtracting the share of respondents who expect a decline from the share of respondents who expect an increase:

$$BAL_t = P_t^{inc} - P_t^{dec}. \quad (1)$$

Generally, positive values of a balance statistic would be interpreted as optimism with respect to the future (i.e. there are more optimists than pessimists) and negative values as pessimism. However, two caveats have to be mentioned here. First, when the expected changes in prices are considered, interpreting the surplus of respondents expecting price increases as 'optimism' is unwarranted; therefore, such value-laden interpretations are not used in this paper. Second, the balance statistic should not be used as an indicator of a consensus, because is constitutes a measure of a central tendency and not of dispersion.

On the basis of Bachmann et al. (2013), the variance-based measure of disagreement can be defined as:

$$Var_t = P_t^{inc} + P_t^{dec} - (BAL_t)^2 = 1 - P_t^{const} - (BAL_t)^2. \qquad (2)$$

High values of measure (2) indicate the lack of a consensus due to its variance-based definition. In order to interpret the results in terms of a consensus (agreement), rescaling is needed. Let us define the variance-based consensus measure as

$$Cns\_VAR_t = 1 - Var_t = P_t^{const} + (BAL_t)^2, \qquad (3)$$

where $0 \leq Cns\_VAR \leq 1$. The maximum value of 1 is reached when all respondents' forecasts belong to the same category (that is, perfect consensus that prices will either increase, decrease or remain the same within the next three months). The minimum value of 0 occurs when respondents are divided into two equinumerous and opposing groups expecting increase and decrease in prices (that is, perfect disagreement: $P^{inc} = 0.50, P^{dec} = 0.50$). The Bachmann variance measure has been successfully used in empirical analyses of economic consensus and remains a current 'default' consensus measure in studies on prices (Mattevi & Padellini, 2024).

Let us mention that, contrary to the colloquial understanding of the term, in this paper (following the economic consensus literature), a consensus is measured in degrees: the higher concentration of survey responses, the stronger the consensus.

To evaluate the consensus on price expectations across the EU, the variance-based consensus measure (3) is used. However, just like all the other measures of a consensus, it does not take into account the 'inclination' of the consensus (optimistic versus pessimistic) – this information is missing. To compare a consensus on expected prices with the observed changes in prices, a sign-

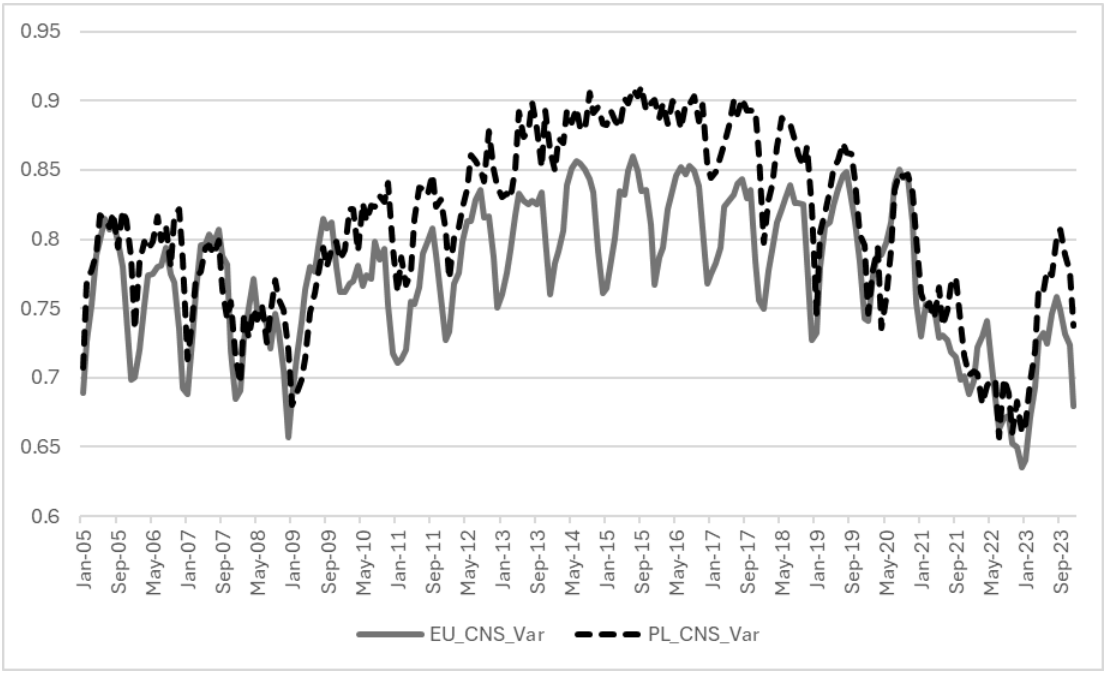
sensitive version of the variance-based consensus measure is therefore used in this paper:

$$Cns\_VAR_t^{sgn} = Cns\_VAR_t \cdot sgn\{BAL_t\}. \quad (4)$$

Data on the expected changes in prices are collected and published by the European Commission, covering all individual EU countries as well as a weighted average for the EU.[1] In monthly questionnaires for retail trade (construction and services sectors excluded), respondents are asked the following question: 'How do you expect your selling prices to change over the next 3 months?' (question Q6) and can choose between the options below: increase, remain unchanged, decrease, refuse to answer/not applicable. They are also instructed to exclude any seasonal variations when answering the questions. However, the effectiveness of the latter is questionable: seasonal variations in expected price changes are clearly visible (although to varying degrees) in all countries. In Figure 1, values of the variance-based consensus measure (3) are presented for Poland and the EU-22 average.

Figure 1. Values of variance-based consensus measure for Poland (PL_CNS_Var) and the average for 22 EU countries (EU_CNS_Var)

[1] https://economy-finance.ec.europa.eu/economic-forecast-and-surveys/business-and-consumer-surveys/download-business-and-consumer-survey-data/time-series_en#detailed-data-by-answer-category-totals.



Source: author's work based on European Commission data.

Seasonal variations and the absence of long-term trends are characteristic of the variance-based consensus measure across all countries. To preserve the inherently seasonal behaviour of the consensus on expected prices, no attempt was made to correct for the seasonality of the time series.

To compare the subjective price expectations with the objective price changes, Eurostat data is used. Section B-E36 (industry, except for construction, sewerage, waste management and remediation activities), a seasonally unadjusted price index is employed as the closest equivalent to the European Commission survey data. Fixed-base index I21 (2021 = 100) must be transformed to allow comparisons with the price expectations formed three months earlier:

$$PR_t^3 = \frac{I21_t}{I21_{t-3}} - 1, \tag{5}$$

which is interpreted as a percentage change in prices between *t* and *t*-3.

To enable meaningful comparisons of the NMSs with their EU economic environment, 2004 was chosen as a starting point for the empirical analysis. Studies show (see Wolszczak-Derlacz & De Blander, 2009) that the integration anchor went into effect in as early as the mid-1990s, long before the date of the official expansion of the EU, and therefore 2004 can be considered as a good starting point for the analysis of economies already integrated to some extent. However, in order to include Denmark, Lithuania and Malta, for which European Commission survey data are not available for 2004, the sample begins in January 2005.

Consensus measures are calculated for the entire sample (January 2005–December 2023) and also for the 'regular times' subsample (January 2005–February 2020). After that date, two macroeconomic shocks occurred, i.e. the COVID-19 pandemic (approximately from March 2020 to May 2022) and then the Russian invasion of Ukraine (February 2022, ongoing), which necessitated considering the post-March 2020 period as a separate 'pandemic and war' subsample. Researchers agree that the global COVID-19 pandemic resulted in major changes in economic relationships, affecting particularly employment and price patterns. A literature review (Anyfantaki et al., 2020; Callegari & Feder, 2022) shows that the economic impact of the COVID-19 pandemic will have extensive, both short- and long-term consequences, making small open economies particularly vulnerable to the risks. Additionally, Tomczyk (2023) demonstrated that the COVID-19 pandemic cannot be seen as just another contraction phase as far as macroeconomic expectations are concerned. While the economic consequences of the pandemic are clearly unfavourable, the statistical properties and the degree of concentration of the answers of survey respondents does not correspond either with the expansion or the contraction phases of the business cycle. For these reasons, the 'regular times' and the

‘pandemic and war’ subsamples are examined in addition to the entire sample of 2005–2023.

The separation of a ‘financial crisis’ subsample was also considered in this study, but the literature generally agrees that the Polish economy stood out as an outlier in the overall global picture, having emerged from the crisis relatively unscathed. Poland was the only EU country that did not experience the economic recession; quite the opposite – it saw economic growth during this period (Allington & Labib, 2015; Drozdowicz-Bieć, 2011; Duszczyk, 2015). Additionally, it would be a very short subsample (from November 2007 to March 2009, i.e. 17 months), which would raise doubts as to the validity of statistical inference.

The initial set of the EU countries consisted of 25 (EU 2004) Member States (i.e. ‘old’ Member States that joined the UE until 2004 and ‘new’ Member States that joined the EU in 2004). Countries which joined the EU later, namely Bulgaria (in 2007), Romania (in 2007) and Croatia (in 2013) were not included, because the time frames for the empirical analysis had to be long enough and comparable. Additionally, the following countries were removed from the sample:

- Great Britain (due to Brexit in February 2020);
- Cyprus (due to missing data on expected prices from January 2004 to April 2008 from the European Commission database);
- Ireland (due to missing data on expected prices for 2004 – 2016 and 2023 from the European Commission database).

Ultimately, the sample begins in January 2005 and covers 22 countries: Austria, Belgium, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain and Sweden.

4. Empirical results

As the first step in the empirical analysis, the values of the consensus measure (3) are calculated for the entire sample (from January 2005 to December 2023, $T = 225$), the 'regular times' subsample (from January 2005 to February 2020, $T = 182$), and the 'pandemic and war' subsample (from March 2020 to December 2023, $T = 43$). Descriptive statistics for the consensus measures across the EU countries as well as the values of the EU average (for the purpose of comparison) are presented in Table 1.

Table 1. Descriptive statistics for the variance-based consensus measure (3): the entire sample (January 2005–December 2023) and the subsamples

Country	(Sub)sample	Mean	Std dev	Min	Max	Range
EU average	Entire sample	0.7748	0.0509	0.6350	0.8603	0.2253
	Regular times	0.7858	0.0435	0.6572	0.8603	0.2031
	Pandemic & war	0.7312	0.0551	0.6350	0.8500	0.2149
'Old' Member States						
Austria	Entire sample	0.7587	0.0675	0.5528	0.8981	0.3453
	Regular times	0.7736	0.0561	0.6117	0.8981	0.2864
	Pandemic & war	0.6998	0.0768	0.5528	0.8829	0.3301
Belgium	Entire sample	0.7548	0.0589	0.5724	0.8910	0.3186
	Regular times	0.7692	0.0471	0.6396	0.8910	0.2514
	Pandemic & war	0.6980	0.0666	0.5724	0.8034	0.2310
Denmark	Entire sample	0.7963	0.0613	0.6026	0.9227	0.3201
	Regular times	0.8024	0.0586	0.6026	0.9227	0.3201
	Pandemic & war	0.7724	0.0664	0.6251	0.9052	0.2801
Finland	Entire sample	0.7098	0.0721	0.4941	0.8509	0.3568
	Regular times	0.7235	0.0630	0.5261	0.8509	0.3248
	Pandemic & war	0.6553	0.0806	0.4941	0.8221	0.3280
France	Entire sample	0.7174	0.0618	0.5294	0.8445	0.3151
	Regular times	0.7145	0.0654	0.5294	0.8445	0.3151
	Pandemic & war	0.7289	0.0432	0.6285	0.8408	0.2122
Germany	Entire sample	0.7790	0.0580	0.6134	0.8790	0.2656
	Regular times	0.7931	0.0469	0.6645	0.8790	0.2145
	Pandemic & war	0.7232	0.0643	0.6134	0.8697	0.2563

Greece	Entire sample	0.7870	0.0628	0.5629	0.9080	0.3451
	Regular times	0.8004	0.0495	0.6609	0.9080	0.2471
	Pandemic & war	0.7340	0.0801	0.5629	0.8940	0.3311
Italy	Entire sample	0.8263	0.0501	0.6882	0.9113	0.2231
	Regular times	0.8391	0.0368	0.7498	0.9113	0.1615
	Pandemic & war	0.7759	0.0628	0.6882	0.8912	0.2029
Luxembourg	Entire sample	0.6972	0.1030	0.3231	0.9132	0.5901
	Regular times	0.7125	0.0892	0.4467	0.9132	0.4665
	Pandemic & war	0.6367	0.1295	0.3231	0.8418	0.5188
The Netherlands	Entire sample	0.8175	0.0593	0.6122	0.9257	0.3135
	Regular times	0.8262	0.0560	0.6122	0.9257	0.3135
	Pandemic & war	0.7827	0.0596	0.6840	0.9001	0.2160
Portugal	Entire sample	0.8036	0.0707	0.5976	0.9248	0.3272
	Regular times	0.8125	0.0700	0.5976	0.9248	0.3272
	Pandemic & war	0.7681	0.0625	0.6828	0.9110	0.2282
Spain	Entire sample	0.7892	0.0601	0.6091	0.9051	0.2960
	Regular times	0.8004	0.0528	0.6523	0.9051	0.2528
	Pandemic & war	0.7451	0.0672	0.6091	0.8926	0.2835
Sweden	Entire sample	0.6996	0.0807	0.4492	0.8616	0.4124
	Regular times	0.6996	0.0817	0.4492	0.8616	0.4124
	Pandemic & war	0.6995	0.0773	0.4629	0.8525	0.3896
‘New’ Member States						
Czechia	Entire sample	0.7922	0.0647	0.5504	0.9291	0.3787
	Regular times	0.8058	0.0559	0.5897	0.9291	0.3394
	Pandemic & war	0.7384	0.0698	0.5504	0.8622	0.3118
Estonia	Entire sample	0.7605	0.0733	0.4610	0.9010	0.4400
	Regular times	0.7770	0.0585	0.5986	0.9010	0.3024
	Pandemic & war	0.6952	0.0885	0.4610	0.8581	0.3971
Hungary	Entire sample	0.7908	0.0681	0.6040	0.9323	0.3283
	Regular times	0.8053	0.0636	0.6612	0.9323	0.2711
	Pandemic & war	0.7331	0.0537	0.6040	0.8593	0.2553
Latvia	Entire sample	0.7908	0.0762	0.5728	0.9234	0.3506
	Regular times	0.8071	0.0668	0.6136	0.9234	0.3098
	Pandemic & war	0.7263	0.0774	0.5728	0.8582	0.2855
Lithuania	Entire sample	0.7549	0.0663	0.5414	0.9030	0.3616
	Regular times	0.7641	0.0579	0.5820	0.9030	0.3210
	Pandemic & war	0.7183	0.0837	0.5414	0.8662	0.3248
Malta	Entire sample	0.7721	0.0909	0.4820	0.9551	0.4731
	Regular times	0.7695	0.0948	0.4820	0.9551	0.4731
	Pandemic & war	0.7826	0.0729	0.5988	0.9390	0.3402

Poland	Entire sample	0.8100	0.0638	0.6566	0.9100	0.2534
	Regular times	0.8260	0.0559	0.6802	0.9100	0.2298
	Pandemic & war	0.7467	0.0531	0.6566	0.8481	0.1915
Slovakia	Entire sample	0.7768	0.1128	0.3469	0.9501	0.6032
	Regular times	0.7831	0.1128	0.3656	0.9501	0.5845
	Pandemic & war	0.7522	0.1107	0.3469	0.9416	0.5947
Slovenia	Entire sample	0.7959	0.0589	0.6296	0.9121	0.2825
	Regular times	0.8043	0.0513	0.6296	0.9121	0.2825
	Pandemic & war	0.7626	0.0740	0.6450	0.9042	0.2592

Source: European Commission database. The missing observation for Italy in April 2020 has been imputed as a mean value of the neighbouring cells, i.e. the observations for March and June 2020.

Comparing the mean values of the consensus measure show that the lowest average values, signifying low consensus on expected prices, are observed in Luxembourg, Sweden, Finland and France. These are all ‘old’ EU countries with a long history in the joint European economy, and a low consensus on expected prices suggests substantial dispersion of opinion on which direction the prices are going within a 3-month forecast horizon. On the other hand, the highest mean values are observed in Italy, the Netherlands, Poland and Portugal, in which case there is no apparent reason for this similarity.

Relatively small differences in the consensus, as measured by the standard deviation, characterises Italy, Germany, Greece and Belgium (so again the ‘old’ EU countries). This finding suggests that the strength of the consensus is relatively stable over time for the ‘old’ EU in comparison to the ’new’ Member States. The highest variation in time, evident in both high standard variation and high maximum values of the consensus measure, are observed for Slovakia, Luxembourg and Malta. In these small economies, the strength of the consensus might vary – i.e. it can go from a relative agreement to a clear disagreement – more dynamically than in big economies.

Unfortunately, there are no previous analyses of the price consensus across EU countries with which these results could be directly compared. However, Wolszczak-Derlacz and De Blander (2009) examine price dispersion in the

EU-15 and three NMSs (Czechia, Hungary and Poland) between 1995 and 2006 on the basis on both aggregate and disaggregate price data. They demonstrate that for each category of goods, the price dispersion is lower in the EU-15 than in all the examined countries together (EU-15 plus 3). The conclusion is that the NMS introduce more variation to the price dynamics. These results cannot be directly compared to the analysis of price expectations presented in this study but both suggest that there are more differences among the NMS regarding prices and price expectations than among the 'old' EU countries.

More patterns emerge across subsamples. The average consensus was higher in the 'regular times' subsample than in the 'pandemic and war' subsample in all EU countries (except France and Malta). One of the possible explanations is that in the untypical subperiods of a pandemic and war, enterprises face much greater difficulties in establishing a consensus over the direction of the expected prices. Also, for most countries, the strength of the consensus as measured by the standard deviation was less uniform during the 'pandemic and war' subsample, with a non-intuitive combination of exceptions including France, Hungary, Malta, Poland, Portugal, Slovakia and Sweden. The general observation that the variation in the consensus is usually greater in wartime or pandemic conditions attests to the difficulties the respondents have in agreeing on the expected behaviour of prices in an anomalous economic environment.

In order to verify whether the differences in the average levels of the consensus between the 'regular times' and the 'pandemic and war' subsamples were statistically significant, a two-sided test for statistical significance of the difference in means was conducted. Its results (*p* values for the null hypothesis of equality in means) are presented in Table 2.

Table 2. Results of the two-sided test for statistical significance of the difference in means between the subsamples

Country	*p* value
EU average	0.0000
'Old' Member States	
Austria	0.0000
Belgium	0.0000
Denmark	0.0068
Finland	0.0000
France	0.0739
Germany	0.0000
Greece	0.0000
Italy	0.0000
Luxembourg	0.0004
The Netherlands	0.0000
Portugal	0.0000
Spain	0.0000
Sweden	0.9945
'New' Member States	
Czechia	0.0000
Estonia	0.0000
Hungary	0.0000
Latvia	0.0000
Lithuania	0.0009
Malta	0.3112
Poland	0.0000
Slovakia	0.0966
Slovenia	0.0007

Source: European Commission database. The missing observation for Italy in April 2020 has been imputed as a mean value of the neighbouring cells, i.e. the observations for March and June 2020.

The null hypothesis of equal mean consensus in the 'regular times' and 'pandemic and war' subsamples was rejected for the majority of EU countries with the exception of France, Malta, Slovakia and Sweden. France and Malta had already been identified as special cases because they alone form a subset of EU countries in which the average consensus is lower in the 'regular times' subsample than in the 'pandemic and war' subsample, although by a small margin and, as Table 2 shows, statistically insignificant. The remaining

countries, Slovakia and Sweden, belong to a small category of countries in which the difference in the strength of the consensus is lower during the ‘pandemic and war’ subsample than the ‘regular times’ subsample. Since these countries share no obvious consensus-specific similarities, the explanation for the lack of significance of the differences in means across the subsamples should perhaps be attributed to the characteristics of inflation expectations, which, however, is outside the scope of this paper.

It is interesting to observe that there does not seem to be any pattern in the consensus on price expectations with respect to the eurozone countries (which, since 2024, have been the following countries: Austria, Belgium, Croatia, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia and Spain). The common currency might cause price expectations to be more uniform across the eurozone countries, but this hypothesis is not confirmed by the indicator of the degree of consensus on price expectations of the EU Member States.

As the next step, correlation coefficients of a sign-sensitive consensus measure (lagged three months) with the observed 3-month changes in prices are presented in Table 3 for the entire sample and the two subsamples. It is worth noting that the sizes of the coefficients cannot be meaningfully interpreted in terms of the usefulness of the consensus measure as a leading indicator of the expected changes in prices. Many country-specific factors influence the relationships between the strength of the consensus on the expected price changes and price indices themselves that remain outside the scope of the framework of this analysis (e.g. the degree of political and social stability that impact the precision of price forecasts or ease of access to reliable macroeconomic data across countries). Therefore, correlation coefficients presented in Table 3 should not be evaluated in terms of the usefulness of the

variance-based consensus measure as a forecasting tool for prices. They are provided solely for inter-country comparisons of the relative strength of the relationship between the price consensus and price changes.

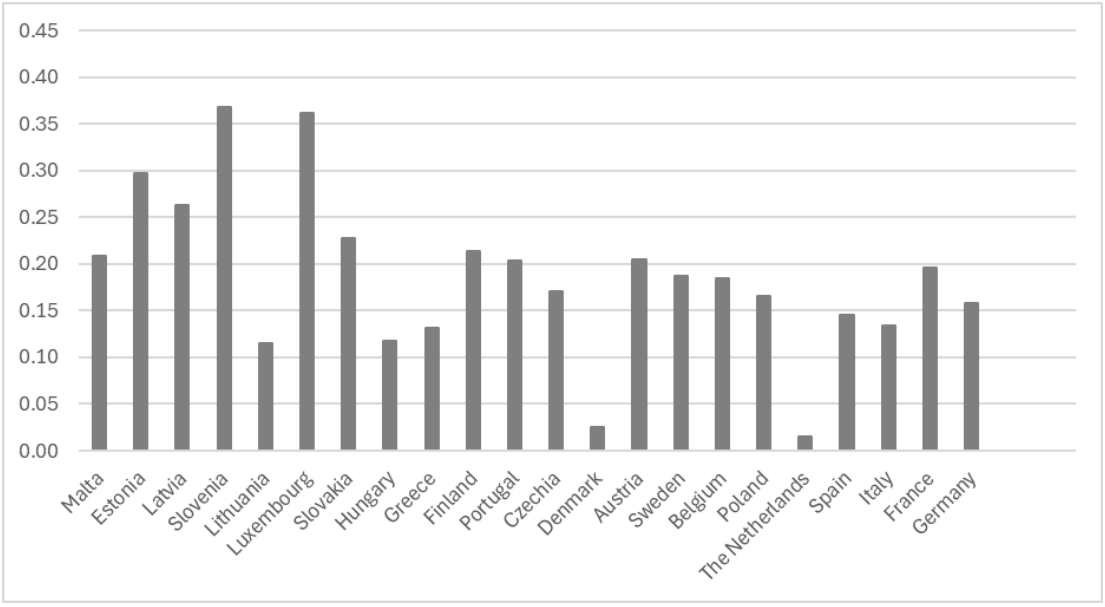
Table 3. Correlation coefficients of the consensus measure (4) with the observed changes in prices (5) for the entire sample (January 2005–December 2023) and the subsamples

Country	Entire sample	Regular times	Pandemic & war
EU average	0.1601	0.1884	0.1795
'Old' Member States			
Austria	0.2046	0.2815	0.3324
Belgium	0.1850	0.1699	0.2839
Denmark	0.0259	-0.0275	0.1662
Finland	0.2131	0.2253	0.2888
France	0.1959	0.1977	0.1710
Germany	0.1581	0.2370	0.2503
Greece	0.1314	0.1577	0.1486
Italy	0.1346	0.2584	0.1388
Luxembourg	0.3615	0.2796	0.5543
The Netherlands	0.0154	-0.0090	0.1388
Portugal	0.2035	0.2032	0.3000
Spain	0.1460	0.1286	0.0993
Sweden	0.1878	0.1469	0.3352
'New' Member States			
Czechia	0.1708	0.1306	0.2113
Estonia	0.2973	0.4052	0.4688
Hungary	0.1174	0.1258	-0.0009
Malta	0.2086	0.1740	0.2080
Latvia	0.2630	0.3657	0.1944
Lithuania	0.1147	0.1368	0.1961
Poland	0.1663	0.2265	0.0601
Slovakia	0.2275	0.3207	0.0660
Slovenia	0.3686	0.3525	0.5070

Source: European Commission database, Eurostat. Sample for Denmark, Lithuania and Portugal are slightly shorter (price index data for January 2005–March 2005 were not available). The missing observation for Italy in April 2020 has been imputed as a mean value of the neighbouring cells, i.e. the observations for March and June 2020.

The highest correlation coefficients with the observed price changes were recorded for Estonia, Slovenia and Luxembourg, which are all small economies. It appears that the relatively strong connection between the strength of the price consensus and the actual price changes is easier to achieve in small rather than large economies. The lowest correlation coefficients characterise Denmark, Hungary and the Netherlands. They form a group for which it is difficult to find a common denominator. In Figure 2, values of the correlation coefficients for the entire sample are presented for countries ordered by the size of their economies (gross domestic product at current market prices in 2024 as measured by Eurostat, in millions of euro).

Figure 2. Correlation coefficients of the consensus measure with the observed changes in prices for the entire sample, ordered by size of the economy



Source: author's work based on European Commission and Eurostat data.

Smaller countries (in terms of the total GDP) are generally characterised by stronger correlations between the degree of the consensus on the expected

prices and the observed changes in prices, but as the size of an economy measured by GDP increases, this pattern disappears. A lack of clear-cut results regarding the interdependence between the consensus and the observed price changes may be partly explained by the absence of an important factor, namely the prevalence of either forward- or backward-looking information in expectations generating processes in individual countries. The Bachmann et al. (2013) paper, in which a variance-based consensus measure is proposed, defines the consensus in terms of the forward-looking behaviour: 'We use these categories to define two forward-looking indices concerning expectations and two indices of current activity' (p. 9). However, the empirical studies on the degree of forward- or backward-lookingness in EU countries yield mixed results. For example, in various studies, Sweden turns out to have a significant backward-looking component in inflation expectations (Łyziak, 2009), but also a high degree of forward-lookingness (Szyszko & Rutkowska, 2019). Further analyses of the influence of the properties of the formation process of expectations on the consensus, along with the impact of other country-specific characteristics, exceeds the scope of this analysis.

As far as subsamples are concerned, a slight majority of countries produce the highest correlation coefficients during the 'pandemic and war' subsample. With the exceptions of Czechia and Slovenia, they are all 'old' EU countries. It follows that during difficult times of the pandemic or war, the seniority in the EU helps the respondents to evaluate the direction of expected price changes in line with the actual price developments.

Again, there is no noticeable effect of the fact if a country belongs or not to the eurozone on the size of the correlation coefficients between the consensus measure and the observed price changes.

5. Conclusions

It follows from the variance-based consensus measure that the lowest consensus on the expected prices and relatively little variation in the consensus appear across the ‘old’ EU countries. Opinions on the direction of expected price changes vary substantially but remain stable in time – i.e. price expectations in the ‘old’ EU countries do not jump between agreement and disagreement but rather consistently remain in disagreement. Shifting from agreement to disagreement on the expected prices is visible in the small economies of Slovakia, Luxembourg and Malta. For almost every country, the consensus on the expected prices is higher in the ‘regular times’ subsample than in the ‘pandemic and war’ one, and for many countries, the differences in the strength of the consensus are larger during the ‘pandemic and war’ subsample. While it is relatively easy to establish a consensus (presumably of expected increases in prices) in wartime or pandemic conditions, the unpredictability of the political, and thus economic environment increases the differences in the strength of the consensus.

As far as the correlation of the consensus on expected prices with the observed price changes is concerned, the highest correlation coefficients are observed for the small economies of Estonia, Slovenia and Luxembourg, which suggests that the relationship between the strength of the price consensus and the actual price changes is stronger in small rather than large economies. Analysing the correlation coefficients across the subsamples shows that during difficult times of the pandemic and war, the seniority in the EU helps the respondents to predict the direction of the expected price changes in line with the actual price developments.

There are no recognisable patterns, either in the descriptive statistics of the consensus measure or the sizes of the correlation coefficients with the observed changes in prices, or as far as belonging or not to the eurozone is concerned.

Sharing a common currency does not facilitate the consensus on the expected price changes nor does it strengthen the correlation between the price consensus and the observed changes in prices.

The main limitation of the research on the consensus presented in this paper lies in the weakness of the consensus measure itself: its original version (3) does not specify whether the consensus is 'positive' (that is, respondents agree that prices will go up) or 'negative' (where the respondents agree that prices will decrease). A sign-sensitive version (4) used in this paper attempts to combine the strength and the inclination of the consensus, but it does not take into account the size of the balance statistics and therefore does not allow the differentiation between the balance of e.g. +40 (signifying a clear majority of respondents expecting an increase in prices) and +4 (only a small majority of those expecting an increase in prices). However, since the balance statistic is the measure of a central tendency and a consensus measure is the measure of dispersion, combining them in a single index presents a challenge. An important task for further research would be to redefine and improve the sign-specific consensus measure (4).

Another limitation of the empirical analysis presented in this paper is the absence of country-specific factors. Prevalence of forward- or backward-looking information in the process of the formation of expectations, dependence of the economy on imported fuel or the degree of fragmentation of the country's industrial sector are just some of the factors to consider. Taking into account the specific characteristics of individual countries that may influence the consensus on price expectations should underline any future research in this field.

Another possible direction for further study could be the search for other measures of consensus, e.g. those rooted in evolutionary biology. One of the key aspects of biodiversity, evenness, is defined as follows: 'A community is

perfectly even if every species is present in equal proportions, and uneven if one species dominates the abundance distribution' (Daly et al., 2018, p. 5). The 'abundance distribution' here stands for the distribution of numbers of individual species in a community. There is no straightforward transfer of the biodiversity concepts to economic applications (for example, it would be difficult to find an economic equivalent of one of the key concepts of biodiversity, i.e. the number of species in a community), but the growing role of evolutionary tools in the economic analysis opens a promising path for further research.

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