

INFLATION EXPECTATIONS ACCURACY AND ERRORS TRANSMISSION AMONG THE AGE GROUPS IN POLAND

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Purpose: The study aims to examine the age-related heterogeneity of inflation expectations errors formed by Polish consumers. First, the analysis was intended to verify whether consumers who experienced hyperinflation in their most productive ages are more prone to overstate the future inflation in comparison to other age groups, accounting for different levels of inflationary pressures. Second, we examine the extent to which the potential bias is transmitted into the younger age groups.

Design/methodology/approach: The analysis has been performed on the survey-based one-year-ahead monthly consumer inflation expectations of four age groups in Poland, quantified with the Carlson-Parkin method (1975) adjusted by Batchelor and Orr (1988). The methodology covers the forecast errors analysis, Peseran-Timmerman test, Diebold-Mariano and HLN tests for significant difference in accuracy, regression analysis, and Granger causality test.

Findings: When the inflation expectations are formed under the inflation target range environment, the accuracy of inflation expectations of consumers within age groups does not differ significantly. Under the high inflation environment, the accuracy of inflation expectations of consumers who experienced hyperinflation in their productive ages differs significantly from the youngest age group of consumers who do not have such experience. This difference increases when the inflation (at the time when the expectations are formed) also increases. Under the high inflation environment in Poland, the oldest age group of consumers is not effective in learning from their mistakes. The oldest group errors are transmitted to the two younger groups and enhance their inflation expectations errors. However, we cannot confirm that the youngest (fourth) group of consumers is affected by the oldest group errors, which may indicate the lack of inflation expectations accuracy transmission.

Research limitations/implications: The research can be expanded by expectations error analysis in other hyperinflation-experienced countries.

Practical implications: Inflation expectations heterogeneity may disrupt implementing common monetary policy and the process of uniform inflation expectations management by central banks.

Originality/value: In the case of Poland, the experience of hyperinflation and corresponding memory-based response can be considered as a valid determinant of the expectations heterogeneity.

Keywords: inflation expectations, accuracy, monetary policy.

Category of the paper: Research paper.

1. Introduction

Inflation expectations play an important role in shaping a country's monetary policy and are widely considered one of the determinants of the actual inflation rate (e.g., Madeira, Zafar, 2014; Moessner, 2024; Verbrugge, Zaman, 2021). The problem of examining inflation expectations in shaping current inflation rates gained popularity in the late 1960s. of the 20th century, when the expected inflation rate was incorporated into the expectations-augmented Phillips Curve (EAPC) model, developed by M. Friedman and E. Phelps. In recent years, more and more attention has been devoted to measuring consumers' inflation expectations, which influence their wage demands as well as their current propensity to consume and invest (Vincent-Humphreys et al., 2019). The high heterogeneity of consumer inflation expectations remains a challenge in this regard, making it difficult for monetary authorities to effectively manage them and anchor them at the inflation target level.

The study aims to examine the age-related heterogeneity of inflation expectations formed by Polish consumers in terms of their accuracy, understood as the difference between predicted and observed inflation rates. More specifically, the analysis was intended to verify whether consumers who experienced hyperinflation in their most productive ages are more prone to overstate the future inflation in comparison to other age groups, accounting for different levels of inflationary pressures. Second, we examine the extent to which the potential bias is transmitted into the younger age groups. To do so, we have performed the inflation expectations forecasts analysis, Diebold-Mariano, and HLN tests. The error transmission has been examined with the use of OLS regression models and the Granger causality test based on VAR (1) models. Both goals were achieved with the use of the one-year ahead survey-based inflation expectations (following D'Acunto, Weber, 2024) from four age groups in Poland.

Poland has been implementing an inflation-targeting regime for at least 25 years, with a set inflation target of 2,5% and a 1% range, measured by the CPI index. The country experienced hyperinflation in 1989-1990 during the first phase of its rapid economic transformation. This makes it a prime example of a country where the youngest age group does not have any hyperinflation experiences, and the older group experienced it during their productive ages (20-60 years).

The rest of the article is structured as follows. In the "Literature review" section, we briefly discuss the current state of knowledge related to the most relevant determinants of consumer inflation expectations formation, with the greatest emphasis put on the learning-based mechanisms linked to previous experiences. Then, after a short description of the data sources and general stages of the analytical framework, the section "Results and Discussion" presents the detailed findings for each of the stages, and explains further the analytical methods, assumptions, and the rationale behind them. The study ends with the "Conclusions" section, which provides the answers to the main research questions.

According to our knowledge, the detailed study of age-related heterogeneities of inflation expectations accuracy in the hyper-inflation experienced country has not been done so far. The authors believe that the study based on Polish economic experience can provide valuable insights and facilitate the process of inflation expectations management.

2. Literature review

2.1. The heterogeneity of consumer inflation expectations – the overview

The level and accuracy of inflation expectations vary both between groups of economic agents and within them. The largest forecast error is observed in the case of households, which tend to present a persistent, structural upward bias regardless of the current inflation environment (D'Acunto et al., 2025; Andre, Schaffranka, Weber, 2026). The increased inaccuracy of households' predictions is attributed to two main groups of factors (Angelico, Giacomo, 2019; D'Acunto et al., 2024; Anesti, Esady, Naylor, 2025):

- a. Imperfect information – in comparison to other groups of economic agents, they tend to form their judgment based on media coverage and/or personal experiences rather than any form of economic analysis. Moreover, individuals often don't even perceive inflation in terms of aggregate CPI/HICP indices and describe the changes in their personal "inflation rates" – the strain levels related to the purchase of goods they tend to acquire most often.
- b. Behavioral factors – expanding on the previous point, individual consumers tend to exercise a selective call approach and put an excessive weight on recent, salient price changes within the sets of goods they purchase frequently. As a result, food prices play a much larger role in aggregate dynamics than other components of the basket, such as energy.

Within the analysed group, the lowest precision of inflation expectations can be observed among households with the lowest level of education and/or income, where the impact of the above factors is the greatest. Lower education levels generally translate into lower financial literacy, and higher income levels may reduce a household's vulnerability to inflation. Beyond the main driver, household socioeconomic status, there is no universal agreement on distinct demographic factors affecting expected inflation levels. Higher expected inflation, along with lower predictive accuracy, has been observed in the case of women, but the effect is usually described as secondary to the differences in education and income levels (Gnan, Langthaler, Valderrama, 2011). Similarly, there are no universal, consistent age-related patterns related solely to the direction of the bias. For example, a survey conducted by D'Acunto et al. (2025) across 31 economies in March and April 2025 showed significantly lower levels of expected

inflation among respondents above the age of 50. But the opposite conclusions can be drawn, for example, from ECB Consumer Expectations Survey results from November 2025 (European Central Bank, 2026), where the younger respondents (aged 18-34) continued to report lower inflation perceptions and expectations than older ones (aged 35-54 and 55-70). More clarity can be derived from another, mechanism-based stream of research that focuses on the generational differences in the consumer inflation expectation formation, presented in the next section of the article.

2.2. Learning-based sources of inflation expectations dispersion

Consumer inflation expectations are heterogeneous due to different learning models and the ability to process the information (Pfajfar, 2013). The set of introduced most common learning models includes: the recursive least squares with infinite memory learning model (Evans, Honkapohja, 2001), the constant gain learning model (Orphanides, Williams, 2005; Milani, 2007), and the learning from experience model introduced by Malmendier and Nagel (2016). The concept of learning from experience described by Malmendier and Nagel (2016) states that consumers form their expectations based on the historical inflation rates with the exponential function of weights. However, these historical inflation rates are strongly connected with the agents' lifetime experiences. This means that the consumers may be divided into cohorts due to their age, and the constant gain may depend on their age. The historical inflation rate affects only these cohorts that have experienced this inflation rate period, and after their disappearance, the impact of these inflation periods emerges. It supports the assumption that the younger agents are more affected by more recent experiences than the older ones.

This is further supported by broader, cross-country research related to the consumer response to the highly volatile economic environment. Following Coibion et.al. (2018), households and firms are remarkably inattentive to inflation dynamics in developed countries that have experienced low inflation rates for several decades, but economic agents in high-inflation environments seem to pay considerable attention to inflation. Ehrmann and Tzamourani (2009) (based on the survey responses) conducted the inflation aversion study, indicating that the memories of high inflation affect agents' preferences about the importance attached to price stability. Similar conclusions can be drawn from studies related to other forms of significant economic stressors. For example, the study performed by Fungacova et.al. (2019) shows that experience with banking crises influences agents' trust in commercial banks to the extent depending on the age at which the crisis was experienced. More precisely, the banking crisis affects trust in banks negatively only if the crisis took place when the individual was between 41 and 60 (Fungacova et. al., 2019). Knight (2012), based on the Greek experiences, analysed how specific historical events (the Great Famine in 1941-43) became embodied during the last economic crisis in 2008. This issue has also been noticed by Pipyrrou (2015) based on experiences in Southern Italy.

Both research streams combined support the hypothesis that a country with a history of hyperinflation periods is characterized by a statistically significant difference in the accuracy of the consumer inflation expectations between the age groups (assuming that the experience of hyperinflation cannot be equally attributed to all of them). The effect should be especially visible under a high inflation environment, which triggers the memory-based inflation aversion response. The study aims to verify this hypothesis with an example of Poland, which experienced a periodic hyperinflation in 1989-1990, in the first phase of the country's transformation to a market economy. By doing this, we assume that hyperinflation during the post-communist transformation in Poland can be considered as an economic stressor sufficient to affect the inflation expectations formation mechanism. Additionally, we extend the analysis and verify the existence of transmission of forecast errors between the age groups, which has been previously confirmed in literature by Braggion et al. (2024). To the best of our knowledge, the study on the transmission of inflation forecast errors among the age groups, accounting for both its impact and direction, has not been done so far.

3. Methods

The data on inflation expectations has been collected from the EC Business and Consumer Survey. The monthly aggregate answers have been quantified with the use of Carlson Parkin's method (1975) adjusted to six answers by Batchelor and Orr (1988). We use the CPI inflation rate as a scaling factor. The survey data are gathered and aggregated for four age groups of responders: (1) 16-29 (AGE1), (2) 30-49 (AGE2), (3) 50-64 (AGE3), and (4) 65 and older (AGE4). The accuracy of inflation expectations was measured as an absolute difference between the inflation expectations in time t and the realized inflation in time $t+12$.

The general analysis has been performed on monthly data within the time span from May 2001 to December 2024, with the main focus on high inflation periods in Poland. The consumers' inflation expectations have been divided into two subsamples within this time line in regards to inflation environment and the inflation targeting regime. An inflation in the range of $<1,5\%; 3,5\%>$ is considered a stable inflation environment, as it remains within the acceptable deviations from the inflation target in Poland. The inflation above 3.5% exceeds the inflation target range, and therefore is regarded as a high inflation environment. The first subsample (S1) consists of inflation expectations formed during the inflation target range environment (CPI inflation in a target range $<1,5\%; 3,5\%>$), and the second one (S2) consists of inflation expectations formed during the high inflation periods (CPI inflation above 3,5%). To obtain the remaining two samples, we have excluded from the whole sample the expectations that have been formed under the low inflation environment (below 1.5%) and

deflation. The main descriptive statistics for inflation expectations formed under these two inflation environments (subsamples) by four age groups are shown in Table 1.

Table 1.

Descriptive statistics of inflation expectations of consumers in Poland among four age groups in two inflation environments (in the time when expectations were formed): inflation target range(S1), and high inflation environment (S3)

Inflation environment	Expectations	Avg.	Me	S.D.	Min	Max
S1: inflation target range	EXP_AGE1	3,67	3,71	0,41	2,98	4,25
	EXP_AGE2	3,75	3,60	0,45	3,09	4,62
	EXP_AGE3	3,83	3,79	0,43	3,28	4,93
	EXP_AGE4	3,82	3,81	0,40	3,21	4,78
	CPI(t+12)	2,53	2,80	1,48	0,20	4,30
S2: high inflation environment	EXP_AGE1	10,10	9,46	4,44	4,33	17,77
	EXP_AGE2	10,46	9,42	4,71	4,40	18,26
	EXP_AGE3	10,08	9,14	4,61	4,49	17,71
	EXP_AGE4	9,56	8,30	4,35	4,04	16,46
	CPI(t+12)	9,86	10,10	5,75	2,00	18,40

Note. S1/S2- inflation environment. EXP_AGE1/EXP_AGE2/EXP_AGE3/EXP_AGE4 – quantified inflation expectations of consumers in a specific age group.

Source: own calculations.

The study has been divided into three stages, which are presented in Table 2. The first stage has been performed on two subsamples. The next two stages were based on the second subsample- a high inflation environment.

As a first step, we verified the inflation expectations accuracy among the age groups under the inflation target range environment and the high inflation environment. The first step is an introductory one to determine the inflation environment under which the differences in inflation expectations accuracy exist among the age groups. Our pre-assumption stated that the oldest groups of consumers may be more attentive to high inflation due to their experiences of hyperinflation in their most productive ages. Due to this, the accuracy of inflation expectations formed under high inflation expectations by the oldest and younger groups may differ significantly (the oldest group may overestimate the inflation or, on the other hand, form it more accurately). The inflation expectations evaluation has been performed based on the chosen forecast error measures: (1) Mean Error (ME), (2) Mean Absolute Error (MAE), (3) Mean Squared Error (MSE), (4) Root Mean Squared Error (RMSE), and (5) Symmetric Mean Absolute Percentage Error (SMAPE) (Hyndman, 2018). The ME, MAE, MSE, RMSE, and SMAPE forecast errors have been used to compare the forecast accuracy among the age groups and inflation environments. We have calculated the Theil U1 Statistics to evaluate the inflation expectations in different age groups and inflation environments with the naive forecasts (where the future values of inflation equal the previous ones) (Theil, 1958). Next, following by Greer (2003), and Fassas and Stephanou (2016) we have examined whether the formed inflation expectations correctly forecasted the sign of inflation over the whole sample period (McCarthy, Snudden, 2023). We intended to check whether these four groups of consumers are able to predict the direction of future changes in inflation. To verify the forecast's

directional accuracy, comparing the inflation expectations at time t and realized inflation in time $t+12$, for all age groups within the time span May 2021-Dec 2024, the Pesaran-Timmerman (P-T) test (Pesaran, Timmermann, 1992) has been performed. By its construction, the test covered the whole sample, including the low inflation and deflation environment.

The simple comparison of previously calculated inflation expectations errors is not enough to prove the difference in accuracy (D'Agostino et al., 2006) between the inflation expectations formed by four age groups in the chosen two subsamples (target range (S1) and high inflation environment (S2)) (Faust, Wright, 2013). We performed the Diebold-Mariano test (D-M) based on the MAE error statistic (Diebold, Mariano, 1995) and the Harvey, Leybourne, and Newbold test (HLN) (Harvey et. al., 1997) to determine whether the accuracy of inflation expectations formed by different age groups in two subsamples differs significantly from each other (Ang et al., 2007).

In the second step, following Andre et.al. (2026), we tested for the phenomenon of upward bias in inflation expectations errors. We have examined the tendency to misjudge the future inflation in different age groups. To verify the existence of systematic bias between the inflation expectations formed by different age groups under the high inflation environment, a set of linear regressions for the difference between the age groups' expectations over a constant has been estimated. Additionally, assuming this overestimation tendency in reaction to high inflation, we have verified the difference in reaction of consumers' inflation expectations in different age groups to the most recent inflation statistics, so-called reaction dispersion. To do so, we have performed the correlation analysis between the differences in inflation expectations among the age groups and the chosen inflation statistics: 12 months standard deviations (Capistrán, Timmermann, 2009), 12 months average inflation, maximum inflation in the last 12 months, and maximum inflation in the last 6 months. By this, we have examined the sensitivity to inflation dispersion, and long- and short-term high inflation in forming the expectations by four different age groups of consumers.

The third stage covers the verification of the transmission of the inflation expectations errors between the age groups during the high inflation periods. To examine whether the inflation expectations errors made by one age group are transmitted and affect the accuracy of the other age groups, we have considered the high inflation period (time span 2021:07-2023:12, $N = 30$) and estimated the set of four OLS regressions between the accuracy of inflation expectations in four age groups. We have estimated four linear regressions with the independent variables lagged by two months, assuming the two months period of information spread between the age groups. The regressions also covered the lagged by two months dependent variable to capture the process of self-learning on mistakes by each age group. The regression specifications are as follows:

$$\begin{aligned} accAGE1_t = & a + a_1 accAGE1_{t-1} + a_2 accAGE1_{t-2} + a_3 accAGE2_{t-1} + a_4 accAGE2_{t-2} \\ & + a_5 accAGE3_{t-1} + a_6 accAGE3_{t-2} + a_7 accAGE4_{t-1} + a_8 accAGE4_{t-2} \\ & + e \end{aligned} \quad (1)$$

$$\begin{aligned} accAGE2_t = & a + a_1 accAGE1_{t-1} + a_2 accAGE1_{t-2} + a_3 accAGE2_{t-1} + a_4 accAGE2_{t-2} \\ & + a_5 accAGE3_{t-1} + a_6 accAGE3_{t-2} + a_7 accAGE4_{t-1} + a_8 accAGE4_{t-2} \\ & + e \end{aligned} \quad (2)$$

$$\begin{aligned} accAGE3_t = & a + a_1 accAGE1_{t-1} + a_2 accAGE1_{t-2} + a_3 accAGE2_{t-1} + a_4 accAGE2_{t-2} \\ & + a_5 accAGE3_{t-1} + a_6 accAGE3_{t-2} + a_7 accAGE4_{t-1} + a_8 accAGE4_{t-2} \\ & + e \end{aligned} \quad (3)$$

$$\begin{aligned} accAGE4_t = & a + a_1 accAGE1_{t-1} + a_2 accAGE1_{t-2} + a_3 accAGE2_{t-1} + a_4 accAGE2_{t-2} \\ & + a_5 accAGE3_{t-1} + a_6 accAGE3_{t-2} + a_7 accAGE4_{t-1} + a_8 accAGE4_{t-2} \\ & + e \end{aligned} \quad (4)$$

where: *accAGE1/accAGE2/accAGE3/accAGE4* – inflation expectations accuracy in the chosen age group.

To determine whether the inflation expectations accuracy of the oldest group of consumers affects the inflation expectations accuracy of the younger groups, indicating that the older group captures additional predictive information, we tested for Granger causality. To do so, we have performed four Granger causality tests between the accuracy of inflation expectations of the oldest group (AGE4) and the three younger age groups (AGE1, AGE2, AGE3). The Granger causality has been tested based on four VAR (1) models, as follows:

$$\begin{aligned} accAGE4_t &= a_{11} accAGE4_{t-1} + a_{12} accAGEN_{t-1} + e_{1t}, \\ accAGEN_t &= a_{21} accAGE4_{t-1} + a_{22} accAGEN_{t-1} + e_{2t}, \end{aligned}$$

where:

accAGE4 – inflation expectations accuracy in the oldest age group (AGE4),

accAGEN – inflation expectations accuracy in the younger age groups (N = 1, 2, 3).

The lag length has been selected according to the AIC, BIC, and HQC criteria.

Table 2.
Stages of the research

Stage	Aim	Methodology	Sample
1.	Inflation expectations accuracy	Mean Error (ME), Mean Absolute Error (MAE), Mean Squared Error (MSE), Root Mean Squared Error (RMSE), Symmetric Mean Absolute Percentage Error (SMAPE)	S1, S2
	Comparison of inflation expectations with the naive forecasts	Theil's U1 statistics	S1, S2
	Inflation expectations directional accuracy	Pesaran-Timmerman (P-T) test	S
	Significance of the differences in inflation expectations accuracy	Diebold-Mariano test (D-M), Harvey, Leybourne, and Newbold test (HLN)	S1, S2
2.	Inflation expectations systematic bias	A set of linear regressions estimated over a constant for the difference between the age groups	S2
	Reaction of consumers' inflation forecasts from different age groups to the most recent inflation measures	Pearson correlation: the differences in inflation expectations among the age groups and 12 months inflation standard deviations, 12 months average inflation, maximum inflation in the last 12 months, and maximum inflation in the last 6 months.	S2

Cont. table 2.

3.	Inflation forecasts errors transmission among the age groups and self-learning within the groups	Lagged linear regressions for the accuracy of inflation expectations of four age groups.	S2
		Granger causality tests based on VAR (1) models	S2

Note. S1/S2- inflation environment.

Source: own.

4. Results and Discussion

4.1. Inflation expectations accuracy among different groups of consumers

The Theil's U1 statistics were similar across all groups, indicating that consumers in all age groups outperform naive forecasts ($U1 < 1$). The inflation expectations accuracy results are shown in Table 3. The results of the Peseran-Timmerman test indicate that inflation expectations of all age groups accurately forecast the direction of the change in future inflation (Table 4). The inflation expectations errors are larger under a high inflation environment than under an inflation target range environment. Under the high inflation environment, the inflation expectations errors seem to be larger in the oldest age group (AGE4) than in the youngest age group (AGE1), and this effect is not so noticeable under the target range environment (Table 3). The results of the D-M test and HLN test indicate that there is no significant difference between the accuracy of expectation between all age groups in the time span May 2001- Dec. 2013, but there is a significant difference in accuracy between the youngest (AGE1) and the oldest (AGE 4) age groups of consumers under the high inflation environment (Table 5). As a conclusion of this stage, to cover the errors transmission among the age groups, we focus, in the next steps, on the second expectations subsample- expectations formed under a high inflation environment.

Table 3.*Inflation expectations errors made by different age groups in Poland*

	CPI, May 2001-Dec.2024, n=272				CPI <1,5%; 3,5%>, S1				CPI>3,5%, S2			
Errors	AGE1	AGE2	AGE 3	AGE 4	AGE1	AGE2	AGE3	AGE4	AGE1	AGE2	AGE3	AGE4
ME	0.17	0.22	0.14	0.10	1.01	0.98	0.96	0.98	-1,02	-1.22	-1.11	-1.22
MSE	11.12	10.03	10.41	11.17	4.69	4.72	4.72	4.71	25.45	25.57	23.29	25.57
RMSE	3.34	3.17	3.23	3.34	2.17	2.17	2.17	2.17	5.04	5.06	4.83	5.06
MAE	2.22	2.13	2.16	2.20	1.62	1.61	1.62	1.62	3.61	3.58	3.43	3.58
SMAPE	0.82	0.80	0.81	0.82	0.58	0.57	0.57	0.58	0.66	0.65	0.64	0.65
U1 Theil	0.36	0.34	0.34	0.35	0.36	0.36	0.35	0.36	0.35	0.34	0.33	0.34

Note: The data analysis for this paper was generated using the Real Statistics Resource Pack software (Release 8.9.1). Copyright (2013 – 2023) Charles Zaiontz. www.real-statistics.com.

Source: own calculations.

Table 4.*Peseran-Timmerman test results within the age groups, May 2021-Dec.2024*

Expectations	AGE 1		AGE 2		AGE 3		AGE 4	
Test	Test Statistics	P value	Test Statistics	P value	Test Statistics	P value	Test Statistics	P value
CPI (t+12)	4.28*	p<0.001	6.34*	p<0.001	7.74*	p<0.001	6.53*	p<0.001

Note: n = 272. *The null hypothesis states that the inflation expectations do not forecast the direction of the change in future inflation (t+12). In each of the age groups, the null hypothesis has been rejected under .1 significance level. The data analysis for this paper was generated using the Real Statistics Resource Pack software (Release 8.9.1). Copyright (2013-2023) Charles Zaiontz. www.real-statistics.com.

Source: own calculations.

Table 5.*D-M and HLN test results within the age groups*

	D-M Test				HLN Test				
All sample	Expectations				All sample	Expectations			
		AGE 2	AGE 3	AGE 4			AGE 2	AGE 3	AGE 4
Expectations	AGE 1	-0.09 (0.92)	1.43 (0.19)	1.47 (0.14)	Expectations	AGE 1	-0.1 (0.92)	1.41 (0.16)	0.12 (1.57)
	AGE 2		1.15 (0.25)	1.06 (0.29)		AGE 2		1.23 (0.22)	1.14 (0.25)
	AGE 3			0.8 (0.42)		AGE 3			0.86 (0.39)
CPI <1.5%; 3,5%>, S1	Expectations				CPI <1.5%; 3,5%>, S1	Expectations			
		AGE 2	AGE 3	AGE 4			AGE 2	AGE 3	AGE 4
Expectations	AGE 1	0.47 (0.64)	-0.28 (0.78)	-0.15 (0.88)	Expectations	AGE 1	0.52 (0.61)	-0.3 (0.76)	-0.16 (0.87)
	AGE 2		0.16 (0.87)	0.46 (0.65)		AGE 2		0.17 (0.86)	0.5 (0.62)
	AGE 3			0.35 (0.72)		AGE 3			0.39 (0.70)
CPI>3,5%, S2	Expectations				CPI>3,5%, S2	Expectations			
		AGE 2	AGE 3	AGE 4			AGE 2	AGE 3	AGE 4
Expectations	AGE 1	-0.09 (0.93)	1.54 (0.12)	-1.67 (0.09)	Expectations	AGE 1	-0.09 (0.93)	1.69 (0.09)	-1.83 (0.07)
	AGE 2		1.35 (0.17)	1.21 (0.23)		AGE 2		1.49 (0.14)	1.33 (0.19)
	AGE 3			0.8 (0.42)		AGE 3			0.88 (0.38)

* The null hypothesis states that there is no significant difference in accuracy between two forecasts. Under the high inflation environment, among the youngest group of consumers (AGE 1) and the oldest group of consumers (AGE 4). The null hypothesis has been rejected under .1 significance level. P-values in parentheses. The data analysis for this paper was generated using the Real Statistics Resource Pack software (Release 8.9.1). Copyright (2013-2023) Charles Zaiontz. www.real-statistics.com.

Source: own calculations.

4.2. Inflation expectations systematic bias among the age groups

To examine whether there is a systematic bias between the differences in inflation expectations among different age groups under the high inflation environment, we estimate a set of regressions for the difference between the age groups' expectations on a constant (Table 6). This systematic bias is significant for the differences among the oldest group and the

other groups, indicating the disagreement on inflation expectations among the oldest (AGE4) and the youngest (AGE1) groups.

The correlation analysis results (Table 7) indicate a significant positive correlation between the differences in inflation expectations for almost all age groups (despite the differences between the youngest groups (AGE 1 and AGE 2)) and moving 12 months standard deviations, 12 months average inflation, maximum inflation in 12 months, and maximum inflation in the last 6 months (Table 7). This indicates that the higher inflation environment (larger inflation averages and maximum) and the more unstable inflation environment (larger standard deviation) generate larger differences among the age groups (excl. AGE 1 and AGE 2).

Table 6.

Systematic bias in inflation expectations among different age groups under the high inflation environment - regression over constant results

Variable	Constant
expAGE1-expAGE2	-0.16*[0.006]
expAGE1-expAGE3	-0.07[0.07]
expAGE1-expAGE4	0.13*[0.08]
expAGE2- expAGE3	0.09[0.06]
expAGE2-expAGE4	0.029*[0.08]
expAGE3-expAGE4	0.2*[0.006]

Note: Standard errors in parentheses. * Significant under .1.

Source: Own calculations.

Table 7.

Correlation coefficients between the differences in inflation expectations formed by different age groups and the chosen inflation statistics

CPI>3,5%	expAGE1- expAGE2	expAGE1- expAGE3	expAGE1- expAGE4	expAGE2- expAGE3	expAGE2- expAGE4	expAGE3- expAGE4
Inflation moving standard deviation 12M	-0.17	0.14	0.33***	0,35***	0.47***	0.3***
Inflation moving average 12M	-0.04	0.47***	0.6***	0.61***	0.66***	0.29**
Inflation moving MAX12M	-0.09	0.38***	0.55***	0.56***	0.63***	0.33**
Inflation moving 6M	-0.19*	0.31***	0.55***	0.58***	0.72***	0.42***

Note: * Significant under .1, ** .05, *** .001

Source: Own calculations.

According to the analysis above, we found that a high inflation environment in Poland generated significant differences in accuracy among the expectations formed by the youngest age group (AGE 1) and the oldest age group (AGE 4). This result is also visible in Figure 1 – under the high inflation environment, the differences between inflation expectations of the oldest group of consumers (AGE4) and the youngest (AGE 1) drastically increase.

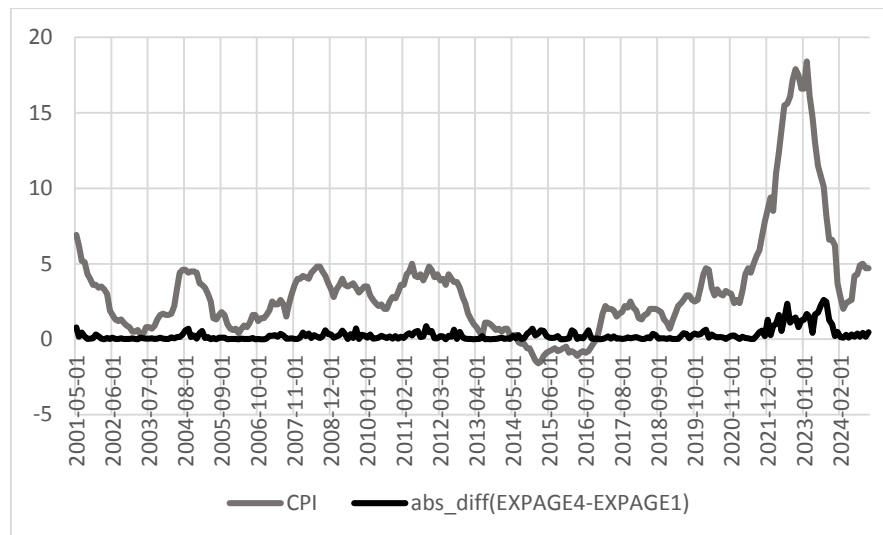


Figure 1. Comparison of the inflation and the difference between inflation expectations of the oldest (AGE4) and youngest (AGE1) groups of consumers.

Source: own.

4.3. Inflation expectations errors transmission among the age groups

To examine whether the inflation expectations errors made by the oldest age group (AGE 4) are transmitted and affect the accuracy of the youngest age groups, we investigated the high inflation period (time span 2021:07-2023:12, $N = 30$) and estimated the set of OLS regressions, and further performed the Granger causality tests based on VAR (1) models. The inflation expectations accuracy is measured as the difference between the inflation expectation formed at time t and the realized inflation at time $t+12$. The larger the values of the accuracy, the larger the errors made.

The results of OLS regressions are shown in Table 8 and highlight two main points. First, the consumers from age groups 1, 2, and 3 are learning from their mistakes. This learning effect is not significant for the oldest age group (AGE 4). Second, the lagged errors of inflation expectations in the oldest age group (AGE 4) affect the accuracy of each younger group and increase their forecast errors. The errors made by the oldest group seem to be transmitted to the younger age groups, which in turn contribute to their own mistakes.

Table 7.

Transmission of inflation expectations errors among the different age groups - OLS regression results

Variable	Accuracy of inflation expectations within groups								Rsqr.
	AGE1 (t-1)	AGE1 (t-2)	AGE2 (t-1)	AGE2 (t-2)	AGE3 (t-1)	AGE3 (t-2)	AGE4 (t-1)	AGE4 (t-2)	
accAGE1		-0.74* [0.37]	-0.74* [0.37]				0.73* [0.4]	1.18** [0.47]	0.23
accAGE2			-0.43* [0.3]				0.71** [0.34]		0.14
accAGE3					-0.53* [0.32]		0.69* [0.38]		0.1

Cont. table 7.

accAGE4		-0.3 [0.3]						0.58* [0.33]	0.12
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Note: Standard errors in parentheses. * Significant under 0.1, **significant under 0.05, ***significant under 0.001. White Test, Chi-square test, and LM test results are available upon request.

Source: Own calculations.

As the last stage, we tested for Granger causality based on VAR (1) models between inflation expectations accuracy of the oldest age group and the younger groups. We assume that if the accuracy of the oldest age group (AGE4) Granger-causes the accuracy of inflation expectations of the chosen younger age group, the expectations errors are transmitted from the oldest consumers to the younger ones. The Granger causality tests based on the VAR (1) models for the accuracy of each age group were performed under the null hypothesis that the accuracy of the oldest age group does not Granger-cause the accuracy of the younger age groups under the high inflation environment in Poland. The Granger causality test results under a high inflation environment in Poland (Table 9) confirmed that the errors made by the oldest age group (AGE4) do Granger-cause errors made by younger groups – AGE2 and AGE3. This causality did not exist in the opposite direction- lack of inverse causality. It needs to be highlighted that the expectations errors made by the oldest age group (AGE4) do not Granger-cause expectations errors made by the youngest group – AGE1. It may be treated as an explanation why the accuracy of expectations formed by the youngest and oldest groups of consumers under the high inflation environment differs significantly from each other. In other words, we may state that under the high inflation environment in Poland, past forecast errors made by the oldest age group (AGE4) contain some additional information and are transmitted to the younger age groups (AGE2 and AGE3). However, this transmission does not cover the learning from the oldest group's mistakes, but increases the younger group's errors.

Table 8.

Granger causality test results among the oldest age group (AGE 4) and the younger groups (AGE1, AGE2, and AGE3) under the high inflation environment in Poland, time span 2021:07-2023:12 (N = 30)

Granger causality	Var model	Test value**
accAGE4→accAGE1	Var (1)*	1,0510 [0,3141]
accAGE1→accAGE4		0,067563 [0,7968]
accAGE4→accAGE2	Var (1)*	4,2607 [0,0484]
accAGE2→accAGE4		0,86239 [0,3610]
accAGE4→accAGE3	Var (1)	3,2054 [0,0842]
accAGE3→accAGE4		0,30527 [0,5850]

Notes: * lag length selected according to the AIC, BIC, and HQC criteria. ADF and KPSS tests, Rao F test, LM test, and Doornik-Hansen test results, and detailed VAR (1) models results are available upon request. The accuracy of inflation expectations was represented as a linear combination of the lagged accuracy of the oldest age group (AGE4) and the accuracy of the chosen younger group (AGE1, AGE2, or AGE3). ** For accAGE4→accAGE2/ accAGE3, the hypothesis assuming the lack of Granger causality is rejected at the .1 significance level.

Source: Own calculations.

4.4. Discussion

The study is based on aggregated survey data, which precludes verification of the impact of individual consumer characteristics on the accuracy of inflation expectations within a single age group. This states a serious limitation of the research. According to the experience-based learning model formulated using US microdata by Malmendier and Nagel (2016), even within the same age cohort, individuals may use different memory-based weights when forming inflation expectations. The weighting scheme of the age-related transmission of errors connected with hyper-inflation experience may differ within the same age group. Additionally, inflation expectations formation, even within the same age group, can also vary due to differences in demographic and socioeconomic characteristics, personal economic experiences, cognitive abilities (D'Acunto et al., 2022), information exposure (Coibion et al., 2022), perceived inflation and reactivity to monetary shocks (Doh et al., 2025), or a high-low inflation environment dependence on expectations formation (Gwak, 2022). Blanchflower, MacCoille (2009) have already proven that inflation expectations dispersion remains even after conditioning on age, and the best way to model it is to include age and socioeconomic interactions. However, these interactions can only be captured in the micro-level analysis.

There are a lot of studies on cross-country heterogeneities in inflation expectations in the euro area, capturing the socioeconomic characteristics (D'Acunto et al., 2024b), forecasting errors (Chen et al., 2022; Brandão-Marques et al., 2023), reaction to economic shocks (Chang et al., 2022), and a general experience-based model (Malmendier, Nagel, 2016). The inflation expectations learning patterns and models have already been verified by Strobach and van der Crujsen (2015) for Germany, Italy, the Netherlands, France, Belgium, and Spain, but did not directly cover the experience-based learning models. Malmendier et al. (2021) verified the existence of a collective memory component in central banking practice (policy makers). Ehrmann and Tzamourani (2012) proved the existence of the euro area cross-country heterogeneities related to the memories of high inflation. The existence of a collective memory of high inflation and its intergenerational transmission has been analysed by Braggion et al. (2024) and Haffert et al (2021) for Germany.

Despite the broad literature on inflation expectations formation in Poland, there is no research on the impact of hyperinflation experiences on inflation expectations formation and its transgenerational transmission. Economic agents in Poland are attached to price stability due to the implementation of the inflation targeting regime and the hyperinflation experiences during the economic transformation. This distinguishes them from consumers with no such experience. Our study showed that there are significant differences in the accuracy of inflation expectations in Poland made by the oldest group of consumers, who experienced hyperinflation, and the youngest, who did not. These differences between expectations are highly positively correlated with the high inflation environment. The main novelty of the research lies in investigating the transmission of inflation expectations errors between the oldest age group (experienced by hyperinflation) and younger groups. The study proved that only under a high inflation environment, the inflation expectations errors of the oldest age group (AGE4) affect

the two younger groups (AGE2 and AGE3). The Granger causality results showed that the oldest group errors do Granger cause the errors of the two younger age groups- indicating the error transmission from the oldest to the younger and the existence of transgenerational inflation memories, but only under a high inflation environment. This may result in insignificant differences in expectations between age groups (AGE2, AGE3) and (AGE4). However, the inflation expectations from the oldest group (AGE4) do not Granger-cause the inflation expectations of the youngest group (AGE1), indicating that these intergenerational memories may disappear stepwise with time and next generations.

The study is based on the Polish economy, which precludes expanding the results to other countries. The further research includes investigating the countries with similar characteristics to Poland – implementing an inflation targeting regime and previously experiencing hyperinflation, e.g. Czech Republic. This may provide more general results and additionally verify the conclusions drawn from the Polish study.

5. Conclusion

Our results confirm the existence of a statistically significant heterogeneity in relation to consumer inflation expectations accuracy between the two specified age groups – the oldest and the youngest – characterized by vastly diverse past inflation experiences. Moreover, the effect in question systematically increases with the increase in inflation at the time when the expectations are formed. Importantly, this only holds under a high inflation environment, and within the inflation target range, the accuracy of inflation expectations formed by different age groups does not differ significantly from each other. Based on the previous findings in the field and related, we assume that the bias can be attributed to the experiences of hyperinflation during the political transformation of the oldest age group.

Furthermore, we also positively verified that the inflation forecast errors made by consumers from the oldest age group (AGE4) and formed under a high inflation environment are transmitted to younger age groups. What's important, the Granger causality tests allowed us to confirm the directionally one-sided transmission in relation to two middle groups (AGE2, AGE3), but not the youngest (AGE1). The finding supports the assumption that the younger agents are more affected by more recent experiences and might form their inflationary experiences more independently. Also, contrary to the three other age groups (AGE1, AGE2, AGE3), the oldest age group (AGE4) does not seem to be effective in learning from their mistakes, which might add to the continuity of the error transmission mechanism.

Our results contribute to the conclusion that the generally ambiguous role of age in inflation expectations formation does not hold in the case of economies affected by past hyperinflation history. In the case of Poland, the experience of hyperinflation and corresponding memory-based response can be considered as a valid determinant of the consumer heterogeneity in that

regard. This, in turn, may disrupt implementing common monetary policy, the process of uniform inflation expectations management, the effectiveness of central banks' communication tools and messages, as well as the general trust of the public in central banks.

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