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INFLATION TARGETING AND INFLATION FORECASTS UNDER CONDITIONS OF INCREASED UNCERTAINTY: EVIDENCE FROM POLAND

Abstract

Objective: This paper aims to assess the National Bank of Poland's efficacy in implementing inflation-targeting monetary policy amidst heightened uncertainty and inflationary pressures during the 2020–2022 period.

Research Design & Methods: Standard forecast error metrics (MAE, MAPE, RMSE) are employed to evaluate the accuracy of inflation forecasts by the National Bank of Poland (NBP). Additionally, qualitative analysis of NBP communication is conducted to discern signals or processes that indicate a departure from the pure inflation-targeting regime. Furthermore, outright buy operations of the NBP are scrutinised to ascertain the true purpose of quantitative easing undertaken during 2020–2021 and its alignment with inflation-targeting policy. Finally, both actual and projected inflation rates are examined for potential inconsistencies in the central bank's responses to ongoing inflationary trends.

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Findings: Analysis of forecast errors and accuracy metrics reveals a significant deterioration in the quality of inflation projections, rendering them ineffective in guiding monetary policy decisions in extreme times. Moreover, examination of selected actions by the NBP indicates deviations from the strict inflation targeting regime, resulting in inappropriate and untimely decisions to tighten monetary policy.

Implications/Recommendations: Discrepancies observed between formal and actual goals of domestic monetary policy, evident in central bank communication, the true purpose of quantitative easing (QE) operations, and the timing or direction of monetary decisions between 2020 and 2022, suggest the need for policymakers to recalibrate or reinforce the legal framework.

Contribution: This study extends the current understanding of the effectiveness of monetary policy under strict inflation targeting in a volatile economic environment. Analysing the approach of the National Bank of Poland in 2020–2022, it provides valuable insights into how discrepancies between the formal and actual goals of monetary policy may impact inflation rates.

Keywords: inflation targeting, inflation forecasts, forecast accuracy, monetary policy.

JEL Classification: E31, E52, E58.

1. Introduction

Inflation targeting has recently become a prevalent monetary policy regime worldwide (Mishkin & Schmidt-Hebbel, 2001; Zhang & Wang, 2022). Explicitly, this is a strategy in which the central bank sets an inflation target with a predefined tolerance range and aims to maintain the desired inflation rate consistent with this target over a specified time horizon (Bernanke & Mishkin, 1997). It assumes that maintaining price stability, i.e. a low and stable inflation rate, is the most substantial contribution of monetary policy to ensuring sustainable economic growth in the long term (Svensson, 1997). Previous monetary policy mechanisms were characterised by short-term manipulation of monetary instruments to achieve other goals, such as low unemployment or high GDP growth, which, in many situations, contradicts the goal of maintaining price stability.

Technically, inflation targeting may be referred to as forecast-based policy (Bernanke & Woodford, 1997; Svensson, 1997, 1999, 2009, 2020; Bernanke, 2004; Orphanides & Williams, 2005; Woodford, 2010). In general, it prompts the central banks to look ahead and to tighten monetary policy earlier, before inflation rates reach high levels. Central banks pursuing inflation targeting employ various types of forecasts to depict the future trajectory of inflation. Comparing these forecasts with the inflation target enables preemptive decision-making before inflation exceeds undesirable thresholds (Debelle *et al.*, 1998). If the forecast-based policy is to be effective, some

conditions must be met. Among them two in particular stand out as crucial: firstly, inflation projections must demonstrate high accuracy, minimising disparities from actual inflation levels across the forecast horizon; secondly, the decisions of monetary authorities must rely heavily on these projections. If actual inflation deviates considerably from the projections or decisions are based on other premises, the inflation targeting framework cannot function properly.

Formally, central banks have been charged with either strict or flexible inflation-targeting monetary policy mandate (Svensson, 2009). While the former restricts them concentrating on stabilising inflation around the target only, the latter further extends their responsibilities to ensuring the stability of the real economy. Therefore, under a flexible regime, monetary authorities are continuously seeking a compromise between stabilising output and inflation and may temporarily prioritise one of the sub-targets. As suggested by Bernanke and Woodford (1997), although inflation forecasts may be useful for monetary authorities, when making monetary decisions they should rather rely on extensive structural models of the domestic economy.

In practice, forecasting inflation is always a difficult task, but it is especially challenging when general economic conditions are affected by serious shocks. Empirical evidence suggests that inflation projections were quite accurate until the Great Financial Crisis, during the period called Great Moderation (McNees, 1992; Debelle *et al.*, 1998; Cristadoro, Saporito & Venditti, 2013; Gestsson, 2018; Bennett & Owyang, 2022; Chahad *et al.*, 2022). The recent global surge in inflation in the aftermath of the COVID-19 pandemic crisis and instabilities caused by Russian aggression in Ukraine has exposed the vulnerabilities of inflation-targeting monetary policy that relies heavily on inflation forecasts. First, under increased uncertainty caused by the extraordinary events (pandemic, war) the quality of inflation projections has deteriorated significantly, which makes them inadequate for making monetary policy decisions in extreme times. Secondly, macroeconomic shocks have prompted an informal reordering of the priorities of monetary policy, shifting focus away from the primary objective of combating inflation towards a greater emphasis on addressing other economic goals important for crisis management (e.g. reducing unemployment, enhancing liquidity of government bond markets, supporting the state budget, stimulating the real economy). While formal monetary policy goals have remained unchanged, their dilution has diminished the efficacy of monetary policy in keeping inflation close to the target. In this

paper we examine the efficacy of the National Bank of Poland (NBP) in pursuing inflation-targeting monetary policy under conditions of increased uncertainty and inflationary pressure. Specifically, we assess the utility and accuracy of inflation forecasts prepared by the NBP and indicate possible deviations of formal monetary goals from the norms prescribed by a strict inflation-targeting regime. To achieve this, we conducted a comparative analysis of conventional forecast error metrics alongside the identification of inconsistencies between the pursued monetary policy and its formal objective. Our hypothesis posits that, since the onset of the pandemic, the inflation projections of NBP have deteriorated drastically, coupled with a diminished role for the inflation target in monetary policy decisions, which have collectively undermined the efficacy of monetary policy, culminating in significantly elevated levels of inflation. Poland, as an emerging economy neighbouring Ukraine and Russia, has been particularly exposed to shocks and high uncertainty effects that shape the local economic conditions. Nevertheless, the adopted inflation-targeting monetary policy framework leaves, at least formally, no room for deviations from its primary focus, which remains price stability irrespective of circumstances. By identifying discrepancies between formal and actual goals of domestic monetary policy, which are evident in both central bank communication, the real purpose of quantitative easing (QE) operations, and the timing or directions of monetary decisions, we uncover the true nature of inflation-targeting regime in Poland between 2020 and 2022, which may be an indication for policymakers to recalibrate and strengthen the legal framework.

The structure of the paper is as follows. Section 2 describes the monetary policy mandate of NBP and characteristics of inflation forecasts. Section 3 clarifies the nature and limitations of the data set and methodology. Section 4 discusses the results and their implications. Concluding remarks follow in section 5.

2. Inflation-targeting and Inflation Forecasts of the National Bank of Poland

As stipulated in the Constitution of the Republic of Poland and the Act on the National Bank of Poland, NBP's principal aim is to uphold price stability while supporting the economic policy of the Government, provided that this does not impede NBP's primary mandate. This general regulation serves as the foundation for the inflation-targeting framework developed by the Monetary Policy Council (MPC), which specifies NBP's primary

objective as achieving a stable inflation rate of 2.5% with a permissible tolerance band of ± 1 percentage point over a medium-term horizon (NBP, 2003). Thus, monetary policy in Poland has taken the form of a strict inflation-targeting regime. While monetary policy has evolved over the years, the inflation target has remained unchanged since 2004 (Cizkiewicz-Pękała *et al.*, 2019).

In order to pursue this strategy, NBP, following other central banks which have implemented an inflation targeting regime, prepares cyclical projections of inflation and GDP, which guide monetary policy decisions. In practice, inflation and GDP projections are developed using the NECMOD model, which after several revisions and improvements has become the primary forecasting tool of the NBP¹.

Model parameters are subject to adjustments by NBP experts, yet the extent to which these experts contribute to the final results of the model projections remains undisclosed. Initially, the projections included information about expert adjustments and their impact on the final results. However, since February 2010, the publication of this information has been discontinued. From February 2008 onward, the projections have included a statistical summary of the results, facilitating comparisons between previous and present inflation forecasts. It should be noted, however, that projections until November 2019 are based on annual periods, while those from March 2020 onward are based on quarterly periods. The frequency of inflation projections, whether annual or quarterly, is crucial for assessing their accuracy. Therefore, the analysis is divided into two periods: from 2009 to 2022 it will cover annual projections, and from 2020 to 2022 it will focus on quarterly projections. This approach is further justified by the relatively stable economic conditions, except for the crisis of 2008–2009, during the period from 2009 to 2019. However, its impact on inflation was not as great as the recent shocks, so the inflation rates remained relatively stable over and after the financial crisis. Therefore, the period covering 2020–2022 characterised by increased uncertainty and dramatic price dynamics is the primary focus in this study.

¹ According to Budnik *et al.* (2009, p. 6): “NECMOD is the structural macroeconomic model of the Polish economy, which was developed foremost to facilitate implementation of the monetary policy in Poland through a regular delivery of inflation and GDP projections. The model encompasses all major channels of the monetary policy transmission mechanism and is able to deliver a comprehensive account of factors underlying the main economic developments. With its complex labor market structure, explicit incorporation of inflation expectations, distortionary fiscal policy and heterogeneity of the capital stock, NECMOD is able to describe propagation of a range of macroeconomic shocks. As a forecasting tool, the model is specifically designed to reflect the dynamic nature of a converging economy”.

An essential consideration for inflation-targeting monetary policy is the choice of an inflation indicator that accurately reflects price dynamics in the medium term. While the consumer price index (CPI) is the primary indicator used to express the inflation target, core inflation is often considered a superior measure of inflationary pressure in the economy (Cristadoro, Saporito & Venditti, 2013; Liu & Smith, 2014). In recent years the central bank has frequently attributed the underestimation of inflation to global factors beyond its control. In this context, it is worthwhile to examine inflation projections that exclude the impact of energy and food prices, referred to as core inflation. Monetary policy exerts greater influence on the course of processes related to core inflation, thus it should remain largely under the control of the central bank.

Nevertheless, in our analysis we include actual and forecasted values of both CPI and core inflation, as well as deviations between the indicators, in order to be consistent with NBP practice. Figure 1 illustrates the formation of actual inflation rates and the NBP reference rate. Furthermore, inflation projections for CPI and core inflation are presented on Figure 2 and Figure 3, respectively.

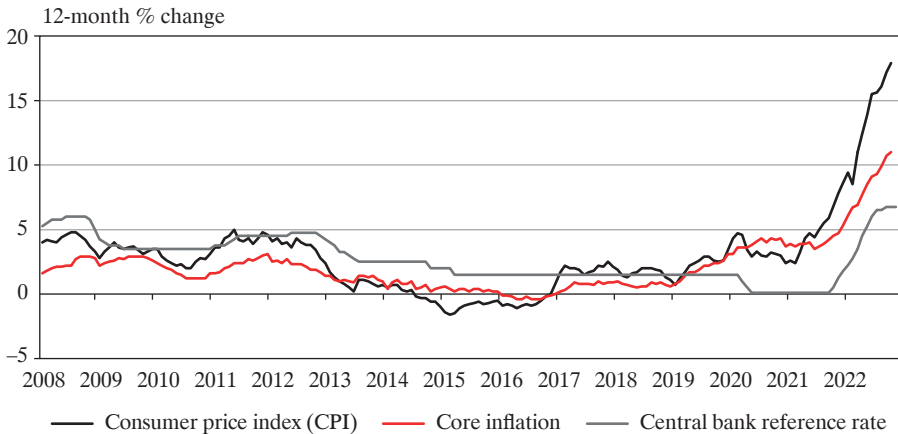


Fig. 1. Consumer Price Inflation (CPI), Core Inflation and the Central Bank Reference Rate in Poland, between 2008 and 2022 (October)

Source: National Bank of Poland, Statistics Poland.

From the beginning of 2018 to July 2021, inflation fluctuated between -1.6% and 5% year-on-year. Only in August 2021 did it exceed 5% (5.5%).

However, increased price change dynamics had already been observed from 2019, peaking in October 2022. Taking into account the rapid increase in inflation, compounded by unpredictable supply-side factors, accurate forecasting of inflation under such conditions is extremely difficult, if not impossible. However, core inflation, particularly in late 2019 and early 2020, seems not to be properly taken into account in the NBP projections and, consequently, not adequately addressed in monetary decisions. Notably, the official inflation forecasts of NBP showed a systematic underestimation of inflation dynamics in this period.

In the years 2020–2022, NBP inflation reports suggested that inflation would typically peak within 1–2 quarters following the publication of the report, and then fall towards the inflation target. However, inflation continued to rise throughout this period, undermining the accuracy of the forecasts. The most evident consequence of the systematic underestimation of inflation is the periodic elevation of the levels from which the medium-term projections anticipated inflation would begin to decline toward the target.

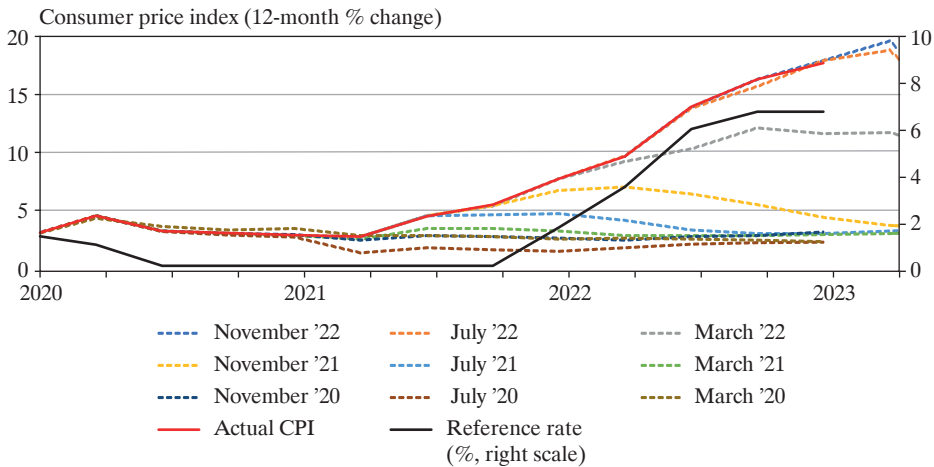


Fig. 2. CPI Inflation Projection According to NBP Inflation Reports Published between 2020 and 2022

Source: National Bank of Poland, Statistics Poland.

Figure 3 presents a series of NBP projections of core inflation, alongside its actual trajectory. Notably, as early as 2020, the actual level of inflation significantly exceeded the central bank’s forecasts. Furthermore, despite

the majority of inflation reports between 2020 and 2022 indicating a decline in inflation, the actual reported core inflation remained consistently high, hovering around 4% throughout 2020 and 2021, before beginning to accelerate from the 4th quarter of 2021.

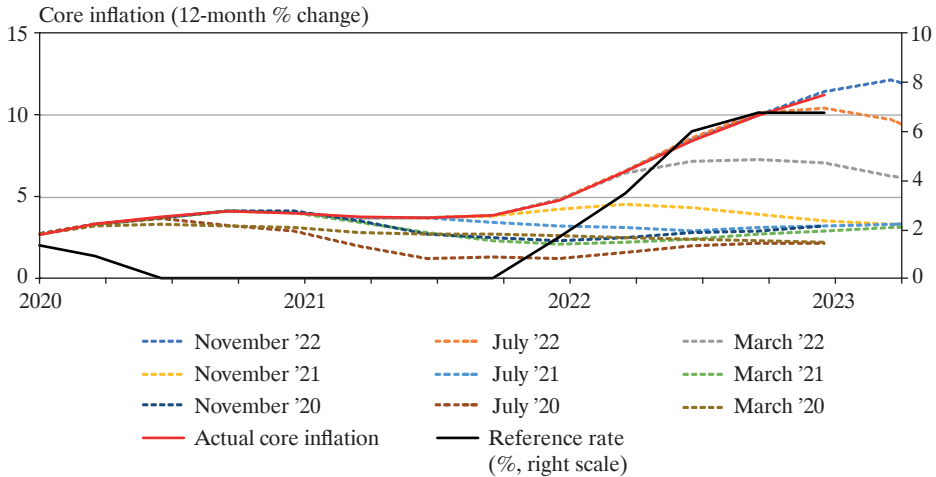


Fig. 3. Core Inflation Projection According to NBP Inflation Reports Published between 2020 and 2022

Source: National Bank of Poland.

3. Methodology and Data

3.1. Data

For the analysis of forecast accuracy we utilise data on the consumer price index (CPI) and core inflation (CPI net of food and energy prices), as well as the forecasts announced by the NBP. Inflation projections are released three times a year (in March, July and November) and cover price developments up to three years into the future from the publication date. The data frequency is annual for 2009–2019, and quarterly for 2020–2022. In both cases the respective inflation rates are computed on a year-to-year basis and are available in Excel format on the NBP website.

As our focus is primarily on recent developments in inflation trends, we divide the data set into two subsamples: subsample A covering projections for the period 2009–2019, and subsample B – with projections for the years 2020–2022. While subsample A includes inflation rates recorded in times of relatively stable price movements, ranging between -1.6% and 5% year-

-to-year (see Fig. 1), subsample B is characterised by highly dynamic price growth driven by increased political and economic uncertainty caused by the COVID-19 pandemic, the energy crisis, and Russia’s aggression against Ukraine. Both subsamples can alternatively be considered as “normal” and “uncertain” conditions, respectively.

Importantly, since successive inflation projections are released every four months and incorporate updated information on the current macroeconomic conditions and prospects for the economy, we group them according to comparable time horizons (Table 1). While these horizons are not entirely equal in length, they are sufficiently close to be clustered together without significantly biasing the analysis. For instance, inflation projections for 2009–2010 announced in February, June and October have been grouped together with the respective projections from March, July and November in this subsample. Likewise, a comparable grouping procedure has been applied for projections of similar length (1q, 2q or 4q) classified as spring, summer and autumn in subsample B.

Table 1. NBP Inflation Forecasts for 2009–2019 and 2020–2022

Forecast Published in	Short Name	Forecast for (Annual Average as at the End of)	Approximate Length (in Quarters)
Subsample A: 2009–2019			
February/March in year t	Spring_long	year $t + 1$	$q + 7$
June/July in year t	Summer_long	year $t + 1$	$q + 6$
October/November in year t	Autumn_long	year $t + 1$	$q + 5$
Subsample B: 2020–2022			
March in year t	Spring_1q	2 nd quarter of year t	$q + 1$
	Spring_2q	3 rd quarter of year t	$q + 2$
	Spring_4q	1 st quarter of year $t + 1$	$q + 4$
July in year t	Summer_1q	3 rd quarter of year t	$q + 1$
	Summer_2q	4 th quarter of year t	$q + 2$
	Summer_4q	2 nd quarter of year $t + 1$	$q + 4$
November in year t	Autumn_1q	4 th quarter of year t	$q + 1$
	Autum_2q	1 st quarter of year $t + 1$	$q + 2$
	Autumn_4q	3 rd quarter of year $t + 1$	$q + 4$

Source: own elaboration.

As a result, the total number of available observations varies between 6 and 11 data points depending on forecast length (Table 2).

Table 2. Summary Statistics for Forecast Errors

Specification	CPI		Core Inflation		Number of Observations
	Average (%)	Standard Deviation (%)	Average (%)	Standard Deviation (%)	
Subsample A: 2009–2019					
Spring_long	-0.43	1.41	-0.75	0.42	11
Summer_long	-0.47	1.32	-0.63	0.61	11
Autumn_long	-0.56	1.24	-0.62	0.57	11
Subsample B: 2020–2022					
1q	0.85	1.23	0.53	0.49	8
2q	1.72	1.71	1.24	1.06	7
4q	5.61	4.53	3.41	2.17	6

Source: own elaboration.

Furthermore, the qualitative analyses of deviations from the inflation-targeting regime is based on various sorts of data. The statements of the NBP president or the minutes of the Monetary Policy Council are used to identify non-inflationary targets of the monetary authorities. Additionally, the information on outright buy operations of the NBP and the characteristics of bond emissions subject to QE operations serve to identify the primary focus of the NBP in supporting the government's crisis management.

3.2. Methodology

In the first step, consistent with prior research (Bryan, Cecchetti & Wiggins, 1997; Öller & Barot, 2000; Nguyen & Tran, 2015; Sari, Mahmudy & Wibawa, 2016; Grechuta, 2018), we employ standard forecast error metrics to examine the accuracy of inflation forecasts made by the NBP. These typically include mean absolute forecast error (MAE), root mean squared forecast errors (RMSE), or mean absolute percentage error (MAPE).

In general, inflation forecast error ($E_{t+q,t}$) for a forecast q periods ahead made in period t can be expressed as follows:

$$E_{t+q,t} = \pi_{t+q} - \pi_{t+q,t},$$

where: π_{t+q} is the actual inflation rate in period $t+q$, $\pi_{t+q,t}$ – the inflation forecast q periods ahead prepared in period t , $q > 0$. Positive values of errors indicate an underestimation, while negative values indicate an

overestimation of the forecasted inflation rates. Smaller forecast errors imply greater forecast accuracy.

In order to compute the average error size and simultaneously avoid the mutual cancellation of negative and positive forecast errors, the mean absolute forecast errors (MAE_q) are calculated based on the following formula:

$$MAE_q = \frac{1}{n} \cdot \sum |\pi_{t+q} - \pi_{t+q,t}|,$$

where: n is the number of observations. Hence, MAE_q measures the average deviation of forecasts q periods ahead from actual inflation by assuming all forecast errors to be positive values. The larger the MAE_q , the less accurate the inflation forecast is. Relatedly, the mean absolute percentage error ($MAPE_q$), which measures the average of absolute forecast errors q periods ahead divided by the actual inflation rates from the corresponding period, is calculated according to the formula:

$$MAPE_q = \frac{100}{n} \cdot \sum \left| \frac{\pi_{t+q} - \pi_{t+q,t}}{\pi_{t+q}} \right|.$$

While MAE_q measures the absolute difference between the actual and the predicted inflation rates, $MAPE_q$ expresses these differences as a relative percentage by dividing them by the actual inflation from the specific period.

Additionally, the root mean squared forecast errors ($RMSE_q$), which represent the standard deviation of the prediction errors, are calculated according to the formula:

$$RMSE_q = \sqrt{\frac{1}{n} \cdot \sum (\pi_{t+q} - \pi_{t+q,t})^2}.$$

All metrics have their advantages and disadvantages and can provide varying degrees of accuracy. For instance, when the actual inflation rates are close to or equal to zero, calculating $MAPE_q$ becomes problematic due to the denominator, which can lead to undefined values. Therefore the analysis will be complemented by a graphical presentation of forecast projections and errors to avoid possible misinterpretation.

Furthermore, we aimed to identify monetary policy-related signals or processes that indicate a departure of the NBP from the pure inflation-targeting regime during the period of increased uncertainty. To achieve this, we first conducted a qualitative analysis of both the minutes of the Monetary

Policy Council, chaired by the NBP president, and the subsequent statements made by the president following these meetings. In this respect we build upon empirical evidence suggesting that the NBP exhibits lower consistency in following its forecasts compared to some other inflation targeting central banks (Szyszko & Rutkowska, 2019), and the official or unofficial communications from bank officials pertaining to the NBP's primary mandate which exhibit internal consistency in the short term (Rybinski, 2019). Complementarily, we investigate outright buy operations of the NBP to verify the real purpose of quantitative easing carried out in 2020–2021 and its links to inflation-targeting policy. Finally, we examine both the actual and projected inflation rates in terms of possible inconsistencies in the central bank's reactions to the ongoing inflationary processes.

4. Results and Discussion

4.1. Accuracy of Inflation Forecasts

For the specified inflation projections (Table 1), we present graphical representations of the forecast errors and provide selected accuracy measures. These are reported in Figure 4 and Table 3 for subsample A and in Figure 5 and Table 4 for subsample B. While the metrics for subsample A have been computed by taking into account three periods indicating the subsequent projection announcements (spring, summer, autumn), those for subsample B, due to the limited data set, have been classified based on the length of the forecast horizon (1q, 2q, 4q), irrespective of the announcement time.

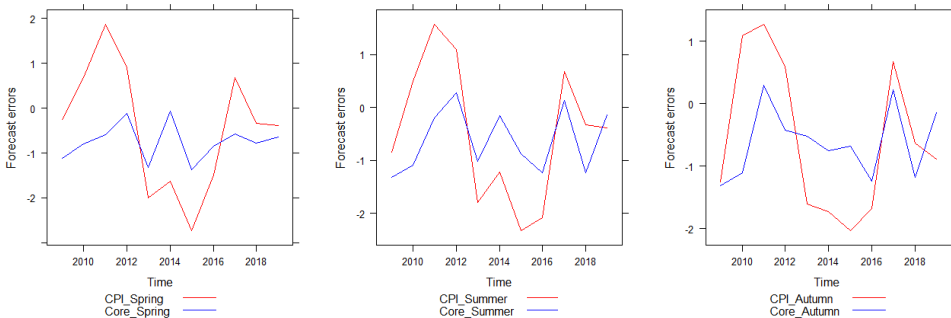


Fig. 4. Forecast Errors for CPI and Core Inflation in 2009–2019 (Subsample A) for Spring, Summer and Autumn Projections

Source: own elaboration.

Table 3. Forecast Accuracy Measures for Subsample A (2009–2019)

Measure	CPI			Core Inflation		
	Spring_ long	Summer_ long	Autumn_ long	Spring_ long	Summer_ long	Autumn_ long
MAE	1.18	1.17	1.22	0.75	0.70	0.72
RMSE	1.41	1.34	1.31	0.85	0.85	0.83
MAPE	676.57	535.28	710.83	112.28	111.76	112.27

Source: own elaboration.

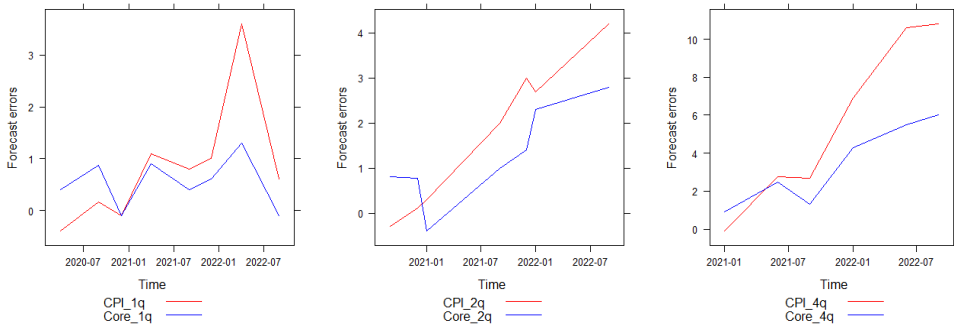


Fig. 5. Forecast Errors for CPI and Core Inflation in 2020–2022 (Subsample B) for Projections of Length 1q, 2q, 4q

Source: own elaboration.

Table 4. Forecast Accuracy Measures for 2020–2022 (Subsample B)

Measure	CPI			Core Inflation		
	4q	2q	1q	4q	2q	1q
MAE	5.64	1.80	0.97	3.41	1.35	0.58
RMSE	6.97	2.33	1.43	3.94	1.58	1.43
MAPE	54.74	22.08	12.01	51.99	23.62	12.01

Source: own elaboration.

The results reveal relatively small errors for core inflation compared to CPI forecasts. This is not surprising, as core inflation excludes changes in food and energy prices that are prone to temporal fluctuations or supply shocks. The high values of MAPE are mostly influenced by the close-to-zero actual deflation rate in 2014, which also reveals the weakness of this measure.

For the period 2020–2022 we present the same accuracy measures for the forecast horizons of one quarter (1q), two quarters (2q) and four quarters (4q) ahead (Table 4, Fig. 5). The relatively high errors across all horizons confirm the strong deterioration of NBP inflation projections since 2021. Interestingly, the short-term forecast errors under increased uncertainty significantly exceed the errors of forecasts extending more than one year in “normal” times. Forecasts with errors several times higher than the inflation target essentially disqualify them as a suitable tool for guiding monetary decisions under an inflation-targeting regime. The accuracy metrics provide supplementary confirmation of discrepancies between actual and projected inflation rates in the period of increased macroeconomic pressure.

4.2. Departures from the Inflation-targeting Regime

4.2.1. General Remarks

In times of increased uncertainty and in crisis situations, monetary authorities take active countermeasures to stabilise the domestic economy and the financial system. The type and scope of actions taken should comply with the legal regulations and be consistent with the monetary policy strategy adopted. Nevertheless, in practice, special circumstances often lead monetary authorities to deviate from inflation-targeting policy and unofficially prioritise other economic objectives. While providing financial support to mitigate macroeconomic shocks is highly desirable, it also raises concerns due to the economically disruptive effects of deviations from official goals. In this subsection we concisely analyse three cases of periodic departures by the Polish central bank from its inflation-targeting regime at the expense of maintaining price stability.

4.2.2. Central Bank Communication

Central bank communication is widely recognised as a pivotal conduit through which monetary policy actions exert influence on the economy (Blinder *et al.*, 2008; Baranowski *et al.*, 2021). Leveraging this insight, upon scrutinising the announcements by the Polish monetary authorities, there is no doubt that during the analysed period, the NBP has moved away from its strict inflation targeting strategy. This is evident in both the documents of the Monetary Policy Council from decision-making meetings and in the speeches of the NBP governor at monthly press conferences following MPC meetings, where the

motives behind the decisions made were explained in the context of the specific economic situation.

In a situation where, in September 2021, CPI inflation was approaching 6% and core inflation exceeded 4%, and had remained at elevated levels for nearly two years, the central bank, as stated by the governor, deemed these factors insufficient to justify a reduction in overly accommodative monetary policy, thus maintaining the central bank's reference rate at 0.1% (NBP, 2021): "Central banks should not respond to negative supply shocks by raising interest rates. That would be a schoolboy error, leading only to lowering the pace of economic growth, or directly to stifling economic growth. Those who advocate for such a significant, abrupt reaction, raising interest rates in the face of negative supply shocks, actually encourage us to have stagnation or even stagflation. (...) If there is a risk of persistently exceeding the inflation target due to sustained demand pressure, under a strong labour market – meaning low unemployment, and amidst favourable economic conditions, we will promptly tighten monetary policy (...)"

On the other hand, as the cycle of interest rate hikes came to a halt in October 2022, with CPI inflation approaching 18% and core inflation exceeding 10%, the NBP governor articulated that further rate hikes would pose a threat to the economy, hampering economic processes in some way (NBP, 2022b). The MPC's decision to adopt a wait-and-see stance occurred despite the central bank's forecasts not indicating that CPI inflation would return to near the inflation target within the next two years.

It is worth adding that documents published by the MPC confirm the position of the NBP governor, indicating that the general economic situation is treated by the monetary authorities as more important than the inflationary processes that were taking place at the same time. The minutes of the Monetary Policy Council decision-making meeting held on October 5, 2022 (NBP, 2022a), explicitly state: "The majority of the Council members pointed out that, given strength and persistence of the current shocks that remained beyond the impact of domestic monetary policy, a return of inflation towards the NBP inflation target would be gradual. Alongside that, it was underlined that, in accordance with the Monetary Policy Guidelines for 2022, the Council flexibly determined the desirable time necessary to bring inflation back to the target, as bringing inflation rapidly back to the target might entail significant costs to macroeconomic stability".

Since the beginning of 2020, the responses of the monetary authorities in Poland have closely resembled a flexible inflation-targeting strategy similar to that of the Federal Reserve System. The mandate of the US monetary authority is

known as a dual mandate, focusing on price stability and maximum sustainable employment, with both objectives of monetary policy being treated equally. However, while this approach is regulated by law through the Federal Reserve Act in the United States, the implementation of such a strategy in Poland is an independent decision of the monetary authorities.

4.2.3. The Real Purpose of QE Operations

The announcement of large-scale asset purchase operations by the NBP was made in a statement by the NBP Board of Directors on March 16, 2020 and reiterated in a statement following the Monetary Policy Council meeting on March 17, 2020. Initially, the aim of these operations was to purchase government bonds in the secondary market. Their purpose was to alter the long-term structure of liquidity in the banking sector and to ensure liquidity maintenance in the secondary market for government bonds. As of April 8, 2020, the range of instruments purchased was expanded to include debt securities guaranteed by the Treasury, and the purpose of the operations was augmented to enhance the impact of lowering interest rates on the economy, i.e. strengthening the monetary transmission mechanism. In practice, the group of debt securities guaranteed by the Treasury encompassed bonds issued by the Polish Development Fund (PFR) for financing the financial shield and those issued by Bank Gospodarstwa Krajowego (BGK) for the COVID-19 Counteracting Fund (FPC).

Notably, the schedule of tenders for NBP structural operations coincided significantly with the timing of PFR and BGK bond issues. For example, BGK bonds marked FPC0427, with an issue volume of up to PLN 33.585 billion, were issued on April 23, 2020 and then largely purchased by the central bank at subsequent tenders on April 29 (PLN 8.763 billion), May 13 (PLN 4.074 billion), May 27 (PLN 7.999 billion) and June 10 (PLN 1.861 billion). Similarly, PFR bonds marked PFR0324, with an issue size of up to PLN 16.325 billion, were issued on April 27, 2020 and then purchased by the NBP after just 2 days, i.e. at a tender on April 29 (PLN 3.69 billion), and again at a tender on May 13 (PLN 0.76 billion). Table 5 presents the first structural outright buy operations carried out by NBP since the outbreak of the pandemic (March–June 2020). Securities marked with an abbreviation starting with “PFR” or “FPC” indicate bonds issued by off-budget entities, i.e. PFR and BGK, respectively.

Table 5. Structural Open Market Operations of NBP in March–June 2020

No.	Date of Tender	Name of Paper	Maturity Date	Nominal Value of Accepted Offers (mln PLN)	Average Profitability (%)
1	2020-03-19	PS0422	2022-04-25	1,472.04	1.05
	2020-03-19	DS0725	2025-07-25	343.98	1.73
	2020-03-19	DS1029	2029-10-25	680.03	1.97
2	2020-03-23	PS0422	2022-04-25	5,538.69	1.00
	2020-03-23	PS0424	2024-04-25	60.00	1.21
	2020-03-23	DS0727	2027-07-25	20.00	1.81
3	2020-03-26	PS0422	2022-04-25	248.34	0.82
	2020-03-26	DS0725	2025-07-25	37.50	1.23
	2020-03-26	DS0726	2026-07-25	5,032.64	1.44
	2020-03-26	DS0727	2027-07-25	165.45	1.65
	2020-03-26	WS0428	2028-04-25	200.00	1.77
	2020-03-26	DS1029	2029-10-25	5,000.00	1.77
4	2020-04-16	OK0521	2021-05-25	50.00	0.50
	2020-04-16	PS0422	2022-04-25	25.00	0.63
	2020-04-16	OK0722	2022-07-25	500.00	0.65
	2020-04-16	DS0725	2025-07-25	10,037.40	1.04
	2020-04-16	WS0428	2028-04-25	5,042.00	1.38
	2020-04-16	DS1029	2029-10-25	15,000.00	1.38
5	2020-04-29	PS0123	2023-01-25	200.00	0.59
	2020-04-29	PFR0324	2024-03-29	3,690.00	1.40
	2020-04-29	DS0726	2026-07-25	334.50	1.18
	2020-04-29	FPC0427	2027-04-27	8,763.28	1.90
	2020-04-29	WS0428	2028-04-25	194.95	1.42
6	2020-05-13	DS1023	2023-10-25	100.00	0.64
	2020-05-13	PFR0324	2024-03-29	760.00	1.40
	2020-05-13	PFR0325	2025-03-31	3,495.00	1.71
	2020-05-13	FPC0427	2027-04-27	4,074.60	2.09
7	2020-05-27	PS0123	2023-01-25	50.00	0.58
	2020-05-27	PFR0325	2025-03-31	1,011.00	1.71
	2020-05-27	PFR0925	2025-09-22	5,278.00	1.68
	2020-05-27	FPC0427	2027-04-27	7,999.20	1.92

Table 5 cont'd

No.	Date of Tender	Name of Paper	Maturity Date	Nominal Value of Accepted Offers (mln PLN)	Average Profitability (%)
8	2020-06-10	FPC0427	2027-04-27	1,861.34	1.82
	2020-06-10	PFR0627	2027-06-07	4,490.00	1.87
	2020-06-10	WS0428	2028-04-25	83.00	1.29
	2020-06-10	FPC0630	2030-06-05	1,964.50	2.14
9	2020-06-24	DS0727	2027-07-25	15.00	1.13
	2020-06-24	WS0428	2028-04-25	190.00	1.26
	2020-06-24	DS1029	2029-10-25	180.00	1.31
	2020-06-24	FPC0630	2030-06-05	1,990.40	2.18

Source: National Bank of Poland.

In this manner, the NBP *de facto* financed the government's anti-crisis programme. Along with the government and its affiliated institutions, it established a closed circuit to set these measures in motion. Consequently, the central bank in Poland appeared to extend its mandate informally from primarily ensuring price stability to assuming responsibility for the stability of the entire economy.

4.2.4. Timing and Directions of Monetary Decisions

Another question regarding the efficacy of monetary policy pertains to the timing and direction of monetary decisions. In this regard, several instances emerge where monetary policy decisions were inadequate or delayed. The first occurred at the onset of the first and second quarter of 2020. The actual inflation rate continued to rise from the beginning of the year and March's inflation projection indicated that inflation would remain at elevated levels in the coming months. This was particularly evident in core inflation which exhibited an upward trend, surpassing 4.2% in September, well above the inflation target, and persisting at this level until September 2021 before rising again. Despite increasing inflation pressure, the Monetary Policy Council reduced the basic interest rate to virtually zero, whereas, according to the inflation targeting regime, they should have done the opposite. In our view, this marks the true onset of inflation increases in Poland, primarily driven by demand factors.

Another episode of such underreaction is the behaviour of the MPC in 2021. CPI began to rise at the beginning of the second quarter of that year from the

level of 2.4% in February, and core inflation had remained elevated since the beginning of 2020. Despite obvious arguments, the MPC began to increase the basic interest rate in October, at least 7 months too late, when the real CPI reached 6.8%. We may also argue that the increases were not sufficient because CPI continued its upward trend unabated until November 2022, marking 20 consecutive months of increase.

5. Conclusion

In 1998 the NBP adopted an inflation targeting regime in monetary policy. This strategy proved to be effective in reducing high inflation rates and ensured low inflation over the following 20 years. This changed dramatically in 2021 and 2022 when inflation soared to levels not seen for over two decades.

Basically, there are two sets of reasons that have recently contributed to such a sharp rise in inflation. The first set relates to external shocks caused by the COVID-19 pandemic and the war in Ukraine, which generally increased inflation volatility. The second set results from errors in monetary policy. As our research shows, there are two primary sources of these errors. First of all, the quality of inflation projections has drastically deteriorated, rendering them *de facto* useless in guiding monetary policy decisions. In general, forecasts grossly underestimated the actual inflation rate, so monetary policy decisions lost their fundamental rationale. Second, monetary policy deviated from the strict inflation targeting. In minutes of the Monetary Policy Council decision-making meetings as well as in the statements of the NBP president, unemployment and GDP growth were at least as important as inflation. This led to inappropriate and delayed decisions to tighten monetary policy. Thus, actual inflation in Poland has become too high and persistent. This conclusion may be indicative for policy makers to rethink the monetary policy framework to better align monetary actions with an inflation-targeting strategy under increased uncertainty.

Our study suffers from several limitations. First, the data encompassing internal inflation forecasts of NBP is extremely limited, which restricts our empirical analysis to basic forecast accuracy metrics and graphical presentations of inflation forecasts and their errors. Second, the varying lengths of forecast time horizons make it challenging to compare forecast errors and accuracy measures. Third, our qualitative analysis of recent shifts in monetary policy strategy relies on selected actions or statements of the monetary authorities. Employing more formalised empirical methods would

enable a more comprehensive analysis of potential deviations from the primary goal of monetary strategy pursued by the NBP. Fourth, our research is confined to the inflationary processes observed in Poland. Including other countries with inflation-targeting regimes in the analysis would provide additional insights into differences in inflationary patterns and central bank actions in extreme times. We will address these shortcomings in our next study of the efficiency of the inflation-targeting regime in Poland.

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