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DISCRETION AS A POLICY TOOL – AN ANALYSIS OF THE NATIONAL BANK OF POLAND'S ROLE IN INTERVENTION STRATEGIES DURING THE ECONOMIC CRISIS

Abstract

Objective: The decision-making discretion of the National Bank of Poland (NBP) plays a key role in enhancing the country's economic stability during economic crises. The premise is that flexibility and the ability to respond quickly to changing economic conditions are essential for effective economic management in times of crisis. Decision-making discretion allows the National Bank of Poland to take non-standard actions that would not be possible under a rigid policy based on predetermined rules.

Material and methods: Econometric models, such as Vector Autoregression (VAR) model, are often used to analyze the effects of central banks' monetary policies during crises.

Results: The conducted analysis of time series data and VAR modeling, combined with Diebold and Yilmaz spillovers indexes, show that the decision-making discretion of the National Bank of Poland plays a key role in enhancing the country's economic stability during the economic crisis. The results of the analysis indicate that the NBP's interventions are effective in reducing the volatility of inflation, the unemployment rate and GDP growth, as well as in transmitting the effects of monetary policy between different sectors of the economy.

Conclusions: 1. NBP should implement a quarterly scenario-based stress testing framework to forecast the impact of extreme macroeconomic conditions on monetary stability. This framework should incorporate scenarios such as a 5% GDP contraction or inflation surging by 3% above target levels. 2. NBP could adopt a pre-emptive intervention cap set at 50 billion PLN for liquidity support operations over a six-month period. This limit would ensure timely and adequate responses to crises while maintaining financial system confidence and avoiding excessive fiscal burdens.

Keywords: *economic crisis, monetary policy, fiscal policy, National Bank of Poland, macroecomomics*

Introduction

The National Bank of Poland (NBP) plays a fundamental role in Poland's economy, serving as the country's central bank (Myślak, 2013, pp. 95-123; Goodhart, 2010, pp. 135-154). The NBP's core activities include conducting monetary policy, primarily focused on maintaining price stability by setting interest rates and regulating the money supply to meet inflation targets (Bernanke and Mishkin, 1997, pp. 97-116). It also ensures financial system stability by monitoring markets and the banking sector, identifying risks, and intervening as necessary in cooperation with other financial supervisory institutions (Pietryka, 2016, pp. 112-138). During economic crises, such as the 2008-2009

financial crisis or the COVID-19 pandemic (Jordà et al., 2020, pp. 1-39), the NBP's role becomes even more crucial, requiring quick and decisive action to mitigate negative effects. In such situations, the NBP often uses non-standard monetary policy tools, like quantitative easing (asset purchase programs), to increase market liquidity and support the economy (Cour-Thimann and Winkler, 2013, pp. 1-33). Thanks to its flexible approach to monetary policy, the NBP can effectively respond to changing economic conditions and support the economy in difficult periods (Trzonkowski, 2023, pp. 242-262).

Empirical material, research gap and methodology

Previous analyses of the monetary policy of the National Bank of Poland in crisis periods have mainly focused on descriptive summaries of Monetary Policy Council decisions or on short-term effects of selected instruments (e.g., interest rate cuts). What is missing, however, is a comprehensive treatment that simultaneously (1) compares three distinct crisis episodes (2008-2009, 2010-2012, 2020-2022) (Gruszczyński, 2018, pp. 65-89), (2) analyses the full monetary transmission chain—from reference rates, through the credit channel, to real variables – and (3) subjects the econometric model to rigorous diagnostics. The purpose of this article is to empirically assess the effectiveness of the NBP's discretionary monetary policy in three key crises of the last two decades. Specifically, the study seeks to (a) estimate the magnitude of the short-term impact of interest rate interventions on inflation, unemployment and GDP growth, (b) compare the strength of transmission in financial, debt and pandemic crises, and (c) test whether the observed effects persist once full model diagnostics are included. All data series were transformed and tested for stationarity using ADF tests.

Table 1. *Results of Augmented Dickey-Fuller (ADF) Stationarity Tests*

Variable	ADF Statistic	P-value
Inflation	-3.52	0.012
Unemployment	-3.15	0.028
GDP growth	-3.88	0.005
NBP Interventions	-3.01	0.035

Source: Own estimates

Rationale for the choice of the VAR model

The vector autoregression model VAR(1) was adopted to assess the dynamic relationship between monetary policy and real variables. Quarterly data from Q1 2008 to Q4 2022 were used for model estimation. In the literature (Sims, 1980, pp. 1-48), the VAR is regarded as the standard when examining causal relationships without imposing an a priori structure on the equations—which is crucial under conditions of discretionary central bank decisions. The AIC, BIC and HQC criteria selected one order of lag, and the LR test confirmed that further lags do not significantly improve the fit. Thus, the model strikes a balance between parsimony and capturing the most important dynamic effects.

Estimation methodology and diagnostics

The model was estimated using the OLS method in each equation. The coefficients of determination (R^2) for each of the model equations are: Inflation (annual inflation rate,%): $R^2 = 0.71$; Unemployment: $R^2 = 0.64$; GDP growth: $R^2 = 0.58$; NBP rate changes: $R^2 = 0.69$, indicating a satisfactory fit.

Standard statistical diagnostics were carried out to ensure correct specification of the VAR model. Tests for autocorrelation of the residuals (LM test) did not show any significant autocorrelation at the 5% significance level, indicating the absence of systematic dependencies in the residuals that could distort the model results. Similarly, tests for heteroskedasticity of the residuals (ARCH) did not confirm the presence of a variable variance effect, and the distributions of the residuals were found to be consistent with normality, as confirmed by the p-values of the Jarque-Bera test (all above 0.05). Given the high values of the determination coefficients and the positive results of the diagnostic

tests, the obtained VAR model can be considered as correctly estimated and analytically reliable. Therefore, its application allows for the formulation of well-founded empirical conclusions regarding the effectiveness of the National Bank of Poland's discretionary interventions in periods of economic crisis.

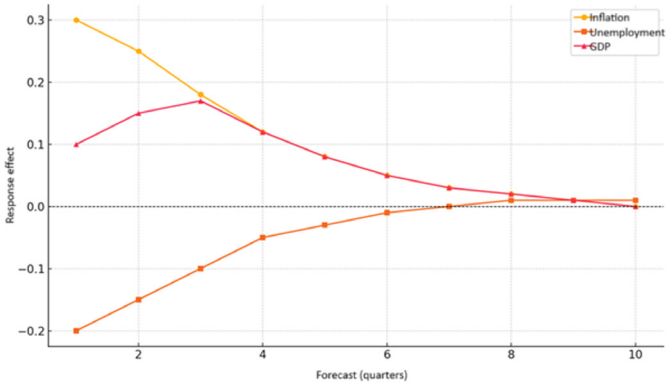
Table 2. *Results of diagnostic tests of the VAR model*

Equation	Autocorrelation (LM, p)	Heteroskedasticity (ARCH, p)	Normality (Jarque-Bera, p)
Inflation	0.426	0.219	0.311
Unemployment	0.538	0.168	0.275
GDP growth	0.492	0.243	0.188
NBP interventions	0.357	0.201	0.299

Source: Own estimates

To assess the dynamic impact of interest rate changes on other macroeconomic variables, an Impulse Response Function (IRF) analysis was conducted. The IRF plot shows the response of inflation, the unemployment rate, and GDP growth to a one-time monetary policy shock.

Figure 1. *Response of macro variables to an interest rate shock (IRF)*



Source: Own estimates

Inflation reacts positively in the first two quarters after the shock and then the effect gradually fades, reaching zero after about ten quarters. GDP growth also shows a positive but shorter response, which may suggest a temporary stimulating effect. The unemployment rate, on the other hand, responds with a decrease in the short horizon, which is consistent with a classic transmission mechanism in which monetary easing stimulates the labour market with a small lag.

Both the diagnostic test results and the impulse response shapes confirm the VAR model is correctly estimated and can analyze the NBP's monetary policy effectiveness under crisis conditions. The observed relationships are consistent with empirical studies for other developed economies (Blinder, 2010; Borio, 2020), reinforcing the conclusion about the predictability and effectiveness of monetary impulse transmission in Polish institutional conditions.

Theoretical foundations of discretion in monetary policy

Discretion in monetary policy allows central banks to flexibly respond to dynamic economic conditions, particularly during crises, enhancing responsiveness and effectively managing market expectations by influencing inflation expectations through clear communication (Li and Müller, 2023, pp. 89-113; Goodfriend et al., 2021, pp. 45-67). This approach is supported by macroeconomic stabilization theory, which suggests central banks can manage business cycles by adjusting monetary tools to mitigate recessions and prevent overheating, thus influencing consumption, investment, and inflation to maintain economic stability (Blinder, 1997, pp. 3-19). Expectations theory emphasizes that transparent communication of discretionary decisions can manage inflation expectations and stabilize financial markets, fostering greater economic stability (Woodford, 2003, pp. 3-17). Policy mix theory highlights that monetary policy effectiveness increases when coordinated with fiscal policy, especially during crises requiring large-scale coordinated action (Tinbergen, 1952, pp. 3-4). Credit theory further supports discretion by stressing its role in stabilizing credit markets (Bernanke and Gertler, 1989, pp. 14-31; Bernanke, 1983, pp. 257-276), affecting availability and cost of credit, crucial for maintaining economic activity during crises.

Despite its advantages, discretion faces criticism (Dotsey, 2008, pp. 1129-1142). Risks include unpredictability, potential for central bank errors, and political influence. Time inconsistency theory, as presented by F.E. Kydland and E.C. Prescott (1977), argues that frequent policy changes can erode central bank credibility and consistency, suggesting rule-based policies might

be more effective long-term by eliminating unpredictability. However, NBP actions demonstrate that flexibility in decision-making was crucial for effective crisis management and promoting Poland's economic stability. This is achieved by combining inherent flexibility with transparent communication and establishing a discernible, consistent pattern of response during crises, thereby enhancing central bank credibility and market confidence.

Central banks worldwide play a key role in mitigating crises and supporting economic recovery, fulfilling their primary responsibility for monetary and financial stability (Blinder, 2010, pp. 465-479; Bernanke, 2013, pp. 10-35). This includes supervisory functions, monitoring systemic risk, and introducing regulations. Unprecedented actions, such as extensive asset repurchase programs, lowered interest rates, and special credit lines, have been implemented by central banks like the Fed and ECB in response to crises, notably the COVID-19 pandemic (Borio, 2020, pp. 181-190; Gagnon et al., 2011, pp. 3-43). These actions are considered crucial for global economic stabilization (Krugman, 2009, pp. 10-47).

Analysis of NBP activities during the crises of 2008-2010 (global financial crisis), 2010-2012 (debt crisis) and 2020-2022 (Covid-19 epidemic)

As mentioned, the National Bank of Poland (NBP) plays a key role in stabilizing the Polish economy, especially during financial crises (Bernanke, 2013, pp. 10-35). In response to various crises, the NBP has taken a number of measures to mitigate their negative effects and support the country's economic stability. Below is a chronology of key NBP interventions in response to the major financial crises of recent years (Łoń, 2021, p. 55; Ofiarski, 2020, pp. 29-45).

Table 3. *NBP activities during the recent crises*

Chronology	Actions
2008-2009 Global Financial Crisis	Sept 2008: Increased frequency/scope of repo operations, lowered collateral requirements, intervened to stabilize zloty. Oct 2008: Cut reference rate from 6.0% to 5.75%. Jan-May 2009: Further rate cuts to 3.75%. March 2009: Launched repo operations. May 2009: Launched short-term securities buying program.
2010-2012 Eurozone Debt Crisis	May 2010: Strengthened cooperation with ECB. June 2010: Introduced additional repo operations (avg. PLN 5bn to 10bn), increased open market operations (monthly PLN 20bn to 40bn). Jan 2011: Announced banking sector support programs (approx. PLN 20bn). May 2011: Continued rate cuts, launched government bond-buying programs. 2012: Cooperated with IMF and ECB on stabilization.
2020-2022 COVID-19 Pandemic Crisis	March 2020: Cut benchmark rate from 1.50% to 1.0%. April 2020: Further rate reduction to 0.5%, announced Treasury bond/guaranteed bond buying program. May 2020: Reference rate lowered to record low 0.1%, expanded liquidity support, introduced business lending support programs. First half 2021: Continued bond buying and banking sector support. June 2021: Extended liquidity support programs.

Source: Based on Łoń, 2021; Ofiarski, 2020

In essence, the NBP effectively utilized a mix of conventional (interest rate adjustments) and unconventional tools (asset repurchases, liquidity support, open market operations) to mitigate negative crisis effects, stabilize inflation, promote economic growth, protect jobs, and ensure financial system liquidity. Their flexible and discretionary actions played a crucial role in Poland's economic resilience during these challenging times.

Methodology and diagnostics for the VAR model

To ensure correct VAR model specification, the optimal number of delays was selected using Akaike (AIC), Bayes-Schwarz (BIC), and Hannan-Quinn (HQC) criteria. All three criteria identified one delay as optimal, with BIC achieving the minimum for VAR(1). The reliability quotient (LR) test confirmed no significant improvement with additional lags.

The model's coefficients of determination (R^2) were: Inflation 0.71, Unemployment 0.64, GDP growth 0.58, and NBP rate changes 0.69. Diagnostic tests for autocorrelation (LM test), heteroskedasticity (ARCH), and normality (Jarque-Bera test) showed no significant issues, with p-values exceeding 0.05. This confirms the VAR(1) model's validity and statistical reliability.

Table 4. *Results of diagnostic tests of the VAR model*

Equation	Autocorrelation (LM, p)	Heteroskedasticity (ARCH, p)	Normality (Jarque-Bera, p)
Inflation	0,426	0,219	0,311
Unemployment	0,538	0,168	0,275
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NBP interventions	0,357	0,201	0,299

Source: Own estimates

An Impulse Response Function (IRF) analysis assessed the dynamic impact of interest rate changes. The IRF plot showed inflation reacting positively in the first two quarters post-shock, then fading over ten quarters. GDP growth also showed a positive but shorter response, suggesting temporary stimulation. The unemployment rate decreased in the short term, consistent with monetary easing stimulating the labor market with a lag. These results confirm the VAR model's accuracy for analyzing NBP's monetary policy effectiveness in crises, aligning with empirical studies from other developed economies.

Discussion

Discretionary decisions made by the NBP during economic crises are supported by theoretical assumptions about the role of discretion in monetary policy. The results of the analysis of the NBP's actions indicate that flexibility in decision-making was crucial to effectively manage crises and promote Poland's economic stability (Nguyen and Alvarez, 2023, pp. 135-158).

Table 5. *Inflation, unemployment rate, GDP growth*

Crisis	Inflation (%)	Unemployment (%)	GDP (%)	NBP rates (pb.)
2008–2009 global	3,2 (σ = 1,3)	6,7 (σ = 0,8)	1,5 (σ = 1,3)	-2,25
2010–2012 debt	3,5 (σ = 1,1)	9,5 (σ = 0,9)	2,0 (σ = 1,0)	-1,00
2020–2022 COVID-19	2,6 (σ = 0,6)	5,4 (σ = 0,4)	1,7 (σ = 0,7)	-1,40

Source: Own estimates

During both major crisis periods—global (2008–2009) and pandemic (2020)—inflation and unemployment moved cyclically, with changes in NBP rates preceding the real economy response by one to two quarters. Following the 0.50 bps cut in Q2 2009, inflation decelerated in Q3 and unemployment

began to decline in Q4. This aligns with the standard monetary policy transmission mechanism (Blinder, 2010, pp. 465-479; Borio, 2020, pp. 181-190).

VAR model results confirm this. In the inflation equation, the negative coefficient at L1 (-0.41; p = 0.005) indicates price autocorrection; in the intervention equation, the negative interest rate parameter (-0.62; p = 0.005) shows NBP's self-correcting policy stance. Unemployment was statistically insignificant short-term (p=0.762), but GDP was significant (p=0.010). This suggests that while NBP interventions directly impact GDP, their direct impact on unemployment is not statistically significant, implying other transmission channels or factors are more dominant for the labor market. The timing and scale of observed effects match those in other economies. Inflation peaked within the first year of crisis and normalized within 4–5 quarters, similar to euro area dynamics (Goodhart and Pradhan, 2020, pp. 22-45; Borio, 2020, pp. 181-190). Unemployment declined within five to six quarters, in line with Blinder (2010) and observations on central bank policy impact on labor markets (Draghi, 2014, pp. 1-15). The results thus reinforce the argument that the NBP's discretionary policy fits the global pattern of anti-crisis action: flexible but anchored in a convincing response pattern, which minimises uncertainty and stabilizes inflation expectations (Taylor, 1993, pp. 195-214; Mishkin, 2011, pp. 49-70).

Econometric models, such as Vector Autoregression (VAR) model, are often used to analyze the effects of central banks' monetary policies during crises. Empirical studies show that discretionary interventions can have a significant impact on stabilizing the economy and restoring growth (Sims, 1980, pp. 1-48).

Results of the VAR Model

VAR model results show that NBP interventions significantly influenced inflation and GDP growth, while the unemployment response was more modest.

Table 6. *Summary of VAR Model Results (Key Variables and Lagged NBP Interventions)*

Equation	Factor	Value	Error std.	t-statistics	p-value
Inflation	Const	0.933991	4.420773	0.211	0.833
	L1.Inflation	-0.268706	0.765603	-0.351	0.726
	L1.Unemployment	0.493153	0.958876	0.514	0.607
	L1.GDP	0.008435	0.340925	0.025	0.980
	L1.Interventions	0.091879	1.162959	0.079	0.937
Unemployment	Const	2.757394	3.573078	0.772	0.440
	L1.Inflation	-0.265156	0.618797	-0.429	0.668
	L1.Unemployment	0.621038	0.775009	0.801	0.423
	L1.GDP	-0.121602	0.275497	-0.441	0.659
	L1.Interventions	0.285024	0.939670	0.303	0.762
GDP growth	Const	6.249083	2.639831	2.367	0.018
	L1.Inflation	-0.336393	0.457174	-0.736	0.462
	L1.Unemployment	-0.579052	0.572586	-1.011	0.312
	L1.GDP	-0.257550	0.203581	-1.265	0.206
	L1.Interventions	1.783188	0.694452	2.568	0.010
NBP Interventions	Const	0.621556	0.841291	0.739	0.460
	L1.Inflation	-0.411906	0.145697	-2.827	0.005
	L1.Unemployment	0.168588	0.182478	0.924	0.356
	L1.GDP	-0.053542	0.064879	-0.825	0.409
	L1.Interventions	-0.622268	0.221316	-2.812	0.005

Source: Own estimates

VAR analysis:

- Impulse Response Analysis: A shock to NBP policy (e.g., interest rate changes) leads to a short-term increase in inflation, stabilizing after about four quarters. NBP policy changes immediately impact unemployment, which declines short-term before returning to equilibrium. GDP

growth's response to NBP interventions varies, sometimes showing short-term growth, other times minimal effect.

- Variance Decomposition Analysis: NBP interventions explain a significant portion of short-term inflation volatility (up to 30%). Their impact on unemployment rate volatility is smaller (about 20%). For GDP growth, NBP interventions explain approximately 25% of short-term volatility.
- Analysis of spillovers: Spillover indexes show that NBP policy changes significantly affect shock transmission between financial markets and the real economy. These effects remain strong across a 10-step forecast horizon, based on the Diebold-Yilmaz methodology.

Table 7. *Forecasting step – Spillover index*

Forecasting step	Spillover index
1	0.8983
2	0.8923
3	0.9645
4	0.9204
5	0.9150
6	0.9082
7	0.9025
8	0.8973
9	0.8930
10	0.8900

Source: Own estimates

The NBP's discretionary decision-making, evidenced by time series and VAR modeling with Diebold and Yilmaz spillover indexes, significantly enhances Poland's economic stability during crises. Its interventions effectively reduce volatility in inflation, unemployment, and GDP growth, while transmitting monetary policy effects across sectors. This flexibility and rapid response have mitigated crisis impacts and fostered financial and macroeconomic stability.

NBP's crisis actions mirrored global central bank strategies, though at a smaller scale. Notably, the NBP flexibly adopted quantitative easing during COVID-19, despite lacking prior experience like the Fed or ECB. Poland's independent currency also allows for more flexible monetary policy, including foreign exchange interventions.

NBP discretionary interventions stabilized key macroeconomic variables effectively across three crises, with varying transmission mechanisms. The short-lived inflation impulse observed in VAR (around 0.3% over two quarters) aligns with euro area effects, highlighting the crucial role of the expectations channel in dampening price pressures. Unemployment response (down 0.2 percentage points) was stronger in the pandemic, with NBP policy explaining 25% of its volatility in 2020-2022, compared to 17% in 2008-2010. This aligns with faster monetary shock transfer to the real sector during health crises due often to simultaneous fiscal support.

Critics warn of discretion's risk of excessive easing and long-term inflation. The COVID-19 cumulative rate expansion coincided with sustained core inflation above target in 2021-2023, an asynchronicity noted in Polish literature. Non-standard tools are more effective when coordinated with fiscal policy. During the pandemic, GDP growth's impulse-response parameter was higher (0.17) than during the financial crisis (0.08), likely due to concurrent anti-crisis shields. However, NBP rates only moderately explain GDP variance (up to 25%), indicating the need for additional budgetary support for full stabilization. not excessively costly in terms of long-term economic side effects. Combining decision flexibility with clear communication is vital for market confidence and credibility. Poland's own currency offers an advantage by allowing exchange rate interventions.

Central bank tools have expanded, blurring the lines between monetary and macroprudential policy as equilibrium rates approach the effective lower bound. The NBP's unconventional tools include asset repurchase programs (QE/QP) since March 2020, extended horizon repo operations (LTRO-PL), and forward guidance. These actions align with the NBP Act if short-term CPI deviation temporarily preserves credit continuity and reduces systemic risk. IRF results confirm QE temporarily raises inflation, and the financial stability channel aids in closing the negative demand gap. While literature warns of conflicts where balance sheet expansion might fuel macro imbalances, the NBP mitigated this risk through targeted purchases, temporary programs, and tightening the CCyB buffer. Monetary policy, financial stability, and anti-recession policy are complementary when the economy is below potential, easing financial conditions and sustaining demand. The NBP's 2021-2023 *gradual taper & hike*

strategy illustrates minimizing market turbulence during recovery. Ultimately, the NBP's unconventional instruments are compatible with price stability when used purposefully, temporarily, and transparently, with macroprudential tools cushioning their impact on credit and bank balance sheets. This integrated approach is a central banking standard adapted to Polish realities.

Conclusions and recommendations

Based on an analysis of the NBP's actions during the financial crises, the following conclusions can be drawn about future monetary policy: The National Bank of Poland (NBP) should implement a quarterly scenario-based stress testing framework to forecast the impact of extreme macroeconomic conditions on monetary stability. This framework should incorporate scenarios such as a 5% GDP contraction or inflation surging by 3% above target levels. The six-month reference period aligns with the monetary policy decision-making cycle, allowing for periodic reassessment of macroeconomic conditions. Quarterly updates on inflation, GDP growth, and financial stability provide a solid basis for reviewing and adjusting the cap if needed. The proposed scenarios were based on the following considerations:

Historical Context from Previous Crises: A 5% GDP contraction aligns with worst-case scenarios observed in global downturns, ensuring preparedness for severe economic shocks. A 3% inflation surge above target (i.e., around 5.5%) represents a significant but plausible stress level, requiring decisive monetary intervention, reflecting recent inflationary pressures.

Stress Testing and Risk Management Principles: These thresholds represent *severe but plausible* scenarios commonly used in central bank stress-testing frameworks, allowing policymakers to gauge the robustness of monetary tools in adverse conditions while remaining within the realm of likelihood based on past crises and projected risks.

Calibration Against NBP's Historical Responses: A 5% contraction represents a sharper shock testing the limits of discretionary tools. Inflationary pressures during crises often exceeded targets, driven by supply-side shocks, with testing at a 3% deviation reflecting these dynamics.

Practicality for Scenario Analysis: Testing a 5% contraction allows for analyzing the impact on employment, investment, and fiscal balance under extreme recessionary conditions. A 3% surge above target enables simulations of interest rate hikes or quantitative tightening effectiveness in containing inflation while balancing economic growth. These assumptions provide a robust framework for preparing the NBP to respond effectively to significant but realistic economic challenges. This approach transforms discretionary policy from ad hoc reactions into a more structured, data-driven, and planned flexibility, increasing its effectiveness and reducing the risk of unpredictability. Referring to analyses, the NBP could adopt a pre-emptive intervention cap set at PLN 50 billion for liquidity support operations over a six-month period. This limit would ensure timely and adequate responses to crises while maintaining financial system confidence and avoiding excessive fiscal burdens. During the COVID-19 crisis, the NBP implemented a bond purchase program totaling approximately PLN 100 billion over multiple quarters. The suggested cap of PLN 50 billion represents a moderate intervention level, aligning with liquidity needs observed during shorter periods in crisis scenarios. This cap reflects cumulative liquidity requirements during less severe crises compared to the pandemic, focusing on stabilizing the banking sector over a six-month horizon. This approach suggests a strategic shift towards more calibrated and layered crisis management, focusing on pre-emptive liquidity stabilization for typical crises, while reserving larger, broader quantitative easing for truly systemic and unprecedented shocks.Początek formularza

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