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Inflationary Effects of Excessive Stimulation of Domestic Demand in Belarus

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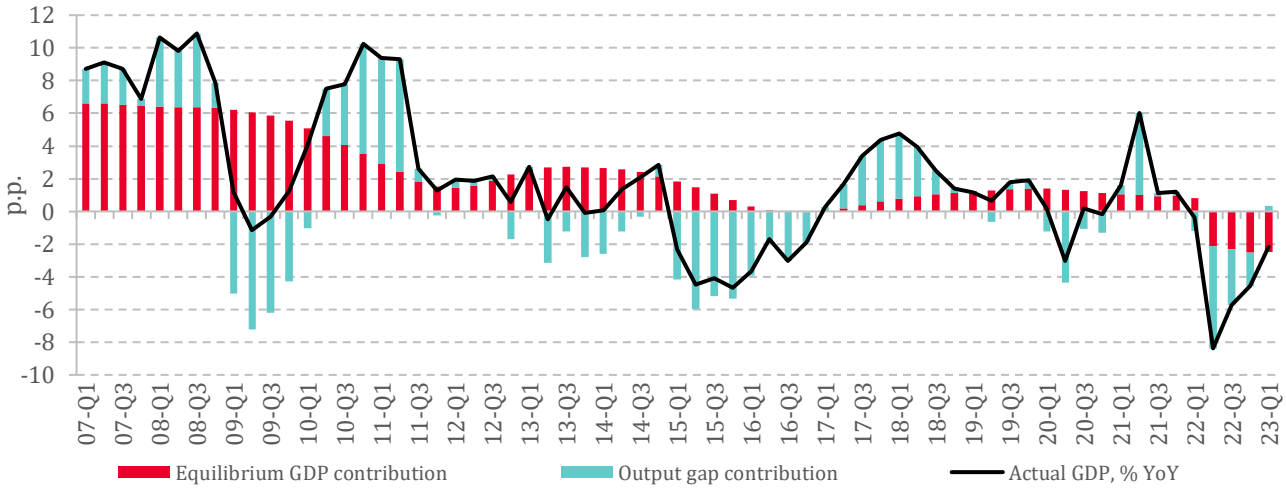
ABSTRACT: The analytical note assesses the potential consequences of excessive stimulation of domestic demand on the macroeconomic indicators of Belarus under different approaches to monetary and exchange rate policies. The quarterly projection model (QPM) for the Belarusian economy (Kharitonchik, 2023) is used for the assessment. The results show that increasing GDP by 1% above its potential level over two years, while maintaining the current approach to monetary policy as of June 2023, will lead to an additional increase in consumer prices by 5.8%. When applying "implicit" inflation targeting with FX interventions to smooth exchange rate fluctuations and partially restricted cross-border capital flows, the cost in terms of price increases may be reduced to 2%.

Keywords: inflation, price level, GDP, output gap, domestic demand, monetary policy, exchange rate, interest rate, inflation targeting, monetary targeting.

1. Introduction

The Belarusian authorities have set an ambitious goal of achieving a 3.8% GDP growth in 2023. This target is expected to be largely achieved through a rapid increase in investments by 22.3%. After a significant decline in GDP and investments by 4.7% and 19.1% respectively in 2022, the planned growth for 2023 by the Belarusian government can be considered as a recovery. However, the economic downturn in 2022 may have had a structural nature, especially if the sanctions regime imposed by Western countries on Belarus and Russia is maintained in the long term (Figure 1).

Figure 1: Dynamics of GDP growth in Belarus



Source: author's calculations based on QPM (Kharitonchik, 2023).

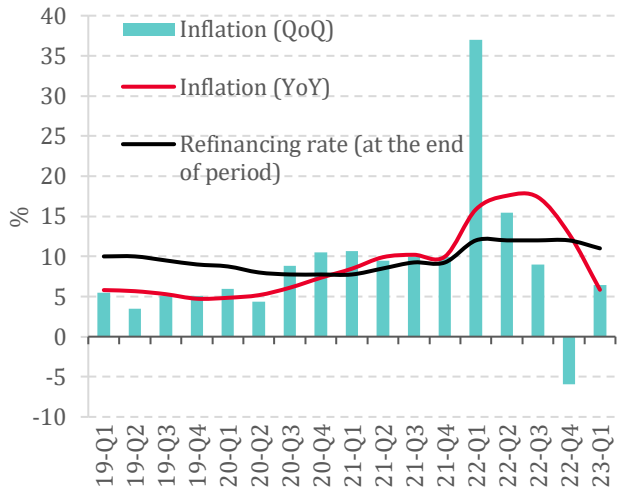
Note: figure 1 presents QPM-based estimates using seasonally adjusted logarithmic data. The equilibrium (or potential) GDP refers to the level of GDP that does not lead to additional inflationary or disinflationary pressures. The output gap represents the deviation of actual real GDP from its equilibrium (potential) level.

The negative effects of stringent export restrictions imposed by Western countries are challenging to compensate for in the short term due to infrastructure limitations, such as the transportation of potassium fertilizers and wood products. The relocation of businesses and employees, particularly ICT companies, from Belarus will have long-term negative consequences for human capital and technological development in the country. [1] If the decline in output in Belarus in 2022 was largely of a structural nature, attempts to stimulate rapid GDP recovery will lead to an overheating of the economy. This poses risks of increased inflation, weakened national currency, and threats to financial stability.

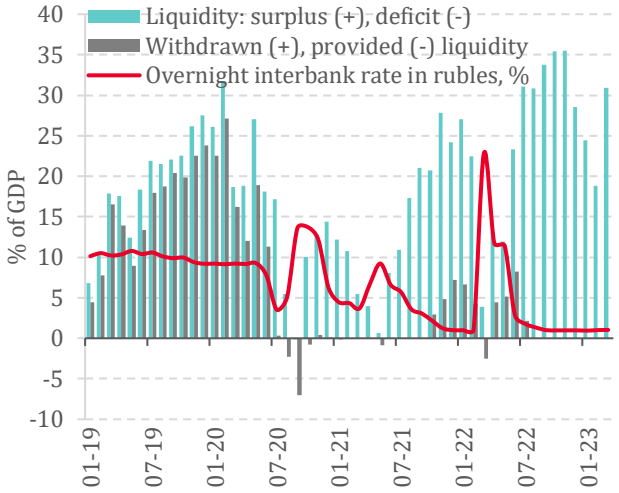
[1] The increased extractivity of political and economic institutions may have even stronger potential negative effects on Belarus' long-term economic growth.

Figure 2: Dynamics of monetary policy indicators and liquidity conditions in the banking system in Belarus

A) Refinancing rate and inflation



B) Liquidity of the banking system



Source: author's calculations based on data from Belstat, the National bank of Belarus.

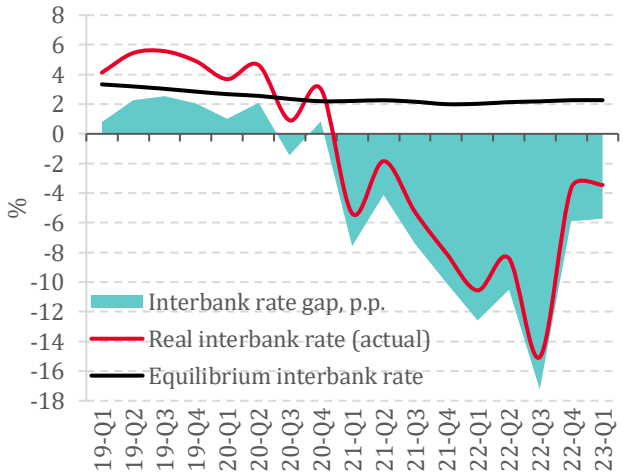
Note: YoY - year-on-year growth rate, representing the growth rate of the last month of the quarter compared to the last month of the corresponding quarter of the previous year; QoQ - quarter-on-quarter annualized growth rate, representing the growth rate of the last month of the quarter compared to the last month of the previous quarter with seasonal adjustment. Seasonal adjustment was performed using the X13 procedure in the JDemetra+ software.

An important "safeguard" against the negative consequences of a voluntarist economic policy by the government could be an independent monetary policy pursued by the National Bank, aimed at achieving the inflation target and smoothing short-term fluctuations in economic activity. However, since mid-2020, the National Bank has effectively abandoned maintaining the money market rate at levels that would correspond to achieving the inflation target in the medium term. Restrictions have been imposed on liquidity management operations in the banking system since mid-2020, and these operations have been suspended since July 6, 2022. [2] As a result, from 2020 to 2022, the volatility of the interbank market rate has significantly increased, while in conditions of structural liquidity surplus in the banking system from mid-2022 to mid-April 2023 it remained close to 1% despite much higher inflation (Figure 2). The balancing of liquidity demand and supply in the money market is directly carried out by the market, which, in the context of structural liquidity surplus, implies the implementation of an expansionary monetary policy (Figure 3), which does not align with the National Bank's stated monetary targeting regime.

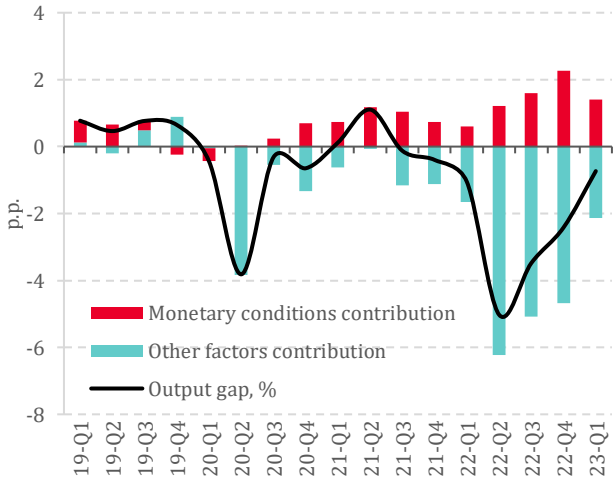
[2] See: https://www.nbrb.by/info/about_auction_operations.

Figure 3: The stance of the monetary policy of the National Bank of Belarus

A) Real and equilibrium interbank rate (average per quarter)



B) Monetary conditions contribution to the output gap



Source: author's calculations based on QPM (Kharitonchik, 2023).

Note: the real interest rate is calculated by adjusting the nominal interest rate for the expected YoY inflation in the upcoming quarter, estimated within the framework of QPM. The equilibrium interest rate represents the level of the real interest rate that corresponds to the growth rates of potential GDP and the equilibrium real effective exchange rate of the Belarusian ruble. The deviation of the real interest rate from its neutral level determines the interest rate gap. A positive interest rate gap indicates a restraining character of the monetary policy on economic activity, while a negative gap indicates a stimulating character. Monetary conditions serve as an indicator of the state of the National Bank's and commercial banks interest rate policies and exchange rate policy. Monetary conditions are a combination of gaps in the real effective exchange rate (with the opposite sign) and real interest rates.

The working paper by BEROC (Kharitonchik, 2023) proposes a quarterly projection model (QPM) for the Belarusian economy. QPM allows for simulating the behavior of the economic system in response to various shocks, including analyzing the differences in its behavior under different designs of stabilization economic policies (mainly monetary and exchange rate policies, as well as capital flow management policies).

In this analytical note, we use the proposed QPM to assess the consequences of excessive stimulation of domestic demand for macroeconomic dynamics in Belarus under different approaches to implementing monetary and exchange rate policies. The results show that increasing GDP by 1% above its potential level over a two-year period[3] while maintaining the current approach to implementing monetary policy will lead to an additional increase in consumer prices by 5.8%.

[3] The two-year time horizon is chosen due to the lags in the transmission mechanism of monetary policy. Monetary policy, including in Belarus, does not have an immediate impact on the economy but is stretched over time (Kharitonchik & Dmitriev, 2018)

Specifically for 2023, calculations based on QPM show that Belarus' GDP can exhibit a recovery growth rate of 2.5% with an inflation rate of 8% YoY by the end of the year (BEROC, 2023). If excessive demand stimulation manages to achieve a GDP growth rate of 3.8%, according to simulation results, inflation, all else being equal, could reach around 10.5% YoY. It should be noted that the inflationary consequences will depend on the duration of output stimulation and the timing of its maximum impulse, and as such, they may materialize in 2023 and/or in 2024.

When implementing an inflation targeting, the costs in terms of price increases can be reduced to 0.4%, and with the application of "implicit" inflation targeting using FX interventions to smooth exchange rate fluctuations and partial restrictions on cross-border capital flows, the costs can be reduced to 2%. Full-scale monetary targeting can reduce the costs of price increases to approximately 1.8%. However, this comes at the price of a substantial increase in the volatility of the money market interest rate, almost 14 times higher compared to the "implicit" inflation targeting regime.

Next, we analyze the simulation results based on QPM regarding the response of the Belarusian economy to a domestic demand shock under different approaches to implementing monetary and exchange rate policies.

2. An approach to estimating the macroeconomic effects of excessive stimulation of domestic demand

We conducted simulations of the economic system behavior within the framework of QPM in response to a shock in domestic demand, which is modeled as a 1% output gap shock in period *t*. The output gap represents the deviation of observed real GDP from its potential level and serves as an indicator of excess (positive output gap) or weak (negative output gap) demand in the economy.

The shocks in the simulations are considered unexpected: prior to the shock the economic system is in a steady state, and economic agents have no information about the potential shock impact. Analysis of the impulse response functions allows us to assess the magnitude of the response of key macroeconomic indicators to the formation of excess demand in the economy, as well as the duration of this response and the volatility of macroeconomic dynamics.

During the simulations, four variants of monetary and exchange rate policies are considered. The first variant is based on the baseline specification and

calibration of QPM (Kharitonchik, 2023).[4] It assumes the implementation of an "implicit" inflation targeting regime with partial control by the National Bank over the money market rate, smoothing of the exchange rate dynamics of the Belarusian ruble through partially sterilized interventions in the domestic foreign exchange market, and incomplete cross-border capital mobility.

The second variant involves the implementation of a passive monetary policy, where the National Bank conducts non-sterilized interventions in the foreign exchange market, strict restrictions on capital flows are in place, and the money market rate is not controlled by the National Bank but is influenced by liquidity fluctuations in the banking system resulting from foreign exchange interventions.[5] This scenario can be considered as a possible behavior of the Belarusian economy in response to shocks under the current sanctions regime and the existing approach to monetary and overall economic policy in Belarus.

The third variant assumes the implementation of an inflation targeting regime, with the National Bank control over the short-term money market interest rate and flexible exchange rate determination in the absence of significant barriers to capital movements.[6] It should be noted that the practical application of this variant implies a significant easing of sanctions against Belarus, and therefore, the likelihood of its implementation in the near future is low. However, simulating this scenario can be useful for discussing reforms in the Belarusian economy and monetary environment.

The fourth variant is intermediate (or "transitional") between the second and third variants. It involves less strict restrictions on cross-border capital flows, a more flexible exchange rate, and greater control by the National Bank over the money market rate compared to the second variant, but less control compared to the third and first variants.[7]

The coefficient of costs (K^{costs}) is calculated to compare the relative costs of demand stimulation. It is computed using the following formula:

[4] We change the value of the core inflation weight in the overall inflation ($weight$ parameter) from 0.7153 in the baseline calibration (Kharitonchik, 2023) to 0.7070.

[5] To simulate the second option, we change the value of the parameter h_1 in equation (29) in A. Kharitonchik (2023) from 0.3 to 1.0, and the parameter mpr in equation (50) from 0.9 to 0.0.

[6] To simulate the third option, we change the value of the parameter h_1 in equation (29) in A. Kharitonchik (2023) from 0.3 to 0.0, and the parameter mpr in equation (50) from 0.9 to 1.0.

[7] To simulate the fourth option, we change the value of the parameter h_1 in equation (29) in A. Kharitonchik (2023) from 0.3 to 0.5, and the parameter mpr in equation (50) from 0.9 to 0.5.

$$K^{costs} = \frac{\Delta cpi_{t+7}}{\sum_{t=1}^{8} \hat{y}_t / 8}. \quad (1)$$

This coefficient indicates the costs, in terms of price level increase, associated with a 1% increase in GDP over two years through excessive demand stimulation. The numerator of the coefficient (1) represents the deviation of the consumer price index (cpi_t) two years after the shock from its baseline value that would have occurred without the shock. The denominator of the coefficient (1) is the average value of the output gap ($\hat{y}_t$) over the two-year period following the shock, which determines the benefits in the form of additional GDP above its potential level.

3. Costs of excessive demand stimulation and the importance of monetary policy

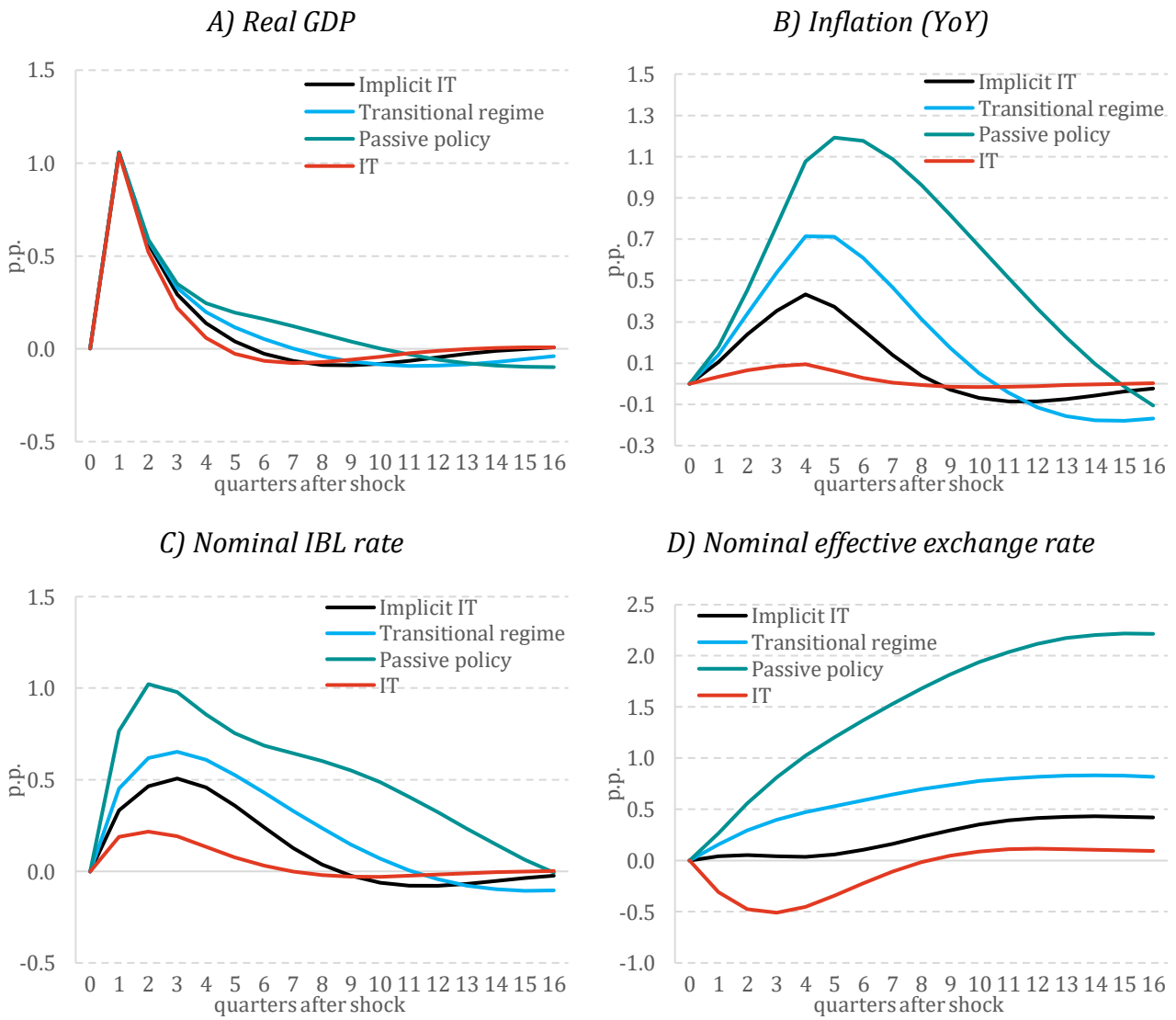
In Figure 4, responses of major macroeconomic variables to a shock in domestic demand of 1% of GDP are presented. One common feature among all the considered variants of monetary policy implementation is the acceleration of inflation in response to the formation of a positive output gap. However, the magnitude of price increases and the duration of the response vary significantly, which can be explained by substantial differences in the exchange rate trajectory.

Under the current monetary policy practice (second variant), excessive stimulation of domestic demand will be accompanied by an increase in imports beyond the potential expansion of exports. This will result in an increased demand for foreign currency, putting pressure on the Belarusian ruble exchange rate. Despite the National Bank's use of currency interventions to smooth the exchange rate trajectory, the depreciation of the currency will still be significant (Figure 4.D).[8] Exchange rate depreciation will lead to an increase in imported inflation and inflation expectations, resulting in a substantial acceleration in consumer price growth. In such conditions, interest rates will rise due to a contraction in bank system liquidity resulting from the non-sterilized sale of foreign currency by the National Bank. In the considered scenario, the increase in interest rates will not have a significant impact on the exchange rate dynamics, as strict restrictions on capital flows and sanctions on Belarus' financial sector are assumed. These restrictions suppress incentives for organized savings in Western currencies (such as dollars, euros, pounds, etc.) and limit the influence of interest rates on the demand and supply of foreign

[8] The simulations assume that the National Bank is able to carry out foreign exchange interventions in an unlimited amount. In practice, this ability is limited, but given the magnitude of the demand shock, the premise appears to be justified. The ability of the National Bank to intervene in foreign exchange depends on the volume of international reserves, which in Belarus amounts to a little more than two months of imports of goods and services, which is less than the traditional criterion of three months of imports.

currency. As a result, the impact of the shock in domestic demand on the exchange rate and inflation will be of a prolonged nature. The coefficient of costs for passive monetary policy is estimated to be 5.8, indicating that a 1% increase in GDP above its potential level over two years will lead to an additional 5.8% increase in consumer prices.

Figure 4: Impulse response functions to a domestic demand shock within the QPM



Source: author's calculations based on QPM (Kharitonchik, 2023).

Note: the impulse response functions are presented in deviations of variables from the equilibrium levels; IT – inflation targeting; YoY – change of the indicator in period *t* relative to period *t-4*.

In the context of "implicit" inflation targeting (first variant), the National Bank will respond by raising the interest rate in response to inflationary risks resulting from excessive demand stimulus. With less strict restrictions on cross-border capital flows and a greater sensitivity of demand for foreign currency and its supply to changes in interest rates compared to the passive monetary policy scenario, the exchange rate will react to interest rate changes. As a result, inflation acceleration under this

monetary policy design will be much weaker compared to passive policy, with an additional price increase of 2% over two years.

The lowest costs in terms of additional price growth (around 0.4% over two years) are associated with the implementation of full-fledged inflation targeting (third variant). This is because in this regime, the exchange rate effectively performs its key function of absorbing shocks. With free capital mobility and active stabilization monetary policy, economic agents will expect an increase in interest rates in response to rising inflationary risks, leading to increased demand for the national currency and strengthening of the Belarusian ruble. In the intermediate ("transitional") regime of monetary policy implementation (fourth variant), the costs of price increases are estimated to be around 3.6% over two years.

In addition to the aforementioned variants of monetary policy implementation, simulations of actual implementation of monetary targeting by the National Bank are of scientific and practical interest.[9] The results of these simulations are presented in the following section.

4. Monetary targeting in QPM

The regime of monetary targeting assumes that the National Bank aims to maintain the money supply at an intermediate target level, in order to achieve its inflation target. In this case, the interest rate in the money market becomes endogenous and ceases to be the operational target of monetary policy.

In a volatile emerging market economy, preventing deviations of the money supply from the intermediate target level would lead to increased volatility of interest rates. Therefore, the National Bank has the option to implement a mixed regime of monetary targeting and inflation targeting, where deviations of the money supply from the trajectory of the intermediate target are allowed if the costs of their adjustment, in terms of interest rate volatility and, consequently, other macroeconomic indicators, are high. As a result, the reaction function of the National Bank takes the following form:

$$i_t = mpr * (mt * i_t^{IT} + (1 - mt) * i_t^{MT}) + (1 - mpr) * i_t^{UIP} + \varepsilon_t^i. \quad (2)$$

[9] The results of the monetary policy analysis presented in A. Kharitonchik (2023) show that the National Bank used the monetary targeting regime from 2015 to mid-2016. From mid-2016 to mid-2020, the National Bank used the "implicit" inflation targeting, and from the second half of 2020 pursued a discretionary policy.

The mechanism for determining the rates i_t^{IT} and i_t^{UIP} is described by equations (51-52) in the work of A. Kharitonchik (2023).[10,11] The interest rate i_t^{MT} balances the money supply and demand for money by economic agents at a given intermediate target level of the money supply. We consider three variants of monetary targeting implementation.[12]

The first variant assumes "pure" (or full-scale) monetary targeting, where the National Bank does not allow deviations of the money supply from the intermediate target: the parameter mpr is equal to 1.0, and the parameter mt is equal to 0.0.

The second variant implies a mixed regime of monetary targeting and inflation targeting, where the National Bank allows temporary deviations of the money supply from the targeted level in the absence of priority for the money and interest rate as operational target: the parameter mpr is equal to 1.0, and the parameter mt is equal to 0.5.

The third variant also proposes a mixed regime but with a priority on the interest rate: the parameter mpr is equal to 1.0, and the parameter mt is equal to 0.7.

The nominal money supply (nm_t) is an observed variable – M3 aggregate or broad money supply, which is declared by the National Bank as the intermediate target of monetary policy. The real money supply (rm_t) is calculated by adjusting the nominal money supply for the consumer price index (cpi_t) according to equation (3):

$$rm_t = nm_t - cpi_t. \tag{3}$$

The demand for real money balances (4–5) is represented by a function of real money supply from real GDP (y_t), the equilibrium money velocity ($\bar{v}_t$) and the deviation of the nominal interbank interest rate from its neutral level (the nominal interbank interest rate gap; $\hat{\imath}_t$).[13] The variable of real GDP approximates the scale of transactions in the economy. We assume that the demand for money increases with an increase in real GDP and decreases with a decrease in real GDP, with a coefficient equal to one in both cases.

$$\widehat{rm}_t = rm_t - (y_t - md_1 * \hat{\imath}_t - \bar{v}_t). \tag{4}$$

[10] Variables in QPM (Kharitonchik, 2023) are presented as 100 * natural logarithm, except for interest rates and growth rates, which are presented in annualized percentages. All variables in QPM (except for nominal interest rates, nominal exchange rates and oil prices) are preliminary adjusted for seasonality.

[11] In QPM (Kharitonchik, 2023), the reaction function of the National Bank is described by equation (50).

[12] In all options, it is assumed that there are restrictions on cross-border capital flows and the National Bank uses foreign exchange interventions to smooth out the volatility of exchange rate dynamics: the h_1 parameter is calibrated to 0.3.

[13] In QPM (Kharitonchik, 2023), neutral (equilibrium) rates are modeled in accordance with equations (53–56).

$$\Delta rm_t = \Delta y_t - md_1 * \Delta \hat{\imath}_t - \Delta \bar{v}_t - md_2 * \widehat{rm}_{t-1} + \varepsilon_t^{\Delta rm}. \quad (5)$$

The equilibrium money velocity characterizes sustainable changes in money demand that may be associated with technological innovations and/or prolonged and inertial changes in National Bank credibility. The velocity of money has a negative correlation with money demand, with a value equal to one.

The nominal interest rate gap serves as a factor explaining the cyclical component of the velocity of money and can approximate the speculative motive for holding money and/or short-term fluctuations in National Bank credibility. There is assumed to be a negative correlation between the nominal interest rate gap and money demand. The parameter md_1 characterizes the semi-elasticity of money demand with respect to the interest rate, and its value is calibrated to 0.3 according to Kharitonchik (2020).

At any given point in time, observed money demand may deviate from the "desired" (or long-term) level, determined by the factors mentioned above. Therefore, in equation (4), which essentially represents a cointegrating relationship, the variable $\widehat{rm}_t$ is present. Temporary deviations of money demand from the long-term level are caused by short-term liquidity shocks, approximated by the shock $\varepsilon_t^{\Delta rm}$ in equation (5). The speed of adjustment of money demand towards the long-term level is determined by the parameter md_2, which is set to 0.6. As a result, the final specification of money demand is represented by an error correction mechanism, defined by equations (4–5).

It is assumed that the dynamics of money supply correspond to the intermediate target of the National Bank (Δnm_t^T). The intermediate target is established according to equation (6) as a function from changes in potential GDP ($\Delta \bar{y}_t$) and the equilibrium money velocity ($\Delta \bar{v}_t$), the inflation target (π_t^T), and a shock $\left(\varepsilon_t^{\Delta nm^T}\right)$, which approximates the discretionary actions of the National Bank. Such a specification of the intermediate target for money supply corresponds to the stated mechanism of its determination by the National Bank [14] and implies that monetary policy will automatically ease or tighten in response to deviations of the economic system from its equilibrium state.

$$\Delta nm_t^T = \pi_t^T + \Delta \bar{y}_t - \Delta \bar{v}_t + \varepsilon_t^{\Delta nm^T}. \quad (6)$$

[14] See: https://www.nbrb.by/engl/mp/target/current-mode.

In "pure" monetary targeting, the National Bank maintains the money supply at the level of the intermediate target at all times. As a result, the money market interest rate i_t^{MT}, which balances money demand and supply at the intermediate target level, is determined by equation (7).

$$\Delta nm_t^T = \pi_t + \Delta y_t - md_1 * ((i_t^{MT} - \bar{\imath}_t) - \hat{\imath}_{t-1}) - \Delta\bar{v}_t - md_2 * \widehat{rm}_{t-1} + \varepsilon_t^{\Delta rm}. \quad (7)$$

The velocity of money (v_t) is decomposed into an equilibrium component ($\bar{v}_t$) and a gap ($\hat{v}_t$). The gap of the velocity of money and the growth of the equilibrium component ($\Delta\bar{v}_t$) are modeled as autoregressive processes respectively with zero mean and an exogenously determined steady state ($\Delta\bar{v}_{ss}$), equal to –1.5%. The parameters vel_1 and vel_2 are assumed to be 0.50 and 0.80, respectively.

$$v_t = \hat{v}_t + \bar{v}_t, \quad (8)$$

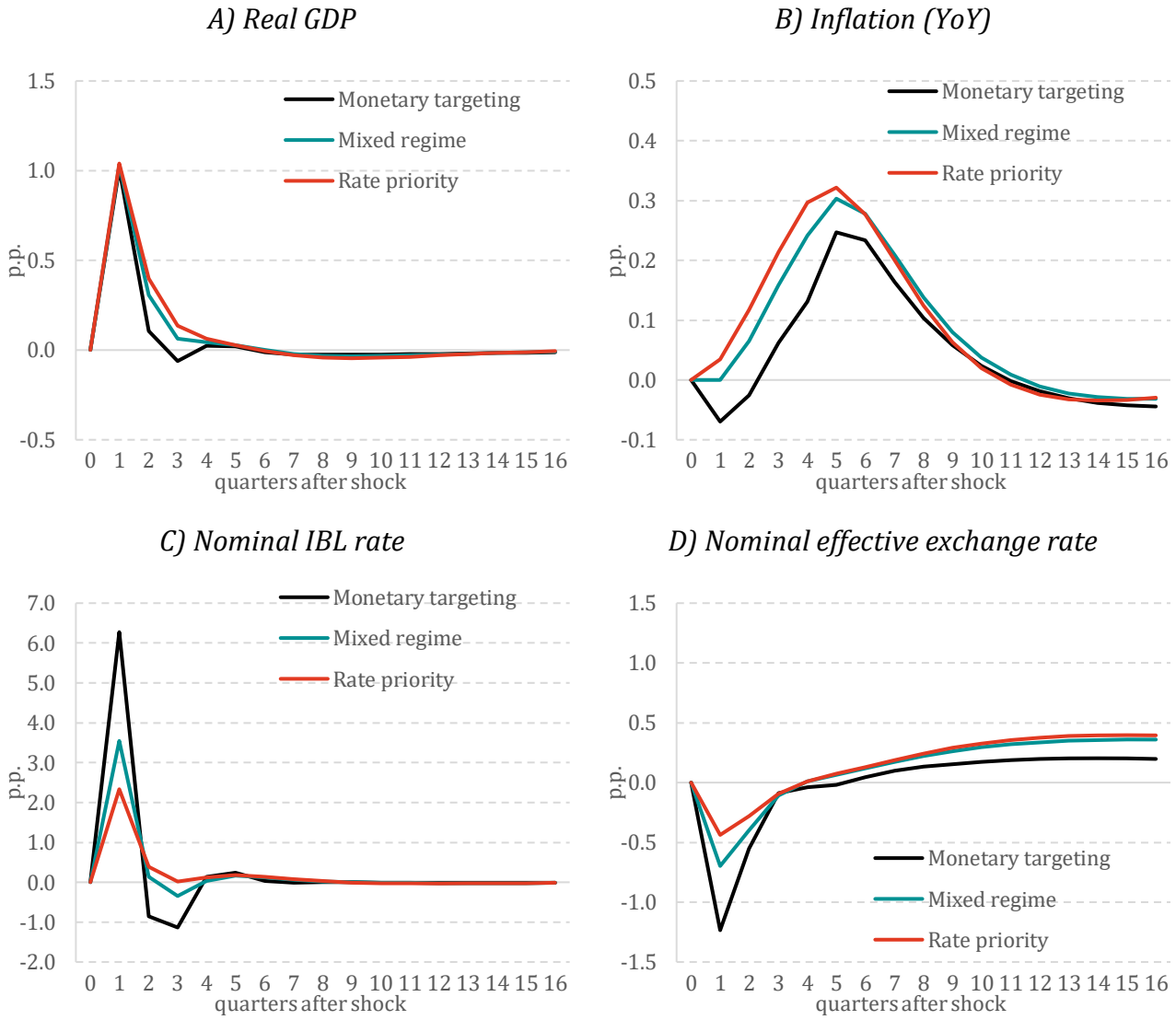
$$\hat{v}_t = vel_1\hat{v}_{t-1} + \varepsilon_t^{\hat{v}}, \quad (9)$$

$$\Delta\bar{v}_t = vel_2\Delta\bar{v}_{t-1} + (1 - vel_2) * \Delta\bar{v}_{ss} + \varepsilon_t^{\Delta\bar{v}}. \quad (10)$$

The results of the simulations of the domestic demand shock are presented in Figure 5. The use of pure monetary targeting is associated with lower costs of price increases compared to mixed regimes. The additional price increase over a two-year period in response to a 1% excess growth of GDP above potential will be around 1.8% under monetary targeting and around 2.1% under mixed regimes.

The comparative effectiveness of monetary targeting is achieved through significant volatility in interest rates. Since the interest rate becomes endogenous when managing the money supply, a sharp increase in the economy's demand for money in response to a domestic demand shock, while holding money supply constant (relative to the intermediate target), leads to a substantial increase in the money market rate. Subsequently, it quickly decreases, generating volatility almost 14 times higher compared to the "implicit" inflation targeting regime. In practice, such volatility in the interest rate would mean a loss of signaling function, which can lead to a weakening of trust in monetary policy, unpredictable behavior of economic agents, and increased overall volatility of the economic system.

Figure 5: Impulse response functions to a domestic demand shock within the QPM: the use of monetary targeting



Source: author's calculations based on QPM (Kharitonchik, 2023).

Note: the impulse response functions are presented in deviations of variables from the equilibrium levels; YoY – change of the indicator in period *t* relative to period *t-4*.

5. Conclusion

In this analytical note we applied QPM to assess the potential effects on the Belarusian economy of excessive stimulation of domestic demand under different approaches to monetary policy implementation. The results show that the use of inflation targeting and implicit inflation targeting most effectively mitigate the negative consequences for prices and interest rates in response to a shock in domestic demand. However, maintaining the current approach to monetary regulation, which has been in

place since mid-2022, will lead to a significant increase, all else being equal, in consumer prices and a weakening of the Belarusian ruble in response to an increase in domestic demand above its potential level.

A transition to inflation targeting is unlikely in Belarus at present due to voluntaristic approaches to economic policy implementation. However, a return to the practice of 2017-2019 – applying implicit inflation targeting with a set of restrictions on cross-border capital flows – appears feasible and necessary to minimize potential negative effects on the economy from shock events, including those caused by attempts to achieve economically weakly justified planned targets for socio-economic development.

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