FISCAL AND MONETARY POLICY INTERACTIONS: IMPACTS AND ECONOMIC IMPLICATIONS

Andreea-Mădălina BOZAGIU, PhD Candidate*
Dănuț-Georgian MIHAI, PhD Candidate**
Cătălina-Ioana TOADER, PhD Candidate***

Abstract

This paper analyses the impact of various macroeconomic shocks - including aggregate demand, supply, monetary policy, real exchange rate, and budget deficit deviation shocks - on Romania's economy using a VAR model with Bayesian inference. The study captures the period following the adoption of inflation targeting by the National Bank of Romania, emphasising the challenges posed by economic policy decisions in an uncertain environment. Simultaneously, monetary policy followed a restrictive approach to counter inflation, causing high interest rates that tightened credit access. This monetary-fiscal policy divergence highlighted the trade-offs in economic stability. The results suggest that the monetary policy response was more effective than the fiscal policy response. Monetary policy measures contributed to the containment of inflationary dynamics while exerting only a moderate adverse effect on real economic activity. In contrast, the expansionary fiscal interventions appear to have amplified macroeconomic imbalances. These findings support the recommendation of adopting a medium-term fiscal consolidation strategy to ensure a sustainable reduction in the budget deficit.

Keywords: macroeconomic shocks, public debt and budget deficit, VAR model - Bayesian inference

JEL Classification: E52, E62, F41

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* *Faculty of Finance and Banking, Bucharest University of Economic Studies, Bucharest, Romania.*

** *Faculty of Finance and Banking, Bucharest University of Economic Studies, Bucharest, Romania.*

*** *Faculty of Finance and Banking, Bucharest University of Economic Studies, Bucharest, Romania.*

1. Introduction

Given the economic context in which Romania currently finds itself, this chapter examines the impact of multiple shocks on a set of macroeconomic variables, both in the fiscal and monetary domains. The analysis follows a methodological approach that considers economic growth, labour productivity, and output. Key indicators such as the adjusted CORE 2 inflation index, the ROROR 3M interbank interest rate, the EUR/RON exchange rate, and the budget deficit are included. The study covers Romania's economic developments from the fourth quarter of 2005 to 2024.

Regarding macroeconomic variables, shocks occur when their evolution deviates significantly from expectations, triggering large-scale effects. To apply constraints consistent with economic theory, the VAR methodology is used as a tool to identify monetary policy shocks. The selection and establishment of the method for identifying these shocks play a crucial role in the correct application of economic models.

This analysis examines five types of shocks. First, the aggregate demand shock is analysed, assessing its impact on GDP growth and inflationary pressures. The second shock, on the supply side, captures the reaction of the economy to a restrictive monetary policy, potentially leading to a slowdown in economic growth but contributing to inflation reduction. Additionally, the study investigates the effect of this shock on interbank interest rates, which serve as a channel for monetary policy transmission. The next shock analysed is the exchange rate shock, which exerts pressure on inflation through currency depreciation. The final shock considered is the budget deficit shock, examining its cyclical nature and its role in influencing macroeconomic variables under uncertainty conditions.

2. Literature review

The study of fiscal and monetary policy interactions has been central to economic research, with various methodologies employed to quantify the effects of policy shocks on macroeconomic stability. A foundational framework in this area is the Vector Autoregressive (VAR) model, introduced by Sims (1980), which has since been widely applied in economic analysis.

One of the key aspects of this interaction is how monetary policy influences inflation and economic activity. Christiano et al.

(1999) examined the monetary policy transmission mechanism in the U.S., finding that an increase in interest rates leads to a rapid decline in economic activity while inflation adjusts more gradually. This observation is closely related to the "price puzzle", introduced by Eichenbaum (1992), which highlights that restrictive monetary policy may initially lead to a rise in inflation before achieving its intended stabilizing effects. To refine inflation forecasting, Giordani (2004) emphasized the importance of incorporating potential GDP into VAR models.

Further, Mojon and Peersman (2001) analysed the impact of monetary policy shocks on selected European economies, demonstrating heterogeneous responses across countries due to structural differences. The role of quantitative easing policies was later investigated by Boeckx et al. (2017), who applied a SVAR model to assess the effects of balance sheet expansions by central banks. Their findings suggest that asset purchases by monetary authorities contribute to lower interest rates, a depreciation of the domestic currency, and improved credit conditions, reinforcing the importance of unconventional monetary policy tools.

Fiscal policy has also been widely studied as a determinant of macroeconomic stability. Blanchard and Quah (1989) examined the effects of demand and supply shocks, concluding that expansionary fiscal policy often leads to inflationary pressures, necessitating monetary countermeasures. Canova and Nicolo (2002) analysed fiscal and monetary shocks in G-7 countries, emphasising the significance of policy coordination in ensuring macroeconomic balance.

External shocks, such as commodity price fluctuations and financial crises, further complicate the effectiveness of monetary and fiscal interventions. Kilian (2009) investigated the impact of oil price shocks on stock markets, finding that the reaction depends on whether the price movement originates from demand or supply-side factors. These findings are particularly relevant for emerging economies, including Romania, where inflation dynamics and exchange rate fluctuations are highly sensitive to external conditions.

Despite significant advancements in this field, challenges remain in fully capturing the non-linear interactions between fiscal and monetary policy, particularly in economies undergoing structural changes. To address these complexities, this study employs a Bayesian VAR model, which allows for a more flexible and data-driven

approach to analysing Romania's economic dynamics following the adoption of inflation targeting by the National Bank of Romania.

3. Data and methodology

The dataset used in this analysis consists of quarterly macroeconomic variables presented in the table below (Table 1).

Table 1

Data description

Variable	Description
GDP gap	Estimated using the Hodrick-Prescott filter
Adjusted quarterly CORE2 inflation	Inflation indicator capturing price adjustments
Interest rate spread	Difference between the 3-month ROBOR and the monetary policy interest rate
Real effective exchange rate dynamics	Measures changes in the real exchange rate
Deviation of the consolidated general budget balance	Expressed in GDP percentage points

Source: Authors' own research

The dataset covers the period 2005Q3–2024Q1, capturing Romania's post-inflation targeting era. The data sources include Eurostat, the National Bank of Romania (NBR), and the National Institute of Statistics (INS). To assess the impact of policy shocks on macroeconomic variables, this study estimates a VAR model using Bayesian inference, implemented via the BEAR toolbox developed by the European Central Bank. The methodology applies the Normal-Wishart prior distribution, ensuring flexibility in modelling the variance-covariance matrix of residuals.

The stationarity transformations applied to the dataset are presented in Table 2.

Table 2

Data transformations

Transformation	Applied Variables	Calculation Method
Log differences	GDP, Inflation	Used for quarter-over-quarter (QoQ) changes
Simple differences	Interest rate spread	Expressed in percentage points
Level deviations	Budget balance deviation	Expressed in GDP percentage points

Source: Authors' own research

The used model is a Bayesian VAR estimated using the BEAR Toolbox, designed to assess the impact of macroeconomic shocks—demand, supply, monetary policy, exchange rate, and budget deficit—on key Romanian economic variables. By applying a Normal-Wishart prior, the model ensures robust and flexible estimation, well-suited to the uncertainty following the adoption of inflation targeting by the National Bank of Romania.

The Bayesian estimation integrates prior information with observed data, enhancing result robustness. By updating parameter distributions with new observations, this approach provides more adaptive and precise estimates than classical frequentist methods.

Finally, the stability of the VAR model was verified by ensuring that the inverse characteristic roots of the coefficient matrix fall inside the unit circle, confirming the model's reliability. The structural identification scheme follows an identification strategy that decomposes innovations into orthogonal components, allowing for a clear interpretation of the underlying economic mechanisms.

This methodological framework enables an in-depth examination of Romania's fiscal and monetary policy interactions, offering insights into the effectiveness of policy measures in maintaining macroeconomic stability.

4. Main results

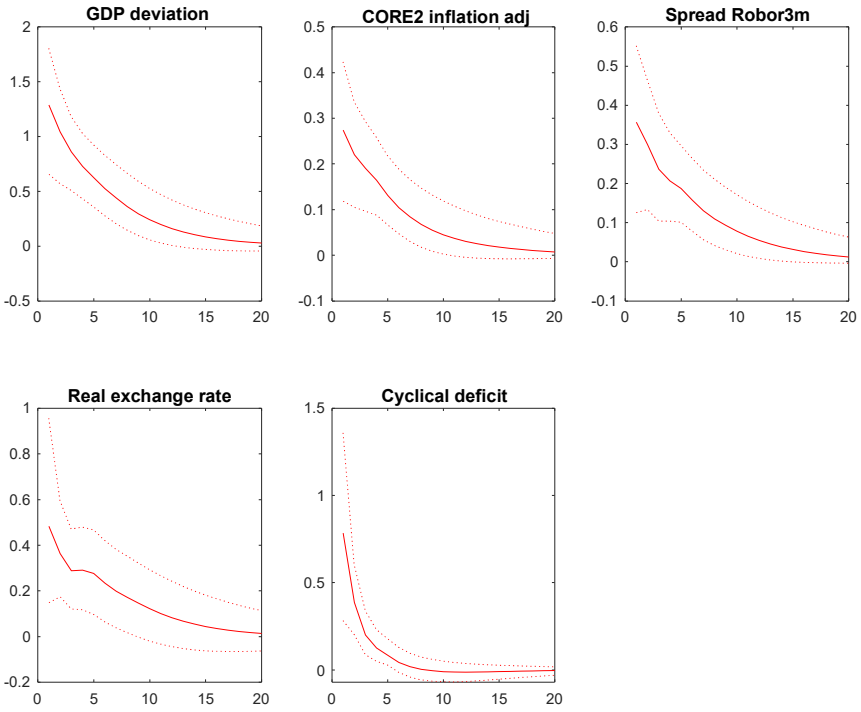
Following a positive aggregate demand shock (Figure 1) of a standard deviation, which tends to 0 after about 10 periods. This response indicates the gradual dispersion effect of the shock, explained by the increase in the total demand for goods and services in the economy. Regarding the inflation response, the direct impact on core price dynamics can be observed, the 0.3% increase in qoq inflation (*quarter-over-quarter*), in the context of positioning aggregate demand above the potential level. This effect is even more amplified if the economy is already operating close to its optimal capacity (potential GDP), where resources are used to the maximum, and it is difficult to expand production quickly.

Next, it can be seen that the gap between the 3-month ROBOR interest rate and the reference rate increases immediately after the application of the shock, which suggests the prompt reaction to combat inflation by increasing the cost of credit, having the effect of taking over liquidity and, implicitly, gradually stabilising the variable. The response

of the real exchange rate is a real depreciation amid pressure on it through the net export channel. The cyclical deficit tends to close at a positive output gap shock, as the economy is above potential, suggesting a lower level of social protection expenditure and, at the same time, a higher amount of tax revenues generated by more robust economic activity.

Figure 1

Impulse response functions of macroeconomic variables to a positive demand shock



Source: Authors' own research

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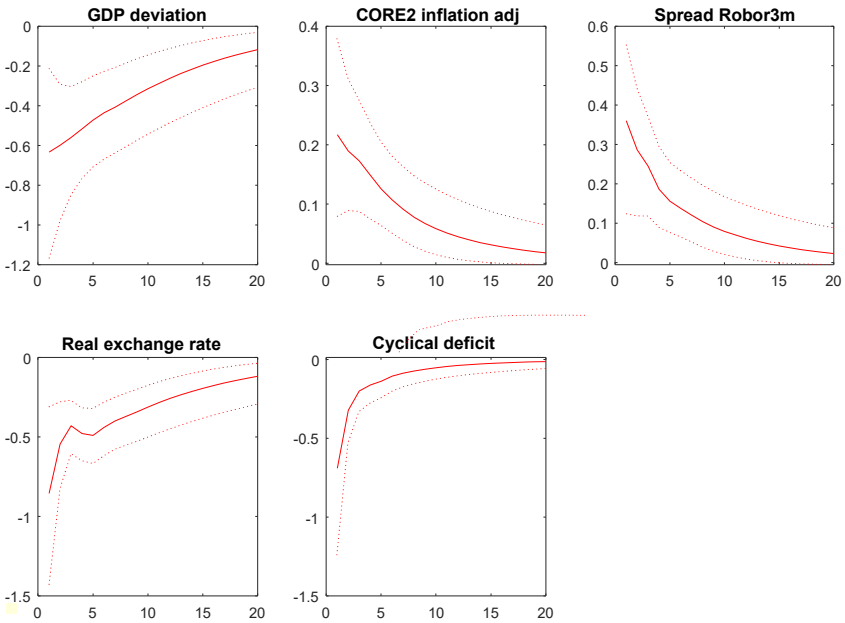
Figure 2

Impulse response functions of macroeconomic variables to a positive supply shock



Source: Authors' own research

Figure 2 shows the impact of rising inflation on the variables introduced in the analysis, namely: the GDP gap shows a significant negative response, gradually recovering towards the end of the horizon. This behavior is explained by the low purchasing power of consumers, which generates a decrease in the aggregate demand for goods and services. Inflation is rising rapidly in response to the supply shock, as expected, input prices are rising and so traders are forced to resort to passing these costs on to the final prices paid by households. As for the central bank's response, monetary policy becomes restrictive, thus curbing inflationary pressure, to the detriment of economic growth.

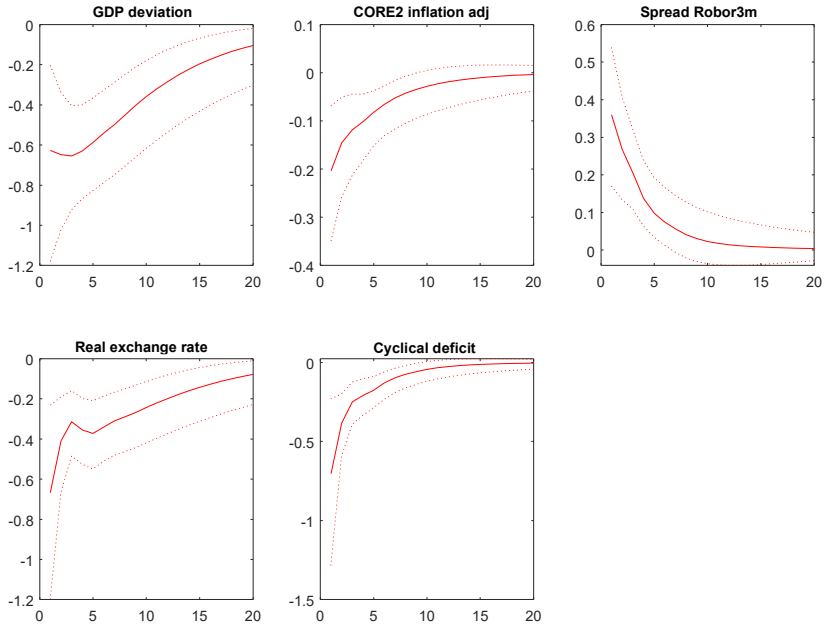
The response of the 3-month ROBOR spread is a positive one, justified by banks' expectations that the interest rate will increase, and because of this they will ask for a higher risk premium for short-term loans, thus leading to a more alert dynamics of the 3-month ROBOR rate, compared to that offered by the monetary policy interest rate.

The interest rate increase implies a real appreciation of the leu compared to the European currency, as investors want higher yields and, therefore, foreign capital is attracted to the country. Following the reduction in economic activity, the cyclical deficit is widening, with fiscal policy intervening to support households and economic agents through fiscal stimuli. As observed during the COVID-19 pandemic, the government applied a series of measures to support the sectors of the economy affected by the strict quarantine imposed, leading to the widening of the cyclical deficit to 5.3% of GDP.

At an increase in the interbank interest rate above the reference rate by 0.4 percentage points (Figure 3), demand contracts by about 0.6% through the increase in the cost of loans granted to both economic agents and households.

Figure 3

Impulse response functions of macroeconomic variables to a positive monetary policy shock



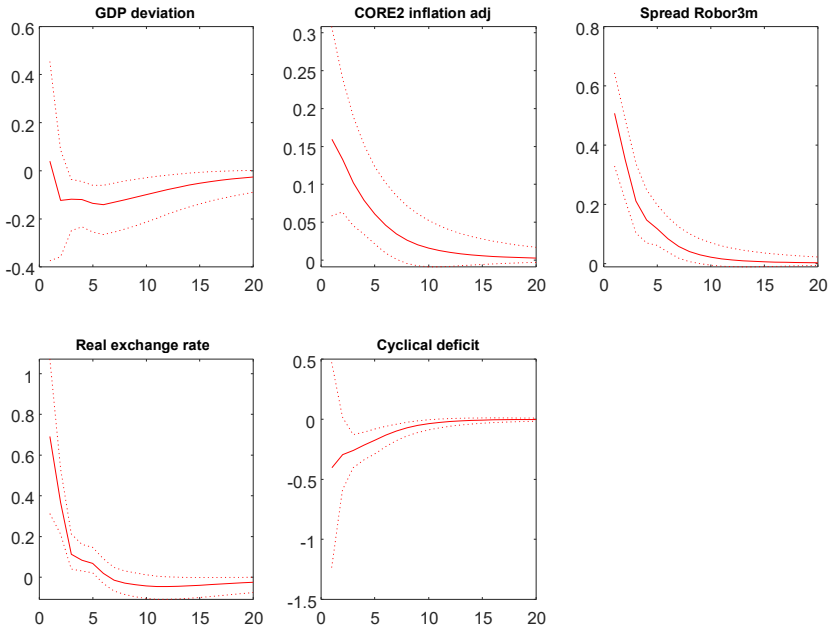
Source: Authors' own research

High interest rates favour the savings process and discourage the contracting of investments, mortgages or even consumer loans. As in the case of the output gap, the deviation of the budget deficit deepens following the increase in the government's financing cost, as the interbank interest rate is in direct correlation with the yields offered by the government through the bonds issued.

As mentioned above, the real exchange rate of the leu appreciates when the interest rate on the interbank market increases, bringing an *inflow* of foreign capital in order to obtain a more attractive return. Finally, the inflation rate reacts negatively to a restrictive monetary policy, leading to a reduction in core price dynamics by 0.2%. As can be seen in the recent period (since the outbreak of the war in Ukraine), the 3-month ROBOR interest rate has been above the monetary policy rate, leading to the reduction of the inflationary pressure of the adjusted CORE 2 index.

Figure 4

Impulse response functions of macroeconomic variables to a real depreciation shock of the leu exchange rate

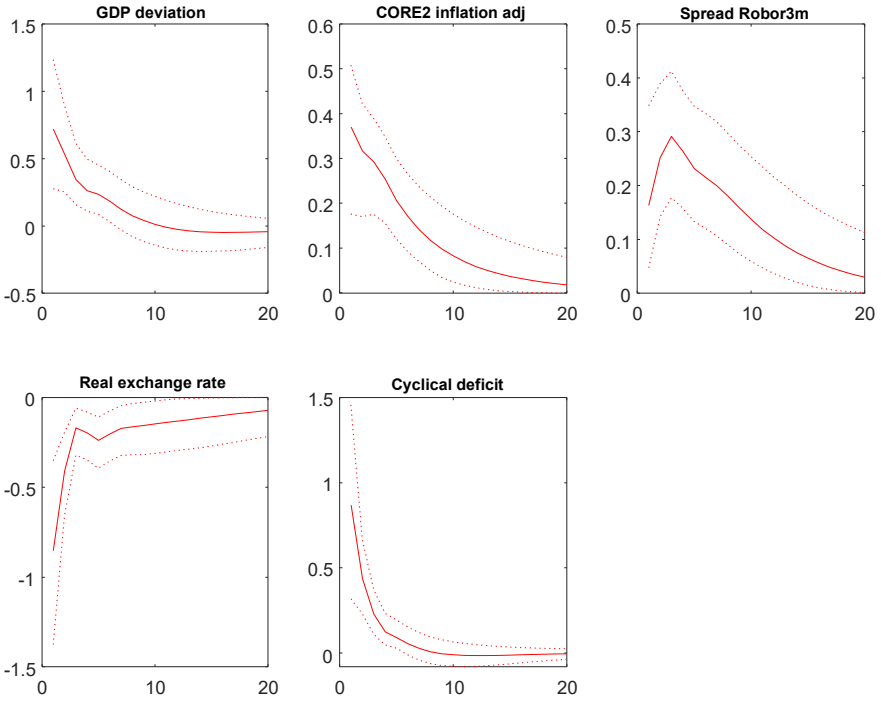


Source: Authors' own research

Figure 4 illustrates the responses of macroeconomic variables to the real exchange rate depreciation shock. The GDP gap slows down slightly, followed by stabilisation towards baseline, reducing demand for domestic goods and increasing demand for imported goods, leading to a decrease in aggregate demand through net exports. In a context where the economy is overheated, this adjustment contributes to bringing actual GDP closer to its potential level. Core inflation reacts positively to the increase in the real exchange rate, with imported goods becoming more expensive for domestic consumers through "imported inflation". In response to rising prices, central bank policy becomes restrictive as a counterbalance to inflationary pressure. However, the cyclical deficit response is not entirely captured, as the uncertainty bands (68% probability) associated with the median are not econometrically significant, as they span both positive and negative territory.

Figure 5

Impulse response functions of macroeconomic variables to a budget deficit deviation shock



Source: Authors' own research

The effects of a cyclical deficit closure shock are highlighted in Figure 5, and the first variable to show a positive effect is the GDP gap. The cyclical component can also be seen as a transitory effect, deviation from the level of the (equilibrium) trend. The direct relationship between the output gap and the deviation of the budget deficit can be explained by both increase and decrease. In the case of reducing the cyclical deficit, it goes from an impasse to a beneficial state for the smooth running of economic activity, thus reducing additional expenditure meant to support the economy. Through the demand channel, associated with a positive GDP deviation, core inflation is fueled by the excess demand for goods and services, leading to an advance in annual price growth of 0.4%. The motivation being given by the increase in aggregate demand while the economy

cannot respond sufficiently by increasing the supply of goods and services, this can lead to inflationary pressures.

A measure to take liquidity from the market, in the context of robust demand and the closure of the cyclical deficit, consists of a restrictive monetary policy with a stabilising role for the economy. When the deviation of the consolidated general budget balance increases by one standard deviation, the gap between the 3-month ROBOR interbank interest rate and the reference interest rate increases by 30 basis points. As for the response of the real exchange rate of the leu, at the end of the cyclical deficit with a standard deviation, the leu appreciates against the European currency in real terms by about 0.9%. The reduction of the deficit leads to a relaxation of the pressure on the current account deficit. Therefore, this fact leads to the appreciation of the leu.

Following the estimation of the SVAR model by Bayesian inference, in addition to the impulse response functions, the historical decomposition of the variance, the long-term equilibrium value (*steady state*) of the input variables and the residual of the model.

5. Conclusions

This paper focuses on analysing the impact of different shocks (aggregate demand shock, supply shock, monetary policy shock, real exchange rate shock and budget deficit deviation shock) using a VAR model estimated by Bayesian inference. The analysis period captured the period after adopting the monetary policy strategy on direct inflation targeting by the National Bank of Romania, namely the third quarter of 2005 until the first quarter of this year. The results suggest increased attention to the implementation by decision-makers of public policies with an impact on the macroeconomic framework. In other words, the application of measures of a type of policy, be it fiscal or monetary, must be calibrated so as not to create major imbalances on economic stability.

In this international context marked by uncertainty, Romania's economy has managed, with a few exceptions, to successfully respond to multiple challenges such as the COVID-19 pandemic, the effects of the Russian Federation's invasion of Ukraine, the energy crisis and strong inflationary pressures. The pandemic strongly influenced the potential GDP, in the sense that a large part of the economy was temporarily closed, but probably the most pronounced impact, from an

economic point of view, was on the situation of public finances. The strong increase in expenditure but also the shock felt in revenues generated a budget deficit at a record level. Therefore, an explosion of public debt could also be observed.

The increase in public spending has been an important point in the economy's return to potential, stimulating practically all economic sectors. It should also be noted that the effects of the energy crisis, amplified by the liberalization of energy prices, have contributed strongly to them, the state having to provide significant subsidies to the population in order to ensure a bearable level of prices for the population. Another factor that put pressure on the budget is military spending. Romania, being a NATO member state, assumed a level of military spending of 2% of GDP.

However, the level of investments as a share of the budget also as a percentage of GDP was very high, the government assuming a policy strongly based on investments in infrastructure, energy and environmental protection. This investment program is strongly supported by the European structural funds made available to Romania in the 2021-2027 multiannual financial framework[1], but also through the Recovery and Resilience Facility[2].

From a monetary policy perspective, the last few years have been characterized by a high level of interest rates. The effect was strongly felt on the population through the lending channel, both from the perspective of the increase in current rates and from the fact that access to credit was much hardened. In fact, monetary policy acted in a manner contrary to the increasingly expansionary fiscal policy, mainly due to inflationary pressures. Although in the last year, the price level has decreased significantly (NBR, 2025), the potential for a return of inflationary pressures exists, mainly against the backdrop of a very dry and probably very weak year in terms of agricultural production, but also as a result of rising tensions in the Middle East leading to a significant increase in oil prices.

A noteworthy aspect is the stability of the real exchange rate, which has remained at an acceptable level in recent years, with twin deficits at record levels, mainly due to the high level of market interest rates.

[1] *https://www.europarl.europa.eu/factsheets/en/sheet/29/multiannual-financial-framework*

[2] *https://mfe.gov.ro/wp-content/uploads/2023/12/6d181d46692c94bd2e40ecb7aed9f754.pdf*

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