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INFLATION TARGETING AND THE MOLDOVAN LEU: EVIDENCE FROM A VAR ON MONETARY CHANNELS

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Abstract
Using annual data for 2004–2024, the paper examines how inflation targeting feeds through to Moldova's USD/MDL exchange rate. The model is a two-lag VAR with a constant built on five series: ΔUSD/MDL, the policy rate, ΔM2, ΔCPI, and foreign-exchange reserves (ΔFX). Unit-root tests (ADF) motivate differencing; impulse responses (IRF) and forecast-error variance decomposition (FEVD) trace dynamics. Results show that monetary policy affects the exchange rate mainly through liquidity and prices rather than the policy rate. A positive money-supply shock depreciates the leu, while inflation shocks raise exchange-rate volatility. The policy rate's appreciation effect is in the expected direction but statistically weak. FEVD indicates that most variation in the exchange rate is due to its own history, with a meaningful share explained by monetary factors (money and prices). Policy implication: liquidity management and anchoring inflation expectations matter more for exchange-rate stability than small interest-rate moves.

Keywords: *Exchange rate; Inflation targeting; Monetary policy; The channels of monetary transmission; VAR.*

JEL Classification: *E52*, *E58.*

INTRODUCTION

Implementing an optimal monetary policy is an integral responsibility of any country's central bank in the modern world. Through monetary regulation instruments, the state influences the state of the economy. A correctly selected central bank policy contributes to stable overall economic growth, lower unemployment, lower inflation, and strengthening the national currency (Juhro & Rummel, 2022). At the same time, errors in implementing monetary policy can provoke economic and financial crises.

Therefore, the central bank needs to correctly define the objectives and instruments of monetary policy. A standard monetary policy regime in developed countries is monetary targeting, which is based on the postulate that control over the money supply can reduce the inflation rate. Over the past two decades, significant changes have occurred in the monetary policy of developing countries.

The experience in applying the inflation targeting regime of monetary policy is important for developing countries, especially for small and open economies (Mohanty & Klau, 2005). In such countries, sustainable economic development is directly connected to international economic flows both in terms of ensuring inputs (raw materials, equipment, technologies, product or economic-financial information), and in terms of capitalizing on a significant part of the resulting outputs (products, services) (Bran & Costica, 2003).

The Republic of Moldova has a small, open economy, a continuous current account deficit, and a strong subordination to international financial flows. Its economy is characterized by several structural peculiarities, which greatly expose it to external developments. For these reasons, any imbalances in the global economy trigger increasingly pronounced external vulnerabilities for the Republic of Moldova (Lopotenco, 2020), which are transmitted through the exchange rate.

I. LITERATURE REVIEW

In the specialized literature, the inflation targeting regime was initiated to be studied since the early 70s of the last centuries (Ha et al., 2019), when Keynesian regulation methods failed and led to the acceleration of prices. Therefore, starting in the 1990s, several countries began implementing elements of a monetary policy to overcome inflation. However, the first central bank to officially introduce the inflation targeting regime was the Reserve Bank of New Zealand, in 1989; in the EU, it was Sveriges Riksbank in 1995 (Hammond, 2012). The scientific

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community was inclined to believe that maintaining price stability lays a solid foundation for improving macroeconomic indicators (Bernanke & Mishkin,1997). The main advantages of inflation targeting are that the parameters of monetary circulation appear earlier than other indicators (Hammond, 2012). This allows for the formation of a short-term monetary policy. On the other hand, there are disadvantages. The effectiveness of monetary targeting decreases with the unstable multiplier and velocity of monetary circulation.

At the same time, some authors raise the issue of the appropriateness of inflation targeting policy in the context of unfavorable conditions on world markets (Schnabel, 2024). The possibilities of this policy are considered, first of all, in terms of inflation. In particular, it is noted that it is impossible to counteract inflation generated by structural factors with monetary methods (Harvey & Cushing, 2014). Inflation is primarily determined by the structure of production, in particular by monopoly prices. The role of the Central Bank is limited to price stability and financial stability (Nier, 2009), while other government institutions should create conditions for achieving other macroeconomic objectives.

Monetary policy stimulus is effective in the context of a floating exchange rate with any degree of capital mobility, but the higher the capital mobility, the better the monetary policy results (Obstfeld et al., 2005).

In this context, various studies extensively analyze the channels of the monetary policy transmission mechanism: the interest rate channel, the monetary channel, the foreign exchange channel, the wealth and asset price growth channel, the balance sheet and profitability channel, the bank financing and lending channel, the bank capital channel, the risk-taking channel, and the inflation expectations channel (Beyer et al., 2017).

Among the above-mentioned channels, the interest rate channel is the most important. The interest rate primarily impacts the economy, leading to a change in overnight interbank rates. Changes in rates by one percentage point in many economies lead to changes in short-term lending rates by up to 1 percentage point within 2-4 months, and short-term deposit rates can change by up to 1 percentage point within 7-9 months (BIS, 2016). Long-term bank lending and deposit rates change. Changes in interest rates affect lending, consumption, and investment, and, ultimately, consumer and investment demand.

The exchange rate reacts to changes in the base interest rate. The fundamental effective exchange rate changes in response to a one percentage point change in the overnight interbank rate (Sánchez, 2005). The direct impact of the exchange rate on inflation in the consumer market is realized both directly through the prices of imported consumer goods and services and through the prices of imported raw materials and components. An indirect effect of a change in the exchange rate on inflation is its impact on the cost of exports and imports. The devaluation of the national currency leads to an increase in the cost of imports and a decrease in their relative attractiveness for the domestic consumer, which expands the possibilities of both import substitution and an increase in the prices of substitute goods (Liu, 2024).

Due to the devaluation of the national currency, the promotion of exports creates increased pressure on the prices of those goods, which are simultaneously exported and sold on the domestic market. In the case of goods, this also creates general pressure on the cost. According to some authors, the main impact of a change in the national currency exchange rate on domestic price dynamics occurs within a few months of the exchange rate change (Carrière-Swallow et al., 2023). When the nominal effective exchange rate changes, inflation will usually change by an amount that depends on the level of openness of the economy (Ha et al., 2020). When the economy is small and strongly connected to external markets, exchange rate changes are reflected more quickly in domestic prices. This relationship should be taken into account by authorities when shaping economic policies.

Inflation expectations are key in transmitting monetary policy, influencing other channels' operations. Based on these expectations, economic agents decide how to consume, save, or invest and set interest rates, wages, and prices.

Inflationary expectations of enterprises play an important role in the formation of inflation, since enterprises set wages and prices of products. Inflationary expectations of the population largely determine the dynamics of consumer demand, which ultimately affects the prices of goods and services (Meyler & Reiche, 2021).

Inflation targeting consists of defining a quantitative inflation target. The key rate, which represents the price of money and affects first the interbank rate and then all medium—and long-term rates, acts as a regulatory instrument (Jahan, 2012).

The money market becomes a transmission mechanism that affects loans, deposits, investments, savings, and economic growth. High inflation creates problems of depreciation of all economic entities' income types. On the other hand, the decrease in inflation can lead to prolonged depression.

Therefore, we can see that in the specialized literature, monetary policy under targeting inflation is thoroughly researched, noting a lack of analysis of its impact on the exchange rate. For countries with small and open economies, the evolution of the exchange rate is of particular importance in the context in which, on the one hand, these countries are dependent on external financial flows. On the other hand, the development of foreign trade has a crucial role in the development of the economy. Starting with these arguments, we propose determining the impact of monetary policy under inflation targeting on the exchange rate.

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Issue **2** ISSN-L 2344-102X

II. RESEARCH METHODOLOGY

We will build an econometric model using vector autoregression (VAR) to determine the extent to which inflation-targeting monetary policy can impact the Moldovan leu exchange rate.

VAR is a statistical model that identifies linear relationships between data from multiple time series. Unlike univariate autoregressive models, which analyze a single time series, VAR models allow for the simultaneous examination of multiple variables (Lütkepohl, 2005).

A VAR model assumes that each variable in a system can be explained by its past values and the past values of all other variables in the system. This multivariate approach will allow us to identify the dynamic relationships and interactions between variables that describe inflation targeting monetary policy on the Moldovan leu exchange rate.

The general formula for the VAR model is as follows (Hamilton, 1994).

$$Y_t = c + A_1 Y_{t-1} + A_2 Y_{t-2} + \cdots + A_p Y_{t-p} + \varepsilon_t \quad (1)$$

where:

Y_t – the vector of endogenous variables at time t.

c – vector of constants (intercepts).

A_i – matrix of coefficients for lag i (dimension k×k).

ε_t – vector of residues.

We included the following variables in the model (Table 1):

Table 1. Variables included in the model

Variable	Role (initial)	Description	Source
USD_MDL	endogenous	Nominal exchange rate MDL/USD	NBM
int_rate	exogenous	Monetary policy interest rate (NBM base rate)	NBM
M_2	exogenous	Aggregate money supply M2	NBM
req_res	exogenous	Required reserves	NBM
open_market	exogenous	Open market operations (volume)	NBM
CPI	exogenous	Consumer price index	NBM
currency_res	exogenous	NBM foreign exchange reserves	NBM
ener_pr_index	exogenous	External shocks (energy prices)	Statista

Source: developed by the authors

Note: In the reduced VAR, the endogenous block comprises ΔUSD/MDL, the policy rate, ΔCPI, and ΔM2. All series are annual and span 2004–2024 (T = 21).

The system includes the exchange rate (ΔUSD/MDL), the policy rate, money supply (ΔM2), inflation (ΔCPI), and foreign-exchange reserves (ΔFX). We denote ΔUSD/MDL by d_USD_MDL; similarly ΔM2 by d_M_2 and ΔCPI by d_CPI (and ΔFX by d_FX, where used).

At the first stage, it is necessary to check whether the time series are stationary. For this purpose, the ADF (Augmented Dickey-Fuller) test was applied. The analysis was performed on the R programming platform. Following the application of ADF, the following results were obtained (Table 2).

Table 2. ADF test results

Variable	Dickey-Fuller	p-value	Conclusion
USD_MDL	-2.4372	0.403	Nonstationary
int_rate	-2.5949	0.342	Nonstationary
M_2	-3.9880	0.021	Stationary
req_res	-3.2063	0.104	Almost, but still nonstationary
open_market	-2.0422	0.557	Nonstationary
CPI	-2.5983	0.340	Nonstationary
currency_res	-1.6195	0.721	Nonstationary
ener_pr_index	-1.9444	0.595	Nonstationary

Source: developed by the authors with *R*

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Therefore, the seven non-stationary variables were differentiated (Δ) to be transformed into stationary ones. The second stage of the analysis involves choosing the optimal lag and estimating the VAR model. Thus, we identified the optimal number of lags as two based on the criteria: AIC(n), HQ(n), SC(n), and FPE(n).

AIC(n)	HQ(n)	SC(n)	FPE(n)
4	4	4	3

In the third stage, we will build the VAR model. To keep the model robust and focused on monetary policy and the exchange rate, we reduced the variables to encompass the essence of monetary policy and the transmission channel on the exchange rate.

These variables are: (1). d_USD_MDL – dependent variable (exchange rate); (2). int_rate – monetary policy interest rate; d_M_2 – money supply (liquidity in the economy); d_CPI – inflation; d_currency_res – foreign exchange reserves.

The model equation is as follows:

$$USD\_MDL_t = \alpha^0 + \alpha^1 \cdot USD\_MDL_t^{-1} + \alpha^2 \cdot int\_rate_t^{-1} + \alpha^3 \cdot M^2{}_t^{-1} + \alpha^4 \cdot PCI_t^{-1} + \alpha^5 \cdot USD\_MDL_{t-2} + \alpha_6 \cdot int\_rate_{t-2} + \alpha_7 \cdot M_{2t-2} + \alpha_8 \cdot PCI_{t-2} + \varepsilon_{1t} \quad (2)$$

where:

USD_MDL_t	exchange rate at time t.
α_0	constant (intercept).
$\alpha_1,\ldots,\alpha_8$	estimated coefficients.
ε_{1t}	error term (unobserved shocks).

Variables with t-1 and t-2 - denote lags.)

Var model:

```
VAR Estimation Results:
========================
Endogenous variables: d_USD_MDL, int_rate, d_CPI, d_M_2
Deterministic variables: const
Sample size: 21
Log Likelihood: -349.233
Roots of the characteristic polynomial:
0.9582 0.9582 0.7742 0.5946 0.5946  0.54  0.54 0.393
Call:
VAR(y = df_var_reduced, p = 2, type = "const")

Estimation results for equation d_USD_MDL:
==========================================
d_USD_MDL = d_USD_MDL.l1 + int_rate.l1 + d_CPI.l1 + d_M_2.l1 + d_USD_MDL.l2 + int_r
ate.l2 + d_CPI.l2 + d_M_2.l2 + const
```

Information-criterion diagnostics (AIC, HQ, SC, FPE) consistently point to p = 2. The VAR is specified with an intercept and no deterministic trend. In the reduced system, all variables are modeled as endogenous: ΔUSD/MDL, policy rate, ΔCPI, and ΔM2. Although M2 appears stationary in levels per Augmented Dickey–Fuller (ADF) tests, we use first differences for comparability across series and to interpret short-run effects; results are robust to using levels. As a robustness check, we ran a standardized OLS on contemporaneous annual changes, yielding consistent signs and relative magnitudes.

III. RESULTS AND DISCUSSIONS

This section presents the results of econometric estimations on the relationship between inflation-targeting monetary policy and the Moldovan leu exchange rate. The analysis focuses on the significance of the coefficients and the economic interpretation of the influence of monetary variables on exchange rate dynamics.

The main estimation outcomes for the exchange-rate equation are summarized in Table 3.

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Table 3. Interpretation of the VAR model (Endogenous Variable: Exchange Rate)

Variable	Explanation
`int_rate.l1` și `int_rate.l2` – insignificant	the interest rate has no statistically significant effect on the USD/MDL exchange rate.
`d_M_2.l1` – p = 0.06	an increase in the money supply leads to a slight depreciation of the MDL.
R^2 = 0.46, Adjusted R^2 = 0.28	the model explains approximately 28% of the exchange rate variation, a value considered admissible for macroeconomic models

Source: developed by the authors

At the same time, after applying VAR, we can determine what influences the NBM (Table 4):

Table 4. Significance patterns across VAR equations

Monetary policy interest rate (`int_rate`)	**Inflation** (`d_CPI`)	**Money supply** (`d_M_2`)
- `int_rate.l1` – very significant (**p < 0.001**): monetary policy is strongly autoregressive (the NBM maintains the interest rate trajectory) - `d_CPI.l2` – significant (**p = 0.0015**) → past inflation (with a two-year lag) influences interest rate decisions ⇒ coherent with the inflation targeting regime	- `int_rate.l1` – p ≈ 0.05 ⇒ higher interest rates reduce inflation, with a short lag.`d_CPI.l2` – positive and significant ⇒ inflation is **persistent** over time. - `d_M_2.l1` – marginal negative effect ⇒ money supply influences inflation moderation.	All coefficients are insignificant ⇒ The money supply does not seem to be determined directly by these variables; it can be better explained by external factors (e.g., foreign exchange inflows, remittances).

Source: developed by the authors

The economic interpretation of the VAR model results confirms that the NBM responds to inflation with a delay, characteristic of the inflation targeting regime. At the same time, we can see that the base interest rate does not directly impact the USD/MDL exchange rate, inflation, and money supply, having a marginal effect. It is possible to identify an indirect channel: interest → inflation → exchange rate, which could be elucidated through the last stage of the -IRF analysis, which will determine how the variables react to a monetary shock or a change in the exchange rate, through the analysis of impulse response functions (IRF).

Following the analysis of impulse response functions (IRF), Figure 1 was constructed.

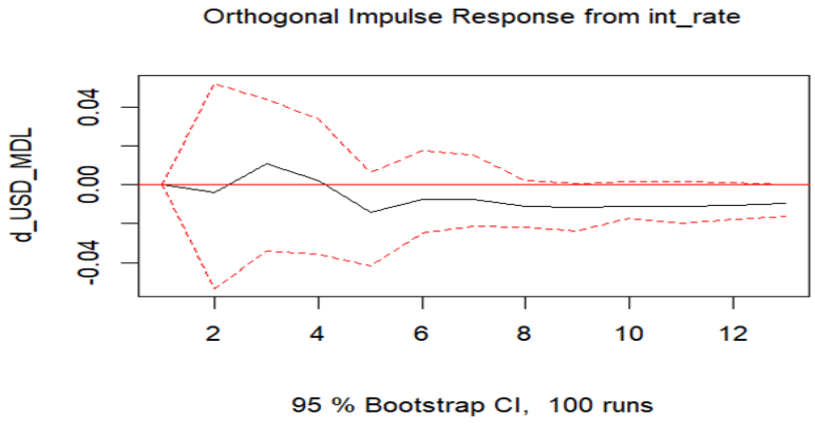

Figure 1. Impulse response of ΔUSD/MDL to a one-sd shock in the policy rate (IRF with 95% bootstrap CI)
Source: developed by the authors with *R*

The black line in Figure 1 shows us how the USD/MDL exchange rate reacts to a positive interest rate shock, and the red line represents the 95% bootstrap confidence interval. From the figure, it can be seen that initially there is a small impact, with the MDL appreciating slightly, which could be explained by attracting capital, as a result of the increase in the interest rate, later the impact turns into a negative one. The national currency slightly depreciates. At the same time, we note that the black line is permanently located within the 95% bootstrap confidence interval.

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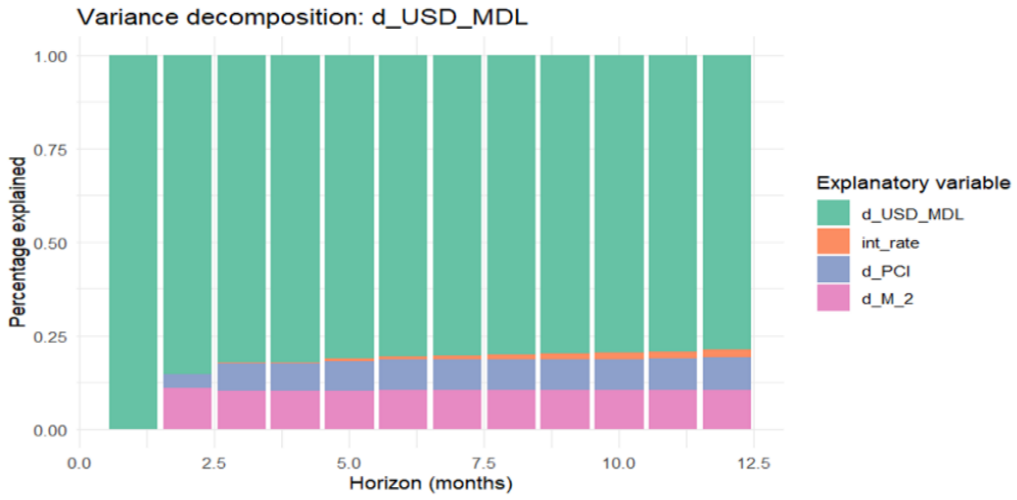

Figure 2. Forecast-error variance decomposition (FEVD) for ΔUSD/MDL (horizons in years)
Source: developed by the authors with *R*

To reveal which part of the exchange rate fluctuation is explained by the shock to other variables, we performed the FEVD variance decomposition and constructed Figure 2, which allows us a better visualization.

IV. CONCLUSION

This paper aims to analyze the impact of monetary policy on the exchange rate of the Moldovan leu (USD/MDL) in an institutional context characterized by the National Bank of Moldova's adoption of an inflation-targeting regime. The analysis used descriptive tools and rigorous econometric methods, including VAR models, impulse response functions (IRF), variance decomposition (FEVD), and multiple regression with standardized coefficients.

The analysis results highlighted that the money supply (M2 aggregate) exerts the most substantial relative impact on the exchange rate. More precisely, an increase in the money supply is associated with a tendency for the Moldovan leu to depreciate, thus confirming the monetarist hypothesis according to which the expansion of liquidity leads to the loss of the value of the national currency. The second most influential factor is the monetary policy interest rate, which leads to a slight appreciation of the leu — an effect consistent with economic theory, but statistically insignificant at the individual level. Annual inflation (CPI) ranks third, suggesting that inflationary pressures exert a marginal but consistent influence on the direction of currency depreciation.

The results of the variance decomposition show that most of the variation in the USD/MDL exchange rate, approximately 75–80%, comes from its historical trends. In contrast, monetary factors — particularly the money supply and the inflation rate — contribute about 20%. These findings highlight the essential role of a balanced monetary framework in ensuring the exchange rate stability of the Republic of Moldova.

The variance decomposition analysis indicates that approximately 75–80% of the USD/MDL exchange rate variations are influenced by its past developments, while monetary policy factors, in particular money supply and inflation, explain the remaining 20%.

In conclusion, the results support the idea that monetary policy under inflation targeting has a tangible impact on the Moldovan leu exchange rate, but not through direct and rapid effects of interest rates, but rather through controlling monetary aggregates and inflationary pressures. Thus, it is recommended that monetary authorities continue to strengthen transmission instruments and closely monitor money supply and price dynamics in order to prevent exchange rate imbalances.

REFERENCES

1. Bernanke, B. S., & Mishkin, F. S. (1997). Inflation targeting: a new framework for monetary policy?. *Journal of Economic perspectives*, *11*(2), 97-116.
2. Beyer, A., Nicoletti, G., Papadopoulou, N., Papsdorf, P., Rünstler, G., Schwarz, C., Sousa, J., Vergote, O. (2017). The transmission channels of monetary, macro- and microprudential policies and their interrelations, *Occasional Paper Series*, 191, European Central Bank
3. BIS. (2016). Expanding the boundaries of monetary policy in Asia and the Pacific. *BIS Papers* No, 88. Retrieved from https://www.bis.org/publ/bppdf/bispap88.pdf
4. Bran, P., Costică, I. (2003) *Economica activităţii financiare şi monetare internaţionale*. Bucureşti: Editura Economică, 567 p. ISBN 9735909251.

DOI: 10.4316/EJAFB.2025.13207

Volume **13** / **2025** ISSN 2344-102X
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5. Carrière-Swallow, M. Y., Firat, M., Furceri, D., Jiménez, D. (2023). State-Dependent Exchange Rate Pass-Through. *International Monetary Fund Working Paper,* 086.
6. Nier, E. W. (2009). Financial Stability Frameworks and the Role of Central Banks: Lessons From the Crisis. *IMF Working Papers*, 09.
7. Ha, J., Kose, M.A., Ohnsorge, F. (2019). Understanding Inflation in Emerging and Developing Economies. *World Bank Policy Research Working Paper*, 8761.
8. Ha, J., Stocker, M. M., & Yilmazkuday, H. (2020). Inflation and exchange rate pass-through. *Journal of International Money and Finance*, *105*, 102187.
9. Hamilton, J. D. (1994). *Time Series Analysis*. New Jersey: Princeton University Press.
10. Hammond, G. (2012). State of the Art of Inflation Targeting. *Centre for Central Banking Studies Handbook*, *No. 29*. London: Bank of England.
11. Harvey, S.K., & Cushing, M. J. (2014). Separating Monetary and Structural Causes of Inflation. *Journal of Finance and Economics*, 2(3), 1-16.
12. Jahan, S. (2012). *Inflation Targeting: Holding the Line. Finance & Development*. International Monetary Fund, *4*, 72-73.
13. Juhro, S. M., & Rummel, O. (2022). Monetary policy framework. In *Central Bank Policy Mix: Issues, Challenges, and Policy Responses: Handbook of Central Banking Studies* (pp. 29-49). Singapore: Springer Nature Singapore.
14. Lopotenco, V. (2020). The Financial System Challenges of the Republic of Moldova in the Pandemic COVID 19 context. *International Journal of Innovative Technologies in Economy*, 31(4), 1-5.
15. Lütkepohl, H. (2005). *New Introduction to Multiple Time Series Analysis*. Springer Science & Business Media, Berlin.
16. Meyler, A., Reiche, L. (2021). Making sense of consumers' inflation perceptions and expectations – the role of (un)certainty. *ECB Economic Bulletin*, Issue 2.
17. Mohanty, M. S., & Klau, M. (2005). Monetary policy rules in emerging market economies: issues and evidence. In *Monetary policy and macroeconomic stabilization in Latin America* (pp. 205-245). Berlin, Heidelberg: Springer Berlin Heidelberg.
18. NBM. Monetary and Financial Statistics. Retrieved from https://www.bnm.md/bdi/pages/reports/drsb/DRSB1.xhtml
19. NBM. Official exchange rates. Retrieved from https://www.bnm.md/en/content/official-exchange-rates
20. Obstfeld, M., Shambaugh, J. C., & Taylor, A. M. (2005). The Trilemma in History: Tradeoffs Among Exchange Rates, Monetary Policies, and Capital Mobility. *The Review of Economics and Statistics*, 87(3), 423-438.
21. Sánchez, M. (2005). The link between interest rates and exchange rates do contractionary depreciations make a difference? *International Economic Journal*, *22*(1), 43-61.
22. Schnabel, I. (2024). Monetary Policy Challenges during Uncertain Times. In The thirteenth conference organised by the International Research Forum on Monetary Policy at the Federal Reserve Board, Washington, D.C. Retrieved from https://www.ecb.europa.eu/press/key/date/2024/html/ecb.sp240417_1~c4cbe733df.en.html
23. Liu, S. (2024). Impact of Exchange Rate Fluctuation on Import and Export Enterprises in China and Japan and Countermeasures. *Highlights in Business, Economics and Management*, 24. 322-330.
24. Statista. Monthly fuel energy price index worldwide. Retrieved from https://www.statista.com/statistics/1302801/monthly-fuel-energy-price-index-worldwide

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