

UDC 336.7

JEL E52, E58, C32

EXCHANGE RATE CHANNEL AS A KEY ELEMENT OF THE MONETARY TRANSMISSION IN UKRAINE

Oleksandr Kuzan¹, Olena Fomenko²

¹Ivan Franko National University of Lviv,
1, Universytetska Str., Lviv, 79008,
e-mail: oleksandr.kuzan@lnu.edu.ua; ORCID: 0009-0009-1506-3438

²National Bank of Ukraine,
9 Instytutska Str., Kyiv, 01601,
e-mail: olena.fomenko@bank.gov.ua; ORCID: 0009-0001-5405-9759

Abstract. *This study investigates the efficiency of the exchange rate channel as a key component of Ukraine's monetary transmission mechanism. The research focuses on transmitting monetary policy impulses to macroeconomic indicators, including the exchange rate, net exports, GDP, and inflation. Special attention is given to the role of the policy rate and foreign exchange interventions in shaping exchange rate dynamics and their subsequent effects on economic performance. By employing vector autoregression (VAR) modeling, the study evaluates the strength and timing of these transmission pathways while identifying specific lags and structural limitations unique to the Ukrainian economy.*

The findings highlight the significant influence of monetary policy tools, particularly the policy rate, on the exchange rate, confirming the channel's efficiency in regulating economic outcomes. The study also demonstrates the critical role of exchange rate changes in driving fluctuations in net exports and GDP growth, although the effects operate with notable time lags. Additionally, the analysis reveals that exchange rate depreciation exerts substantial short-term deflationary pressures, but these pressures stabilize over the medium term.

The results further underscore the challenges posed by the Ukrainian economy's structural peculiarities, such as limited financial market development and high reliance on external trade, which occasionally lead to short-term anomalies in the channel's operation. Despite these challenges, the exchange rate channel remains an essential tool for monetary regulation in Ukraine, supporting macroeconomic stability and growth. The study concludes with recommendations for policymakers on leveraging the exchange rate channel's potential while addressing its limitations.

Keywords: *monetary policy, transmission mechanism, exchange rate, VAR modeling, economic growth, inflation, macroeconomic stability.*

Introduction. The effective functioning of a country's monetary transmission mechanism is fundamental to achieving the dual objectives of price stability and economic growth. This process depends on successfully transmitting policy impulses, driven by central banks' instruments, to key sectors of the economy.

In Ukraine, having an open economy with high exposure to external trade and significant exchange rate volatility, the exchange rate channel plays an essential role in shaping monetary policy outcomes. The exchange rate's impact extends beyond its direct influence on trade to affect inflation, investment, and broader macroeconomic stability. However, Ukrainian financial markets' vulnerability to external shocks and an incomplete institutional framework – introduces considerable challenges to the exchange rate channel's efficiency. This fact underscores the necessity of such research.

Literature review. The exchange rate channel of monetary transmission has been extensively explored in global literature. Seminal works by F. Mishkin highlight its critical role in monetary policy implementation, especially in open economies where exchange rate fluctuations have far-reaching effects on trade balances and inflationary dynamics [1, 2].

In the Ukrainian context, researchers such as V. Mishchenko, S. Naumenkova, and S. Mishchenko have underscored the pivotal importance of the exchange rate channel in monetary policy transmission [3]. These authors also concluded that the effectiveness of the exchange rate channel was the highest among the rest of them.

In contrast, V. Shevchuk [4] has examined the implications of exchange rate shocks for the Ukrainian economy, emphasizing the presence of short-term anomalies and structural lags that complicate monetary policy implementation. Similarly, O. Zholud, V. Lepushynskyi, and S. Nikolaychuk [5] have examined the effectiveness of the exchange rate channel under the inflation-targeting regime adopted by Ukraine. Their findings suggest that while the exchange rate channel effectively influences inflation, the effect on economic growth is less pronounced. Additionally, Ukrainian economists S. Lobozyńska and A. Grui et al. have investigated key aspects of monetary mechanisms [6, 7].

Setting Objectives. This article aims to investigate the mechanisms through which monetary policy decisions in Ukraine are transmitted to macroeconomic indicators via the exchange rate channel. Also, among objectives, we should assess the relative effectiveness of monetary policy tools and identify the specific anomalies or structural constraints that affect the performance of the exchange rate channel in Ukraine's economic context.

Methodology. A comprehensive methodological framework was employed to achieve the study's objectives, integrating qualitative and quantitative approaches. The analysis is structured around the following key components:

Literature Synthesis: Theoretical concepts regarding the exchange rate channel were synthesized and contextualized within Ukraine's economic environment.

VAR Modeling: A Vector Auto-Regression model captured the dynamic relationships between monetary policy variables and macroeconomic indicators.

Statistical and Mathematical Methods: Macroeconomic data were sourced from the State Statistics Service of Ukraine (SSSU) and the National Bank of Ukraine (NBU). Variables were transformed to ensure stationarity, as required for VAR modeling.

Research results. The exchange rate channel is traditionally considered one of the most effective components of Ukraine's monetary transmission mechanism [8; 9, p. 30; 10, c. 31]. This channel plays a critical role in shaping the overall impact of monetary policy decisions on the real economy. Its significance is particularly pronounced in emerging and open economies due to several distinctive characteristics [11]:

In most developing economies, exchange rate fluctuations have a pronounced effect on domestic price levels. This «pass-through effect» directly links changes in the exchange rate and inflation dynamics. Businesses and consumers in Ukraine tend to react strongly to currency fluctuations, which amplifies inflationary pressures and heightens inflation expectations.

A large proportion of businesses in open economies hold debt denominated in foreign currencies. Any sharp depreciation of the national currency can exacerbate foreign currency liabilities, leading to solvency risks for these entities. This, in turn, can trigger broader systemic risks in the financial sector, underlining the importance of exchange rate stability for macroeconomic and financial stability.

High economic openness makes the economy susceptible to «sudden stops» in capital flows, where large-scale capital outflows exert severe depreciation pressures on the currency. Such episodes can significantly destabilize the economy, as witnessed in past crises. The central bank's role in managing these pressures through interventions in the foreign exchange market is crucial to mitigating the associated risks.

Central banks, including the NBU, often resort to foreign exchange interventions to stabilize the currency and cushion the economy from adverse external shocks. However, while these interventions are beneficial in the short term, over-reliance on exchange rate stabilization can undermine the credibility of inflation-targeting policies.

At the same time, although moderate attention to exchange-rate control is beneficial, placing excessive emphasis on currency stability can undermine confidence in the declared inflation target. Therefore, it is essential to maintain balance – considering the exchange rate when implementing monetary measures but not allowing it to become the determining factor [11].

The exchange rate channel operates through multiple transmission pathways in Ukraine, and its impact on macroeconomic variables varies depending on the tools employed by the NBU and external economic conditions. The theoretical framework suggests that restrictive monetary policy, characterized by an increase in the policy rate (r), makes domestic currency deposits more attractive than foreign currency deposits. In this context, a contractionary policy may be carried out by reducing the money supply (M) or raising the discount rate. Such measures increase the value of deposits in the national currency relative to other currencies – i.e., they lead to an appreciation of the national currency (E). A stronger currency makes domestic goods more expensive than foreign goods, reducing their appeal in external markets. This, in turn, affects net exports (NX) and ultimately leads to a decline in aggregate output (Y) [1, 2].

Thus, the monetary transmission mechanism that operates through the exchange rate can be outlined as follows:

$$M \downarrow - r \uparrow - E \uparrow - NX \downarrow - Y \downarrow$$

However, the exchange rate channel in Ukraine must be considered with an eye to the specifics of the country's monetary policy. In contrast to the theoretical model, the discount rate should represent since it is decisive in influencing deposit interest rates in the national currency. Given the central bank's direct authority over this rate, we can ignore the first link in the theoretical model's mechanism.

It should be noted, however, that the discount rate instrument also has certain limitations. For example, while analyzing the implementation of the National Bank of Ukraine's interest rate policy, S. Lobozyńska [6] has concluded that its effectiveness may be constrained by the real sector's low sensitivity to central bank rate signals, as well as by the absence of adequate institutional underpinnings for the currency, interbank, and stock markets.

In addition, the NBU influences the exchange rate channel through the conventional interest rate instrument and by conducting foreign exchange interventions that directly affect the exchange rate. This suggests an additional monetary transmission mechanism in Ukraine through the exchange rate, independent of .

In summary, we posit that the exchange rate channel in Ukraine operates along two pathways: $r\uparrow - E\uparrow - NX\downarrow - Y\downarrow$ and $E\uparrow - NX\downarrow - Y\downarrow$. To evaluate these pathways' effectiveness in monetary regulation, we developed a vector autoregression (VAR) model.

In economic research, vector autoregression (VAR) models have become one of the most widely used tools for analyzing macroeconomic indicators and short-term forecasting. Their popularity is attributable to the absence of rigid theoretical constraints and the capacity to investigate the simultaneous dynamic effects of one variable on others – a significant advantage when modeling complex systems such as the transmission mechanism. Consequently, this study will employ VAR modeling.

We have gathered the necessary data to achieve declared objectives and subjected it to preliminary statistical processing. Table 1 presents the variables selected for the study and the stages of their transformations. Note that some of the variables included in the model do not directly participate in the monetary transmission through the exchange rate channel; instead, they serve as auxiliary variables to ensure sufficient explanatory power and overall model quality.

Table 1

Data used for the VAR-based research

Variable	Notation	Description	Unit	Transformation Steps	Source
1	2	3	4	5	6
Household Expenditures	agr_cons	Households' total expenditures in Ukraine	million UAH	Quarterly averages converted to monthly frequency; adjusted for inflation	SSSU [12]
Money Supply	m2	Monetary aggregate M2	million UAH	Adjusted for inflation	NBU [13]
Consumer Price Index	cpi	Cumulative inflation index relative to January 2005	–	Converted cumulatively to 2005 price levels	SSSU [14]

1	2	3	4	5	6
Euro Exchange Rate	ex_rate_eur	Official UAH–EUR exchange rate	–	–	NBU [15]
GDP	gdp	Ukraine’s Gross Domestic Product	million UAH	Quarterly averages converted to monthly frequency; seasonally adjusted; inflation-adjusted	SSSU [16]
Net Exports	net_exp	Ukraine’s net exports	million UAH	Quarterly averages converted to monthly frequency	SSSU [17]
Corporate Loans	loans_corp	Loans to corporations	million UAH	Inflation-adjusted	NBU [18]
Household Loans	loans_hh	Loans to households	million UAH	Inflation-adjusted	NBU [18]
Policy Rate	policy_rate	The key interest rate of the National Bank of Ukraine	%	–	NBU [19]
Government Bond Yield	yield_ovdp	The yield on domestic government bonds in the primary market	%	–	NBU [20]
Investment Volume	invest	Gross fixed capital formation	million UAH	Quarterly averages converted to monthly frequency; seasonally adjusted; inflation-adjusted	SSSU [21]
Reserves	reserve	Commercial banks’ reserves	million UAH	Inflation-adjusted	NBU [22]

Source: developed by the authors.

The data analyzed spans the period from January 2010 to December 2023, with all variables expressed every month. Adjustments made to the data include converting quarterly averages to monthly frequency for certain variables, seasonal adjustments where required, and deflating nominal variables using relevant price indices to ensure consistency in real terms. These transformations were conducted to align the data with the econometric requirements of the VAR model.

Ensuring the variables are stationary (or rendered stationary through differencing) is crucial for confirming accuracy in vector autoregression modeling. Accordingly, we performed the Dickey-Fuller test on the time series. The results show that the variables representing investment volume (*invest*) and government bond yields (*yield_ovdp*) were stationary at their levels. However, all other variables required transformation to achieve stationarity. Considering that goal, the remaining variables were converted to their first differences. Such adjustments should ensure the validity of the VAR model used in this study.

To investigate the effectiveness of the exchange rate channel within Ukraine's monetary policy framework, we have generated cumulative impulse response functions within the developed VAR model. These plots illustrate how each variable responds to positive shocks in others over a 30-month horizon.

Figure 1 presents the impulse response function (IRF) corresponding to the $r \uparrow - E \uparrow$ linkage. The IRF of the exchange rate to a policy rate shock shows a pronounced and statistically significant reaction. We can conclude that an increase in the policy rate leads to a decrease in the euro exchange rate, meaning appreciation of the national currency. This effect aligns with the standard theoretical expectations, where higher interest rates reduce the demand for foreign currency while increasing the demand for domestic currency. These findings are in line with previous research conducted by Ukrainian economists, including O. Zholud, V. Lepushynskyi, and S. Nikolaichuk, who documented the sensitivity of Ukraine's exchange rate to changes in the central bank's policy rate [5, p. 30].

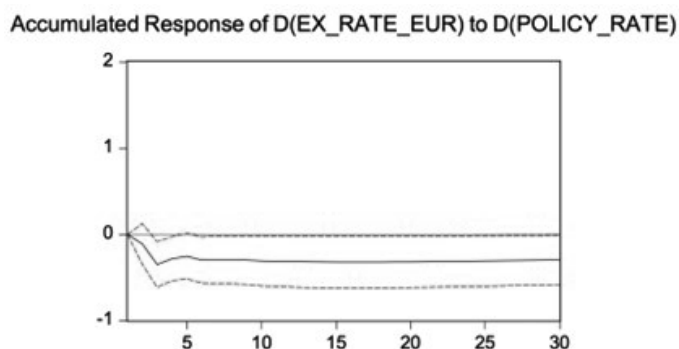


Figure 1. The impulse response function of the exchange rate to changes in the discount rate

Figure 2 presents the IRF illustrating the $E \uparrow - NX \downarrow$ linkage. Visualization suggests that the exchange rate channel presumably influences net exports, but no-effect scenarios are also possible. The response of net exports to exchange rate shocks becomes evident after a lag of approximately two months. This lag reflects the time required for trade contracts to adjust and for businesses to respond to changes in relative prices. Similar findings were reported by other Ukrainian researchers [5, c. 31; 18, p. 30–31]

Figure 3 depicts the IRF for $NX \downarrow - Y \downarrow$ linkage. A net-export shock appears to elicit a positive response in GDP, peaking around 5–7 periods in. In the long run, GDP may continue to rise or decline. This outcome is consistent with theoretical perspectives on how shifts in net exports pass through to GDP. Nonetheless, researchers have often reported mixed findings regarding net-export impacts on GDP. For instance, V. Mishchenko, S. Naumenkova, and S. Mishchenko conclude that there is an inverse correlation between the exchange rate and GDP [3, p. 59], while O. Zholud, V. Lepushynskyi, and S. Nikolaichuk point to the limited effectiveness of the exchange-rate channel in influencing GDP [5, p. 36].

Accumulated Response of D(NET_EXP) to D(EX_RATE_EUR)

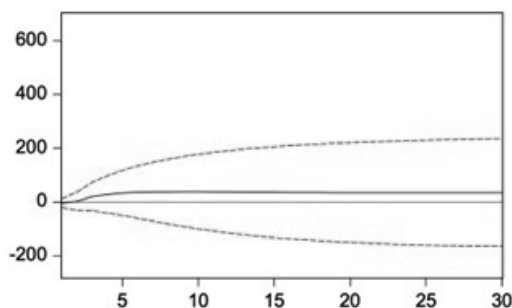


Figure 2. The impulse response function of the net export to changes in the exchange rate

Accumulated Response of D(GDP) to D(NET_EXP)

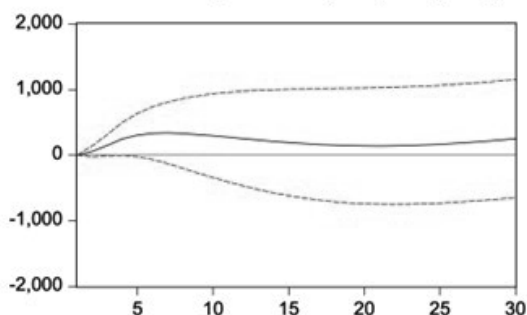


Figure 3. The impulse response function of the GDP to changes in the net export

Figure 4 visualizes the consumer price index's (CPI) impulse response to a net export shock. A partial pass-through of net export changes to inflation is evident; however, in the short run, the effect appears to run counter to the theoretical model. Moreover, given the wide confidence interval, the CPI's dependence on the net export shock remains uncertain.

A similar phenomenon is described by V. Shevchuk [4, p. 41], who examined the impact of an unexpected depreciation on the real sector and argued that unpredictable currency

Accumulated Response of D(CPI) to D(NET_EXP)

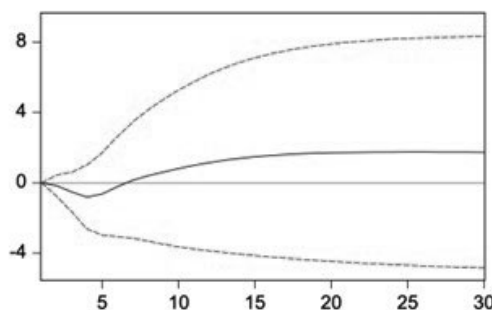


Figure 4. The impulse response function of the inflation to changes in the net export

appreciation could dampen the economy. This may be attributed to the absence of inflation-expectation effects and the structure of Ukraine's exports, where agriculture plays a leading role and is characterized by high reinvestment rates. As foreign currency proceeds are rapidly converted and reinvested, the resulting temporary imbalance in the foreign exchange market prompts a revaluation of the national currency. This revaluation has a short-lived effect on prices, particularly for imported goods.

Conclusions and Prospects for Further Research. Summarizing the findings, we can conclude that the cumulative impulse response functions for each component of the exchange rate channel indicate a high degree of the channel's effectiveness within Ukraine's monetary transmission mechanism. The scope and strength of this channel are supported by the exchange rate's sensitivity to both the policy rate and foreign exchange interventions.

It is also important to note that each linkage in the exchange rate channel operates sequentially with distinct lag structures. This multi-stage nature of transmission necessitates that the National Bank of Ukraine factor in the delays and potential side effects of monetary decisions. For instance, minor adjustments to the policy rate may substantially influence consumer prices once the cumulative lag of each stage in the exchange rate channel has taken effect.

Moreover, the analysis suggests that atypical or theory-deviant reactions often arise due to the unique characteristics of Ukraine's economy – specifically, the real sector's limited responsiveness to policy rate changes and the lack of robust institutional foundations for the currency, interbank, and stock markets.

Finally, external factors can alter the transmission mechanism's strength and direction. Consequently, specific short-run reactions may be weak or even contrary to expectations, a consideration that policymakers must consider. Further investigation into the exchange rate channel in Ukraine would benefit from a detailed examination of short-term deviations from theoretical predictions in simulated shocks and an exploration of the root causes behind such outcomes.

References

1. Mishkin, F. S. (1995). Symposium on the monetary transmission mechanism. *Journal of Economic Perspectives*, 9(4), 3–10.
2. Mishkin, F. S. (1996). The channels of monetary transmission: Lessons for monetary policy. *NBER Working Paper*, 5464, 1–29.
3. Mishchenko, V., Naumenkova, S., & Mishchenko, S. (2021). Assessing the efficiency of the monetary transmission mechanism channels in Ukraine. *Banks and Bank Systems*, 16(3), 1–15.
4. Shevchuk, V. (2017). The impact of anticipated and unanticipated exchange rate variability in Ukraine. *Visnyk of the National Bank of Ukraine*, 241, 34–47.
5. Zholud, O., Lepushynskiy, V., & Nikolaychuk, S. (2019). The effectiveness of the monetary transmission mechanism in Ukraine since the transition to inflation targeting. *Visnyk of the National Bank of Ukraine*, 247, 19–37. DOI: 10.26531/vnbu2019.247.02
6. Lobozyńska, S. M. (2013). Osoblyvosti realizatsii protsentnoi polityky Natsionalnym bankom Ukrainy [Features of implementing interest rate policy by the National Bank of Ukraine]. *Visnyk of Lviv Polytechnic National University*, 769, 380–386. [in Ukrainian].

7. Grui, A., Aragon, N., Faryna, O., Krukovets, D., Savolchuk, K., Sulimenko, O., Vdovychenko, A., & Zholud, O. (2023). Between Russian invasions: The monetary policy transmission mechanism in Ukraine in 2015–2021. *NBU Working Papers*, 02/2023, 1–50.
8. Stelmakh, V. (2009). Monetarna polityka Natsionalnoho banku Ukrainy: Suchasnyi stan ta perspektyvy zmin [Monetary policy of the National Bank of Ukraine: Current state and prospects for change]. Kyiv: National Bank of Ukraine. [in Ukrainian].
9. Mishchenko, V., & Somyk, A. (2007). Dolyaryzatsiia: Prychyny ta naslidky dlia ekonomiky Ukrainy [Dollarization: Causes and consequences for the Ukrainian economy]. *Visnyk of the National Bank of Ukraine*, 5, 28–31. [in Ukrainian].
10. Lepushynskyy, V. (2006). Diia kanaliv monetarnoi transmisii v ekonomitsi Ukrainy [The operation of monetary transmission channels in the Ukrainian economy]. *Visnyk of the National Bank of Ukraine*, 2, 30–34. [in Ukrainian].
11. Stone, M., Roger, S., Shimizu, S., Nordstrom, A., Kis, T., & Restrepo, J. (2009). The role of the exchange rate in inflation-targeting emerging economies. *IMF Occasional Paper*. 267.
12. State Statistics Service of Ukraine. (n.d.). Dokhody ta vytraty naselennia Ukrainy [Household incomes and expenditures of Ukraine]. URL: https://www.ukrstat.gov.ua/operativ/operativ2007/gdn/dvn_ric/dvn_ric_u/arh_dvn_kv_u.htm [in Ukrainian].
13. National Bank of Ukraine. (n.d.). Ohliad depozytnykh korporatsii [Overview of deposit corporations]. URL: https://bank.gov.ua/files/SDDS/AA_BS.xlsx [in Ukrainian].
14. State Statistics Service of Ukraine. (n.d.). Indeksy spozhyvchych tsin na tovary ta posluhy [Consumer price indices for goods and services]. URL: https://www.ukrstat.gov.ua/operativ/operativ2010/ct/is_c/arh_isc/arh_iscml10_u.html [in Ukrainian].
15. National Bank of Ukraine. (n.d.). Ofitsiyni kurs hryvni shchodo inozemnykh valiut [Official exchange rate of the hryvnia to foreign currencies]. URL: <https://bank.gov.ua/ua/markets/exchangerates> [in Ukrainian].
16. State Statistics Service of Ukraine. (n.d.). Kvartalni natsionalni rakhunky [Quarterly national accounts]. URL: https://www.ukrstat.gov.ua/operativ/menu/menu_u/nac_r.htm [in Ukrainian].
17. State Statistics Service of Ukraine. (n.d.). Zovnishnoekonomichna diialnist [Foreign economic activity]. URL: https://www.ukrstat.gov.ua/operativ/menu/menu_u/zed.htm [in Ukrainian].
18. National Bank of Ukraine. (n.d.). Kredyty, nadani depozytnymy korporatsiiamy [Loans issued by deposit corporations]. URL: <https://bank.gov.ua/files/3.3-Loans.xlsx> [in Ukrainian].
19. National Bank of Ukraine. (n.d.). Oblikova stavka Natsionalnoho banku Ukrainy [Policy rate of the National Bank of Ukraine]. URL: <https://bank.gov.ua/ua/monetary/archive-rish> [in Ukrainian].
20. National Bank of Ukraine. (n.d.). Dokhidnist OVDP na pervynnomu rynku [Yield of domestic government bonds on the primary market]. URL: https://bank.gov.ua/files/OVDP_mis.xlsx [in Ukrainian].
21. State Statistics Service of Ukraine. (n.d.). Valoz nagromadzhennia osnovnoho kapitalu [Gross accumulation of fixed capital]. URL: https://www.ukrstat.gov.ua/operativ/operativ2003/vvp/vvp_kv/vvp_kv_u/arh_vvp_kv.html [in Ukrainian].
22. National Bank of Ukraine. (n.d.). Ohliad depozytnykh korporatsii (operativni dani) [Overview of deposit corporations (operational data)]. URL: https://bank.gov.ua/files/ms_oper.xlsx [in Ukrainian].

КАНАЛ ОБМІННОГО КУРСУ ЯК ЦЕНТРАЛЬНИЙ ЕЛЕМЕНТ ТРАНСМІСІЙНОГО МЕХАНІЗМУ В УКРАЇНІ

Олександр Кузан¹, Олена Фоменко²

¹ Львівський національний університет імені Івана Франка,
79008, м. Львів, вул. Університетська, 1,
e-mail: oleksandr.kuzan@lnu.edu.ua; ORCID: 0009-0009-1506-3438

² Національний Банк України,
01601, м. Київ, вул. Інститутська, 9,
e-mail: olena.fomenko@bank.gov.ua; ORCID: 0009-0001-5405-9759

Анотація. У цьому дослідженні розглядається ефективність каналу обмінного курсу як центрального компоненту механізму монетарної трансмісії в Україні. Основна увага приділяється передачі монетарних імпульсів на макроекономічні показники, такі як обмінний курс, чистий експорт, ВВП та інфляція. Особливу увагу зосереджено на ролі облікової ставки та інтервенцій на валютному ринку у формуванні динаміки обмінного курсу та їх подальшого впливу на економічні показники. За допомогою моделювання на основі векторної авторегресії (VAR) оцінюється сила та тривалість дії імпульсів кожної ланки каналу обмінного курсу, а також визначаються часові лаги та структурні обмеження, характерні для економіки України.

Результати дослідження демонструють суттєвий вплив монетарних інструментів, зокрема облікової ставки, на обмінний курс, підтверджуючи ефективність цього каналу у регулюванні макроекономічних показників. Крім того, доведено, що зміни обмінного курсу мають значний вплив на коливання чистого експорту та зростання ВВП, хоча цей ефект проявляється із певними часовими затримками. Аналіз також показує, що знецінення обмінного курсу спричиняє короткостроковий дефляційний ефект, проте цей ефект нівелюється в середньостроковій перспективі.

У дослідженні також підкреслюються виклики, пов'язані зі структурними особливостями економіки України, такими як низький рівень розвитку фінансових ринків та висока залежність від зовнішньої торгівлі, що часом спричиняє короткострокові аномалії у функціонуванні каналу. Незважаючи на ці виклики, канал обмінного курсу залишається важливим інструментом монетарного регулювання в Україні, сприяючи макроекономічній стабільності та зростанню. У висновках сформульовано рекомендації для Національного Банку України щодо максимального використання потенціалу каналу обмінного курсу та усунення його недоліків.

Ключові слова: монетарна політика, трансмісійний механізм, обмінний курс, VAR-моделювання, економічне зростання, інфляція.

Стаття надійшла до редакції 30.10.2024

Прийнята до друку 29.01.2025