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THE LATEST ASPECT OF ASSESSING THE LEVEL OF CURRENCY SECURITY OF UKRAINE

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ABSTRACT

The level of currency exchange security is an important indicator of the effective functioning of the currency exchange market. An imbalance in the domestic currency exchange market intensifies financial instability and makes it impossible to maintain an adequate level of currency security. The purpose of the research is to estimate the level of currency security of Ukraine in the conditions of currency market imbalance to determine the main reasons for its inadequate level and to make proposals for improving the methodology of calculation of the integral index of currency security.

The article offers the author's interpretation of the essence of the concept of "currency security". The integral index of currency security during 2008 - 2022 was calculated in accordance with the "Methodical recommendations for calculating the level of economic security of Ukraine" and recommendations were suggested for improving this methodology in order to improve the situation on the currency market.

It was proved that certain indicators make an impact on the level of currency security of Ukraine: movement of capital, negative trade balance, sufficient level of international reserves, dollarization of the economy, and high level of public debt. Ways to ensure an adequate level of currency security were proposed. Macroeconomic indicators that can act as indicators of currency security are considered and the correlation between them and the level of currency security was investigated. The expediency of introducing an additional indicator for the integral assessment of currency security is substantiated: the ratio of state and state-guaranteed debt to GDP. It allows to calculate the level of currency security more reliably. It is well-founded that the proposed indicator has a close stochastic connection with the exchange rate, therefore, if it is used with existing indicators of currency security calculation, it allows to detect negative trends of decreasing of the level of currency security.

Keywords: financial instability, currency security, financial security, currency market, international reserves, dollarization, official exchange rate of the national currency, state and state-guaranteed debt, GDP

JEL Classification: E42, E44, E58

INTRODUCTION

Financial instability is provoked by crises and other factors related to hostilities, devaluation of the hryvnia, and high inflation. It negatively affects the domestic currency market and causes its imbalance. In turn, an imbalance in the currency exchange market increases financial instability and makes it impossible to maintain the level of currency security at the appropriate level. Taking into account the globalization of financial relations, the growing openness of national currency markets and the increasing dependence on exogenous factors in their regulation and determination of development directions, there is a growing need to take into account the risks and requirements for ensuring the appropriate level of currency security of Ukraine. The devaluation of the national currency against the USD by almost 20 times for the period of 1997-2023 leads to decreasing of the level of currency security. In this context, the issues of estimation of the level of currency security in Ukraine, quality assurance of its proper level, and the analysis of indicators that have a significant impact on this level are being updated.

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LITERATURE REVIEW

The estimation of the level of financial security in general and currency security, in particular, are objects of research by domestic scientists. In particular, in their research, V. Kovalenko, M. Slatvinska, S. Sheludko, S. Makukha, and V. Valihura [14] consider that the monetary component plays an important role in ensuring the financial security of the state due to its influence on macroeconomic processes in the country. Therefore, in order to ensure the level of financial security, it is needed to focus on improving the coordination of monetary and fiscal policies. In this context, the proposals, expressed in the research of A. Kuznetsova and N. Pogorelenko [16, p. 38], are relevant and mean that the coordination of monetary and fiscal policy should take place in the plan of implementing such strategic goals as ensuring price stability, achieving target indicators of the state budget deficit, ensuring sustainable economic growth and ensuring an appropriate level of transparency in the activities of the government and the central bank.

Monetary policy covers the issue of currency security, the content of which is considered from different scientific positions. Thus, O. Baranovskyi [4] considers currency security as "the degree of security of the state with currency funds, sufficient to maintain a positive balance of payments balance, fulfil international obligations, accumulate the necessary amount of currency reserves, maintain the stability of the national monetary unit", which in the scientific community gained the greatest use. Ya. Belinska and Ya. Zhalilo define currency security as "the state of the currency system, which is characterized by the predictability of the dynamics of the exchange rate of the national currency, the balance of the currency market, the satisfaction of the needs of the state, business entities and the population in foreign currency" [29].

A. Maryna and G. Myroshnychenko [20] in their research calculated the integral index of currency security according to the Methodological recommendations for calculating the level of economic security of Ukraine and identified measures to increase the level of currency security of the country in the context of strengthening integration processes. B. Ilychok [11] investigated the main problems of the existing level of currency security in Ukraine and proposed ways to eliminate these problems. Scientists T. Filipenko [9] and O. Bryginets [5] in their works focused on identifying factors that affect the level of currency security. O. Kokovikhina [13] identified and analyzed internal and external threats to currency security. A. Kulinska [15] formed a list of tasks that should be used as a basis for stabilizing and strengthening the safe level of national currency policy. T. Marena and M. Inozemtseva [19] investigated the current Methodology for calculating the integral currency security index of Ukraine, established its advantages and disadvantages, and substantiated directions for its improvement. O. Tereshchenko [28] focused attention on proposals for improving the Methodology for calculating the integral index of currency security, which is used by scientists and practitioners. With the development of financial technologies and tools, research on the connection of the level of currency security with these technologies appeared, in particular, O. Makovoz and T. Perederii [18] consider the blockchain as a tool for ensuring a sufficient level of currency security. In the work of H. Polishko, the influence of the level of currency security on the development of economic entities is investigated [24].

Despite the significant scientific contribution of the above-mentioned studies, insufficient attention has been paid to the factors that affect the level of currency security, especially public debt. We believe that the impact of public debt on the level of currency security cannot be ruled out, especially in conditions of crisis and military operations in Ukraine, when some rules of monetary policy cease to work. The public debt grows significantly within such negative events and is reflected in the growth of the accounting rate. The accounting rate is reflected in the credit policy, which affects the exchange rate. An updated scientific approach to assessing the level of currency security based on the analysis of the relationship between indicators of the integral index of currency security was presented, as well as the relationship between certain macroeconomic indicators and indicators of currency security. Certain issues of currency security also require more in-depth research and analysis. This is due to the need to ensure the stable operation of the foreign exchange market and the dynamics of the exchange rate with sufficient amounts of international currency reserves of the central bank. If the volumes are insufficient, then the appropriate level of currency security decreases. So, as mentioned above, currency security is an indicator of the functioning of the currency market and, in our opinion, a criterion for evaluating the effectiveness of currency policy and activities of authorities during the reform and development of the state's financial system as a whole. To increase the level of currency security, it is necessary, firstly, to identify the reasons for the inadequate level of currency security in Ukraine, and, secondly, to investigate the impact of the main economic macroeconomic indicators on the level of currency security.

Since this research focuses on issues of currency security in Ukraine, the literature review focuses on the works of domestic scientists. Each country has its own level of economic development, and the stability of the national currency is generally ensured by internal factors.

AIMS AND OBJECTIVES

The aims of our research are to estimate the level of currency security of Ukraine in the conditions of currency market volatility, to determine the main reasons for its inadequate level, and to develop proposals for improving the Methodology for calculating the integral index of currency security.

The objectives of the research are to estimate the level of currency security in the conditions of currency market imbalance and provide proposals for improving the Methodology for calculating the integral index of currency security.

METHODS

In the process of our research, in accordance with the defined tasks, general scientific and special methods of scientific research were used: logical analysis, synthesis, generalization and grouping - when defining the concept of "currency security"; analytical hierarchy - when determining the integral index of currency security; time series analysis; economic-mathematical modelling and correlation analysis - when justifying the feasibility of introducing a justified new indicator for the integral assessment of the currency security of Ukraine, statistical and graphic - for presenting the results of the study.

Calculations of the integral index of currency security were carried out in accordance with the Methodological recommendations for calculating the level of economic security of Ukraine, approved by the order of the Ministry of Economic Development of Ukraine dated 29.10.2013 No. 1277. This document proposes to calculate the level of currency security using six indicators: the index of changes in the official exchange rate of hryvnia to the USD; gross international reserves of Ukraine; the difference between the forward and official exchange rates of the hryvnia; the share of loans in foreign currency in the total amount of loans granted; balance of purchase and sale of foreign currency by the population; level of dollarization of the money supply. The estimate of the level of currency security is carried out in stages: 1) formation of a set of indicators; 2) determination of characteristic (optimal, threshold and limit) values of indicators; 3) normalization of indicators; 4) calculation of the integral index.

Correlation analysis between currency security indicators and macroeconomic indicators was carried out using Microsoft Excel and SPSS applications. Recommendations regarding the use of a new indicator (the ratio of state and state-guaranteed debt to GDP, in %) for calculating the integral index of currency security are substantiated using econometric methods, namely correlation analysis, which is calculated using the SPSS application and the Pearson test.

RESULTS

The state of currency security in Ukraine requires increased attention since the national economy interacts with world markets and the global economy through the currency market. It was noted above that the depreciation of the hryvnia against the USD for the period of 1997-2023 contributed to a decrease in the level of currency security by almost 20 times. Based on the analysis and generalization of theoretical approaches regarding the essence of currency security, we suggest that this term should be understood as the state of the country's currency system, which ensures the effective performance of its functions by the currency market, as well as the maintenance of stable dynamics of the exchange rate formation of the national currency and the fulfilment of international obligations to creditor countries.

Monitoring of currency market indicators from the standpoint of their compliance with the appropriate level of currency security is of particular importance under the conditions of further internationalization of financial relations. A simplified method of estimating the level of currency security of the state is the analysis of individual indicators of the state of the national currency market. At the same time, methods that allow obtaining a comprehensive estimate of the level of security of the national currency market are considered more effective, in particular, based on the calculation of the integral index of currency security [19]. In the economic literature, currency security is distinguished from micro- and macro-levels, that is, it is distinguished at the level of the state, population and business entities [12, c. 64]. Since in the research we focus on the macro level, we will calculate the level of currency security of Ukraine during 2008 - 2022. The methodology for calculating the integral index of currency security is contained in the "Methodical recommendations for calculating the level of economic security of Ukraine", approved by the order of the Ministry of Economic Development of Ukraine dated 10/29/2013 No. 1277 [21].

According to the recommendations, "the estimate of the level of currency security is carried out in such stages:

- formation of a set of indicators;
- definition of characteristic (optimal, threshold and limit) indicator values;

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- indicators normalization;
- calculation of the integral index" [21].

From Figure 1, we can observe that the most acute periods of financial crises (2008-2009 and 2014-2015) have the most significant impact on the level of currency security. The level of currency security in these periods fell significantly due to the devaluation of the hryvnia, which was caused by the outflow of capital from the banking and financial sectors. The increase in the level of currency security of Ukraine in 2017-2021 was ensured at the expense of the instruments of monetary and currency regulation of the NBU. The successful use of these instruments ensured the growth of foreign exchange reserves, and contributed to the inflow of financial capital and stable dynamics of the exchange rate. In 2019 and 2022, the level of currency security fell to an unsatisfactory level due to the COVID-19 crisis and the full-scale Russian invasion of Ukraine.

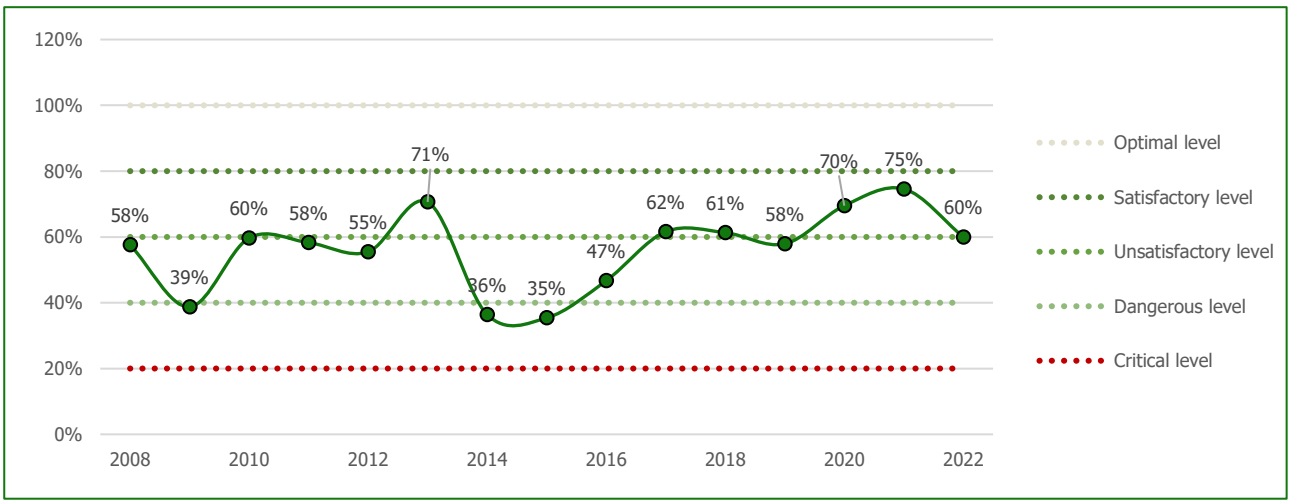

Figure 1. Distribution of the level of currency security by zone. *(Source: compiled by the authors according to calculations) [17].*

The stable functioning of the foreign exchange market in Ukraine is influenced by various macroeconomic indicators, which reflect the situation in the economy, which is influenced by both internal and external factors.

Problems in ensuring currency security do not allow creating conditions for economic growth and have a negative impact on the financial, tax, and insurance spheres and the budget process of the state. Therefore, in modern conditions, the question arises of determining threats to the currency security of the state in order to further level their negative actions.

Since currency security is an important component of the financial security of the state, we have drawn attention to a number of factors that can determine the level of financial security of the state. W. Grześkiewicz [10] identifies the level of budget debt as an important factor, which contributes to the reduction of the country's liquidity, and M. Szturo et al [27] and M. Pasternak-Malicka [22] determine the occurrence of the shadow economy, i.e., tax evasion by citizens, which may have a moral basis and contribute to increasing the risk of the country's insolvency and clearly reduce the level of its financial security. Among other factors, it is also mentioned: the policy of the central bank [7] and the effective functioning of the entities of the financial security network or the level of reserve assets held by the state [23]. Non-financial factors include the level of cyber security of the country, which is of crucial importance in view of the constantly growing number of transactions based on IT networks, which in the context of the appearance of hacker attacks can significantly affect the security of state interests [3; 25].

In the scientific literature, external and internal threats to the currency security of the state are distinguished, which often define each other. Internal threats are "the result of the development of internal contradictions in the national economy and are mainly caused by inadequate monetary and currency policies, imperfection of the legislative framework, miscalculations by authorities, errors, abuses and other deviations in the regulation of the currency system of the state. Long-term preservation of internal threats without effective economic policy makes the country more vulnerable to external threats as well" [13, c. 277].

Scientists include such factors affecting the currency security of the state:

- high level of dollarization;
- ineffective management policy of international reserves and debt security of the state;

- imperfection and lack of transparency of the exchange rate policy;
- low level of trust in the national currency and the regulator;
- the high impact of the shadow currency market on exchange rate fluctuations;
- a specific structure of foreign trade, which involves the sale of raw materials and the purchase of high-tech goods;
- high rates of inflationary processes [5, c. 52].

In addition to the mentioned factors, the influence of which must be levelled, the determination of institutions (organizations) that will ensure the appropriate level of currency security is also an important issue. In our opinion, the National Bank of Ukraine, the Ministry of Finance of Ukraine, the Cabinet of Ministers of Ukraine, the State Fiscal Service of Ukraine and other state regulatory bodies that, in accordance with current legislation, have powers in the sphere of currency regulation. Some authors also point to authorized banks, enterprises-subjects of foreign economic activity, households [15, c. 93].

When calculating the integral index of currency security, we determined that a significant amount of capital outflow has a significant impact on the level of financial security, and currency security in particular. Ukraine is trying to control the export of domestic capital, but this issue still remains a problem for the Ukrainian state. According to scientists, the main reasons for the withdrawal of capital from the country are "deficiencies in the system of state regulation of capital movement and foreign economic activity, which create a favourable basis for the spread of various schemes for the withdrawal of capital from Ukraine for tax evasion and legalization (laundering) of income obtained through criminal means » [1, c. 5]. Another factor that can affect the level of currency security is dollarization. This phenomenon has accompanied the currency market of Ukraine since the time of the monetary reform. The increase in the level of dollarization is caused by distrust in the banking system and the national currency, as well as high rates of inflation, which provokes the population to save in a more stable currency.

In turn, a high level of dollarization causes:

- increased sensitivity of the exchange rate to changes in the money supply;
- pressure on the country's currency reserves due to the need for currency interventions by the NBU;
- reduction of the effectiveness of the discount rate as a means of regulating the money supply [9].

Also, an important factor provoking the devaluation of the hryvnia exchange rate is the negative balance of the article "Balance of goods and services" of the balance of payments of Ukraine, the "negative balance of which during 2007 - 2022 amounted to USD 167 billion, and only in 2022 its decrease was observed – to USD 25.7 billion" [2], this is explained by a significant reduction in foreign economic transactions in connection with the war in Ukraine.

The indicators of the trade balance of the Ukrainian market in 2022 suffered due to the fact that a large number of enterprises were forced to stop their activities due to the inability to supply components or raw materials for their production. Some experts believe that the negative balance of the trade balance is due to the fact that the state in previous years paid more attention to increasing foreign exchange earnings from the export of goods and services than to the development of protectionist policy [11, c. 42]. Therefore, Ukraine became too dependent on foreign markets.

The currency security index is influenced by the size of the country's international currency reserves. Determining their optimal size is a problem due to the leading role of international reserves. An excessive number of them "leads to a long-term "freezing" of a part of the national income, and an insufficient number leads to the limitation of the regulatory capabilities of the state" [17]. The amount of international reserves depends on the exchange rate regime and the degree of openness of the domestic economy.

In Table 1, we assessed the adequacy of the NBU's international reserves for 2008-2022 using the money supply indicator, the volume of imports, the volume of foreign debt, and the volume of short-term foreign debt. We can conclude that reserves are insufficiently effective as a currency regulation tool. The existence of a low demand for the national currency in the country is evidenced by the low coefficients of the ratio of currency reserves to the money supply. The increase in the ratio of international reserves to the volume of imports and external debt indicates an improvement in the situation, but they are still not sufficient to prevent or combat speculative attacks on the national currency.

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Table 1. Estimate of the adequacy of international reserves of the NBU for 2008-2022. Note: M3 – monetary aggregate M3; IR - international reserves. *(Source: calculated by the authors based on (National Bank of Ukraine, 2024) [17]*

Years	M3/IR	Import/IR	External debt/IR	Short-term external debt/IR
2010	2.2	2.0	3.4	1.4
2011	2.7	3.0	4.0	1.8
2012	3.9	4.1	5.5	2.6
2013	5.6	4.8	7	2.9
2014	10.7	9.3	16.6	7.8
2015	3.4	3.8	8.8	3.8
2016	2.8	3.4	7.2	2.9
2017	2.4	3.3	6.1	2.5
2018	2.3	3.4	5.5	2.3
2019	2.2	3.0	4.8	1.9
2020	2.4	2.2	4.3	1.6
2021	2.5	2.7	4.2	1.5
2022	2.7	2.9	4.6	1.3

From the information analyzed above, it follows that measures to maintain a sufficient level of currency security in Ukraine should include:

- generation and implementation of measures to reduce the dollarization of the money supply;
- maintaining stable dynamics of the exchange rate can be accomplished by the provision of optimal volumes of international currency reserves;
- ensuring a positive balance of the balance of payments item "Balance of goods and services" using elements of protectionist policy;
- establishment of stricter state regulation regarding monitoring and control of shadow movement of capital.

One of the main indicators of the effectiveness of the currency exchange market is the stable dynamics of the exchange rate, so we will determine and analyze the level of dependence between the exchange rate of the hryvnia and macroeconomic indicators, which, when their certain volumes are violated, provoke financial instability. These are the rate of inflation, the amount of state and state-guaranteed debt, the state budget deficit, the GDP index, and the amount of international reserves, which will make it possible to find out the extent of this influence.

Table 2 shows the built multivariate linear function regression equation and the criteria that determine the adequacy of the model.

Table 2. Multivariate linear function regression equation. *(Source: compiled by the author based on calculations in Statgraphisc [17])*

Regression equation	Determination coefficient	Durbin-Watson test	t-statistic of Student	Fisher test
$Y = 4{,}074 + 0{,}0000090\mathrm{X}_1 - 0{,}0000154\mathrm{X}_2 + 8{,}31467\mathrm{E} - 8\mathrm{X}_3 + 0{,}0000056\mathrm{X}4$	0.96	1,5	t0=12.77 t1=14.84 t2=-10.32 t2=-3.14 t1=2.72	494.97
$\propto = 0.05, \gamma = 26 - 5 = 21$	$0.7 < R^2 < 1$	n =26, k =4, dl=1.06, du = 1.76	2.08	5.77

To explain the obtained results, we will use the standardized parameters of the model (Table 3), which allow us to measure the impact of using different units of measurement in the model because we have exogenous variables presented in UAH million, and endogenous variables in the ratio of UAH to the USD.

Table 3. Standardized regression coefficients. *(Source: compiled by the author based on calculations in Statgraphisc [17])*

Ridge Parameter	State and state-guaranteed debt	State budget deficit	GDP	International reserves
0.0	1.39483	-0.381906	-0.460196	0.322744
0.005	1.24525	-0.341523	-0.24748	0.226047
0.01	1.14031	-0.313427	-0.124194	0.183914
0.015	1.05994	-0.291797	-0.043482	0.164939
0.02	0.995247	-0.274152	0.0135324	0.157147

The table shows that the state and state-guaranteed debt has the strongest negative influence and dependence on the exchange rate of the hryvnia. Its growth by 1% will depreciate the exchange rate of the hryvnia against the USD by 0.995%. At the expense of debts, it is possible to solve certain current tasks in the state, but the growth of debts increases the burden on the state budget of the country, which ultimately brings instability to the financial system and affects the stability of the exchange rate of the national monetary unit.

Ukraine has been in crisis for a long time due to military aggression by Russia. This requires significant monetary resources, which Ukraine lacks, so the state is obliged to borrow these resources from other countries. At the moment, Ukraine's debt burden is reaching its peak, which entails a review of the previous monetary regulation. For example, an increase in credit rates and an increase in inflation lead to the depreciation of the national currency, which affects the decrease in the level of currency security. In addition, the increase in state and state-guaranteed debt requires significant funds to repay the debt, which increases the demand for foreign currency and, in turn, provokes further devaluation of the national currency. Therefore, we believe that it is inappropriate to reject this indicator for calculating the level of currency security.

Based on this, in the search for factors that have an impact on currency security, we found a direct strong dependence of the level of currency security on the indicator of the ratio of state and state-guaranteed debt to GDP (%). Therefore, we propose to include this indicator for the calculation of the level of currency security, which, in our opinion, will allow us to calculate the integral index of currency security with greater accuracy.

First, we want to argue the feasibility of introducing this indicator to assess the level of currency security by defining the meaning of such concepts as "state debt" and "state-guaranteed debt". In the Budget Code of Ukraine, state debt is defined as "...the total amount of the state's debt obligations for the return of received and outstanding loans as of the reporting date, arising as a result of state borrowing," and state-guaranteed debt as "...the total amount of debt obligations of economic entities - residents of Ukraine regarding loans received and outstanding as of the reporting date, the fulfilment of which is ensured by state guarantees" [6].

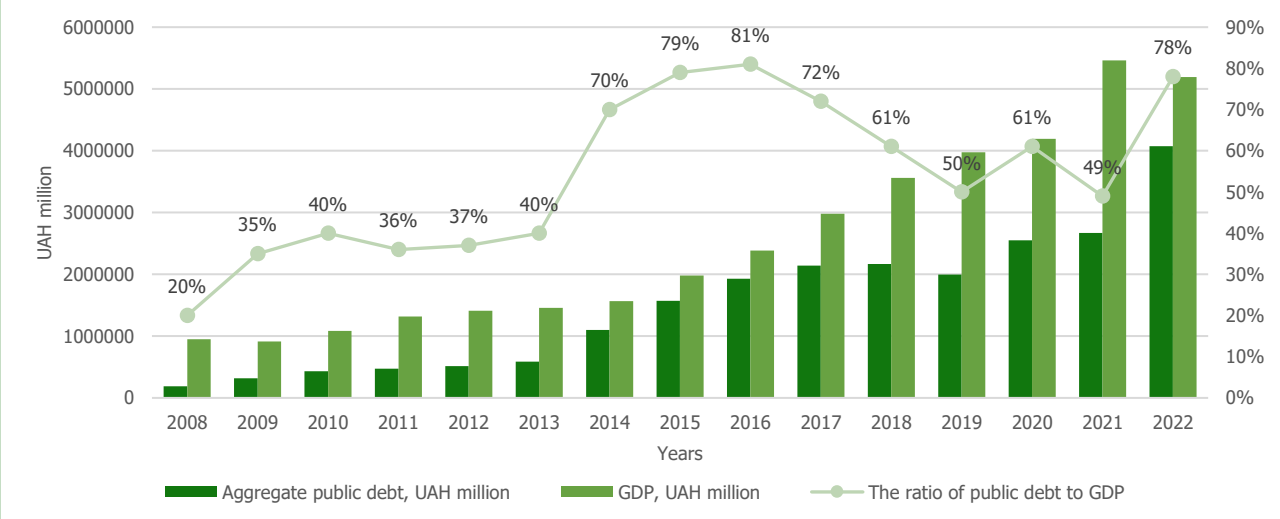

Figure 2. Dynamics of state and state-guaranteed debt to GDP for the period of 2008-2022. *(Source: compiled by the authors based on statistical data of the National Bank of Ukraine, 2024)*

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Currency security was defined as "the state of the currency system, which ensures the effective performance of its functions by the currency market, as well as maintenance of the stability of the national currency and the fulfilment of international obligations to creditor countries" [17]. Therefore, currency security determines the state of fulfilment of the country's international obligations, from which it follows that the amount of public debt has an impact on the level of currency security. We suggest using the indicator as a percentage of GDP, since with faster growth of debt over GDP, its maintenance can be carried out at the expense of accumulation and consumption, that is, at the expense of a decrease in the standard of living of the population. In order to guarantee a stable situation in the monetary and financial sphere and ensure the solvency of the state, the public debt of Ukraine should not exceed 20% of GDP [13].

With the help of econometric methods, namely correlation analysis, we will prove the expediency of introducing another indicator for the integral assessment of Ukraine's currency security — the ratio of public debt to GDP as a percentage. We divided the practical proof into 4 parts.

1. In the first stage, we will determine the influence of all component indicators of currency security, including our proposed indicator, on the nominal official exchange rate of the national monetary unit to the USD. The matrix of pairwise Pearson correlation coefficients makes it possible to calculate the strength and direction of the stochastic relationship. In Table 4, we used the notation: Y – the official exchange rate of the national currency to the USD, X1 – the index of changes in the official exchange rate of the national currency to the USD, X2 – the gross international reserves of Ukraine in the months of imports, X3 – the share of loans in foreign currency to the total amount of loans granted, X4 – the balance of foreign currency purchase and sale by the population, X5 – the level of dollarization of the money supply, X6 – the difference between the forward and official exchange rates of the national currency, X7 – the ratio of state and state-guaranteed debt to GDP [17].

Table 4. Matrix of paired Pearson correlation coefficients between the official exchange rate of the national currency to the USD and indicators of currency security, the ratio of government and government-guaranteed debt /GDP. Notes: Data for 2008-2022. *(Source: compiled by the author based on 17)*

	Y	X1	X2	X3	X4	X5	X6	X7
Y	1.000							
X1	-0.026	1.000						
X2	-0.110	-0.304	1.000					
X3	-0.397	0.509	0.065	1.000				
X4	0.835	0.144	-0.342	-0.115	1.000			
X5	-0.454	0.417	-0.102	0.751	-0.307	1.000		
X6	0.937	0.034	-0.148	-0.386	0.735	-0.421	1.000	
X7	0.754	0.420	-0.432	-0.086	0.742	-0.011	0.682	1

From the correlation matrix, it can be seen that there is no relationship between the index of changes in the official exchange rate of the national monetary unit and the official exchange rate of the hryvnia, as well as the gross international reserves of Ukraine and the official exchange rate of the hryvnia. The share of loans in foreign currency in the total amount of loans granted and the level of dollarization of the money supply have a weak inverse relationship with the official hryvnia exchange rate. Only three indicators from the indicator of currency security have a strong stochastic relationship: the difference between the forward and official exchange rates (0.937), the balance of purchase and sale of foreign currency by the population on the market (0.835) and the ratio of public debt to GDP (0.754), which we propose to use for the completeness of the calculation [17].

In Tables 5 – 7, we used the notations: Y - index of changes in the official exchange rate of the national currency against the USD, X2 - gross international reserves of Ukraine in the months of imports, X3 - the share of loans in foreign currency in the total volume of loans provided, X4 - the balance of purchase and sale population of foreign currency, X5 – the level of dollarization of the money supply, X6 – the difference between the forward and official exchange rates of the national currency, X7 – the ratio of state and state-guaranteed debt to GDP, X8 – the volume of international reserves in monetary terms, X8 – the volume of foreign direct investments, X9 – the volume of exports of goods and services, X10 – the volume of M3 money supply, X11 – the NBU discount rate.

2. In the second stage, we investigated the influence of the component indicators of currency security, adding an endogenous variable - international reserves in USD million, on the nominal official exchange rate of the national monetary

unit to the USD. The choice of an endogenous variable is explained by the fact that this indicator characterizes and ensures the stability of the functioning of the domestic currency market (information in Table 3).

Table 5. Matrix of paired Pearson correlation coefficients between the index of changes in the official exchange rate of the national currency against the USD and indicators of currency security, the ratio of state and state-guaranteed debt/GDP, and the volume of international reserves. Notes: Data for 2008-2022. *(Source: compiled by the author based on 17)*

	Y	X2	X3	X4	X5	X6	X7	X8
Y	1.000							
X2	-0.304	1.000						
X3	0.509	0.065	1.000					
X4	0.144	-0.342	-0.115	1.000				
X5	0.417	-0.102	0.751	-0.307	1.000			
X6	0.034	-0.148	-0.386	0.735	-0.421	1.000		
X7	0.420	-0.432	-0.086	0.742	-0.011	0.682	1.000	
X8	-0.577	0.768	-0.277	-0.480	-0.450	-0.142	-0.635	1.000

From Table 5, we can see the lack of connection according to the following indicators: the difference between the forward and official exchange rates (-0.142) and the share of loans in foreign currency in the total amount of loans provided (-0.277). The level of dollarization of the money supply (-0.45) and the balance of the population's purchase and sale of foreign currency on the market (-0.48) have a weak inverse influence. The index of change of the official exchange rate of the national monetary unit to the US dollar (-0.577) and the ratio of public debt to GDP (-0.635) have an average inverse relationship. Only one indicator has a direct strong connection with international reserves - it is the gross international reserves of Ukraine calculated in months of imports (0.768) [17].

3. Another indicator that characterizes the stability of the functioning of the foreign exchange market and the financial system of Ukraine as a whole is foreign direct investment, so we will determine the impact on it of all components of the currency security indicator (information in Table 6).

Table 6. Matrix of paired Pearson correlation coefficients between the index of changes in the official exchange rate of the national currency against the USD and indicators of currency security, the ratio of state and state-guaranteed debt/GDP, and the volume of foreign direct investment. Notes: Data for 2008-2022. *(Source: compiled by the author based on 17)*

	Y	X2	X3	X4	X5	X6	X7	X9
Y	1							
X2	-0.304	1						
X3	0.509	0.065	1					
X4	0.144	-0.342	-0.115	1				
X5	0.417	-0.102	0.751	-0.307	1			
X6	0.034	-0.148	-0.386	0.735	-0.421	1		
X7	0.420	-0.432	-0.086	0.742	-0.011	0.682	1	
X9	-0.562	0.320	0.101	-0.566	0.072	-0.472	-0.805	1.000

From the correlation matrix in Table 6, we can observe the lack of connection for three indicators: the level of dollarization of the money supply (0.072), the share of loans in foreign currency in the total amount of loans provided (0.101), gross international reserves of Ukraine (0.32). The average inverse relationship can be traced from the balance of foreign currency purchases and sales by the population on the market (-0.566) and the index of changes in the official exchange rate of the national monetary unit to the USD (-0.562). The new indicator – the ratio of public debt to GDP has an inverse strong relationship (-0.805) [17].

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4. In the fourth stage, we determined the influence of the component indicators of currency security by adding endogenous variables - export of goods and services, M3 money supply, and NBU discount rate (information in Table 5). Our proposed indicator takes precedence among other indicators under the condition of application with endogenous changes.

Table 7. Matrix of paired Pearson correlation coefficients between the index of changes in the official exchange rate of the national currency against the USD and indicators of currency security, the ratio of state and state-guaranteed debt/GDP, the volume of exports of goods and services, the volume of the M3 money supply, the NBU discount rate. Notes: Data for 2008-2022. *(Source: compiled by the author based on 17)*

	Y	X2	X3	X4	X5	X6	X7
Y	1.000						
X2	-0.304	1.000					
X3	0.509	0.065	1.000				
X4	0.144	-0.342	-0.115	1.000			
X5	0.417	-0.102	0.751	-0.307	1.000		
X6	0.034	-0.148	-0.386	0.735	-0.421	1.000	
X7	0.420	-0.432	-0.086	0.742	-0.011	0.682	1.000
X9	-0.507	-0.115	-0.315	-0.366	-0.346	-0.441	-0.678
X10	-0.324	-0.099	-0.272	-0.585	-0.246	-0.600	-0.651
X11	0.577	-0.336	0.274	0.531	0.157	0.675	0.690

An additional indicator proposed by us for inclusion in the Methodological recommendations for calculating the level of economic security of Ukraine has significant advantages among the existing six indicators - the ratio of state and state-guaranteed debt to GDP in percentage terms. The use of econometric methods made it possible to substantiate the implementation of this indicator.

Therefore, we proposed to calculate the integral index of currency security using seven indicators, including the indicator "ratio of state and state-guaranteed debt to GDP". The safety level of this indicator is determined by the characteristic values developed by us. Each indicator is measured from 0 to 1 (or from 0 to 100 per cent) and divided into five intervals:

"$[y_0, y_{critical}]$, $[y_{critical}, y_{dangerous}]$, $[y_{dangerous}, y_{unsatisfactory}]$, $[y_{unsatisfactory}, y_{satisfactory}]$, $[y_{satisfactory}, y_{optimal}]$,

where: y_0 - the value of the indicator, which is characterized as an absolutely dangerous level of currency security and for which the level of currency security is equal to 0; $y_{critical}$ - the value of the indicator, which is characterized as a critical level of currency security and for which the level of currency security is equal to 0.2, or 20% of the optimal value; $y_{dangerous}$ - the value of the indicator, which is characterized as a dangerous level of currency security and for which the level of currency security is equal to 0.4, or 40% of the optimal value; $y_{unsatisfactory}$ - the value of the indicator, which is characterized as an unsatisfactory level of currency security and for which the level of currency security is equal to 0.6, or 60% of the optimal value; $y_{satisfactory}$ - the value of the indicator, which is characterized as a satisfactory level of currency security and for which the level of currency security is equal to 0.8, or 80% of the optimal value; $y_{optimal}$ - the value of the indicator, which is characterized as the optimal level of currency security and for which the level of currency security is equal to 1, that is, equal to the optimal value" [14].

In Ukraine and in international practice, the normative value of the indicator of the ratio of state and state-guaranteed debt to GDP is set to 60% [8], the characteristic values of this indicator are shown in Table 8.

Table 8. Characteristic values of the indicator "ratio of state and state-guaranteed debt to GDP" (expressed in %). *(Source: calculated by the authors based on Methodological recommendations for calculating the level of economic security of Ukraine, 2013 [17])*

Name of the indicator, unit of measurement	XLcriti-cal	XLdang	XLun-satisf.	XLsat-isf.	XLopti-mal	XRopti-mal	XRsat-isf	XRunsa tisf	XRdang	XRcriti-cal
The ratio of state debt to GDP, %						20	30	40	50	60

So, taking into account the suggestions given by us regarding the formation of measures aimed at ensuring a sufficient level of currency security, it can be stated that in Ukraine the index of currency security fluctuates significantly - from a dangerous to a satisfactory level.

As a result of the conducted correlation analysis, we found the absence of a direct strong connection between the indicators used to calculate the integrated indicator of currency security and the formation of the official exchange rate of the national currency. At the same time, it was found that the proposed new indicator for calculating the integral index of currency security - the ratio of state and state-guaranteed debt to GDP in percentage terms has a strong correlation with the formation of the official exchange rate of the national currency. Therefore, we have proposed to add this indicator to the calculation of the integral index of currency security, which, in our opinion, will allow a more qualitative assessment of the level of currency security.

DISCUSSION

A comparison of the results obtained in this research with those previously conducted by other scientists shows the existence of noticeable differences. Researchers are mostly limited to the calculation of currency security in accordance with the Methodological recommendations for calculating the level of economic security of Ukraine. They did not take into account the fact that there are a number of macroeconomic indicators that have an impact on the currency security of the country and should also be paid attention to. In this article, we investigated that the ratio of state and state-guaranteed debt to GDP (in %) has a significant impact on the level of currency security. A similar conclusion was reached by O. Kokovikhina [13], who notes the impact of the gross external debt indicator on currency security. O. Tereshchenko [28] offers to improve the Methodology of calculating currency security by using an additional indicator to the level of dollarization of the money supply in the estimation of the level of currency risk, the indicator - the level of GDP dollarization, explaining this by the fact that the amount of money supply in national and foreign currency is a momentary indicator, and the proposed coefficient combines it with an interval one and reflects the ratio between monetary aggregates in foreign currency and GDP created during the period.

T. Marena and M. Inozemtseva [19], suggest to use an alternative indicator – "the difference between the interest rates on deposits in USD and in UAH" to estimate the level of currency security, instead of the indicator "difference between the forward and official exchange rate of the hryvnia". In the absence of publicly available information on the forward exchange rate of the hryvnia, this proposal is valid, and I can agree with it.

As a conclusion, the proposed article presents an updated scientific approach to estimate the level of currency security based on the analysis of the relationship between indicators of the integral index of currency security, as well as the relationship between certain macroeconomic indicators and indicators of currency security. By providing a more detailed analysis of canonical and correlational relationships between indicators of currency security, this research is a significant contribution to the scientific literature.

CONCLUSIONS

The calculation of the integral currency security index for 2008-2022 made it possible to draw conclusions that:

- the peak periods of financial crises (2008 - 2009 and 2014 - 2015) had a significant impact on the level of currency security;
- the creation of conditions for the inflow of financial capital, the growth of foreign exchange reserves, and the establishment of stable dynamics of the exchange rate became possible thanks to the instruments of currency and monetary regulation of the NBU. Therefore, 2017-2021 was characterized by macro-financial stability, which raised the level of currency security to a satisfactory level;
- in 2019 and 2022, the level of currency security decreased to an unsatisfactory level due to the COVID-19 crisis and the war in Ukraine.

The movement of capital, the negative balance of the trade balance, the level of international reserves, the high level of public debt, and the dollarization of the economy have been proven to affect the level of currency security in Ukraine. Control over the shadow movement of capital, development of a step-by-step program of de-dollarization of the economy, and increasing the volume of international currency reserves are some of the proposed measures to ensure an adequate level of security.

There was no strong correlation between the level of currency security and the official exchange rate of the hryvnia. The level of currency security is affected by the ratio of state and state-guaranteed debt to GDP in percentage terms. It is proposed to evaluate the level of currency security using seven indicators for each of which a weighting factor is determined that characterizes the degree of contribution of the indicator to the integral index of currency security.

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The development of alternative scientific and methodological approaches to determining the level of national currency security, as well as the proposed changes to the Methodology for calculating the integral index of currency security, may become the subject of further research in this direction.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

Conceptualization: *Tetiana Lesnik, Olena Bereslavska, Julia Derkach*
Data curation: *Tetiana Lesnik, Olena Bereslavska*
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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

REFERENCES

1. Arzhevitin, S. (2010). Vidplyv kapitalu z Ukrainy: prychyny ta shliakhy podolannia. *Visnyk of the National Bank of Ukraine*, *1*, 3-7. https://journal.bank.gov.ua/archive/2010/1.pdf
2. Balance of payments of Ukraine: statistic data. (2023). https://index.minfin.com.ua/ua/economy/balance/
3. Balawejder, B., Dankiewicz, R., Ostrowska-Dankiewicz, A., & Tomczyk, T. (2019). The role of insurance in cyber risk management in enterprises. *Humanities and Social Sciences, 26*(4), 19-32. https://doi.org/10.7862/rz.2019.hss.33
4. Baranovskyi, O. I. (2000). Financial security in Ukraine (assessment methodology and security mechanisms): abstract of the dissertation for obtaining the scientific degree of doctor economic sciences: Instytut ekonomiky ta prohnozuvannia NAN Ukrainy, 36.
5. Bryhinets, O. O. (2016). Pravove zabezpechennia valiutnoi bezpeky derzhavy yak strukturnoho elementa finansovoi bezpeky derzhavy. *Prykarpatskyi yurydychnyi visnyk*, *3*, 51-54. file:///C:/Users/Tom/Downloads/Pjuv_2016_3_13.pdf
6. Budget Code of Ukraine. (2024, January 1). Vidomosti Verkhovnoyi Rady Ukrayiny. https://zakon.rada.gov.ua/laws/show/2456-17#Text
7. Downs, J., Cebula, R.J., Johansen, D., & Foley, M. (2022). U.S. small bank failures and the Financial Crisis of 2007 - 2009. *Banks and Bank Systems*, *17*(4), 50-60. https://doi.org/10.21511/bbs.17(4).2022.05
8. Fatiukha, N. H. (2017). Analiz borhovoi bezpeky Ukrainy. *Economic Efficiency, 10*. http://www.economy.nayka.com.ua/?op=1&z=5816
9. Filipenko, T. V. (2010). Valiutna bezpeka derzhavy v umovakh svitovoi hlobalizatsii. *Public administration: improvement and development, 11*. http://www.dy.nayka.com.ua/?op=1&z=219
10. Grześkiewicz, W. (2018). Wpływ zaległości budżetowych na bezpieczeństwo finansowe budżetu państwa. *Prawo Budżetowe*, *3*(6), 45-67. https://doi.org/10.12775/PBPS.2018.016
11. Ilychok, B. I. (2017). Valiutna bezpeka Ukrainy – stan ta perspektyvy vdoskonalennia. *Problemy systemnoho pidkhodu v ekonomitsi, 2*(58), 40-45. http://psae-jrnl.nau.in.ua/journal/2_58_2017_ukr/7.pdf
12. Kokovikhina, O. O. (2021). Finansova bezpeka: konspekt lektsii. Kharkiv: Ukrainian State University of Railway Transport. http://lib.kart.edu.ua/handle/123456789/6228

13. Kokovikhina, O. O., & Boiarska, A. V. (2019). Vyznachennia osnovnykh zahroz valiutnii bezpetsi derzhavy. *Pryazovskyi economic bulletin, 5*(16), 276-280. https://doi.org/10.32840/2522-4263/2019-5-47

14. Kovalenko, V., Slatvinska, M., Sheludko, S., Makukha, S., & Valihura, V. (2023). The monetary component in ensuring the financial security of the state. *Financial and Credit Activity Problems of Theory and Practice*, *1*(48), 8–22. https://doi.org/10.55643/fcaptp.1.48.2023.3972

15. Kulinska, A. V. (2016). Optymalni umovy formuvannia skladovykh valiutnoi bezpeky natsionalnoi ekonomiky. *Scientific Bulletin of the Odessa National Economic University, 3*, 86–96. http://irbis-nbuv.gov.ua/cgi-bin/irbis_nbuv/cgiirbis_64.exe?C21COM=2&I21DBN=UJRN&P21DBN=UJRN&IMAGE_FILE_DOWNLOAD=1&Image_file_name=PDF/Nv_2016_3_8.pdf

16. Kuznetsova, A. Ya., & Pohorelenko, N. P. (2021). Mechanism of providing financial stability of the banking system of Ukraine. *Financial and Credit Activity Problems of Theory and Practice*, *2*(33), 37–47. https://doi.org/10.18371/fcaptp.v2i33.206396

17. Lesnik, T. M. (2023). *The impact of financial instability on the currency market of Ukraine*. PhD Thesis. Irpin: State Tax University. https://nrat.ukrintei.ua/searchdoc/0823U101897/

18. Makovoz, O. S., & Perederii, T. S. (2018). Blokchein yak zaporuka valiutnoi bezpeky. *Eastern Europe: Economy, Business and Management*, *1*(12), 353-363. https://core.ac.uk/reader/ 187222610

19. Marena, T. V., & Inozemtseva, M. H. (2018). Suchasni naukovo-metodychni pidkhody do vyznachennia rivnia natsionalnoi valiutnoi bezpeky. *Bulletin of Mariupol State University. Series: Economy, 16*, 37-47. http://nbuv.gov.ua/UJRN/Vmdu_ek_2018_16_7

20. Maryna, A. S., Myroshnychenko, H. B., & Shapoval, I. A. (2022). Valiutna bezpeka Ukrainy v umovakh realizatsii kontseptsii staloho rozvytku. *Scientific view: economics and management, 3*(79), 180-190. https://doi.org/10.32782/2521-666X/2022-79-25

21. Methodological recommendations for calculating the level of economic security of Ukraine. (2013). Order of the Ministry of Economic Development of Ukraine, № 1277. http://www.me.gov.ua/Documents/List?lang=uk-UA&tag=MetodichniRekomendatsii

22. Pasternak-Malicka, M. (2015). Nieetyczne postawy podatników jako zagrożenie bezpieczeństwa finansowego państwa. *Kwartalnik Kolegium Ekonomiczno-Społecznego. Studia I Prace*, *4*(3), 129-143. https://doi.org/10.33119/KKESSiP.2015.4.3.9

23. Płaczek, J., & Stańczyk, K. (2016). Rezerwy złota jako element kształtowania bezpieczeństwa ekonomicznego państwa. *Przedsiębiorczość i Zarządzanie*, *XVII* (8), 197-211. http://piz.san.edu.pl/docs/e-XVII-8-1.pdf

24. Polishko, H. H. (2018). Problemy ta perspektyvy zabezpechennia valiutnoi bezpeky rozvytku pidpryiemnytstva v Ukraini. *Management of the development of business entities: mechanisms, realities, perspectives: a collective monograph*. http://confcontact.com/kolektyvna_monographiya_2018/kolektyvna_monographiya_2018__maket.pdf#page=404

25. Prokopchuk, O., Nepochatenko, O., Malyovanyi, M., Ulyanych, Y., & Bilan, Y. (2022). Trends in the functioning of the Ukrainian insurance services market. *Insurance Markets and Companies*, *13*(1), 47-65. https://doi.org/10.21511/ins.13(1).2022.05

26. Statistics of National Bank of Ukraine. (2023). *The official website of NBU*. https://bank.gov.ua/ua/statistic/nbustatistic

27. Szturo, M., Długosz, J., & Szturo, K. (2018). Wpływ szarej strefy na bezpieczeństwo finansowe państwa. *Studia I Prace Kolegium Zarządzania I Finansów*, *165*, 95-109. https://doi.org/10.33119/SIP.2018.165.6

28. Tereshchenko, O. V. (2022). *Mechanisms of regulation of the foreign exchange market in conditions of openness of the national economy.* Candidates' thesis. Kyiv: National Aviation University. https://er.nau.edu.ua/handle/NAU/57698

29. Zhalilo, Ya. A., Babanin, O. S., & Belinska, Ya. V. (2009). Ekonomichna kryza v Ukraini: vymiry, ryzyky, perspektyvy: tutorial. Kyiv: Natsionalnyi instytut stratehichnykh doslidzhen, 142 p. https://www.academia.edu/4491722/Економічна_криза_в_Україні_виміри_ризики_перспективи_Жаліло_Я_А_Бабанін_О_С_Белінська_Я_В_та_ін_за_заг_ред_Я_А_Жаліла_К_НІСД_2009

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НОВІТНІЙ АСПЕКТ ОЦІНЮВАННЯ РІВНЯ ВАЛЮТНОЇ БЕЗПЕКИ УКРАЇНИ

Рівень валютної безпеки є важливим показником ефективного функціонування валютного ринку. Дисбаланси, що виникають на вітчизняному валютному ринку та посилюють фінансову нестабільність, унеможливлюють підтримання належного рівня валютної безпеки. Метою дослідження є оцінювання рівня валютної безпеки України в умовах дисбалансів валютного ринку, визначення основних причин зниження її рівня, розроблення пропозицій щодо вдосконалення методики розрахунку інтегрального індексу валютної безпеки.

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У статті запропоновано авторське тлумачення сутності поняття «валютна безпека». Розраховано інтегральний індекс валютної безпеки за 2008-2022 рр. відповідно до «Методичних рекомендацій щодо розрахунку рівня економічної безпеки України» та запропоновано рекомендації для вдосконалення цієї методики з метою покращення ситуації на валютному ринку.

У результаті проведеного дослідження доведено, що на рівень валютної безпеки України мають вплив такі показники: рух капіталу, від'ємне сальдо торговельного балансу, достатній рівень міжнародних резервів, доларизація економіки, високий рівень державної заборгованості. Запропоновано заходи для забезпечення належного рівня валютної безпеки. Розглянуто макроекономічні показники, що можуть бути індикаторами валютної безпеки, та досліджено кореляційний зв'язок між ними й рівнем валютної безпеки. Обґрунтовано доцільність запровадження додаткового показника для інтегральної оцінки валютної безпеки України: співвідношення державного та гарантованого державою боргу до ВВП, що дозволить достовірніше розрахувати рівень валютної безпеки. Обґрунтовано, що запропонований показник має тісний стохастичний зв'язок із валютним курсом, тому за умови його використання з існуючими індикаторами розрахунку валютної безпеки дозволить виявити негативні тенденції щодо зниження рівня валютної безпеки.

Ключові слова: фінансова нестабільність, валютна безпека, фінансова безпека, валютний ринок, міжнародні резерви, доларизація, офіційний курс національної валюти, державний і гарантований державою борг, ВВП

JEL Класифікація: E42, E44, E58