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## Essence and modern trends in the formation and management of international reserves

**Abstract.** World financial markets development indicates an increase in the role of intentional reserves for international capital markets. The study aims to address, evaluate and analyse the international reserves, as well as their impact on the national economy. During the research data of graphical and statistical analysis, as well as the selection of information for analysis, generalization and methods of regulation of international reserves were used. The study analysed and systematised the goals and objectives, principles, risks, structure, functions of international reserves, factors that affect the international reserves, policy directions for the management of foreign exchange reserves, stages of the management process, as well as factors that depend on the number of intentional reserves. The dynamics of changes in Ukraine's intentional reserves; dependence of the change in the level of the foreign exchange reserves of Ukraine on the change in inflation via the analysis of macroeconomic data using the elasticity coefficient were analysed, and costs and sources of replenishment of the intentional reserves were analysed to determine the optimal size of foreign exchange reserves for the period from 2010 to 2023. One of the criteria for the adequacy of the international reserves was systematized, namely the coverage of at least three months of future imports of goods and services. The importance of the role of the international reserves in the economy of Ukraine is substantiated. The study identified the most important problems, as well as methods and ways of more effective management of intentional reserves are suggested. The practical value of the conducted research is that it allows for an increase in the efficiency of the management of international reserves in the context of ensuring financial security

**Keywords:** foreign exchange reserves; National Bank of Ukraine; inflation; monetary policy; interest rate; economic growth; national monetary unit

### INTRODUCTION

A sufficient amount of international reserves is one of the factors that ensures an appropriate level of financial and currency security, contributes to the stable development of the economy, as well as increases confidence in the national monetary unit. Moreover, the management of foreign exchange reserves (hereinafter, FX reserves) takes a leading place in the national economy, whereas the integration

of national economies is under the influence of external factors. Besides, sufficient volumes of foreign exchange reserves enable the monetary authorities to localize the effect of any factors that cause imbalances in the financial market through intervention measures, while international reserves are one of the tools for balancing financial markets of the negative impact of external risks. Therefore, in

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conditions of financial instability, the regulation and effective management of international reserves is one of the most relevant issues for ensuring financial and macroeconomic stability. In addition, the optimal structure of FX reserves is a guarantee of international payments.

T. Derkach (2019a) notes that gold as part of FX reserves serves as a strategic financial asset. Therefore, to ensure the economic stability of Ukraine's economy, it is necessary to develop a long-term policy based on state control over gold mining and its circulation, as well as increase the motivation of state structures in the accumulation of gold reserves. The author concluded on the geographical concentration of FX reserves, namely that more than half of the total amount of worldwide reserves consists of only six countries. N. Kuryacha & V. Mairer (2020) addressed the trends of currency regulation of international reserves, their structure and dynamics, and determined the influence of macroeconomic indicators on the size of international reserves, as well as the change of components in the structure of FX reserves depending on the economic situation. Empirical analysis of several indicators of FX reserves worldwide by V. Koziuk (2021) showed intersystem demand for gold tied to the general trend of increasing reserves, as well as demand for gold determined by specific reasons.

N. Tataryn *et al.* (2020) determined that a high level of uncertainty, significant dollarization, instability of the exchange rate and devaluation of the hryvnia, as well as a low level of FX reserves, interfere with effective monetary regulation. D. Diakovskiy (2020) analysed the essence of FX reserves and their purpose. The scientist determined that the main purposes of FX reserves are to protect the national currency system from speculative capital movements, and global financial and currency crises; improve public debt management; export promotion; inflow of direct foreign investments and lending by international financial institutions of production industries; innovative economic development, slowing of inflation.

M. Korol *et al.* (2022) found that the correct formation and effective use of FX reserves ensure the stable functioning of the financial system. The scientist indicated that one of the main tasks of the National Bank of Ukraine is the effective management of FX reserves to ensure the coverage of the balance of payments deficit and the influence on the exchange rate through foreign exchange policy, as well as the influence on the dynamics of the money supply to achieve price stability as a strategic goal of monetary regulation. A. Hrytsyshyn (2021) analysed the empirical studies of the determinants of international reserves, the criteria for the adequacy of reserve assets and their structure, as well as the activities of the central banks of the European Union (hereinafter, EU) in the field of management of international reserves following the norms of the national legislation of each country. Yu. Harkusha (2023) suggested optimizing the structure of international reserves by diversification and expansion of the list of reserve currencies; increasing the share of monetary gold as

a reliable asset; expanding the directions of international reserves investment, considering the possibility of investing funds in securities of countries with sustainable economic development.

The study aimed to research, assess and analysis of foreign exchange reserves, and their impact on the state of the national economy, highlighting the main trends in the formation and use of official reserves, as well as determining the optimal level of FX reserves.

## MATERIALS AND METHODS

The study was conducted on data of statistical and graphical analysis. The methodology used for the research includes the selection of information for the generalization, analysis and methods of state regulation of international reserves. The main characteristics of international reserves were analysed and systematized based on information data from "Economic Truth" (n.d.) and Minfin (n.d.) portals, as well as obtained from the official website of the NBU (National Bank of Ukraine, 2024).

Since the risk of high rates of accumulation of FX reserves is an increase in inflationary pressure, the dependence of the change in inflation on the change in the level of the international reserves of Ukraine was considered, based on the analysis of macroeconomic data for the period from 2010 to 2023, using the elasticity coefficient:

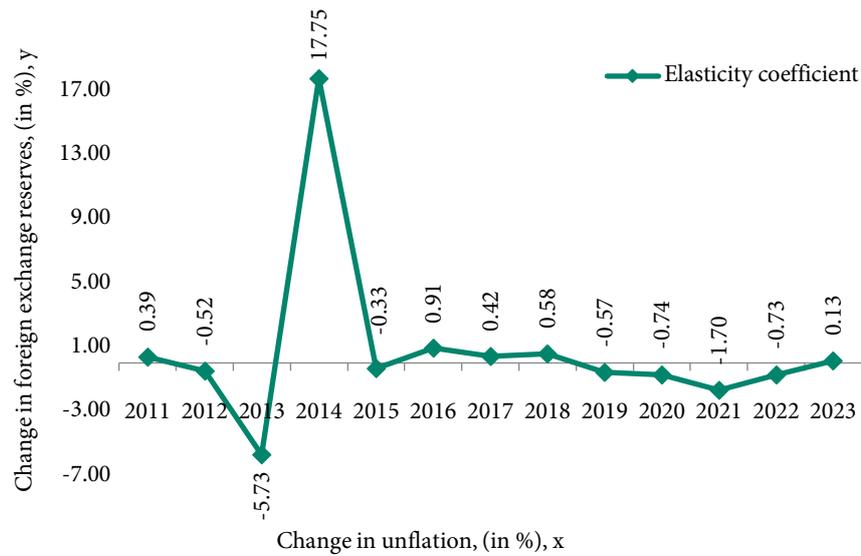
$$Exy = \left[ \frac{dlny}{dlnx} \right] = \left[ \frac{dy}{dx} \cdot \frac{x}{y} \right], \quad (1)$$

where  $y$  – a change in amount of official international reserves;  $x$  – a change in inflation.

Since the formation of an optimal international reserve structure is necessary for efficient management, an analysis of costs and sources of replenishment of FX reserves covering the period 2010-2023 was carried out based on annual time series data obtained from the official website of the National Bank of Ukraine (2024) to determine the optimal size of FX reserves. FX reserves are the dependent variable in the study and indicate that the volume of international reserves decreased in the period 2010-2014 and steadily increased in the period 2015-2023. Actions aimed at obtaining new scientific results of the study involved the use of the indicators of the FX reserves in Ukraine, obtained based on the annual reports of the NBU for the period from 2010 to 2023.

## RESULTS

Since one of the three criteria for the adequacy of foreign exchange reserves is the coverage of at least three months of future imports of goods and services, the number of months of future imports financed by the current volume of FX reserves as of the 2010-2023 period was analysed. The dependence of the change in inflation on the change in the level of the FX reserves of Ukraine was addressed. Due to the limitations of open data, economic aspects for the period from 2011 to 2023 were analysed using the elasticity coefficient formula (Fig. 1).



**Figure 1.** The elasticity coefficient of inflation and international reserves changes

**Source:** compiled by the authors based on National Bank of Ukraine (2024)

The results of the assessment of the influence of the macroeconomic factor of inflation on the volume of international reserves showed that the most significant elasticity level was only in the period of economic

turbulence, as of 2014, as well as pre-crisis 2013 with fewer fluctuations, while in other periods changes in inflation had a relatively small impact on the volume of FX reserves (Table 1).

**Table 1.** Elasticity coefficient between changes in FX reserves and inflation

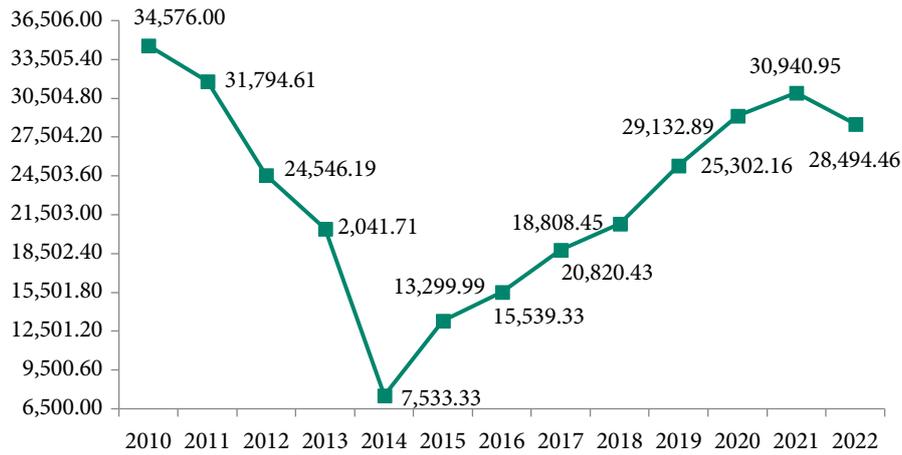
| Year | Change in FX reserves, (in %), $y$ | Change in inflation, (in %), $x$ | Elasticity coefficient |
|------|------------------------------------|----------------------------------|------------------------|
| 2010 | 30.45                              | 9.1                              |                        |
| 2011 | -8.04                              | 4.6                              | 0.39                   |
| 2012 | -22.8                              | 0.2                              | -0.52                  |
| 2013 | -16.83                             | 0.5                              | -5.73                  |
| 2014 | -63.1                              | 24.9                             | 17.75                  |
| 2015 | 76.55                              | 43.3                             | -0.33                  |
| 2016 | 16.84                              | 12.4                             | 0.91                   |
| 2017 | 21.04                              | 13.7                             | 0.42                   |
| 2018 | 10.7                               | 9.8                              | 0.58                   |
| 2019 | 21.53                              | 4.1                              | -0.57                  |
| 2020 | 15.14                              | 5                                | -0.74                  |
| 2021 | 6.21                               | 10                               | -1.70                  |
| 2022 | -7.91                              | 26.6                             | -0.73                  |
| 2023 | 42.16                              | 5.1                              | 0.13                   |

**Source:** compiled by the authors based on National Bank of Ukraine (2024)

Hence, since 2011, international reserves were allocated in support of the exchange rate due to the growing balance of payments deficit, as well as external debt repayment, which increased during the 2008 global crisis. The drop in the volume of FX reserves during the specified period was caused by the strict monetary policy to support the stability of the hryvnia, which was carried out in 2011-2012; significant capital outflow in 2013-2014; repayment of external debt obligations of Ukraine to foreign creditors, in particular, to the International Monetary Fund (hereinafter, IMF); as well as rapid devaluation of the hryvnia.

Nonetheless, after 2014-2015 FX reserves dropped to a catastrophically low level when a huge amount of

foreign currency was withdrawn by non-residents, the population and Ukrainian businesses, the further recovery was facilitated by the financial assistance of international institutions and the equalization of the balance of payments due to the reduction of imports. An important feature of this stage is the transition to a floating exchange rate, inflation targeting, as well as to gradual currency liberalization. The transition to a floating exchange rate allowed the NBU to spend less funds from reserves on interventions to maintain the hryvnia exchange rate. Meanwhile, in 2017-2019, some economic growth was achieved, which contributed to the increase in reserves (Fig. 2).

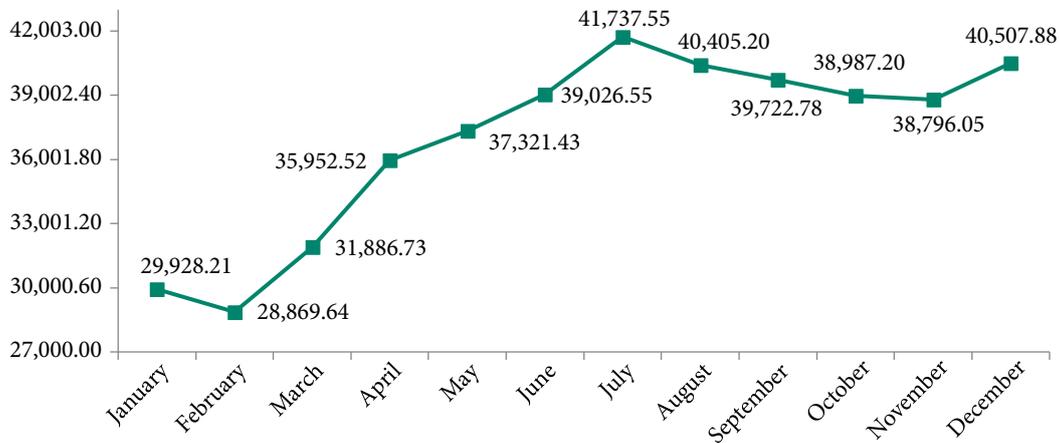


**Figure 2.** Foreign exchange reserves of Ukraine (2010-2022, million USD)

**Source:** compiled by the authors based on National Bank of Ukraine (2024)

In 2019, international reserves increased from USD 20.82 billion to USD 25.3 billion, i.e., by USD 4.48 billion. However, during the last month of 2019, the NBU made a record purchase of currency from the interbank market, acquiring about USD 3 billion. Meanwhile, in 2022, Ukraine received about USD 3.1 billion due to currency government bonds. Furthermore, in June 2023, the international reserves of Ukraine increased by 4.5% to almost USD 39 billion, which is the highest indicator in the entire history of Ukraine’s restoration of independence. Moreo-

ver, in July 2023, Ukraine’s international reserves broke the historical record, reaching USD 41.72 billion. Nevertheless, as of October 1, 2023, the international reserves of Ukraine amounted to USD 39.7 billion (Fig. 3), which is 1.7% less compared to September 2023. The reason for the decrease in reserves was debt payments in foreign currency and the NBU’s intervention in the sale of foreign currency, which were partially compensated by proceeds from DGLB; macro-financial assistance from the EU; grants from the USA and the World Bank (National Bank of Ukraine, 2024).



**Figure 3.** Foreign exchange reserves of Ukraine (2023, million USD)

**Source:** compiled by the authors based on National Bank of Ukraine (2024)

Subsequently, in 2023 the NBU predicted the volume of foreign direct investment in the amount of USD 44.7 billion in 2024 and USD 45 billion as of 2025. Due to international aid, Ukraine can also finance a significant current account deficit, as well as able to maintain a high level of international reserves and balance the currency market (National Bank of Ukraine, 2024). In addition, international reserves

must cover at least three months of future imports of goods and services. Notwithstanding that war caused a drop in the sufficiency of military supplies to the lowest level since the early 1990s: 1.2 months of imports, however, the recuperative growth of the volume of reserves against a drop in imports led to the fact that in 2015, the FX reserves accounted for 3.4 months of imports of goods and services (Fig. 4).



**Figure 4.** The number of months of future imports financed by the current volume of FX reserves

**Source:** compiled by the authors based on National Bank of Ukraine (2024)

The second criterion for the adequacy of FX reserves is the ratio of their value to the monetary aggregate M2. Hence, in 2008, the state budget was not used to maintain the hryvnia exchange rate, therefore the national currency devalued. Comparatively, in 2004-2007 and 2009-2011, reserves could ensure the maintenance of a stable exchange rate of the hryvnia through currency interventions. However, in 2012-2023, FX reserves were rapidly spent to support the hryvnia exchange rate. Finally, the third criterion for the adequacy of reserves is

their volume concerning the sum of external state and non-state debts. Subsequently, Ukraine's external debt is the main threat to its international reserves. Additionally, characteristics of international reserves, such as principles, risks, functions of FX reserves, goals and objectives, structure, stages of the management process of FX reserves, as well as factors that influence the volume of international reserves, such as those on which the volume of international reserves depend have been systematized and analysed (Table 2).

**Table 2.** Characteristics of international reserves

|  |   |
|--|---|
| The structure of FX reserves of Ukraine  | special drawing rights; reserve position in the IMF; monetary refined gold in bars (gold reserve); securities (except shares) paid in foreign currency; foreign currency in the form of banknotes and coins (a basket of international reserve currencies consists of the US dollar, euro, British pound and Japanese yen) or funds in accounts abroad.   |
| Goals, functions, tasks and directions of FX reserves management policy                        | currency policy implementation; maintaining economic stability; formation of a currency basket; rational placement of assets abroad; diversification of currency reserves; fixing the ratio between foreign currency and gold; financing the deficit of payment and trade balances; maintenance of FX reserves in a highly liquid form; making a profit when conducting financial transactions; selection of the ratio between components of the reserve; financing of the negative net of the balance of current operations; guaranteeing the state solvency when making international payments; determination of the optimal amount of international payment methods; participation in capital formation and activities of international organizations; ensuring international trade-economic and credit-financial relations between states; partial holding abroad in non-resident banks for possible use during currency crises; maintaining market participants' confidence in the state's ability to fulfil its external obligations; control of state authorities that ensure currency and monetary policy and conduct currency regulation; assistance to the government in meeting its needs in foreign currency when fulfilling obligations under foreign debt; ensuring trust in the national currency and the financial policy regarding the management of monetary aggregates and the exchange rate; limiting the impact of negative external factors by keeping liquid funds in foreign currency to neutralize shocks during crisis events; maintaining a reserve in case of force majeure; implementation of foreign exchange interventions for the purchase and sale of foreign currencies in exchange for the national currency to stabilize the national currency exchange rate, form a reserve of liquidity and the ability to fulfil state external obligations, as well as expenses from operations with monetary metals and other internationally recognized reserve assets. |
| Factors affecting the amount of FX reserves and factors that affect the international reserves | inflation rates; export capacity; legislation, taxes; capital movement; investment climate; exchange rate mode; amount of external debt; currency restrictions mode; scales of foreign economic activity; national currency exchange rate mode; dynamics of official currency reserves; equilibrium of the balance of payments; currency interventions of the central bank; own mining of precious metals, including gold; participation in international division of labour; reserve position in the IMF, special drawing rights; the state of foreign trade (conjuncture in world markets); currency and monetary policy (the currency restrictions mode, the nature of the policy of interventions, the regime of exchange rates).   |
| Principles of FX reserves  | liquidity, reliability, and profitability.  |

Table 2. Continued

|  |   |
|--|---|
| Risks of FX reserves                         | external market risk (liquidity risk, credit risk, market risk, currency risk and interest rate risk); operational risk (the risk of making a control system error, the risk of making a financial error, the risk of submitting incorrect financial data and losing potential income). |
| Stages of the FX reserves management process | planning; organization and implementation; efficiency analysis; accounting and control.   |

**Source:** compiled by the authors based on O. Yaremenko (2011), I. Karakulova (2011), T. Derkach (2019b)

The mode of formation and use of FX reserves is one of the components of the national currency system and is manifested in the preservation of the independence of the central bank in national monetary policy conducting. Thus, there are two main purposes of international reserves: transactional (making international settlements, payments for external obligations related to the import of goods and services, servicing the external debt and capital) and interventional (aimed at supporting the external and internal value of the national currency to regulate the exchange rate of the national currency) (Bodrova, 2014). Similarly, the formation and management of FX reserves is a component of the currency policy of the National Bank. The creation of sufficient reserves, and therefore the provision of the national bank with the appropriate tools and resources for conducting an effective monetary and currency policy, can contribute to sustainable economic development (Dikovskiy, 2020).

Initially, when forming the central banks were guided by the principles of liquidity and reliability by placing the FX reserves in highly liquid and low-risk financial instruments (freely convertible currency, bonds of international organizations, government bonds). However, over time, Central Banks began to place international reserves in more profitable assets (corporate bonds, shares, derivatives) (Stetsenko & Bezvukh, 2017). In addition, the structure of FX reserves depends on the level of economic development, and the stability of the national currency (Bereslavskaya, 2014). Equally, the optimal size of the FX reserves is sufficient to prevent significant devaluations and revaluations of the national currency and to maintain the stability of the national monetary unit; meanwhile, the limited size of the international reserves is the amount that prevents default on the state's external obligations (the minimum amount of reserves must not be less than the amount consisting of

the cost of covering imports and the amount of the cost of payments from the external state debt); finally, critical is the size of reserves, which are smaller than the value of three-month imports (Karakulova, 2011).

Elsewhere, if the revenue from export operations is exchanged for the national currency, it will be used for domestic investment and will contribute to economic growth. Moreover, the risk of high rates of accumulation of FX reserves is an increase in inflationary pressure. The costs of holding international reserves are especially high for countries with high inflation and a fixed exchange rate. The diversification of excess international reserves can prevent macroeconomic imbalances and the possibility of a financial crisis. Thus, if the central bank does not conduct currency intervention promptly, the national currency may begin to fall, which will lead to inflation. The excessive growth of reserves due to the constant overloading of external revenues over expenses contributes to the increase of the money supply in circulation, which stimulates inflation and leads to a significant outflow of funds from the sphere of production to the monetary sphere (Bodrova, 2014).

A sufficient volume of international reserves is a sign of effective economic growth and confidence in the national monetary unit. The formation and maintenance of an optimal level of FX reserves is the key to effective monetary policy and stable economic development (Yaremenko, 2011). Subsequently, the main task of the central bank in the process of implementing currency policy is the effective management of FX reserves (Kuryacha & Maier, 2020). Effective management of international reserves involves determining the optimal amount of reserves and maintaining them at the appropriate level to ensure financial security (Karcheva & Syrytsia, 2015). To determine the optimal size of FX reserves, expenses and sources of the reserve fund for the period 2010-2023 were analysed (Table 3).

**Table 3.** Sources and expenses of FX reserves

| Year | Sources of FX reserves   | Expenses of FX reserves  |
|------|--|--|
| 2010 | Sale of currency to the population, non-residents and exporters; demand for the main goods of Ukrainian export; inflow of foreign funding; currency exchange of funds received from the IMF. | Ensuring payments for external obligations and, in particular, in the sphere of energy import (imported gas); support of foreign exchange reserves of the NBU; replenishment of the government's treasury account to support the state budget. |
| 2011 | Placement of Eurobonds in securities of foreign companies, as well as in deposits and current accounts of foreign banks.   | Maintenance of the exchange rate (to support the hryvnia from devaluation).  |
| 2012 | Receipt of funds from five-year Eurobonds by the government; high demand for dollars.  | Planned payments for state loans; settlement of loans, foreign debts, gas payments, and debts; maintenance of the exchange rate (stable hryvnia).  |
| 2013 | Foreign exchange interventions on the interbank foreign exchange market (receipt of funds from the government securities: foreign and domestic loan bonds denominated in foreign currency).  | Payments by the government of Ukraine for external and internal obligations, including payments to the IMF, as well as support of the hryvnia exchange rate.   |
| 2014 | IMF loan tranches.   | Payments of debt in foreign currency, including payments to the IMF.   |

Table 3. Continued

| Year | Sources of FX reserves  | Expenses of FX reserves  |
|------|---|--|
| 2015 | Income from swap operations with foreign banks, NBU interventions (foreign exchange operations at auctions and targeted interventions to state-owned enterprises “Naftogaz of Ukraine” and “National Atomic Power Generating Company “Energoatom”), income from Canadian funds, assistance programs from the IMF and other financial donors.  | Payments to the government for repayment of state and state-guaranteed debt in foreign currency, including foreign state loan bonds and government securities, as well as payments to the IMF.   |
| 2016 | Receipts of Japanese yen; receipts from the European Commission; the NBU currency interventions: auctions for the sale of foreign currency (net currency sale); placement of government bonds denominated in foreign currency; IMF tranche under the Extended Fund Facility (EFF), as well as official financing related to the IMF program; placement of Eurobonds by the Ministry of Finance under the guarantee of the US government.  | Payments for service and repayment of the state debt in foreign currency (payments to the Government and the NBU for debt to IMF; the government’s Eurobonds; borrowed funds under the swap operation).  |
| 2017 | Income from Eurobonds; sale and purchase of currency through foreign exchange interventions; income from a favourable situation for domestic exports on world raw material markets; receipt of funds from Domestic government loan bonds (hereinafter, DGLB) denominated in foreign currency, as well as from the European Commission; receiving IMF financing.   | Foreign debt payments: payments to the IMF; for repayment of state and state-guaranteed debt in foreign currency (including sovereign Eurobonds; under Domestic government loan bonds as well as External government loan bonds (hereinafter, EGLB)); for borrowed funds under the swap operation. |
| 2018 | Net purchase of currency by the NBU on the interbank foreign exchange market; proceeds from the export of a record crop of agricultural products; net sale of currency; receiving external financing (income from the IMF, the EU and the World Bank); increase in the value of financial instruments (change in market value, exchange rate of the hryvnia); sale of DGLB denominated in foreign currency.   | Payments to the Government and the NBU for the repayment of the state debt in foreign currency (for the DGLB, as well as payments to the IMF).   |
| 2019 | High level of supply of agricultural products; proceeds from DGLB; external financing from state and private companies; purchase of surplus currency by the NBU, active sale of currency by the private sector, state-owned companies, as well as foreign investors; revaluation of financial instruments (change in market value and exchange rate of the hryvnia).  | For Government operations on public debt management; for repayment of the state debt in foreign currency (for DGLB, for other obligations to foreign creditors and international financial organizations).   |
| 2020 | Increase in the value of financial instruments (as a result of changes in the market value and exchange rates); positive balance of operations of the NBU on the interbank foreign exchange market (income from DGLB and Eurobonds (i. e. EGLB)); revitalization of business activity (activation of importers).  | Repayment of state and state-guaranteed debt (including DGLB denominated in foreign currency, as well as payments IMF); repayment of external and internal obligations and operations of the NBU.  |
| 2021 | External financing and purchase of currency by the NBU on the foreign exchange market; receiving SDR; tranches from the IMF and funding from the European Commission; Foreign exchange receipts for the government (in particular from Cargill Financial Services International, Inc. as well as from the DGLB); revaluation of financial instruments (due to changes in market value and exchange rates).  | Government payments for repayment of state debt in foreign currency (Eurobonds (i.e. EGLB); payments to the IMF).  |
| 2022 | Foreign exchange receipts from international partners (from the USA (through the World Bank trust fund); the EU; the DGLB; the World Bank; the Government of Canada; as well as other international creditors); interventions of the NBU on the net sale of currency in the interbank foreign exchange market to maintain a fixed exchange rate; activation of budget expenditures; high demand of business and population for the import of alternative energy sources; revaluation of financial instruments (due to changes in market value and exchange rates); currency bonds; stable foreign exchange earnings from exporters (primarily agro-industrial complex). | Receipts for government and payments for repayment of the state debt in foreign currency (to the EBRD (hereinafter, European Bank for Reconstruction and Development); as well as to the IMF).   |
| 2023 | Income from: international partners (macro-financial assistance from the EU and the World Bank), NBU operations on the foreign exchange market of Ukraine; from DGLB; and revaluation of financial instruments (due to changes in market value and exchange rates).   | NBU interventions to support exchange rate stability; receipts for government and payments for repayment of the state debt in foreign currency (debts to the European Investment Bank, the World Bank, the EBRD, IMF).   |

**Source:** compiled by the authors based on information from the National Bank of Ukraine (2024), information portal “Economic Truth” (n.d.), Minfin (n.d.)

Diversification of foreign currency reserves can be used to minimize risks, as well as to invest funds in promising financial assets of developed countries (Harkusha, 2023). It is worth noting that the collapse of the Bretton Woods fixed exchange rate system in the early 1970s initiated the flexible exchange rate system. Initial excessive overvaluation of the US dollar in the early- and mid-1980s, and its devaluation in the late 1980s led the G7 countries to coordinate formal intervention to stabilize the value of the US dollar. Comparatively, monetary authorities engage in the sale of foreign exchange to reduce the volatility of exchange rates affecting international trade, international financial flows, and foreign investment, or, to strengthen the national macroeconomic fundamentals, to influence the value of its currency. Furthermore, monetary authorities have adjusted the level or volatility of their currency prices by buying and selling foreign exchange (Lee & Yoon, 2020). The higher the level of stability of the national currency, the greater the percentage of gold in its FX reserve. The weaker the national currency, the greater the percentage of strong world currencies in the international reserves (Kuryacha & Maier, 2020). Thus, as part of the agreement with the IMF, Ukraine is gradually liberalizing currency relations, which is enshrined in the Law "On Currency and Currency Transactions" (2018).

It is worth tracing the process of management of FX reserves in Ukraine, which began with the creation of the NBU in December 1991 and was conducted in six stages. The first stage (1991-1992) saw the creation of the NBU, the infrastructure for managing FX reserves, as well as domestic international reserves. The second stage (1992-1995) was characterized by the creation of the Currency Exchange, the rapid growth of FX reserves due to the introduction of the mandatory sale of a part of foreign exchange earnings, and the beginning of cooperation with IMF. The third stage (1995-1998) is associated with the rapid growth of FX reserves at the expense of IMF loans and short-term portfolio foreign investments and ended with the 1998 financial crisis. In the fourth stage (1998-2008) initiation of reforming the NBU reserve management mechanism and the significant accumulation of international reserves took place. The fifth stage (2008-2014) provided for the management of international reserves in the crisis and post-crisis period and was characterized by a sharp drop in the volume of international reserves. The sixth stage (2015-2024) was characterized by the recovery of the growing trend in the volume of reserve assets of Ukraine, and fluctuations in the size of FX reserves (Korol *et al.*, 2022).

Thus, the study revealed that the purpose of accumulating FX reserves is to support and regulate the exchange rate of the national monetary unit in the long term, as well as to counter the spread of global financial and currency threats and crises of financial and macroeconomic stability since international reserves should ensure the financial stability of the national monetary system, as well as increase the reliability of banking system, protect the economy from external shocks, while a sufficient amount of international

reserves is a sign of economic growth, effective economic development and confidence in the national currency.

The study determined that the creation of sufficient reserves, and therefore the provision of the national bank with the appropriate resources and tools for conducting an effective monetary policy, contributes to sustainable economic development since the structure of international reserves depends on the stability of the national currency and the level of state economic development. The importance of the diversification of reserves in foreign currency which makes it possible to minimize risks, as well as to invest funds in promising financial assets of developed countries was found. Six stages of the management and the structure of international reserves for the period 2010-2023 in Ukraine, as well as forecast data on this macroeconomic indicator for 2024-2025, were given.

## DISCUSSION

First of all, it is important to note that the NBU as the central bank of Ukraine, defines international reserves as highly liquid assets of the NBU in foreign currency and gold, which are used to ensure payments by state authorities, as well as conducting currency interventions (National Bank of Ukraine, 2024). J. Aizenman *et al.* (2023), as other aspects of investigated question, show the buffer effect of international reserves which is more pronounced in Europe and Central Asia and provide policymakers with advice to adapt reserve strategies to the country's financial system, by ensuring stability and sustainability in modern interconnected economy and shows that the level of development of financial institutions plays an essential role in explaining the buffer effect of international reserves to deal with the negative consequences of financial shocks on the real exchange rate. The authors also determined that the buffer effect is stronger in countries with intermediate levels of financial openness.

M. Korol & I. Lapa (2018) highlighted the essence of FX reserves and examined the structure, level and factors that affect their volumes, methods of management, as well as characteristic features. The authors analyse the process of formation of international reserves and methods by measuring their optimal level. The authors investigate the correlation between the structure of international reserves and economic development, as well as external debt and the stability of the national currency. The authors claim that a constant analysis of international reserves is necessary, therefore, monitoring of the main operations with reserve funds (operational, credit, interest, currency, liquidity) is needed. The authors consider the history of the emergence and change of components in the structure of international reserves depending on the world economy in general and national economies in particular. However, in this research work dynamics of changes in intentional reserves have been more widely analysed.

N. Stetsenko & S. Bezvukh (2017) review the components of the FX reserves management system, identify the goals and objectives of the formation and management of

reserves and propose promising ways to solve them, as well as analyse the criteria for determining the optimal amount of international reserves and conduct their calculation for Ukraine. Scientists note that during the formation and management of FX reserves, it is not necessary to strive to increase their volume, but it is important to ensure its optimal value, which will enable the NBU to perform its functions of regulating currency relations, primarily in terms of maintaining the balance of payments and the external stability of the national monetary unit. Scientists claim that the system of the monetary market should be more adaptive because the ability to quickly react to economic challenges, consistency with world trends and taking into account the cycles of economic development are key properties in modern economic conditions. In comparison, this scientific work significantly expanded the components of the foreign exchange reserve management system, as well as the goals and objectives of the formation and management of reserves.

J. Hernández (2018) contributes to the international reserves study by developing a quantitative model of sovereign default and international reserves to evaluate the different contingent lending arrangements put in place by the IMF and other developed countries' central banks. The author described a mechanism which explained the role of reserves in reducing spreads and the probability of debt crises. It was shown that for a given Net Foreign Asset position, additional reserves reduce the set of states that allow multiple equilibria regarding the repayment and rollover decisions to address the optimal portfolio choice of the government. V.B. Shatkovska-Shmorhay (2016) substantiated approaches to determining the adequacy of international reserves, taking into account the floating exchange rate mode in Ukraine, and also carried out a comparative analysis of approaches to determining the adequacy of intentional reserves. Meanwhile, to determine the optimal size of foreign exchange reserves analysis of the sources and costs of FX reserves replenishment was carried out in this scientific work.

The mentioned works were used to conclude that the problems of researching various aspects of foreign exchange reserves are quite broad. Scientists successfully find new niches for study, which makes it possible to implement new practical tools for international reserves management. However, despite the versatility of the study of foreign exchange reserves aspects, a comprehensive view of the modern world structure of international reserves; investigation of dynamics of changes in intentional reserves; dependence of the change in the level of the foreign exchange reserves on the change in different macroeconomic factors; as well as an analysis of the costs and sources of replenishment of the intentional reserves also necessary.

## CONCLUSIONS

While summing up the study of FX reserves, it is worth noting that to ensure the currency security of Ukraine, the volume of international reserves of Ukraine must be optimal and sufficient for the implementation of the main functions

of the NBU. Accordingly, it is necessary to take into account that the globalization of financial markets determines the necessity of FX reserves to protect the national economy from the negative impact of global financial and currency crises, to increase the ability to fast respond to economic challenges, as well as to counter financial and currency crises.

It is worth noting that the riskiness of financial markets determines the urgency to manage FX reserves to maintain a high level of liquidity. This should be facilitated by slowing inflation, innovative economic development, inflow of direct foreign investments, improvement of public debt management, export stimulation and crediting by international financial institutions of production industries. Therefore, one of the main tasks of the NBU should be the effective management of the FX reserves to ensure the coverage of the country's balance of payments deficit and influence on the exchange rate, as well as the volume of the money supply for price stability as a strategic goal of monetary regulation. In the future, it should also be taken into account that the improvement of the process of formation and use of international reserves by the NBU should include: optimization of the structure of international reserves through its diversification and expansion of the list of reserve currencies; increasing the share of monetary gold as a reliable asset; expansion of investment directions of international reserves, in particular consideration of the possibility of investing funds in securities of countries with sustainable economic development.

Moreover, it is also necessary to implement an effective exchange rate policy that will allow overcoming external imbalance. Subsequently, particular attention should be devoted to the management of strategic reserves to increase economic stability and mitigate the consequences of external economic shocks. Similarly, it is also necessary to constantly analyse the FX reserves through the monitoring of the main operations with funds, since international reserves are an element of financial bodies for economic maintenance, therefore ensuring their optimal value will allow the NBU to effectively support the balance of payments and the external stability of the national monetary unit. Therefore, a perspective direction for further research is the realization of a comparative analysis of the sufficiency of worldwide FX reserves, as well as searching for a model of the optimal structure of reserve currency assets.

Thus, in the future, it should be taken into account that FX reserves are a necessary element to protect the economy from external shocks, and therefore international reserve's structure requires constant analysis and monitoring. In addition, prospects for further research include conducting a comparative analysis of the sufficiency of worldwide FX reserves.

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## CONFLICT OF INTEREST

None.

## REFERENCES

- [1] Aizenman, J., Ho, S.-H., Huynh, L.D.T., Saadaoui, J., & Uddin, G.S. (2023). Real exchange rate and international reserves in the era of financial integration. *Journal of International Money and Finance*, 141, article number 30891. doi: 10.3386/w30891.
- [2] Bereslavskaya, O. (2014). Foreign exchange reserves of Ukraine: Sources of replenishment and efficiency of management. *Scientific Notes of the National University of Ostroh Academy. Series: Economics*, 27, 63-68.
- [3] Bodrova, N. (2014). Management of foreign exchange reserves in the system of currency regulation of Ukraine. *Scientific Bulletin of Kherson State University*, 6(4), 178-183.
- [4] Derkach, T. (2019a). Indicative properties of processes of transformation of foreign exchange resources of countries of the world. *Problems of the Systems Approach in Economics*, 4(72), 7-14. doi: 10.32782/2520-2200/2019-4-1.
- [5] Derkach, T. (2019b). Trends in spatio-temporal changes in international reserves of countries of the world. *Scientific Notes of the National University of Ostroh Academy. Series: Economics*, 14(42), 4-10.
- [6] Diakovskiy, D. (2020). The essence and current tendencies of formation and use of foreign exchange reserves in Ukraine. *Scientific Papers NaUKMA. Economics*, 5(1), 48-54. doi: 10.18523/2519-4739.20205.1.48-54.
- [7] Harkusha, Yu. (2023). International reserves: The experience of Ukraine and Poland. *Business-Inform*, 7, 128-134. doi: 10.32983/2222-4459-2023-7-128-134.
- [8] Hernández, J. (2018). *How international reserves reduce the probability of debt crises*. Washington, D.C.: Inter-American Development Bank. doi: 10.18235/0001235.
- [9] Hrytsyshyn, A. (2021). International reserves of the countries of the European Union: Theory and practice of management. Lviv: SPOLOM.
- [10] Karakulova, I. (2011). Traditional and alternative approaches to determining the adequacy of the state's foreign exchange reserves. *Bulletin of Taras Shevchenko National University of Kyiv. Series: Economics*, 127, 42-44.
- [11] Karcheva, H., & Syrytsia, A. (2015). The role of international reserves in ensuring the financial security of Ukraine. *Socio-Economic Problems of the Modern Period of Ukraine*, 2, 33-37.
- [12] Korol, M., & Lapa, I. (2018). Theoretical basis of formation and management of foreign exchange reserves. *Scientific Bulletin of State University "Uzhhorod National University". Series: International Economic Relations and World Economy*, 21, 128-131.
- [13] Korol, M., Palinchak, M., & Tseber, M. (2022). Activities of the National Bank of Ukraine in the management of foreign exchange reserves. *Sciences of Europe*, 104, 17-20. doi: 10.5281/zenodo.7298620.
- [14] Koziuk, V. (2021). Role of gold in foreign exchange reserves of commodity exporting countries. *Journal of European Economy*, 20(2), 211-232. doi: 10.35774/jee2021.02.211.
- [15] Kuryacha, N., & Maier, V. (2020). Trends in foreign currency regulation by international reserves in Ukraine. *Money, Finance and Credit*, 49, 269-273. doi: 10.32843/infrastructure49-47.
- [16] Law of Ukraine No. 2473-VIII "On Currency and Currency Transactions". (2018, June). Retrieved from <https://zakon.rada.gov.ua/laws/show/2473-19?lang=en#Text>.
- [17] Lee, Y., & Yoon, S.-M. (2020). Relationship between international reserves and FX rate movements. *Sustainability*, 12(17), article number 6961. doi: 10.3390/su12176961.
- [18] Minfin. (n.d.). Retrieved from <https://minfin.com.ua/>.
- [19] National Bank of Ukraine. (2024). Retrieved from <https://bank.gov.ua/en/>.
- [20] Shatkovska-Shmorhay, V.B. (2016). Approaches to determining the adequacy of the state's foreign exchange reserves. *Business-Inform*, 3, 193-198.
- [21] Stetsenko, N., & Bezvukh, S. (2017). Modern aspects of management of foreign exchange reserves. *Bulletin of the Khmelnytskyi National University. Series: Economics*, 5, 254-260.
- [22] Tataryn, N., Baik, A., & Ohirko, O. (2020). Features of the monetary policy of the NBU at the current stage. *Young Scientist*, 3(79), 264-268. doi: 10.32839/2304-5809/2020-3-79-55.
- [23] Ukrainian information portal "Economic Truth". (n.d.). Retrieved from <https://www.epravda.com.ua/>.
- [24] Yaremenko, O. (2011). Theoretical aspects of foreign exchange reserves. *Economy and the State*, 11, 114-116.

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## **Сутність та сучасні тенденції формування та управління міжнародними резервами**

**Анотація.** Розвиток світових фінансових ринків свідчить про зростання ролі навмисних резервів для міжнародних ринків капіталу. Метою дослідження є розгляд, оцінка та аналіз міжнародних резервів, а також їх вплив на національну економіку. Під час дослідження були використані дані графічного та статистичного аналізу, а також підбір інформації для аналізу, узагальнення та методи регулювання міжнародних резервів. У дослідженні проаналізовано та систематизовано цілі та завдання, принципи, ризики, структуру, функції міжнародних резервів, фактори, що впливають на міжнародні резерви, напрями політики управління золотовалютними резервами, етапи процесу управління, а також фактори, що залежать від обсягу навмисних резервів. Проаналізовано динаміку зміни обсягу золотовалютних резервів України; залежність зміни рівня золотовалютних резервів України від зміни рівня інфляції за допомогою аналізу макроекономічних даних з використанням коефіцієнта еластичності; проаналізовано витрати та джерела поповнення золотовалютних резервів з метою визначення оптимального розміру золотовалютних резервів на період з 2010 по 2023 роки. Систематизовано один із критеріїв достатності міжнародних резервів, а саме покриття не менше трьох місяців майбутнього імпорту товарів і послуг. Обґрунтовано важливість ролі міжнародних резервів в економіці України. За результатами дослідження виявлено найбільш важливі проблеми, а також запропоновано методи та шляхи більш ефективного управління золотовалютними резервами. Практична цінність проведеного дослідження полягає в тому, що воно дозволяє підвищити ефективність управління золотовалютними резервами в контексті забезпечення фінансової безпеки

**Ключові слова:** золотовалютні резерви; Національний банк України; інфляція; монетарна політика; процентна ставка; економічне зростання; національна грошова одиниця