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ABSTRACT

of the dissertation for the degree of Doctor of Philosophy

**“DIRECTIONS FOR ENHANCING THE EFFICIENCY OF
THE CENTRAL BANK IN REGULATING THE MONETARY
AND CREDIT SYSTEM”**

Speciality: 5301.01 - Internal fiscal policy and public finance

Field of science: Economic sciences

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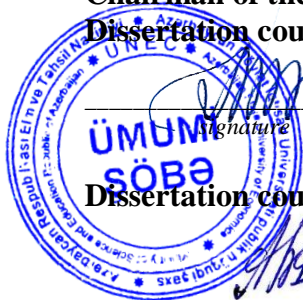
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GENERAL DESCRIPTION OF RESEARCH

Relevance and study level of topic. One of the institutional mechanisms that plays a key role in ensuring sustainable development of the economy is the country's financial and banking system. Efficient and systematically coordinated management of monetary policy is one of the main conditions for economic stability. In this regard, the increase in global and regional financial risks in modern times requires more efficient regulation of the monetary and credit system. The implementation of monetary and exchange rate policy, including the improvement of the Central Bank's activities to regulate inflation, maintain macroeconomic stability, and support economic growth, makes the study of the topic relevant. Although the topic of the dissertation has been widely studied in the scientific literature, the relevance of the topic is constantly maintained against the background of changing macroeconomic conditions and new challenges. Considering the key role of Central Bank's in regulating the monetary and credit system, the issue of efficient organization of the use of financial policy in this area is considered a priority. The efficiency of the monetary policy implemented by Central Bank's affects the development of the national economy. Here, efficiency acts as both a development indicator and a stimulating factor. The dissertation examines traditional tools and new approaches that can be used to achieve monetary policy goals.

Regulation of the monetary system and ensuring sustainable development of the financial sector are reflected in strategic documents such as Strategic Road maps (for the national economy perspective and the development of financial services) approved by the head of state, “Azerbaijan 2030: National Priorities for Socio-Economic Development” and “Socio-Economic Development Strategy of the Republic of Azerbaijan for 2022-2026”. In addition, the “Financial Sector Development Strategy for 2024–2026” identifies issues such as increasing financial inclusion, deepening financial markets, and expanding access to innovative services as priority areas.

The study of the banking system in the context of the general economy has always been in the focus of attention of economists. The

studies of prominent scientists A.A.Alakbarov, S.M.Mammadov, E.M.Sadigov, N.N.Khudiyev, V.A.Gasimli, Z.F.Mammadov, M.M.Bagirov, Z.H.Zeynalov, I.Z.Seyfullayev, R.A.Bashirov, A.A.Babayev, Z.H.Ibrahimov and other economists are of great importance in studying the role of the banking and financial sector in economic development. Foreign economists C.M.Keynes, B.S.Bernanke, F.S. Mishkin, P. Volcker, J.P. Morgan, A. Mellon, C.E. Walsh, R.C.Merton, P.Krugman, A.L.Kudrin, S.Sumner, L.P.Krolivetskaya and others have conducted research in the relevant field. At the same time, the role of the Central Bank in the implementation of the monetary system and the interaction between the banking system and the real sector increase the relevance of research in this field. The research study examined the impact of the Central Bank's activities in regulating monetary policy on macroeconomic stability and economic development.

The object and subject of the study. The role of the Central Bank of the Republic of Azerbaijan in regulating the monetary system in order to ensure macroeconomic stability in the country was chosen as the object of the research. The subject of the research is the analysis and assessment of the mechanisms, tools and the impact of monetary policy transmission on economic outcomes used to increase the efficiency of the Central Bank's activities within the framework of monetary policy regulation.

The purpose and main tasks of the study. The aim of the research is to investigate the impact of the Central Bank's activity in regulating monetary policy on economic development and financial stability, to evaluate the monetary tools and mechanisms applied in this area, as well as to provide scientific proposals for improving the activities of the Central Bank. To achieve these goals, the following tasks have been set:

- Analysis of the theoretical foundations of monetary policy and the mechanisms applied in international practice;
- Determination of the impact of the main instruments of monetary policy on economic development, as well as assessment of the impact of monetary policy on the real sector, price level and financial markets;

- Analysis of the mutual influence and relative importance of exchange rate, credit and interest rate channels in the transmission of monetary policy and to determine their role in macroeconomic stability;
- Assessment of the impact of monetary policy on the stability of the banking sector and financial depth;
- Investigation of the integration of digital financial technologies and innovative tools into the mechanism of influence of monetary policy;
- Development of proposals for increasing the efficiency of monetary policy in Azerbaijan based on the results obtained.

Research methods. In the dissertation work, dynamic analysis, statistical analysis, structural analysis, SWOT analysis, comparative analysis and mathematical-statistical forecasting, application of econometric models, as well as correlation-regression analysis. In the research, extensive analyses were conducted using econometric models such as Structural VAR (SVAR) and VECM to measure the short-term and long-term effects of monetary policy, as well as to assess the strength of transmission channels. ARDL and cointegration tests were used to verify the existence of persistent relationships between interest rates, monetary aggregates and inflation.

The theoretical and methodological basis of the research work is scientific works on the current state of the banking sector and strengthening its role in economic development, studies on the activities of the Central Bank in implementing monetary policy, as well as regulatory and legal documents adopted by the country's supreme legislative and executive authorities. The dissertation used official reports of the Central Bank and the State Statistical Committee, as well as data from the International Monetary Fund, the World Bank, the Bank for International Settlements, and other institutions.

The main provisions for the defense. In the dissertation, the directions for increasing the efficiency of the Central Bank in regulating monetary policy are analyzed within the framework of theoretical and methodological foundations, institutional environment, and current monetary policy, and the following propositions are defended:

- Study of the scientific and theoretical foundations of monetary regulation and their systematization in accordance with the current economic conditions;
- Study of international experience in the use of monetary policy instruments, integration of monetary policy in accordance with local economic and regional characteristics;
- Application of appropriate economic and statistical models for the evaluation of monetary policy decisions, analysis of the results obtained, as well as determination of the compliance of these results with the goals and instruments of the existing monetary policy;
- Assessment of the impact of financial inclusion, digital payments and innovations in payment and financial infrastructure on the monetary transmission mechanism in the development of monetary policy;
- Assessment of the effectiveness of monetary policy in Azerbaijan based on key performance indicators (KPIs);
- Taking into account international experience and local economic characteristics, analysis of the mechanisms of impact of monetary policy on the real sector in Azerbaijan and determination of an optimal roadmap in order to increase the efficiency of the Central Bank's activities in implementing monetary policy.

The scientific novelty of the research. The research analyzed the interest rate corridor, open market operations, reserve requirements and liquidity management, which are the main instruments of the Central Bank's operational framework, within the framework of a unified approach to their interaction with the economic environment. The scientific innovations presented for defense by the author and obtained as a result of the research are as follows:

- In the presence of a fixed exchange rate regime in the country, the transmission mechanism of monetary policy was analyzed based on a specially constructed quantitative model, and directions consistent with institutional realities were determined in accordance with the results obtained;
- The role and mechanisms of influence of the Central Bank in regulating the monetary system were analyzed, and the

effectiveness of monetary policy in this direction was assessed based on macroeconomic indicators reflecting the real sector and overall economic dynamics;

- The current state of the Azerbaijani banking sector was analyzed, and factors affecting the effectiveness of monetary policy were identified, and specific proposals were put forward to improve the operational framework of monetary policy;
- The role of the banking sector in economic development was examined and an approach was presented to assess the impact of monetary and credit instruments on the real sector based on measurable indicators;
- It was proven by econometric analysis that the exchange rate channel plays a key role in the transmission of monetary policy, that the impact of interest rate policy weakens in unstable economic periods, that the exchange rate and credit channels take a leading position, and that the interest rate policy transmission mechanism has a faster effect in economically stable stages;
- Taking into account modern trends, including the expansion of digital payments, increasing financial depth, and the application of macroprudential policy, practical proposals and recommendations have been developed to increase the efficiency of the Central Bank's activities in implementing monetary policy based on the current economic conditions.

The theoretical and practical significance and foundations of the research. The results obtained as a result of the research and the substantiated proposals and recommendations allow us to further strengthen the activities of the Central Bank by increasing the efficiency of monetary policy and ensuring the optimal application of monetary instruments. The scientifically substantiated provisions and recommendations established within the framework of the research can be applied to improve the mechanisms of the Central Bank's inflation targeting, liquidity regulation and influence on the credit market. At the same time, the research substantiated the priority directions of protecting financial stability, deepening the financial sector, stimulating economic activity, increasing the share of the financial sector in GDP and making monetary policy more effective in the

development of the real sector, as well as expanding access to financial resources.

The materials obtained in the dissertation work (including scientific innovations and proposals) can be used in the preparation of educational and methodological materials, as well as as lecture materials in the teaching of macroeconomics, finance and other subjects at UNEC and other higher education institutions.

Approbation and implementation of the results. The main theoretical provisions, conclusions and proposals of the dissertation were presented at international and republican scientific-practical conferences in 2022-2025 and articles were published in periodical scientific journals included in the list of scientific publications recommended by the Higher Attestation Commission under the President of the Republic of Azerbaijan. 16 scientific works with a total volume of 10 printed sheets were published on the topic of the dissertation.

The name of the organization in which the dissertation work was carried out. The research was carried out at the Academy of Public Administration under the President of the Republic of Azerbaijan.

The total volume of the dissertation work with marking structural sections separately. The dissertation consists of an introduction (13235 characters), three chapters (Chapter I – 98003 characters, Chapter II – 70083 characters, Chapter III – 53486 characters), eight sub-sections, a conclusion (27799 characters), and a list of 138 references. Additionally, the dissertation includes 16 tables and 25 graphs. Excluding tables, graphs, diagrams, and the reference list, the main body of the dissertation comprises a total of 262606 characters.

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SUMMARY OF THE DISSERTATION

In the “**Introduction**” section, the relevance and level of research on the topic, the object and subject of the study, its aim and objectives are defined. The methods applied during the research process, the main theses submitted for defense, the scientific novelty, as well as the theoretical and practical significance of the research and its approbation are also presented.

In the first chapter, titled “**Theoretical and methodological foundations of the regulation of the monetary and credit system,**” examines the theoretical foundations of monetary policy in the economic regulation system, the role of financial instruments in the formation of the monetary system, as well as the study of international experience in monetary policy.

The monetary system is one of the main economic mechanisms aimed at regulating money circulation, managing credit relations and ensuring macroeconomic stability. *Monetary policy has a significant and lasting impact on the real economy*¹. The implementation of an effective monetary policy is considered necessary to increase the resilience of countries to economic crises, maintain macroeconomic balance and ensure long-term well-being.

Different views of economic theories have put forward different approaches to the essence of monetary policy. Classical and neoclassical schools assess the impact of monetary policy on economic processes as relatively limited and accept the self-regulation ability of market mechanisms as the main principle. Keynesian and post-Keynesian approaches consider the active role of the state and the central bank to be important, while monetarists emphasize efficient management of the money supply as a key condition for macroeconomic stability.

¹ Altavilla C., Carboni G., Lenza M., Uhlig H. Interbank rate uncertainty and bank lending // ECB Working Paper. - Frankfurt am Main: European Central Bank, - 2019.

Table 1. The regulatory functions of the monetary and credit system ²

Macroeconomic stability and economic growth	Inflation and price management	Financial and exchange rate stability
Ensuring the resilience of the economy	Controlling money supply and reducing inflationary pressures	Maintaining exchange rate stability and regulating the balance of foreign trade
Strengthening economic stability through coordination with fiscal policy	Regulating consumption and investment activity through monetary policy instruments	Enhancing the confidence of foreign investors and stimulating capital inflows
Creating a stable macroeconomic environment that ensures sustainable growth	Enhancing the predictability of economic decisions aimed at maintaining price stability	Ensuring the resilience of financial markets and mitigating crisis risks

The economic role of the monetary system can be explained by several factors. First, the monetary system ensures the optimal allocation of credit resources by maintaining the stability of the financial sector, and the healthy functioning of the banking ecosystem stimulates the development of the business environment. Second, monetary policy affects economic growth and employment through its instruments.

The digital transformation taking place on a global scale requires new approaches to the activities of financial institutions in the direction of the digitalization of banks. In this regard, in our modern era, central banks operate against the backdrop of rapid economic changes. In this direction, the application of artificial intelligence (AI) in the economic sphere has great potential in terms of increasing technology efficiency, increasing accuracy and strengthening decision-making processes, and central banks are further improving their operations through AI. The use of artificial intelligence has key advantages for central banks such as rapid analysis of large volumes of data, flexible decision-making ability, provision of economic forecasts, early detection of financial

² Dornbusch, R., Fischer, S., & Startz, R. (2016). *Macroeconomics: Textbook*. Baku: McGraw-Hill Global Education Holdings and Central Bank, pp. 118–306

risks, and the use of virtual auxiliary services. In addition, digital money is developing in two interconnected directions: Central Bank Digital Currencies (CBDCs) and Real-Time Payment (RTP) platforms. CBDCs create a new, risk-free liability for the central bank. RTP platforms, in turn, modernize the settlement of existing commercial bank money. The Bank for International Settlements (BIS) defines CBDC as “a new form of digital money denominated in a national unit of account and directly liable to the central bank.” *Survey data shows that 94% of the world’s central banks are currently exploring CBDCs*³.

The main technological basis for the real-time payment system AZ-FAST and the possible future retail CBDC is the SIMA platform. This platform, in terms of its functional approach, is in line with systems such as FedNow, UPI, and Pix in other countries, and is aimed at providing fast and secure digital payments.

Various efficiency indices are used in international practice to assess the efficiency of the monetary system. The efficiency index mainly focuses on indicators such as the percentage of deviation of the inflation rate from the targeted level, the difference between the real economic growth rate and long-term potential growth, the stability of financial markets and the stability of the exchange rate. In order for the efficiency index to be high, monetary policy includes not only the balance of inflation and economic growth, but also financial stability and risk management. International financial institutions, including the World Bank, the International Monetary Fund and other financial institutions, use key performance indicators (KPIs) to assess the performance of banks. These indicators allow for the analysis and forecasting of monetary policy.

In general, the Central Bank's application of flexible and innovative approaches to monetary policy plays an important role in terms of macroeconomic stability. The application of advanced international practices can not only increase the efficiency of the

³ Di Iorio A., Kosse A., Mattei I. Results of the 2023 BIS survey on CBDC and crypto // BIS Paper No. 147. - Basel: Bank for International Settlements, 2024. - pp. 2.

Central Bank's activities, but also make a significant contribution to stimulating economic growth and maintaining financial stability.

In the second chapter of the dissertation, titled “**Specific features of the Central Bank’s activities in implementing the monetary and credit system in the modern era**”, the mechanism for implementing the monetary policy of the Central Bank of the Republic of Azerbaijan, anti-crisis measures applied in the monetary policy, and the criteria for evaluating monetary policy were extensively analyzed.

The Central Bank implements various measures to develop the monetary system and maintain financial stability in the Republic of Azerbaijan. The monetary system plays an important role in ensuring economic development and macroeconomic stability. The implementation of the monetary policy by the Central Bank is of particular importance in terms of managing inflation in the country, maintaining the stability of the national currency, and ensuring the stability of the financial system.

Table 2. Information on the Key Economic Indicators of the Central Bank

	2020	2021	2022	2023	2024
Refinancing rate (discount rate), %	6.25 - 6.50	6.25 - 7.00	7.50 - 8.25	7.50 - 7.75	7.25
Annual inflation, %	2.8	6.7	13.9	8.8	4.9
Strategic foreign exchange reserves, USD billion	51.1	50.8	53.2	58.5	71
Official foreign exchange reserves, USD billion	6 369.4	7 075.0	8 995.7	11 613.0	10 959.5

Source: Compiled by the author based on the statistical databases of the Central Bank

Analyses show that in recent years, a number of significant changes have been observed in the economic indicators of the Central

Bank. The discount rate, annual inflation rate, strategic and official foreign exchange reserves have increased in certain periods, and in some years a decrease has been recorded. The economic indicators of the Central Bank are not only limited to reflecting the current dynamics of economic processes in the country, but also indicate the priority directions of macroeconomic policy, changes in the application of monetary and credit instruments and their eventual impact on economic stability, inflation processes, and the stability of financial markets.

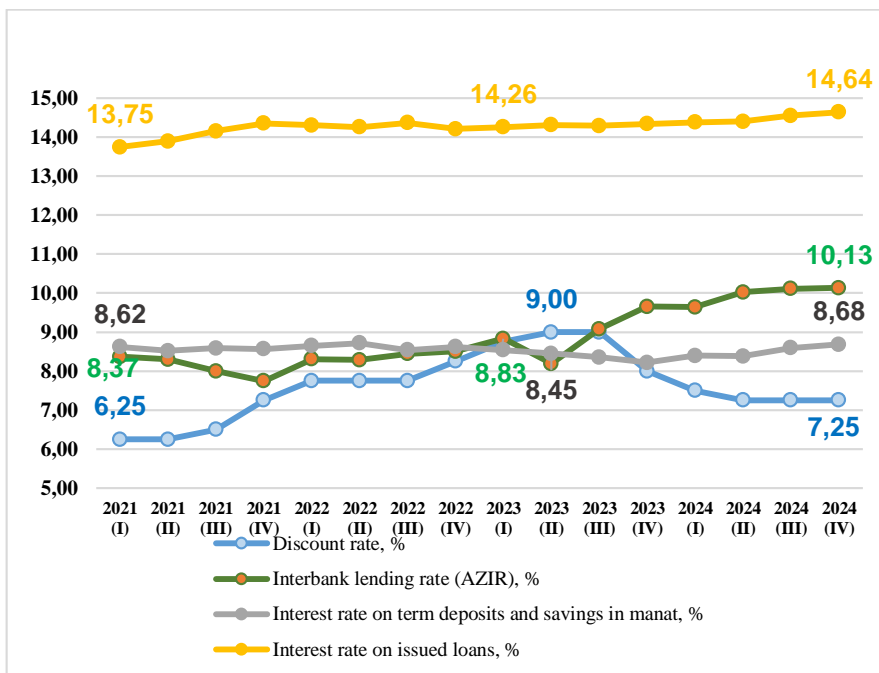
Table 3. Average annual inflation indicators

	2016	2017	2018	2019	2020	2021	2022	2023	2024
Average Annual Inflation, %	14.7	12.9	2.3	2.6	2.8	6.7	13.9	8.8	2.2

Source: Compiled by the author based on the statistical databases of the State Statistical Committee

Table 3 shows that inflation was very high in 2016–2017, and at a minimum level in 2018–2019. This variability is mainly due to external market influences, exchange rate factors and economic crises, as well as domestic economic policy. One of the important factors affecting the increase in average annual inflation is import inflation. Against the background of current geopolitical tensions, possible price volatility in international commodity markets creates risks related to the increase in import inflation.

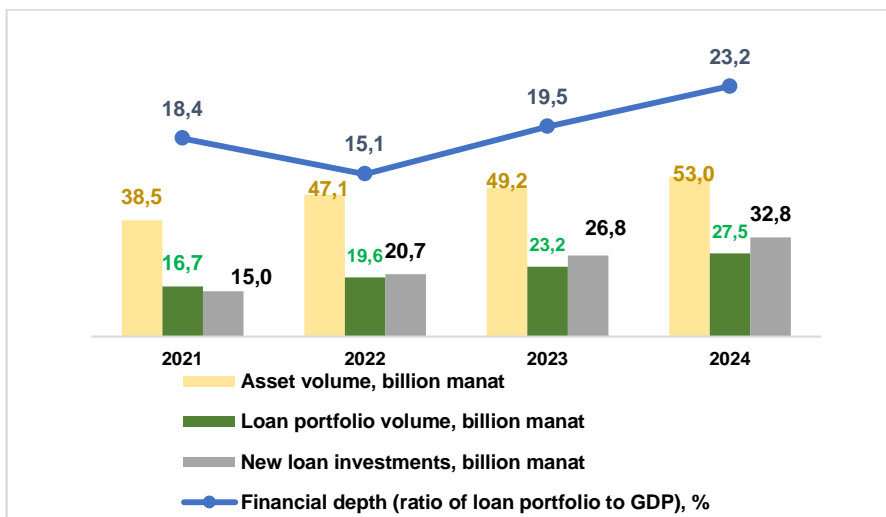
The conclusion drawn from Graph 1, which is based on statistical data, is that changes were observed in various interest rates during the corresponding period. Starting from 2021, an upward trend in discount interest rates has been observed. The interest rate on interbank loans, which was 8.37% in 2021, increased with fluctuations and reached 10.13% in 2024. This reflects the general upward trend in interest rates in the interbank loan market. In addition, the interest rate on term deposits and savings in manat increased to 8.68% in 2024. The graph shows that interest rates on loans issued during the relevant period are high, which creates additional financing costs for borrowers.



Graph 1. Interest rates dynamics

Source: Compiled by the author with reference to the electronic statistical databases of the Central Bank

According to the results of the analysis of statistical indicators by year, the volume of bank assets increased by 37.7% compared to 2021 and reached 53 billion manat at the end of 2024. The loan portfolio also increased similarly from 16.7 billion manat to 27.5 billion manat (an increase of 1.6 times), indicating an expansion of the flow of credit to the economy. New loan disbursements increased from 15 billion manat in 2021 to 32.8 billion manat in 2024, indicating a significant acceleration in loan turnover. At the same time, the final outcome indicator, financial depth (the ratio of loan portfolio to GDP), increased from 18.4% to 23.2%, reflecting the strengthening of the impact of loans on economic activity (Graph 2).

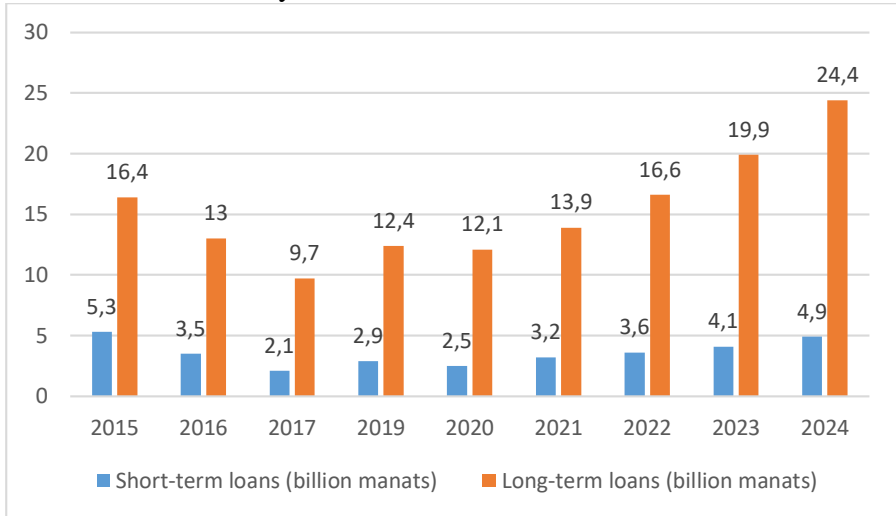


Graph 2. Volume of Bank Assets and Credit Portfolio, and Indicators of Financial Depth (in billion AZN and %

Source: Compiled by the author based on the statistical databases of the Central Bank

As can be seen from Graph 3, in some years, a significant decrease in the volume of both short-term and long-term loans was observed. The main reason for the decrease in loans during that period was the sharp decline in oil prices on the world market and, as a result, a decrease in foreign exchange revenues entering the country, the crisis in the banking sector with the double devaluation that occurred in 2015, the increase in problem loans and the cessation of the activities of a number of banks, which both limited the ability of banks to provide loans and led to a weakening of credit demand from the population and businesses. Since 2021, the situation has changed to the opposite, and short-term loans have been increasing. Long-term loans, on the other hand, have increased at a faster pace and have entered a sharp upward trend. This dynamics shows that credit investment is closely related to the strengthening of economic activity. The conducted analyses show that the banking sector prefers to provide long-term loans in the loan portfolio. Thus, while in 2015 the share of long-term loans in the total portfolio was 76%, in 2019 this graph was 81%, and in 2024 it was 83%. The fact that banks prefer long-term

loans is an indicator of the expansion of investments in the real sector and economic stability.

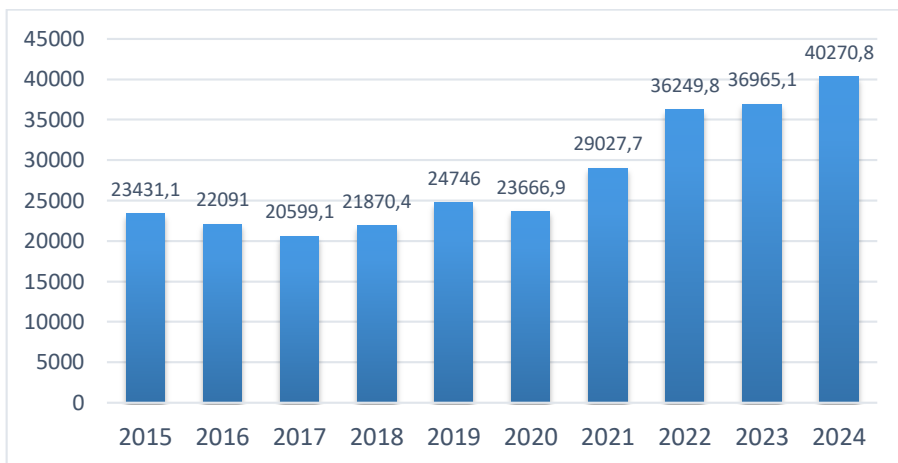


Graph 3. General loan portfolio

Source: Compiled by the author based on the statistical databases of the Central Bank

In addition, over the past 5 years, the volume of business loans has increased 1.5 times to 14.8 billion manat, while its share in the total loan portfolio has decreased by 4.7 percentage points to 53.8%. At the same time, small and medium-sized business loans have increased by 45.8% over the same period, reaching 6.5 billion manat in 2024, but their share in the total loan portfolio has decreased by 2.3 percentage points to 43.9%. This indicates that banks are giving more preference to consumer loans. In this regard, the increase in liquidity is directed mainly to the consumer market, and not to the production-oriented part of the real sector, and the process of economic diversification is weakening⁴.

⁴ Monetary statistics (statistical database) // [Electronic resource] / Central Bank of the Republic of Azerbaijan. – Baku, December 24, 2024. - URL: <https://www.cbar.az/page-42/monetary-indicators>



Graph 4. Total deposit portfolio, in million manats

Source: Compiled by the author based on the statistical databases of the Central Bank

As can be seen from Graph 4, the total volume of the deposit portfolio in the banking sector has increased by more than 1.5 times over the past 10 years. Deposits in the sector have generally increased over the years, but there has been a dynamic accompanied by periodic fluctuations. As a result of the decline in oil prices in 2015, the global energy crises had a serious impact on the banking sector of Azerbaijan, which resulted in macroeconomic instability. Accordingly, in 2016, the deposit portfolio decreased by 5.7%, and in 2017 by 6.8%, amounting to 22 billion manat and 20 billion manat, respectively. In 2020, the deposit portfolio decreased by 4.4% due to the impact of the COVID-19 pandemic. Nevertheless, as a result of the economic reforms implemented in our country, growth has been observed in the sector in recent years. Thus, as can be seen from the graph, in 2024 it was 40.2 billion manat, an increase of 8.9% compared to the previous year (36.9 billion manat), which proves the effective implementation of the accumulation of financial resources in the banking sector.

At the same time, analyses show that the fact that the majority of deposits are short-term is considered risky in terms of the stability of the sector, which can complicate the situation in the banking sector during crises. Thus, if the share of demand deposits in the total deposit

portfolio was 33% in 2015, in 2017 the corresponding indicator was 50%, in 2021 it was 68%, and in 2022 it was 70.4%, reaching the peak of recent years. According to the results of 2024, this indicator was 59.8 percent. The volume of deposits in manat and foreign currency in the banking system has undergone significant transformation over the years. Thus, in 2015, the volume of deposits in manat was 4.3 billion manat, the volume of deposits in foreign currency was 19.1 billion manat, and in 2024 these indicators were 24.7 billion manat and 15.4 billion manat, respectively. In addition, if in 2018 deposits in the national currency (7.5 billion manat) accounted for 35% of the total portfolio, in 2024 the corresponding indicator increased to 62% (24.7 billion manat). Over the past decade, the volume of deposits in manat has increased, which proves the stability of the manat, higher interest rates on deposits in manat, and, as a result, the population's confidence in the national currency has increased⁵.

Research and analysis show that implementing a more flexible monetary policy by the Central Bank to increase the efficiency of monetary policy can contribute to strengthening economic stability.

In the third chapter of the dissertation, titled **“Directions for Enhancing the Role of the Central Bank in the Regulation of the Monetary and Credit System**, an extensive analysis and assessment of the improvement of the regulation of the monetary and credit system of the Central Bank of the Republic of Azerbaijan, as well as the forecasting directions of the impact of the monetary and credit system on the economic development of the country in the modern period, was carried out based on econometric models.

In the global economy, predicting the impact of monetary and credit policy on real sector indicators in advance improves the quality of economic management and allows for more flexible decision-making. For this purpose, various econometric approaches, including structural vector autoregression (SVAR), VAR models and autoregressive distributed lags (ARDL) framework, are applied to analyze the interdependencies between interest rates, money supply, exchange

⁵ Monetary statistics (statistical database) // [Electronic resource] / Central Bank of the Republic of Azerbaijan. – Baku, December 24, 2024. - URL: <https://www.cbar.az/page-42/monetary-indicators>

rates and inflation. On this basis, analyses were conducted on the five-variable SVAR/VECM model based on 186 months of observation. The results obtained allow for the formulation of practical proposals and recommendations to increase the efficiency of the Central Bank's activities in monetary policy. Thus, forecasting the monetary system in modern times is not only a statistical analysis, but also an integral part of strategic management. Together, the system-wide SVAR/VECM and the GDP-based ARDL form a coherent econometric architecture. This two-step approach answers the key question: to what extent and through what channels do the ECB's domestic policy instruments affect economic growth and inflation in a fixed exchange rate environment?

The variables included in the model are as follows:

Δy_t (Growth of the real sector). The use of the growth rate eliminates the level jump that occurred after the February 2015 devaluation and brings the real sector indicator to the same percentage change scale as the money and price series.

Δg_t (Growth of real GDP). The monthly GDP growth rate is taken from the available monthly data (official publications of the State Statistics Committee) and is directly based on the monthly growth rate.

Π_t (Inflation). The transformation of the Consumer Price Index (CPI) into a monthly log difference creates a continuous growth rate that is not sensitive to base effects. Monetary tightening raises the cost of borrowing and suppresses demand, but the impact on π_t should be observed only after a while due to pricing lags.

i_t (Policy interest rate). The midpoint of the interest rate corridor is the level at which commercial banks arbitrage in the overnight markets (where banks lend or borrow money to each other (or the Central Bank) for 1 business day) for several days and acts as the most operational policy signal immediately after the decisions of the monetary authorities. It is not considered necessary to include the corridor boundaries separately.

Δm_t (Money supply). M3 includes time deposits of households and businesses and is sensitive to the cost of holding liquidity, with deposit growth slowing and Δm_t falling below its long-term average amid tight policy.

Table 4. Information on Variables

Symbol	Definition and transformation	Source	Expected Response to a 1 Percentage-Point Increase
Δy_t	Real sector growth rate: seasonally adjusted industrial output (constant AZN), $100 \times$ first log-difference	State Statistical Committee	\downarrow – real activity contracts
Δg_t	Monthly real GDP growth, $100 \times$ first log-difference	State Statistical Committee	\downarrow – broad economic activity contracts
Π_t	Inflation: $100 \times$ first log-difference of seasonally adjusted CPI	State Statistical Committee	\downarrow - with lag disinflation
i_t	Midpoint of the refinancing corridor of the Central Bank (annual, percentage points)	Central Bank of the Republic of Azerbaijan	\uparrow – increases by definition
Δm_t	Broad money growth: $100 \times$ first log-difference of M3	Central Bank of the Republic of Azerbaijan	\downarrow – liquidity tightens

Source: Prepared by the author using the “R” statistical software

Econometric model. Two parallel four-variable structural VAR models are estimated:

$$A_0 y_t^{(1)} = A_1 y_{t-1}^{(1)} + A_2 y_{t-2}^{(1)}, \quad y_t^{(1)} = [\Delta y_t, \pi_t, i_t, \Delta m_t],$$

$$A_0 y_t^{(2)} = A_1 y_{t-1}^{(2)} + A_2 y_{t-2}^{(2)}, \quad y_t^{(2)} = [\Delta y_t, \pi_t, i_t, \Delta m_t],$$

Both systems share the same contemporaneous matrix A_0 the forecast coefficient matrices A_1 , A_2 and a lag order of $p=2$. This specification minimizes the Schwarz and Hannan–Quinn information criteria and ensures the absence of autocorrelation in the residuals. Structural shocks $\varepsilon_t^{(j)}$ ($j = 1, 2$) are mutually orthogonal and normalized to unit variance. Classical monetary neutrality is imposed by constraining the long-run response of real activity growth to zero. This restriction is implemented on the cumulative impulse response matrix $C(1)$ ensuring that output contractions induced by monetary policy are only temporary. Johansen trace and maximum eigenvalue

statistics are estimated on the level vectors. Johansen trace and maximum eigenvalue statistics are estimated on the level vectors $[y_t^{(j)}]_{levels}$. If a long-run relationship between prices and money exists ($r = 1$), each VAR is transformed into the following Vector Error Correction Model (VECM):

$$\Delta y_t^{(j)} = \alpha \beta y_{t-1}^{(j)} + \Gamma_1 \Delta y_{t-1}^{(j)} + \Gamma_2 \Delta y_{t-2}^{(j)} + A_0^{-1} \varepsilon_t^{(j)},$$

Here, $\beta y_{t-1}^{(j)}$ represents the long-run money–price equilibrium, while α indicates the speed at which the variables adjust to this equilibrium. The error correction term prevents the loss of cointegration information during the differencing process. Data preprocessing and summary of methodological procedures. All level series were initially tested using the Augmented Dickey–Fuller (ADF) and KPSS tests with two dummy variables:

$D_{2015-02}$ – the dual devaluation that occurred in February 2015

$D_{2020-03}$ – the COVID-19 quarantine introduced in March 2020.

The long-run neutrality requirement is imposed by restricting the elements of the cumulative impulse response matrix $C(1)$ such that the cumulative effect of a policy rate shock on Δy_t (və ya Δg_t) üzərində after 60 months is equal to zero. Once the structural shocks are identified, 24-month orthogonal impulse response functions are constructed for both systems.

Table 5. The effects of an interest rate shock

Model	$\Delta g_t / \Delta y_t$	$\Pi_t (\Delta \pi_t)$	Δm_t
GDP-VAR(2)	-0,193 (h = 3)	+0,105 (h = 2)	+0,466 (h = 2)
IND-VAR(2)	-0,218 (h = 1)	+0,120 (h = 2)	+0,449 (h = 2)

Source: Prepared by the author using the “R” statistical software

For each VAR, the share of the variation in $\Delta activity$ and π explained by interest rate and money growth shocks is calculated over a 12-month forecasting horizon. These proportions measure the relative importance of the “price” and “quantity” channels of monetary transmission under a fixed exchange rate regime. Dynamic stability is

assessed through recursive eigenvalue plots, while parameter shifts are evaluated using CUSUM of Squares diagrams.

Table 6. FEVD at a 12-Month Horizon – Share of Interest Rate (di) and Broad Money (dm) Shocks, %

Model / Variable	Share of di	Share of dm	di + dm
GDP-VAR(2)			
Δg_t	3,6	0,9	4,5
Π_t	1,2	0,2	1,4
Δm_t	3,0	—	3,0
IND-VAR(2)			
Δy_t	0,06	3,5	3,6
Π_t	1,06	0,07	1,1
Δm_t	2,9	—	2,9

Source: Prepared by the author using the “R” statistical software

The forecast-error decomposition of inflation has a very small monetary explanatory power in both models ($\approx 1.1\text{--}1.4\%$). This highlights the dominant influence of external factors such as energy prices and import tariffs on price dynamics under a fixed exchange rate regime. Overall, the impulse-response trajectories and the FEVD tables show that the transmission of interest rate policy primarily produces a rapid but short-lived contraction in the real sector. The inflationary effects are weak and lagged, confirming that a fixed nominal exchange rate dampens imported price pressures.

Main results of econometric analyses:

- The tightening of monetary policy has its first impact on the economy on the real sector. The impact on the GDP indicator is revealed later. This result shows that the tight monetary policy first weakens the manufacturing sector, and then affects the overall economic activity through the aggregate demand channel.
- The analysis conducted on the role of interest rate channels shows that the main impact on the real sector is formed through the exchange rate channel. On the GDP indicators, the impact of interest rate decisions is stronger. This result shows that industrial production depends more on the availability of credit resources, while overall economic activity reacts more sensitively to changes in interest rates.

- In terms of the impact on prices, the tightening of monetary policy does not have a noticeably strong impact on the price level. This result shows that the fixed exchange rate regime amortizes the impact of import prices, while pricing in the domestic market is carried out with a delayed reaction due to administrative and structural constraints.
- Analyses of the behavior of the monetary policy impact mechanism in stability and crisis regimes show that in crisis and unstable periods (for example, in 2015 and 2020), the transmission mechanism of interest rates to the economy weakens and its effects manifest themselves in a more delayed form. In these stages, the main role belongs to the exchange rate and credit channels. In economically stable periods, the impact of interest rates is observed relatively faster.

In general, the empirical analyses conducted show that the exchange rate channel plays a major role in the transmission of monetary policy in Azerbaijan. The interest rate and price channels have a relatively weak impact. At the same time, the nominal effective exchange rate of the manat is one of the factors that significantly affects the import of inflation. The instability of long-term relations and the strong influence of external factors continuously reshape the results of transmission. The monetary policy of the Central Bank of Azerbaijan, based on international experience, is considered appropriate to be developed in the direction of strengthening the interest rate channel, increasing flexibility in the currency regime and ensuring the stability of the banking sector. Thus, based on the analysis, evaluation and research conducted by the Central Bank of the Republic of Azerbaijan to enhance the efficiency of regulating the monetary system, the following **results** were obtained and final **recommendation** were made:

➤ The main anchor of price stability in our country is exchange rate stability. Exchange rate stability is the main factor affecting the trajectory of inflation. Since the manat exchange rate actually plays the role of an anchor, the ability of the discount rate to influence inflation expectations remains limited. The degree of dollarization of

the economy and the large share of imports in GDP lead to the formation of price dynamics mainly by external cost shocks. For this reason, a long-term cointegration relationship between monetary aggregates and inflation is not observed. In international practice, central banks widely use a communication strategy called “forward guidance”. They stabilize market expectations and strengthen the impact of monetary policy by announcing quarterly forecast tables and the expected trajectory of interest rates in advance. It is advisable for the Central Bank to gradually introduce a $\pm 2\%$ managed exchange rate corridor for the manat and publish the interest rate trajectory in the Monetary Policy Report at least 8-12 quarters in advance.

➤ The results of the econometric analysis (structural VAR analysis) conducted in the study show that the increase in the discount rate has only a short-term impact on the real sector and does not have a statistically significant impact on inflation indicators. This result confirms that the “expectations channel” effect emphasized in the international literature (Woodford, Keynesian approaches) is weak in Azerbaijan. The main reason is the fixed exchange rate regime and the relatively high level of dollarization in the economy, which limits the transmission of interest rate policy. In order to strengthen the transmission of interest rates to the economy, it is advisable to improve the subsidized credit mechanisms applied by the government, reduce the level of dollarization in the financial sector, as well as use the phenomenon of anchoring inflation expectations in a more systematic and active way in the communication strategy of monetary policy.

➤ Statistical analyses show that the banking sector does not significantly support economic growth. In recent years, the share of the oil sector in GDP has decreased. Nevertheless, revenues from the oil and gas sector still dominate in the formation of economic development. In this regard, in order for the banking sector to further support economic growth, it is considered appropriate to redirect its loans from consumption to investment and production-oriented sectors, further facilitate access to finance for small and medium-sized businesses, form long-term and low-interest credit resources,

expand state guarantees and risk-sharing mechanisms, improve bank-real sector relations, as well as further develop financial markets.

➤ According to the analysis, the low share of business loans in the total loan portfolio creates difficulties for the development of the real sector and diversification of the economy. In order to support the real sector, it is advisable to strengthen the financial infrastructure to increase the volume of business loans. In this regard, credit institutions can provide business loans on more profitable and favorable terms, as well as the creation of improved financial products for enterprises operating in various sectors of the economy through joint cooperation between the state and financial institutions. At the same time, modeling conducted in Azerbaijan shows that the decrease in the share of SME loans in the portfolio weakens the transmission of monetary policy impulse to the real sector. To solve this problem, it would be advisable to establish a portfolio guarantee fund jointly with the SME Agency and increase its volume to at least 1% of GDP. As a result of this mechanism, the liquidity channel of monetary policy can operate in a more balanced manner.

➤ The large-scale economic reforms implemented create conditions for a more efficient organization of the accumulation of financial resources in the banking sector and an increase in the overall stability of the banking system. However, analyses show that the large volume of deposits consisting of short-term deposits is considered risky in terms of the stability of the sector, which can complicate the situation in the banking sector during crises. This factor indicates that depositors' expectations regarding the stability of the banking sector are not entirely positive, including the preference of the population for liquidity, the possibility of risks in the banking sector and, in general, confidence in the banking sector is at a relatively limited level.

➤ According to the conducted analyses, in recent years, a decrease in the spread between the 1D AZIR (Unsecured Interbank Money Market Benchmark Rate) index and the discount rate has been observed. This dynamics indicates that the 1D AZIR index and the discount rate have stabilized at a closer level and that the influence

of the Central Bank's discount rate on other market rates has become stronger over time. In order to improve the operational framework of monetary policy, it is advisable for the Central Bank to effectively manage liquidity, effectively implement open market operations, apply the interest rate corridor mechanism, and provide short-term credit and deposit facilities to banks.

➤ Due to the high sensitivity of the country's economy to oil and gas revenues, fluctuations in the global economy affect the national economy and macroeconomic stability, including the exchange rate of the manat. In this regard, it is necessary to implement more flexible and coordinated macroeconomic policy measures in order to reduce the risk of devaluation of the national currency. In the presence of devaluation risks of the national currency, the flow of foreign direct investment enters the economy intermittently. In this regard, the application of effective fiscal and monetary policy mechanisms is of great importance to maintain the stability of the manat and minimize devaluation risks. This approach can create conditions for maintaining the competitiveness of export-oriented sectors, stability of the investment environment, effective management of inflation expectations, stability of the balance of payments, and minimizing the impact of potential shocks in the foreign exchange market. In this regard, it is advisable to consider the following proposals:

- In order to adapt monetary policy to the inflation targeting regime, inflation should be kept within the target range ($4\pm 2\%$) and decisions should be made based on macroeconomic forecasts, taking into account demand-side and supply-side risk factors of inflation, as well as strengthening expectation management mechanisms;
- Promoting a transition to a more flexible approach in monetary policy, establishing predictable mechanisms for currency correction, as well as taking into account currency volatility in the assessment of credit and investment risks;
- Efficient management of foreign exchange reserves, improving mechanisms for the targeted use of reserves and

their effective application as a shock absorber ensuring macroeconomic stability during a crisis;

- Strengthening effective coordination between fiscal and monetary policies in order to maintain macroeconomic stability, ensuring mutual compatibility between the strategic objectives of both policy directions.

➤ It is considered necessary for the Central Bank to proactively establish a communication policy and make timely and coordinated interventions in the foreign exchange market. In this regard, it is advisable to develop a Dynamic Stochastic General Equilibrium (DSGE) model that allows for accurate analysis of macroeconomic variables in order to provide accurate economic forecasts and identify future trends.

➤ In order to increase the efficiency of monetary policy and the role of the financial sector in economic development, it is considered advisable to systematically analyze key target indicators (KPIs) on inflation, monetary aggregates, credit and deposit portfolio indicators, as well as the volume and growth rates of financial markets. In this context, monitoring through target indicators such as the dynamics of the money supply, credit investments directed to the economy, bank assets, attracted deposits and interest rates allows for an objective assessment of the depth of financial markets, the level of liquidity and macroeconomic stability in general. At the same time, analyzing and correctly forecasting the aforementioned indicators in their interrelationships can create conditions for a more precise determination of the mechanisms of influence of monetary instruments on economic growth and price stability.

➤ Reforms are being implemented in our country to develop the non-bank financial segment, including the insurance market. However, there are challenges related to the low insurance penetration (ratio of collected insurance premiums to GDP) (1–2% interval), the increase in loss indicators of insurance companies, the limited competitive environment in the market, the level of risk in insurance, as well as ensuring the profitability and profitability of insurance companies. In this regard, it is advisable to diversify the risk portfolio by insurance objects and subjects, increase competition

in portfolio management and develop new insurance products, increase insurance penetration and expand the application of technologies (insurtech).

➤ The Central Bank of Azerbaijan has taken important steps towards compliance with the Basel Core Principles. However, since the necessary database for measuring operational and market risks has not been fully formed, the effectiveness of risk-based control mechanisms is still limited. The average capital adequacy in the banking sector amounted to 17.6 percent by the end of 2024, which is more than the minimum requirement of the Central Bank and significantly exceeds the Basel III requirements. Since this indicator significantly exceeds the Basel requirements, the absorption of additional capital requirements is possible without creating a serious financial burden. However, it is advisable to apply stricter requirements for systemically important banks (for example, an additional leverage requirement of 1% and a countercyclical capital buffer of 2.5%). In general, the balanced application of capital adequacy requirements with transition periods and the increased use of stress-testing mechanisms in real decision-making can strengthen market discipline. As a result of these measures, the “delay” effect of interest rate shocks in the credit channel can be weakened, that is, the transmission of monetary policy can be more efficient.

➤ In order to strengthen stability in the Azerbaijani banking sector, it is necessary to deepen risk-based supervision in accordance with the experience of advanced countries. For this purpose, it is recommended to assess the capital adequacy of banks based on stress tests, stimulate the diversification of loan portfolios across sectors with mandatory regulations, daily monitoring of liquidity ratios and the application of early-warning indicators. Such an approach is consistent with the requirements of Basel III standards and, by expanding proactive control capabilities in protecting financial stability, creates conditions for timely detection and management of systemic risks.

➤ According to statistical figures, in recent years, the volume of non-cash turnover in domestic transactions carried out through payment cards in the country and the share of non-cash turnover in

total domestic transactions carried out through payment cards have increased. The positive trend in the growth of non-cash payments also increases the risks of cyber attacks and data theft. In this regard, it is advisable to apply security standards based on the “zero-trust” principle in the payment infrastructure, strengthen the cyber resilience strategy at the national level, and conduct “cyber stress tests” in the banking sector.

➤ In order to strengthen the analytical framework of the Central Bank’s monetary policy, it is considered appropriate to gradually use artificial intelligence-based models applied in advanced international practice as a pilot project. It is recommended to apply the aforementioned models in terms of forecasting macroeconomic indicators, identifying economic risks in advance, inflation forecasts, and strengthening the analytical foundations of decision-making mechanisms.

➤ Within the framework of the development of digital payment systems in Azerbaijan, real-time payment systems are considered one of the main mechanisms that enhance the speed of monetary policy transmission and financial inclusion. According to research, the cores of the AZIPS and XÖHKS systems, which are the main components of the National Payment System (NPS) infrastructure in our country, have been adapted to the requirements of the ISO20022 standard. As emphasized in the report of the Bank for International Settlements, instant payment platforms increase the speed of money circulation and transmit the impact of monetary policy to the real sector more quickly. International examples also confirm this: FedNow in the USA and Pix systems in Brazil have shown that the integration of the 24/7 RTGS (Real Time Gross Settlement) infrastructure with ISO20022 open APIs allows digitizing more than 70% of payments within five years. This both reduces transaction costs and accelerates the flow of liquidity in bank-customer relations. It is advisable for the Central Bank of Azerbaijan to fully develop the “AZ-Fast” instant payment system within the framework of the expansion of digital payments.

➤ Central bank digital currency (CBDC) acts as an innovative tool that enhances both inclusiveness and real-time data in modern

monetary policy. The results of the BIS 2023 CBDC survey show that an interest-free model and a holding limit of approximately 4% minimize the risk of deposit runs, while at the same time increasing financial inclusion and allowing for more timely data collection on the economy. A pilot project of a limited and interest-free “Digital Manat” could be implemented as a suitable approach for Azerbaijan. In this context, a digital wallet with a limit of 500 AZN and offline functionality for each customer could be envisaged. Such a mechanism, integrated with the “AZ-Fast” instant payment platform, would reduce the dependence on cash in the regions, as well as increase the accuracy of “now-casting” models by providing the Central Bank with high-frequency consumption and spending data.

➤ The effectiveness of modern monetary policy depends not only on the tools, but also on the efficiency of the database. The transition to a fast payment infrastructure and, in the future, to a CBDC will allow the Central Bank to obtain rich transaction data in the ISO20022 format. International experience shows that FedNow Guide has already implemented a “clearing data lake” module for real-time limit management in the US. A similar step is possible for Azerbaijan. It is advisable for the Central Bank to establish a “now-casting” platform based on “R” and “Python”. This platform will allow the formation of daily consumption indicators and regional turnover indices based on payment data. Such a mechanism, in addition to ensuring more reasonable decisions on interest rates, can also create conditions for faster and more accurate updating of SVAR models.

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2. Y.T.Məmmədov, “Formation of the institutional base of monetary policy”/ “IV International Scientific and Practical Conference” book of proceedi

3. Y.T.Məmmədov, “The economic basis of the role of the central bank in increasing the efficiency of the system” / “V International Scientific and Practical Conference” book of proceedings // -Toronto, -2023, -pp.27-31.

4. Y.T.Məmmədov, “Müasir dövüdə mərkəzi bankların pul siyasətlərinin arxitekturası (transformasiyası)” / Qərbi Kaspi Universitetinin “Elmi xəbərlər” jurnalı (İctimai və Texniki elmlər seriyası) // -Bakı, -2023, №3, -s.144-151.

5. Y.T.Məmmədov, “Inflation targeting in monetary and credit policy of central banks” / İqtisadi İslahatların Təhlili və Kommunikasiya Mərkəzi // “İqtisadi İslahatlar” jurnalı // -Bakı, -2023, №3, -s.44-53.

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