“ANALYSIS OF FINANCIAL MANAGEMENT AND STABILITY OF THE BANKING SYSTEM IN CONDITIONS OF ECONOMIC CRISIS”

by

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Abstract

The dissertation is devoted to the financial management and stability of the banking system in the conditions of the economic crisis.

In chapter I, entitled "Theoretical foundations of the essence and assessment of the financial stability of the banking sector", the researchers' views on financial stability are reflected. At the same time, financial stability, indicators for assessing the financial stability of the banking sector are presented in detail.

Chapter II entitled "The role of the central bank in ensuring the financial stability of the banking sector" contains the analysis of the Central Bank's measures to eliminate financial instability during and after the crisis, the stress test and its application by the Central Bank of the Republic of Azerbaijan, indicators of the banking sector reflecting the impact of macro shocks was analyzed.

In chapter III, "Analysis of the stability of the banking sector of Azerbaijan based on the econometric model", the assessment of the dependence of reserves for possible losses of the banking sector on macroeconomic factors, the assessment of the dependence of the profitability of banking sector assets on macroeconomic factors was carried out. At the same time, in this chapter, a correlation analysis was conducted based on the data of the banking sector.

As a result of the study, we can say that the country's banking system is sensitive to GDP growth rates, oil prices, capital flows, exchange rate dynamics and stock indices. These are the main macroeconomic shocks specific to the economy. Moreover, some of them, for example, capital outflows and falling GDP, affect banks not immediately, but after a certain period of time. Understanding this fact is useful in developing measures to prevent crisis tendencies in the banking sector and to strengthen the financial stability of the banking sector.

At the end of the research work, a list of literature used during the research is given.

Key words: Bank, finance, management, economic crisis, stability

Referat

Dissertasiya iqtisadi böhran şəraitində bank sistemində maliyyə idrəetməsi və sabitliyinə həsr edimişdir.

“Bank sektorunun maliyyə sabitliyinin məhiyyətinin və qiymətləndirilməsinin nəzəri əsasları” adlı I fəsildə tədqiqatçıların maliyyə sabitliyi ilə bağlı fikirləri əks olunmuşdur. Eyni zamanda, maliyyə sabitliyi, bank sektorunun maliyyə sabitliyinin qiymətləndirilməsi üçün göstəricilər ətraflı şəkildə təqdim edilmişdir.

“Bank sektorunun maliyyə sabitliyinin təmin edilməsində Mərkəzi Bankın rolu” adlı II fəsildə böhran zamanı və böhrandan sonra Mərkəzi Bankın maliyyə qeyri-sabitliyinin aradan qaldırılması üzrə tədbirlərinin təhlili, stress-test və onun Azərbaycan Respublikasının Mərkəzi Bankı tərəfindən tətbiqi, makroşokların təsirini əks etdirən bank sektorunun göstəriciləri təhlil edilmişdir.

“Azərbaycanın bank sektorunun sabitliyinin ekonometrik model əsasında təhlili” adlı III fəsildə bank sektorunun mümkün itkiləri üçün ehtiyatların makroiqtisadi amillərdən asılılığının qiymətləndirilməsi, bank sektorunun aktivlərinin gəlirliliyinin makroiqtisadi amillərdən asılılığının qiymətləndirilməsi keçirilmişdir. Eyni zamanda bu fəsildə bank sektorunun məlumatları əsasında korelyasiya analizi aparılmışdır.

Tədqiqatın nəticəsi olaraq, deyə bilərik ki, ölkənin bank sistemi ÜDM-in artım templəri, neft qiymətləri, kapital axını, valyuta məzənnəsinin dinamikası və fond indeksləri qarşısında həssasdır. Bunlar iqtisadiyyata xas olan əsas makroiqtisadi şoklardır. Üstəlik, onların bəziləri, məsələn, kapital axını və ÜDM-in aşağı düşməsi banklara dərhal deyil, müəyyən müddətdən sonra təsir edir. Bu faktın dərk edilməsi bank sektorunda böhran meyllərinin qarşısının alınması və bank sektorunun maliyyə dayanıqlığının gücləndirilməsi üçün tədbirlərin işlənib hazırlanmasında faydalıdır.

Tədqiqat işinin sonunda tədqiqat zamanı istifadə edilmiş ədəbiyyat siyahısı verilmişdir.

Açar sözlər: bank, maliyyə, idarəetmə, iqtisadi böhran, sabitlik

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Abbreviations

GDP: Gross Domestic Product

IMF: International Monetary Fund

GFB: German Federal Bank

ECB: European Central Bank

FSAP: Financial Sector Assessment Program

FSI: Financial Sustainability Indicators

NPL: Non-Performing Loan

CBA: Central Bank of the Republic of Azerbaijan

SOCAR: State Oil Company of Azerbaijan Republic

SOFAZ: State Oil Fund of Azerbaijan

FED: Federal Reserve Bank of United States of America

USD: United States Dollar

AZN: Azerbaijani manat

PPLL: Provisions for Possible Loan Losses

ROA: Return on Assets

ROE: Return on Equity

OLS: Ordinary Least Squares

LLP: Reserves of Banking Sector

GDPGR: Gross Domestic Product Growth Rate

OP: Oil Price

DER: Dollar Exchange Rate

INW: Inflow of capital

BSEI: Baku Stock Exchange Index

IIR: Interbank Interest Rate

CREDGR: Credit Issued Growth Rate

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INTRODUCTION

The actuality of the subject. Banks and the banking system are one of the most important economic institutions in any country today. Banks provide quick settlements between economic agents, contribute to the investment of savings of the population and firms and the development of the economy as a whole. The country's economy and banking sector are closely interconnected. The stability of the banking sector plays a key role in ensuring the efficient allocation of financial resources and enhancing economic growth. Therefore, the macroeconomic environment influences the condition and stability of the banking sector.

In the context of globalization and international integration, the economies of countries are becoming more open, which leads to an increase in their vulnerability to external macroeconomic shocks occurring in the world. This is confirmed by the fact that crises in the world have become more frequent and are taking on increasingly serious proportions and consequences. The effects of the crisis affect various aspects of the economy, including the banking sector, on the stability of which the normal functioning and development of the economy depends.

Therefore, at present, much attention is paid among researchers to studying the impact of macroeconomic shocks on the banking sector. The topic is relevant at the present time, since during a crisis, the condition of banks and their stability largely determines how quickly and with what losses the country will overcome the impact of macroeconomic shocks. It is the banking sector that, to a greater extent, distributes financial flows and provides liquidity to the real sector of the economy, which experiences a shortage of funds during the crisis. In other words, banks are a kind of circulatory system of the country that needs to be monitored and maintained to function smoothly. If banks are highly vulnerable to macroeconomic shocks and are unable to withstand these shocks, the consequences and development of the crisis for the country will be more serious.

Purpose and objectives of the research. The purpose of the work is to analyze the stability of the banking sector to the impact of macroeconomic shocks in the economy.

To achieve this goal, it is necessary to solve several problems:

- To study what the concept of financial stability of the banking sector includes, and what methods are used in the process of its analysis and assessment.

- Investigate the dependence of a number of variables characterizing the state of the banking sector on various macroeconomic shocks inherent in the economy.

- Analyze how the Central Bank is involved in regulating and monitoring the financial stability of the banking sector, as well as through what measures it supports banks in times of crisis.

- Identify macroeconomic shocks, the dynamics of which significantly affect the state of the banking sector, assess the strength and nature of the impact and propose possible measures to minimize the potential losses that they entail.

The object and subject of the research. Thus, the main object of research in this work is the Azerbaijani banking sector. The main subject of the study is the impact of macroeconomic shocks on the state of banks in Azerbaijan.

Research methods. Statistical methods of data processing related to the empirical analysis of multiply regression model, studied statistical data were applied, proven modern econometric methods for multiply regression models were correctly used, as well as all the necessary econometric testing procedures. Taking into account all calculations were carried out in Eviews 12 software packages.

Research question and hypothesis: Research question is: How do macroeconomic factors affect the financial stability of the banking sector? And what is the position of the Central Bank in the face of these effects?

Following research hypotheses were devoloped according to the findings:

H1: There are different approaches to defining financial stability, and each of them emphasizes important aspects for analyzing the stability of the banking sector.

H2: There are key indicators such as liquidity, profitability and asset quality ratios that most accurately reflect the financial strength of the banking sector.

H3: The measures taken by the Central Bank contribute to a significant reduction in financial instability in the banking sector and support its stability in times of crises.

H4: Stress testing is an effective tool for assessing the stability of banks and identifying potential risks, which helps the Central Bank take timely measures to maintain financial stability.

H5: Macroeconomic shocks, such as changes in interest rates and exchange rates, have a significant impact on the financial performance of the banking sector, which requires active intervention by the Central Bank to stabilize the situation.

H6: The stability of the banking sector depends significantly on a number of macroeconomic factors, such as GDP, inflation, interest rates and exchange rates.

H7: Macroeconomic factors such as inflation and GDP significantly influence the amount of reserves banks need to cover possible losses.

H8: Macroeconomic changes such as interest rate and GDP fluctuations significantly affect the return on assets of the banking sector.

I CHAPTER. THEORETICAL FOUNDATIONS OF THE ESSENCE AND ASSESSMENT OF FINANCIAL STABILITY OF THE BANKING SECTOR

1.1. Basic approaches to defining the concept of financial stability

The banking system of each state, regardless of its economic model and organization of social relations, plays a vital role in ensuring the movement of cash flows. It participates in performing the basic functions of the financial system by ensuring the stability of the monetary unit; ensuring the movement of financial resources over time, across state borders and between individual industries, etc.; developing and ensuring risk management methods; providing a mechanism for pooling financial resources and their distribution between individual business entities; ensuring the smooth functioning of payment systems, including by improving clearing and settlement methods that facilitate trade; ensuring market saturation with price information that allows coordinating the decentralized decision-making process in individual sectors of the economy.

In the context of the financial crisis, one of the main problems facing the banking systems of the world is maintaining an adequate level of financial stability, which allows banks to perform the functions of providing the economy with a sufficient amount of financial resources.

Changing market conditions threaten not only the profitability of banks, but also their functioning in general. The main reasons for the cessation of the activities of banks is their inability to neutralize risks in the banking system, as well as to meet their obligations, which is due to the insufficiency of the resource base. As is known, sustainable economic development is a process in time and space. The transition to a model of sustainable development involves an efficient economy that uses a minimum of resources to obtain a unit of result [1] Based on the above, efficiency must be ensured, on the one hand, by market structures, and on the other, by means of state regulation and development of society.

Currently, in conditions of stagnation of the world economy, a high degree of financial globalization and the likelihood of crisis phenomena in the world, more and more attention is being paid to the problems of financial stability of both the financial system as a whole and its individual components. One of the key elements of the financial system is the banking sector. The banking sector plays an important role in the redistribution of funds and financing of the real sector of the country's economy. Therefore, the financial position of banks and their stability are extremely important for the optimal functioning of the economy. Many scientists and economists are trying to identify the main factors that influence financial stability and develop a number of effective measures that can minimize their negative impact. However, it is worth noting that, despite the

growing interest in this topic, there is no single generally accepted definition of financial sustainability and ways of defining and measuring it in the literature.

If we turn to Western literature, then, as a rule, there is no specific definition of the financial stability of the banking sector, and in this context the financial stability of the financial system as a whole is mentioned. In principle, this, in our opinion, is quite possible, since, as we mentioned earlier, the banking system is one of the key elements of the entire financial system.

Let's consider a number of definitions of financial stability presented in Western literature. Having analyzed different sources, we can identify different approaches to the interpretation of this definition. A number of experts define financial stability by contradiction, that is, it is everything that does not belong to the concept of financial instability. For example, "...we define financial stability as the absence of financial instability...a situation in which economic well-being is weakened by price fluctuations of financial assets or financial institutions are unable to meet their contractual obligations....[2] or "...financial instability refers to the category of situations (conditions) in which financial markets affect or threaten to affect economic well-being" [3].

In our opinion, the above definitions of financial stability in terms of financial instability are quite vague and do not reflect the true essence of the phenomenon. In addition to price factors in financial markets, there are many other factors that influence the stability of the financial system. In addition, there is also no clear and uniform opinion on what financial instability is, so this approach to defining the concept of financial stability is accompanied by some difficulties.

The International Monetary Fund (IMF) defines it as follows: "a financial system, regardless of size or complexity, is stable when it has the ability to enhance economic welfare and correct any fluctuations that may occur as a result of negative shocks" [4].

The German Federal Bank (GFB) considers financial stability as "the ability of the financial system to perform its macroeconomic functions well even in stressful situations and during periods of structural change, including the effective allocation of financial resources and risks, as well as the conduct of payments and settlements" [5].

In turn, G. Shinasi, who conducted a fairly large amount of research in the study of this area, believed that financial stability takes place subject to the ability of the financial system to simultaneously perform three main functions. "First, the financial system effectively and continuously promotes the intertemporal redistribution of resources in the economy from savers to investors and the distribution of economic resources in general. Secondly, financial risks for the future are identified and assessed with acceptable accuracy, and are also relatively well managed. Third, the financial system is in such a state that it can absorb financial and economic unexpected events and shocks without strain, if not continuously" [6].

As we can see, in all of the above definitions, to one degree or another, a very important characteristic of financial stability is highlighted - this is the confrontation and smoothing out of various types of shocks that have a negative impact on both the financial system as a whole and its individual elements. The authors emphasize the importance of the uninterrupted performance of its basic functions by the financial system, despite external fluctuations, since this is necessary to maintain the stability of the economy as a whole and prevent the development of crisis scenarios.

The financial condition of the banking system and the economy as a whole are two interrelated phenomena. The state of each of them depends not only on their own development, but also on the development of social relations as a whole.

The effectiveness of the development of the banking system has a positive effect on investment activity and economic growth in the country. On the other hand, the efficiency of the functioning of banks largely depends on the state of the economy and especially on its manufacturing sector, since in conditions of crisis and a fall in investment activity, the activities of banks shift towards conducting speculative and risky banking operations [7].

Based on the need to orient the state regulation system towards economic growth, the development strategy of banking systems should include increasing the level of their financial stability based on minimizing the impact of systemic banking crises; improving the quality of implementation by the banking system of the functions of accumulating savings of the population, enterprise funds and their transformation into loans and investments; restoration and strengthening of confidence in the banking system on the part of investors; minimizing the risks of using the banking system in the practice of laundering proceeds from crime [8].

In scientific research, the concept of sustainability is considered in the works of B.A. Raizberg, L.Sh. Lozovsky, O.B. Starodubtseva, David B. Pierce and others.

In the “Encyclopedic Dictionary” [8] stability is interpreted as the ability of a system to maintain its structure and functional features, sufficient for activity, under various parameters of the external environment, and it is noted that the stability of the entire system depends on its ability to respond to external influences of the environment and the stability of the system itself, determined by its internal factors.

In “Macmillan's Dictionary of Modern Economic Theory” [9] stability is defined as a period, often used in the analysis of the state of partial or general equilibrium of economic systems to indicate the degree of stability of an equilibrium price or group of prices in relation to external influences on the system, which temporarily deviates the price from the equilibrium level.

A generalization of the concepts of sustainability provided gives grounds to assert that sustainability in relation to the banking system is a complex characteristic. From a methodology

perspective, this means that managing the stability of the banking system should be considered from the perspective of the relationship of three main levels:

- first level – unification with the economy as a whole and its regional segments;

- second level – the relationship between the stability of an individual bank and the stability of the banking system as a whole as an integral entity;

- third level – from the position of an individual bank as a structural element of the banking system.

Thus, sustainability is a macroeconomic characteristic of both the entire banking system and an individual bank as an integral element of this system.

The definition of the European Central Bank (ECB) also has similarities with the above terms. Financial stability is a state in which the financial system is properly fulfilling its fundamental objectives and is expected to continue to function in the future. Among the main tasks, ECB also highlights efficiency in the distribution of financial resources, identification and management of financial risks, as well as the absorption of negative external effects [10].

As we mentioned earlier, in English-language publications, issues and problems related to the concept of banking sector sustainability are considered in the context of work in the field of financial stability. However, as a rule, in all countries, banks play a key role in ensuring financial stability. The study of the financial stability of the banking system, in our opinion, plays an important role in the analysis of overall financial stability, because the banking sector in most cases occupies a key position in the financial sector in comparison with the issuance of various types of debt financial instruments and other types of investment financing that others engage in elements of the financial system (financial markets and institutions). The banking sector is the main financial intermediary in the economy, without which effective and stable functioning the progressive development of the economy is impossible. Therefore, the above definitions of financial stability can in principle be considered as definitions of financial stability of the banking sector.

It should also be taken into account that the direction of studying financial stability and sustainability of the banking sector began relatively recently, the currently available terminology is not generally accepted, clear and unambiguous definitions have not yet been developed and approved. There is some disagreement as to whether the terms "financial stability" and "sustainability" are identical to each other. If we turn to foreign sources, we will find that both sustainability and stability are denoted by one word - “stability”. That is, the distinction between these concepts has not yet been identified in foreign literature.

As for Eastern European economists, there is no consensus here. For example, O.I. Lavrushin and G.G. Fetisov believe that the concept of sustainability is more complex and

important - "... sustainability is based on stability - the ability to withstand internal and external influences... a process can be sustainable only when there is stability" [17].

I.V. Larionova takes a different position; she believes that "in relation to the banking system, the term "stability" should be used." However, at the same time, he adds that the stability of the banking system is possible only if all its elements are stable [14].

It is also worth noting the opinion of P.V. Kallaur on the relationship between the terms "stability and sustainability". For him, the term "financial stability" is broader than "sustainability". Here is what he writes about this: "financial stability presupposes the balance of the financial system, it is only the desire for balance, and its achievement is possible only in the absence of negative shocks in the economy" [16]. Thus, there are clearly opposing points of view, a lack of agreement on this issue, and economists cannot yet come to a common decision. In our opinion, the best option for the purpose of specifying and avoiding confusion in further analysis and use of these terms is to identify the concepts of financial stability and financial sustainability, that is, to adhere to Western terminology.

In publications, the financial stability of the banking sector has also been studied quite little, but recently more and more attention has been paid to this topic in the context of growing risks of crises in the world, the globalization of the economy and the impact of shocks on the banking sector. Despite the fairly active use of the term financial stability, its precise definition is extremely rarely given. Thus, in the work of S.M. Ilyasov, which is devoted to the analysis of the stability of the banking system, a definition is given in terms of stability according to a certain parameter: "an economic system (including banking) functions stably according to a certain parameter if the deviation of this parameter does not exceed an acceptable value, and interference can be compensated within certain limits." In addition, he considers stability as a whole as a set of optimal values of many parameters - a region of stability, the transition from which means the system enters an unstable state [15].

According to Fetisov G.G., "the stability of the banking system is understood as the ability of the latter to carry out, at a level set by society, its inherent functions and role in the economy, regardless of the influence of external and internal forces that impede their implementation" [17]. In the two above definitions, one can highlight the commonality - the ability and need to maintain the basic parameters of one's functioning under conditions of pressure and the influence of external destabilizing factors.

A similar definition is reflected in the work of O.I. Lavrushin, in which the stability of the banking sector is considered as "a complex, positive state, which is characterized by the ability to withstand the destabilizing influence of internal and external factors, the development of

quantitative and qualitative parameters of the sector as a whole and its individual structural components in interaction with the interests of the non-financial sector of the economy" [13].

The stability of the banking system is a property of its development that allows the system to perform its functions and role in the economy regardless of the nature and nature of the disturbing influences of internal and external factors, including on the basis of a qualitative change in its structure.

The banking system is stable if it is in a state of equilibrium and it is very important to achieve this equilibrium. Otherwise, it is problematic to call a system stable if it is not in equilibrium, since this means that exogenous and endogenous external factors were still able to negatively affect the banking system and knocked it out of its usual state.

However, here the question arises: what kind of equilibrium should take place in the banking sector: static or dynamic? In the definitions of Fetisov G.G. In our opinion, the static approach dominates, in which what is important, first of all, is the invariance of the equilibrium position over time. However, there are more supporters of the dynamic approach from the point of view of the stability of banks and their balance. I also adhere to this position, since many things change over time, including the functioning of the banking sector, as well as the nature and degree of influence of external forces. And in this context, a system is stable if it can independently or with little support adapt and achieve a new, higher level of its equilibrium, improve the qualitative and quantitative parameters responsible for sustainability. Thus, achieving dynamic equilibrium is another necessary factor for determining financial stability.

The banking sector, like the financial system as a whole, is also a complex system of interconnected elements and components, the state of each of which and the strength of the relationships between them determine the stability of the system and its resistance to various types of shocks. To characterize the stability of the banking system, it is necessary to take into account the possibility of structural changes occurring in it over time, and its ability in new conditions to either eliminate these new changes or move to a new level of development, to achieve a new equilibrium state. For this, the banking system, like any other, must have the property of self-organization. To verify the presence or absence of this quality in the banking sector, we will consider a number of prerequisites sufficient for the self-organization of the system.

Firstly, the system must be open, i.e. mutual exchange with other elements of the economic system is assumed. Banks actively interact with various institutions of the financial and non-financial sector and participate in the redistribution of financial resources. Therefore, the banking system is an open system.

Secondly, all processes in the system must occur in harmony. As an example of a similar process in the banking sector, we can take changes in the activities of commercial banks caused

by the requirements of the central bank, the development of bank branch networks, and direct interbank relations.

Thirdly, deviations from equilibrium exceed a critical value. This property manifests itself, as a rule, during periods of crisis situations in the economy, when indicators characterizing the quality and condition of the banking sector deviate from the acceptable norm in the direction of deterioration.

Fourthly, processes are considered in a range of parameters when nonlinear mathematical models are needed to describe them. Due to the fact that the banking system has a complex and ambiguous structure, accompanied by instability of influence from external forces, which are almost impossible to analyze on the basis of linear methods, it fully complies with this condition.

Thus, we have revealed that the banking system has the ability to self-organize, which is very important for studying its financial stability. In this context, the stability of the banking system can be considered as "the ability, due to the presence of structural stability, self-organization phenomena, maintaining the stability of commercial banks included in the system, as well as control influences from the central bank, to return to an equilibrium state, despite the disturbing influences of internal and external factors "[16].

Most of the definitions are connected by the fact that the financial stability of the banking sector must necessarily include the obligation of uninterrupted and normal functioning, regardless of the negative impacts on it from external shocks. It involves automatically solving emerging problems with minimal losses, both for banks and for the entire economy as a whole.

The financial stability of banks is extremely important for the redistribution of financial resources, optimal functioning and development of the country. Therefore, each state puts forward financial stability as one of its goals. To achieve positive results, it is necessary to analyze the structure of the banking sector, identify the main sources of risk for instability, identify weaknesses and the ability of banks to cope with these problems. And then, when there is already a general picture of the state of affairs, an action plan should be developed that will be aimed at strengthening financial stability and countering various kinds of destabilizing factors.

The need to form anti-crisis systems related to ensuring the financial stability of the banking sector of both global and national economies is caused by reasons characteristic of the banking sector, the main of which are:

- the extreme complexity of the functioning mechanism of international banking systems and the use of a significant number of new financial instruments; variety of operations and speed of movement of financial capital, which increases banking risks and uncertainty of the consequences of their implementation;

- financial globalization and integration, increasing the impact of systemic risks on the processes of their extrapolation from the banking sector to capital markets and derivatives markets;

- the presence of asymmetry of information in the financial market, which requires improving the processes of explication of information and ensuring its transparency based on the use of macroprudential indicators that reflect the functioning of the interbank money market, repo markets, stocks, bonds, derivative financial instruments, etc. [17];

- processes for introducing uniform standards in the field of banking management; improvement of banking management methods, in particular, anti-crisis management, based on the harmonization of international and national regulatory systems;

- ensuring technical compatibility of infrastructure, pricing policies for relevant banking and financial services [18].

When forming the principles of an anti-crisis management system for the financial stability of the banking system, it is necessary to take into account factors that should be considered at the mega, macro and micro levels:

- mega-level factors: global financial imbalances, cyclical economic development, problems of ensuring international financial stability and liquidity;

- macro-level factors: imbalances in the development of the financial market, processes of formation and spread of systemic risk, disintermination, financial innovation and communications, information asymmetry in the financial market;

- micro-level factors: the systemic nature of financial instability of banks.

According to the author, in order to form an effective system of anti-crisis management of the financial stability of the banking system, it is necessary not only to determine its general goal, but also to identify a system of ordered related goals of this system.

The main goal of the anti-crisis management system for the financial stability of the banking system is to recognize the scale of influence of crisis factors; determination of ways and methods of anti-crisis management, measures to overcome the future crisis with minimal losses.

In the international space, there are a large number of international, national and regional organizations involved in improving the regulation and supervision of the activities of financial institutions. Ensuring the financial stability of banking systems involves the development and application of anti-crisis regulation tools.

The main goal of implementing anti-crisis measures is to ensure financial stability, stability, and solvency of banking activities. Therefore, public administration and supervision of activities must ensure stability and sustainability. State management of the process of selecting and implementing anti-crisis measures should be coordinated at the mega, macro and micro levels, taking into account the specific features of the functioning of banks, its significance for the state,

including the participation of the state in the capital of banking institutions and the economy as a whole.

1.2 Indicators for assessing the financial stability of the banking sector

The financial stability of banks is extremely important for the stable and progressive development of the economy. It is necessary to monitor its condition over time for the purpose of control and regulation in order to prevent serious consequences as a result of the destabilizing effects of external and internal shocks. There are various methods for measuring and assessing the financial stability of banks, one of which is based on calculating groups of coefficients that characterize from various aspects the level of stability of the banking sector. In this context, it is worth mentioning the strengthening role of macroprudential analysis, the fundamental purpose of which is to identify and regulate risks arising in the financial system.

Indicators of financial stability are indicators of the current state and stability of the country's financial sector, as well as the corporate sector and the household sector, which are clients of financial institutions [1]. The system for assessing the financial stability of the banking sector based on financial stability indicators is one of the most important parts of macroprudential analysis, developed by the IMF based on the results of a survey of member states and regional and international financial institutions. Macroprudential analysis is the assessment and monitoring of the strengths and vulnerabilities of financial systems with the aim of enhancing financial stability. Financial stability indicators began to be actively used in 1999 during the implementation of the Financial Sector Assessment Program (FSAP) conducted by the IMF and the World Bank. Currently, these indicators represent an innovative area of macroeconomic analysis designed to provide general information about the stability of the financial sector, which allows data to be analyzed and compared across countries [12].

The globalization of the economy, the growth of international flows of goods and capital and the dependence of countries on the situation on the world market have caused an increase in the importance of control over the stability of banks in relation to volatility in the international market and crises in other countries. Concern for the state of credit institutions has gone beyond the borders of states and has risen to the supranational level. In my opinion, this is an important step, since in the conditions of modern development and integration the risk increases that financial instability in one country will lead to similar consequences in another, causing a chain reaction. As a result, the IMF, based on the results of multiple studies with the support of member countries, international and regional institutions, developed and approved in 2004 a core group of financial sustainability indicators (hereinafter referred to as FSI).

“FSIs are indicators of the current financial condition and stability of the entire sector of financial institutions in the country, as well as the sector of corporations and households that are clients of financial institutions” [19]. It is worth noting that these indicators were developed for the entire financial system, but in our case we will consider only the financial indicators that characterize the stability of banks. The list of presented FSIs is divided into two groups: basic and recommended. The difference between them is that basic indicators of financial stability are required for calculation by all countries, and advisory indicators can be used depending on the need and characteristics of a particular state. The basic set of financial stability indicators includes ratios characterizing capital adequacy, asset quality, profit and profitability, liquidity and sensitivity to market risk. A list of basic FSIs is presented below.

1. Capital adequacy

• Regulatory capital to risk-weighted assets ratio;

• Ratio of regulatory Tier 1 capital to risk-weighted assets;

• The ratio of non-performing loans and borrowings minus created reserves to capital (Non-performing loans net of provisions to capital).

2. Asset quality

• Ratio of non-performing loans and borrowings to total gross loans;

• The ratio of the distribution of loans and borrowings by sector to total loans and borrowings.

3. Earnings and profitability

• Return on assets;

• Return on equity;

• Ratio of interest margin to gross income;

• Ratio of non-interest expenses to gross income;

4. Liquidity

• The ratio of liquid assets to total assets;

• Ratio of liquid assets to short-term liabilities.

5. Sensitivity to market risk

• Ratio of net open foreign exchange position to capital.

A group of indicators for assessing capital adequacy, the meaning and formation of which is regulated by the rules of the Basel Agreement, are extremely important in the regulation and supervision of the level of risk in the banking system and help prevent excessive investment in high-risk assets, accompanied by an insufficient amount of own funds. In addition, the non-performing loan (NPL) to capital ratio can help identify a bank's ability to absorb losses before the sector falls into technical insolvency.

The next group of indicators characterizes the quality of assets, which allow us to assess the state of the bank's loan portfolio. This is an integral part of the analysis of financial stability, since the quality of loans issued has a direct impact on the financial results of the bank. An increase in overdue loans increases the risk of non-receipt of income and non-repayment of provided funds, which can lead to problems in the bank fulfilling its obligations. In order to ensure its stability, the bank must monitor the quality of its loan portfolio and carefully select the range of potential borrowers. The share of the distribution of loans by sector in the total volume of loans makes it possible to identify the degree of concentration of loans issued to a particular sector. You should not allow this indicator to be too high, because this will lead to an increase in the bank's dependence on the situation in a given sector of the economy: economic activity, pricing policy, profitability, dependence on foreign markets, etc. A quality loan portfolio should be well diversified to reduce risk and avoid serious losses.

The third group of FSIs characterizes the efficiency of asset management and use of capital by credit institutions. The growth of these indicators indicates an improvement in the quality of the bank's work and an increase in its financial stability.

Liquidity ratios monitor the adequacy of cash and other liquid assets to meet unexpected cash demands, as well as the bank's ability to meet short-term obligations, such as demand withdrawals, without experiencing liquidity problems.

As for the ratio of net open foreign exchange position to capital, it allows us to identify the degree of dependence of banks on exchange rate dynamics, that is, exposure to currency risk. In my opinion, this indicator is important for countries in which banks actively carry out transactions with foreign currency and their national currency is highly dependent on the situation on the foreign exchange market.

The above indicators are required for calculation for the purposes of control and analysis of financial stability. It is worth emphasizing that it is necessary to consider all indicators of financial stability not individually, but in conjunction with each other, in order to obtain a more complete and high-quality picture of the financial stability of banks in a particular country. Taking into account the peculiarities in a number of countries, to improve the quality of analysis, a number of indicators that are advisory in nature can be used in addition:

- Capital to assets ratio;
- Large exposures to capital ratio;
- Ratio of geographic distribution of loans to total loans;
- Ratio of gross asset position in financial derivatives to capital;
- The ratio of the gross position on derivative financial instruments on the liability side to capital;

• Ratio of income from trading operations to total income;

• Ratio of personnel expenses to noninterest expenses;

• Spread between reference lending and deposit rates;

• Spread between the highest and lowest interbank rate;

• Ratio of customer deposits to total loans and borrowings;

• Ratio of foreign currency loans and borrowings to total loans;

• Ratio of foreign currency liabilities to total liabilities.

FSIs make it possible to assess the state of the banking sector, monitor dynamics and apply measures to regulate and improve them in order to avoid destabilization of both individual banks and the entire banking system, in order to prevent a further worsening of the crisis throughout the economy. It is worth noting that when calculating the FSI, it is necessary to use data that have the same order of formation. In other words, this means that both the numerator and denominator should contain values that were obtained either at the end of the reporting period (quarter, year) or for a certain period of time to obtain more objective estimates.

Since FSIs were introduced and approved relatively recently, and this area of financial and economic analysis is quite new, countries have limited experience in the formation and application of FSIs. In these circumstances, the compilers acknowledge that "the definitions underlying the available data series for use in calculating FSIs may vary from country to country and may also differ from the recommendations set out in the Guidelines" [19].

One of the differences between the Azerbaijan system for assessing the stability of banks in comparison with the FSI is that the Central Bank in its supervisory activities relies not only on the results of the analysis and consolidation of bank reporting items, but also applies in practice some informal methods of expert assessment in order to identify factors which cannot be obtained from reporting, but which can have a certain impact on the condition of the bank and the results of its economic activities. An example of such factors can be the bank's policy in the field of personnel management, the quality and structure of management, transparency of activities, etc.

To monitor the financial stability of banks, the Central Bank of the Azerbaijan has developed indicators that are based on the principles of the well-known rating assessment model - "CAMEL", used by many banks in the world.

The CAMEL methodology is a set of indicators that involves dividing the assessment of a bank's financial stability into five main components:

1. Capital adequacy;

2. Asset quality;

3. Management;

4. Earnings (profitability);

5. Liquidity.

The qualitative indicators calculated by the Central Bank, which characterize the quality, structure and transparency of the management of credit institutions, are not of particular value, since the assessment is carried out using a questionnaire method and information on a number of criteria is not publicly available. Thus, the reliability of the results obtained in the process of assessing the quality of management is quite subjective and, as a rule, does not reflect the real state of affairs in banks.

Let us conduct a comparative analysis of the financial statements adopted by the IMF and the Central Bank of the Republic of Azerbaijan (CBA) in order to determine how Azerbaijan indicators correspond to international standards (Table 1, 2).

Table 1. Comparison of financial statements using the methods of the IMF and the CBA (basic list)

Group name	IMF	CBA
1. Capital adequacy	Ratio of regulatory capital to risk-weighted assets	Ratio of regulatory capital to risk-weighted assets
	Ratio of regulatory tier 1 capital to risk-weighted assets	Percentage ratio of additional capital to main capital
	Ratio of non-performing loans and borrowings less provisions created to capital	Ratio of assets with a risk of more than 20% for which reserves are under-created to the amount of capital
2. Asset quality	Ratio of non-performing loans and borrowings to total gross loans and borrowings	Share of bad loans in the loan portfolio Share of overdue loans in the loan portfolio
	Ratio of distribution of credits and loans by sector to total credits and loans	
3.Profit and profitability	Rate of return on assets	Rate of return on assets
	Rate of return on equity	Ratio of financial result to average assets
	Ratio of interest margin to gross income	Ratio of net interest income to total bank assets
	Ratio of non-interest expenses to gross income	Ratio of administrative and management expenses to bank net income
4.Liquidity	Ratio of liquid assets to total assets	
	Ratio of liquid assets to current liabilities	Ratio of liquid assets to current liabilities (30 days)
		Ratio of highly liquid assets to demand liabilities
		Ratio of highly liquid assets to attracted funds

		Ratio of demand liabilities to the total volume of raised funds
		Ratio of bank bills and bankers' acceptances to capital
		Ratio of the difference between attracted and placed interbank loans to attracted funds
		Ratio of liabilities of large creditors and depositors to liquid assets
5.Sensitivity to market risk	Ratio of net open foreign exchange position to capital	

Table 2. Comparison of financial statements according to the methods of the IMF and the CBA (recommended list).

Group name	IMF	CBA
1.Capital adequacy	Capital to asset ratio	The ratio of equity to assets excluding risk-free assets.
2.Asset quality	Large open interest to equity ratio	Large credit risk to capital ratio
	Ratio of geographical distribution of credits and loans to total credits and loans	
3.Profit and profitability	Ratio of trading income to total income	
	Ratio of personnel expenses to non-interest expenses	
		Ratio of net income from non-recurring transactions to financial result
		Ratio of administrative and management expenses to net operating income
4.Liquidity	Ratio of customer deposits to total loans and borrowings	Ratio of loans granted to customers to liabilities to customers
5.Sensitivity to market risk	Ratio of foreign currency loans and borrowings to total loans and borrowings	
	Ratio of foreign currency liabilities to total liabilities	
	Asset-side gross derivatives position to equity ratio	
	Ratio of gross derivatives position on the liability side to equity	

	Spread between reference rates on loans and deposits	The value of the net spread from credit operations
	Spread between maximum and minimum interbank rates	

Based on Tables 1 and 2, we can conclude that, in general, the basic FSIs according to the methods of the IMF and the CBA are almost completely identical. As for the recommended FSIs, there are some differences.

In the methodology of the CBA, in the group of indicators assessing the quality and condition of capital, there is no indicator of the ratio of Tier 1 capital to risk-weighted assets, which is widely used in European countries.

The tables show that in Azerbaijan, a more detailed system of indicators is used to analyze the financial stability of banks at the national level. This is especially true for the group of indicators characterizing asset quality and liquidity. Since most of the assets of the Azerbaijan banking sector are issued loans, the CBA applies a more detailed analysis of this article, expanding both the basic and recommended set of financial statements for this group, assessing the amount of reserves formed for possible loan losses, the share of overdue and bad loans. An increase in these values has a negative impact on the quality of the loan portfolio and can cause financial instability and a crisis. It is worth noting that there are differences in interpretation regarding the term "non-performing loans". According to the IMF, non-performing loans are loans that are overdue for more than 90 days. In Azerbaijan, they mean loans that are overdue for more than 30 days, as well as bad loans that are subject to write-off. In addition, to assess the quality of assets, the CBA does not calculate indicators that take into account the geographical distribution of loans and distribution by economic sectors.

Much attention in assessing the financial stability of banks in the Azerbaijan is paid to assessing liquidity. Compared to FSIs, which calculate only the ratio of liquid assets to total assets and short-term liabilities, the instructions of the CBA approve a wider list of indicators, some of which have regulatory values that are mandatory for execution (instant and current liquidity standards). That is, it is important for the Central Bank to control the ability of banks to fulfill their obligations within different periods of time. It is important for credit institutions that there is no problem with a shortage of liquid funds to fulfill their obligations, otherwise this may lead to a decrease in the financial stability of the bank and the threat of bankruptcy. In addition, the mandatory liquidity ratios are supplemented by some more coefficients characterizing the level of liquidity of the bank. Their analysis reveals the degree of dependence of the bank on the interbank market and large creditors, and the share of unstable liabilities in the bank's liabilities. These factors may, in an unfavorable economic situation, have a destabilizing effect on the functioning

of the bank. For example, if a bank has a high dependence on funds raised on the interbank market, then in the context of a crisis this source of funding may be cut off and the bank will not be able to use these funds. It is also worth noting that in order to ensure its stability, the bank needs to monitor the amount of demand liabilities. Of course, on the one hand, this type of borrowed funds is cheaper, but on the other hand, the risk of withdrawal of these funds increases, and the bank cannot invest them in more profitable, but long-term assets. Thus, all liquidity indicators are important for analyzing the financial stability of the banking sector and describe in more detail the condition of banks in comparison with international financial institutions.

As for profitability indicators, they are almost identical. There are minor differences only in what is taken as the numerator and denominator for calculating a number of recommended coefficients. For example, when analyzing net interest income in the Pension Fund, they consider its relation to gross income, while according to Azerbaijan standards - to the total amount of assets. In addition, the CBA does not calculate the share of trading income in total income. This, in my opinion, can be explained by the fact that banks have very little activity in the stock market in order to generate additional income.

The methodology for assessing the stability of banks does not include indicators that assess sensitivity to market risk. This fact is due to the low share of open foreign exchange positions of banks in the country, which do not pose a serious threat. In Azerbaijan, the non-use of advisory indicators related to the analysis of derivative financial instruments, in my opinion, is explained by the fact that the stock market in our country is rather poorly developed. As a rule, banks hold almost all of their assets in the form of loans and invest only a small part of their funds in securities.

Thus, these figures confirm that, in general, due to the underdevelopment and low demand for derivative financial instruments from the banking sector, there is generally no urgent need to analyze the risk exposure of securities. Much more important for analyzing the financial stability of banks in Azerbaijan are the coefficients that assess the quality and level of risk of loans issued, since this item is the main source of income for credit institutions, and, therefore, a potential source of threat to their stability.

In general, as we found out, groups of ratios help assess and control the financial stability of banks. Financial institutions analyze the state of the banking sector from different angles, allowing them to identify the weakest areas with an increased level of risk. With their help, the Central Bank can monitor the current situation and develop macroprudential policy measures to increase the stability of banks in relation to internal and external shocks in order to prevent the development of a crisis on the entire economy of the country as a whole.

The method for assessing financial or banking stability indicators is a separate issue. Although for some indicators there are certain "optimal" thresholds that are even set by national procedures (for example, 8 or 12% for capital adequacy; 30% for asset liquidity; a value close to zero for net open positions in foreign currency), many others indicators do not have such threshold values. The evaluation should therefore focus on the development of indicators over time and on comparisons with other countries.

FSIs, however, can be used in stress testing of the banking sector [20]. The great advantage of stress tests is the provision of a relationship between individual FSI and non-characteristic indicators, which are relatively static in nature. In addition, stress tests allow us to take into account the potential losses of the financial sector in the event of a shock scenario. The results of regular stress testing, especially in the banking sector, can also serve as an additional indicator of financial stability [21].

II CHAPTER. THE ROLE OF THE CENTRAL BANK IN ENSURING THE FINANCIAL STABILITY OF THE BANKING SECTOR

2.1. Analysis of the Central Bank's measures to overcome financial instability during and after the crisis

The banking sector is vulnerable to the effects of macroeconomic shocks occurring in the world. Awareness of this problem leads representatives of various countries to a common opinion that in a crisis, one of the key tasks is to take measures to maintain the financial stability of banks. It is worth emphasizing that for Azerbaijan, supporting banks in a crisis is extremely important, since they are the main elements of the Azerbaijani financial system, accumulating and redistributing financial resources in the country, as well as maintaining stability and normal functioning of the economy. If no measures are taken, the deterioration of the banking sector will further aggravate the scale and consequences of the development of crisis processes in the economy.

In conditions of macroeconomic instability, the Central Bank must take measures that will compensate for the negative effect of the crisis and avoid a collapse of the banking system.

The global financial and economic crisis in 2008-2009, which affected the USA and European countries, had a serious impact on the economy of our country, including the banking sector. The fact is that the fall in prices for oil and other export goods, a sharp outflow of capital from the country caused by growing risks in the world market, led to a fall in export earnings, the balance of payments and limited access to external sources of funding. During the period of economic recovery, enterprises and banks actively attracted loans abroad, which were provided at a lower interest rate. In addition, to repay foreign loans taken, economic entities resorted to refinancing against the security of their assets, which increased the external debt of the private sector. The weakening of the manat and falling asset prices have put borrowers in a difficult situation.

During the crisis, banks were faced with a liquidity shortage, rising costs, deteriorating loan portfolio quality, and growing distrust of the banking sector among the population. In 2008, the Central Bank decided to adopt a package of anti-crisis measures in order to maintain the financial stability of the banking sector.

The CBA has developed a package of anti-crisis measures aimed at ensuring the liquidity of banks, their solvency and stability. The CBA quite successfully coped with the task of maintaining the financial stability of the banking sector in the context of the global financial crisis; its policies were effective and implemented on time. Let us analyze the anti-crisis measures taken

by the CBA during the financial crisis of 2008-2009. The CBA has set itself a number of tasks, the achievement of which contributed to the stability of the banking sector:

- Increasing the level of capitalization of banks;
- Ensuring liquidity of the banking sector;
- Preventing the outflow of household deposits;
- Financial recovery and support for banks.

During the global financial crisis in Azerbaijan, in the context of a liquidity shortage, the depreciation of the manat and limited access to financial resources, the CBA focused its main efforts on injecting liquid funds to maintain the financial stability of the banking sector.

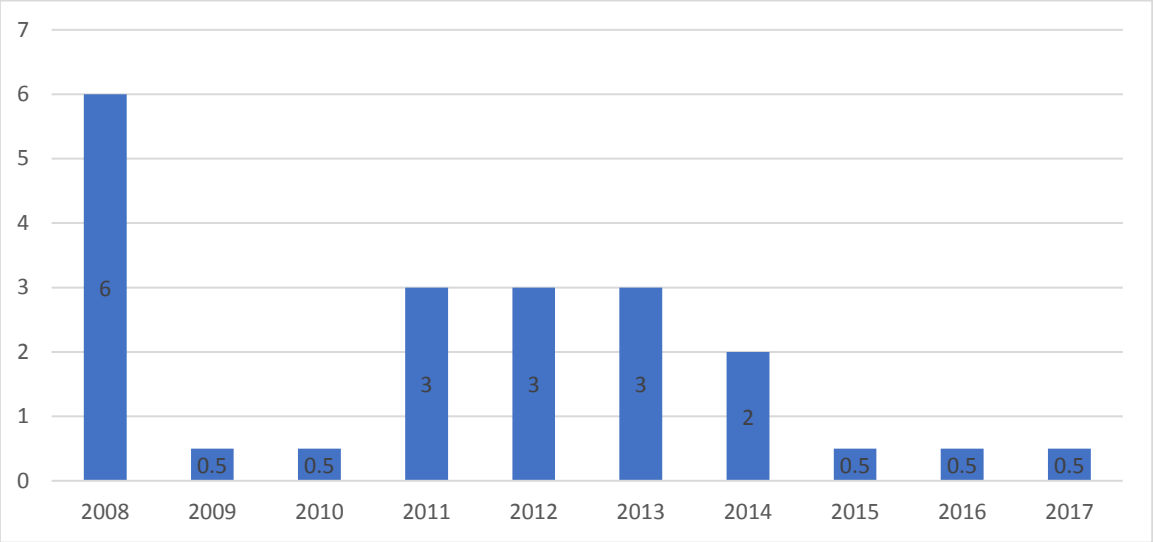
The provision of a significant amount of liquidity was simultaneously accompanied by a gradual devaluation of the manat in order to compensate for the sharp decline in external financing.

A whole range of instruments aimed at increasing liquid funds at the disposal of credit institutions was approved for use.

One of the initial measures to support liquidity was to reduce the required reserve ratio to 0.5% for all categories of reserveable liabilities. Thanks to these measures, from September to the end of 2008, the amount of required reserves decreased from 12% to 9%, which allowed banks to free up more than 3% that were in the accounts of the CBA. It highlighted the soft monetary policy of the CBA. In addition, mandatory reserve norms were reduced from 12% to 9% on 14.10.2008, and then from 9% to 6% on 01.12.2008. This made it possible to prevent the lack of resources in banks. This tradition was continued until 01.05.2011, paving the way for the mandatory reserve ratio to decrease to 0.5% [22].

Then, after the end of the crisis and the withdrawal of anti-crisis measures, the reserve ratio gradually increased, which led to an increase in the size of the required reserves. In order to regulate the rate of growth of the money supply, the form of mandatory reserve for internal and external liabilities of banks was gradually increased from 0.5% to 3% during 2011 (Fig. 1).

Figure 1. Required reserves of the banking sector in the CBA in 2008-2017 (%)

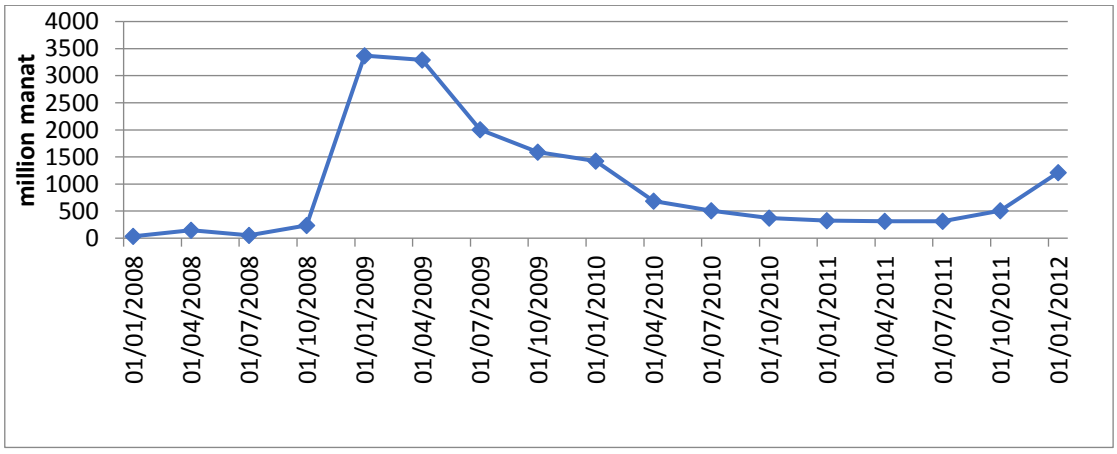


Source: [22]

To maintain liquidity, the CBA used a wide range of monetary policy instruments during the acute stage of the crisis. For the banking sector, access to various forms of refinancing was expanded, which was accompanied by an increase in permissible limits, terms of provision and a decrease in interest rates. In other words, the CBA sought to ensure the financial stability of the banking sector by providing the opportunity to receive funds on fairly soft and affordable terms and for a longer period.

During the crisis, the CBA took an active part in stabilizing the banking system (Fig. 2).

Figure 2. Banking sector loans and deposits received from the CBA



Source: [22]

In 2008, the volume of credit investments increased by 53%. The volume of newly granted loans in 2008 was 9,828 mln. AZN, which is 46.5% more than in the corresponding period of last year. In the last year, the amount of newly granted loans exceeded the amount of payments on loan debts. As a result of this, the net increase of credit investments is formed 2481.4 mln. AZN and

thus the balance of credit investments in 01.01.2009 has increased to 7163.2 mln. AZN. The specific weight of credit investments in non-oil GDP has reached 41%. In 2008, 97.6% of the total credit investments were made by banks, and 2.4% by non-bank credit organizations [22].

Bank loans have increased by 53.5%, and loans by non-bank credit organizations have increased by 36.5% in 2010. In 2009, 75% of the net emission carried out by the CBA was provided through direct instruments (credit mechanisms), and 25% through indirect instruments (compulsory reserves and notes). During the period, 22% of the loans granted by the CBA to the economy were directed to the support of the banking system, and 78% to the systemically important state enterprises [22].

In 2010, credit investments increased by 9%, including household loans by 16%. In 2011, household loans (by commercial banks and non-bank credit organizations) increased by 21.9%. By the end of 2015, the volume of the loan portfolio for households was 7.9 billion manat. In 2016, a 30.1% decrease was observed in loans given to households, which is one of the components of consumer demand. By the end of 2016, the volume of the loan portfolio for households was 5.9 billion manat. A 21.4% decrease in loans was observed in 2017. By the end of 2017, the volume of the loan portfolio for households was 4.6 billion manat [22].

During 2008, savings and deposits increased by 32.1% or 4505.7 million manats. Thus, at the end of the year, demand deposits and deposits in manat increased by 6% compared to last year, while term deposits and deposits increased by 20.6%. Deposits of individuals in manat increased at a higher rate than deposits of legal entities in manat. The special weight of deposits of legal entities (state and private) in total savings and deposits in manat decreased from 59.3% to 44.6% in 2008. The growth of long-term deposits of natural persons in manat amounted to 76.7% during the year. Long-term savings of non-resident natural persons increased 7 times. As of 01.01.2009, compared to the corresponding period of the previous year, the growth rate of savings and deposits in foreign currency was 50.8%, and the growth rate of savings and deposits in national currency was 12.5%. 41.5% of withdrawn savings and deposits were in national currency, and 58.5% were in foreign currency. The growth rate of natural persons' deposits in manat exceeded the growth rate of their deposits in foreign currency. So, in the last year, the population's savings in manat increased by 53.1%, and their savings in foreign currency increased by 9.6% [22].

During 2009, the implementation of the soft monetary policy by the CBA and the recovery of the money supply also affected the dynamics of interest rates. In general, nominal interest rates on financial assets and liabilities with national currency had a tendency to decrease during the period. Average interest rates on loans in national currency decreased by 1.5% during the year and amounted to 15.92% as of 01.01.2010. Average interest rates for loans to legal entities in manat decreased by 0.7 percentage points to 14.14%, and for individuals decreased by 0.99 percentage

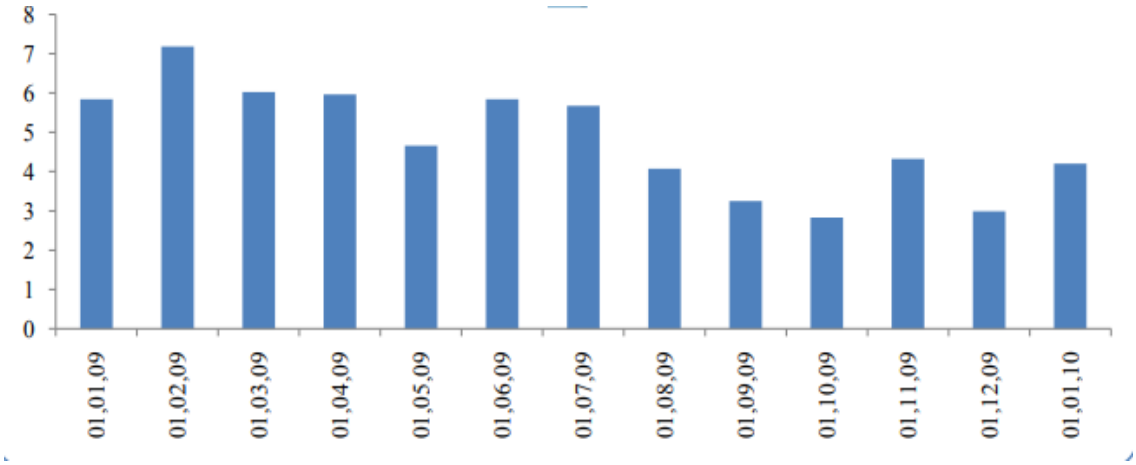
points to 20.54%. In the conditions of stability of the exchange rate of the manat, the level of dollarization decreased during the year. Thus, the share of foreign currency deposits in the M3 monetary aggregate decreased by 6 percentage points, and its share in total deposits decreased by 10 percentage points. The share of foreign currency deposits in the savings of the population decreased from 58.6% at the beginning of the year to 53.5% at the end of the year. In 2015, the level of dollarization increased. By the end of the year, the specific weight of foreign currency deposits in savings and deposits was 76.8%. In 2016, time deposits in manat increased by 45.2% during the period, and demand deposits by 25.6%. During 2017, funds were attracted by deposit operations at 10%-14.87%, and notes were placed at 10.01%-14.99% [22].

The CBA has significantly expanded its ability to refinance the banking sector to meet its liquidity needs. The following monetary policy instruments were used to implement anti-crisis measures:

- Lombard loans;
- Direct REPO operations;
- Loans secured by non-marketable assets;
- Operations to provide loans without collateral;
- Operations of the Ministry of Finance of the Republic of Azerbaijan.

The volumes and structure of funds provided during the crisis are presented below (Fig. 3).

Figure 3. The difference between nominal interest rates on loans and nominal interest rates on deposits in manat



Source: [22]

Unsecured loans for periods ranging from 5 weeks to 1 year played a special role in saturating credit institutions with liquid funds during the crisis. This refinancing instrument was in high demand from banks in conditions of acute need for funds and the lack of high-quality

collateral for loans from the CBA. Unsecured lending opened up access to funds to a wider range of banks after deciding to use national ratings to assess creditworthiness.

As anti-crisis measures, the changes made in the law "On the Central Bank" in 2009 played an important role. Changes and additions to the law reflected global trends regarding the status of Central Banks in the world. With this, the Central Bank got the opportunity to provide long-term loans in various currencies to commercial banks, as well as subordination loans [23]. Taking into account the main macroeconomic trends and the results of the economic monitoring of various large enterprises operating in the real sector, the CBA gradually lowered the discount rate from 15% to 2%, and the mandatory reserve ratio from 12% to 0.5%. In general, by means of indirect and direct instruments, the CBA increased the economy by 1.8 billion for 2008 and 2009 as well as managed to provide liquidity worth AZN. Along with the banking system, this liquidity support was applied to many enterprises of the real sector, especially SOCAR, "Azeraluminium" OJSC, as a result of which the economic growth rate continued in 2008 and amounted to 9%. Also, CBA has the right to lend to commercial banks with a state guarantee for providing support to the real sector. In 2009, the CBA took into account important macroeconomic trends and changed the discount rate 3 times during the year, reducing it from 8% to 2%, lowering the upper limit of the interest corridor from 13% to 7%. In 2009, liquidity operations were activated by the CBA, and liquidity attraction tools were relatively limited. Also, the CBA's direct aid package to the economy at the fixed exchange rate of the manat was recorded at the level of 5% of GDP [22]. The average term for mandatory reserve norms was 30 days for both national currency and foreign currency deposits. As a result of anti-crisis measures, financial stability and economic activity in banks were protected by preventing the decrease in the volume of money supply, and necessary support was provided to the production and investment activities of systemically important leading enterprises. On the basis of the successfully implemented anti-crisis measures and the stable financial and economic potential created in previous years, the endurance of the country's economy was preserved, and the ability to resist negative external influences was successfully tested.

After the global economic crisis, the growth rate of the country's economy was observed, after that, in response to the threefold drop in oil prices from the second half of 2014, macro-economic policy maneuvers were again made, this time deeper. The level of use of oil revenues has been optimized, exchange rate corrections have been made, financial segment rehabilitation and restructuring operations have been initiated, the created Financial Stability Council has played the role of an important platform for macroeconomic coordination. However, until 2016, the global economic situation remained unfavorable for Azerbaijan. The sharp drop in crude oil prices compared to previous years and the weak economic growth trends observed in important economic partners have had significant effects on the country's balance of payments indicators as well as

aggregate demand. With the decrease of income expressed in foreign currency, the calls for ensuring macroeconomic stability have been in the focus of attention.

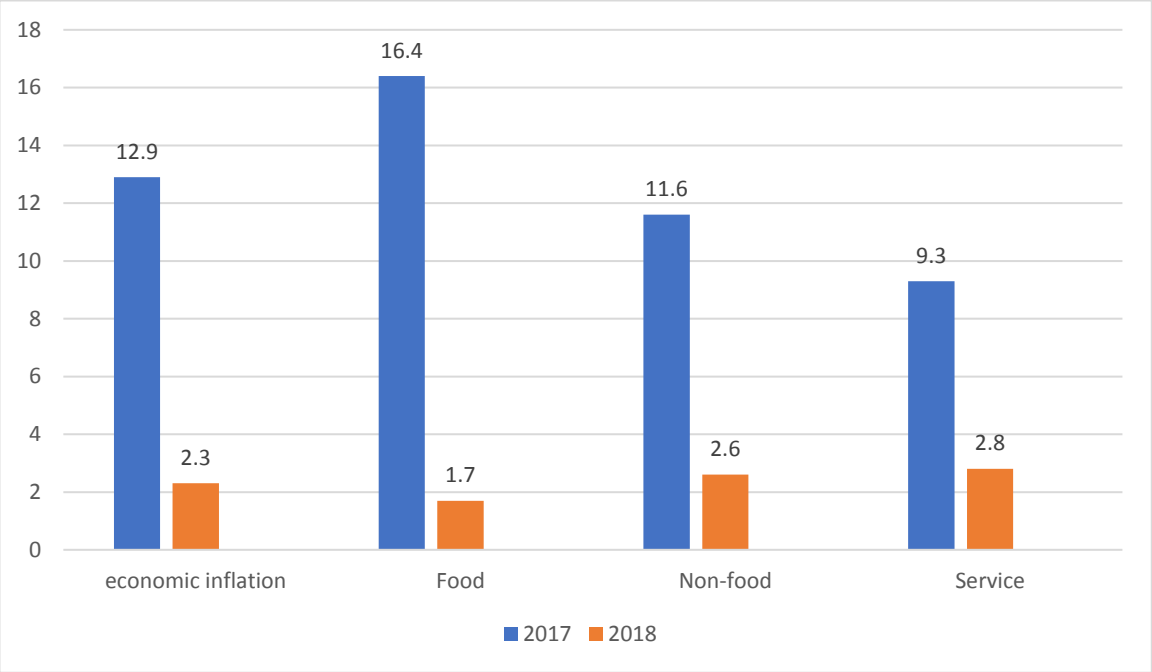
During 2016, the GDP decreased by 3.8% and nominally amounted to approximately 60 billion AZN. The volume of GDP per person of the population was 6,223.8 AZN. During 2016, there was an increase in agriculture and forestry, fisheries, trade, communication, tourist accommodation, public catering, and a decrease in transport and construction. In 2016, 41 million tons of crude oil and 18.7 million cubic meters of natural gas were produced in the mining industry. Oil production decreased by 1.4% and gas production by 3.9%. During this period, there was a 2% increase in the non-oil sector. In 2016, the average annual inflation rate was 12.4 percent, according to the data of the Central Bureau of Statistics. Also, food prices increased by 14.8%, non-food prices by 16.7%, and service prices by 5.8% [22].

The program for providing unsecured loans introduced by the CBA has made a significant contribution to ensuring the financial stability of the banking sector. The need and effectiveness of this mechanism during a crisis is confirmed by the volume of loans provided and their share in the total volume of refinancing funds. Many banks that really needed additional liquidity simply did not have the opportunity to receive a loan from the CBA in conditions of an acute shortage of collateral assets and falling stock indices. These measures really provided an opportunity to saturate medium-sized and regional banks with liquidity, which previously did not have access to refinancing and prevent the insolvency of a number of credit institutions.

Observations have shown that the direct impact of the devaluation of the nominal effective exchange rate of the manat in 2016 on the average annual inflation (12.4%) was 5.5% [22].

Since 2016, the CBA has provided important support to the protection of macroeconomic stability in the country by ensuring the performance of its functions according to its mandate. The monetary policy implemented by the CBA during the year is aimed at price stability, which is considered an important indicator of macroeconomic stability, and further strengthening of confidence in the manat. The amount of money supply was adjusted according to the monetary program agreed with the relevant authorities, and necessary changes were made to the quantitative indicators of monetary policy instruments depending on macroeconomic indicators and forecasts. Also, measures to improve the strategic framework of monetary policy have been strengthened. By continuing the exchange rate regime applied by the CBA at the end of 2015, opportunities were created for the formation of the manat exchange rate based on macroeconomic fundamentals. In order to create conditions for determining the national exchange rate depending on the demand and supply formed in the foreign exchange market, the CBA has reduced its participation in the foreign exchange market. As a result, the level of average annual inflation in 2017-2018 has decreased significantly (Fig. 4).

Figure 4. Average annual inflation in 2017-2018



Source: [22]

Since 2015, the exchange rate of the manat compared to foreign currencies has been formed in accordance with the trends in the direction of the balance of payments and according to the floating - adjustable exchange rate regime announced by the CBA. As a result, the exchange rate of the manat was changed by the influence of the main macroeconomic fundamentals (oil price, balance of payments, etc.). With this, the CBA completely abandoned the exchange rate regime it established in December 2015. However, taking into account the presence of a deficit in the balance of payments and the fact that this deficit is more concentrated in the movement of capital and finance, in 2016, a managed floating exchange rate regime was implemented in order to prevent a sharp depreciation of the manat. Thus, the negative impact of exchange rate changes on financial stability has been minimized. In general, the volume of the foreign exchange market decreased significantly in 2015 and 2016. For example, in 2016, compared to the previous year, the volume of currency transactions in US dollars decreased by 3.2 times, and the volume of transactions in Euros decreased by 2.4 times. Decreases in the volume of the foreign exchange market were also observed in the cash foreign exchange market segment. In 2016, the cash sold by commercial banks decreased 20 times compared to the previous year and amounted to 445.4 million US dollars and transactions with euros decreased by 3.3 times and amounted to 266.6 million euros [22].

In 2016, the operational framework was implemented in accordance with the new exchange rate regime of the CBA. The level of participation of the CBA in the foreign exchange market was

reduced to a minimum, and the sales of foreign currency by SOFAZ were carried out within the framework of auctions organized by the CBA. During 2016, sales of foreign currency by SOFAZ amounted to 4.9 billion USD. It was 37.5% less compared to the previous year. Compared to 2013, when more transfers of the Fund to the state budget were recorded, foreign currency sales decreased by about 3 times [22]. In order to create opportunities for flexible participation of commercial banks in the foreign exchange market, the CBA started implementing a new bilateral auction mechanism in this period. The new auction mechanism gave market participants the opportunity to place orders in both directions (purchase or sale of currency).

The introduction of the new exchange rate regime made it possible to effectively protect the reserves of the CBA. According to the end of 2016, the reserves of the CBA in foreign currency amounted to 4 billion USD, which exceeded the norms accepted in the international standards for sufficiency (covering the import of goods and services for a 3-month period, ratio of manat to money supply, etc.) [22].

In 2016, taking into account macroeconomic forecasts, the CBA made important changes to the parameters of the interest corridor for liquidity operations in order to further strengthen confidence in the manat and create opportunities for improving monetary policy instruments in accordance with the situation in the money market. As a result of the decision of the CBA, the discount rate was gradually increased from 3% to 15%, the lower limit of the interest corridor was increased from 0.1% to 12%, and the upper limit was increased from 5% to 18%. When decisions on the interest rate corridor were made, together with the macroeconomic situation, the dynamics of the profitability of government securities were also taken into account [22].

Also, during 2016, the duration of transactions for guaranteeing and attracting liquidity for interest rates at the lower and upper limits of the interest corridor was extended from 1 day to 7 days. Commercial banks can use 1-7-day repo and counter-repo operations (instruments of monetary policy used to ensure the placement and attraction of funds), which are considered the framework tool of the CBA for short-term liquidity management, at their discretion. In 2016, the CBA activated sterilization operations, taking into account the macroeconomic processes, as well as the processes observed in the currency markets. Thus, starting from the second half of 2016, the CBA started conducting deposit auctions to attract free funds denominated in manat, and from November, auctions to place notes. In general, in 2016, 26 deposits and 9 auctions related to the placement of notes were held in connection with the attraction of funds. With this, at the end of 2016, the balance of funds raised by deposit auctions and placement of notes was 189 mln. AZN [22].

Deposits and short-term note placing operations, such as open market operations, are aimed at the development of the money market along with the sterilization of the money supply, thereby

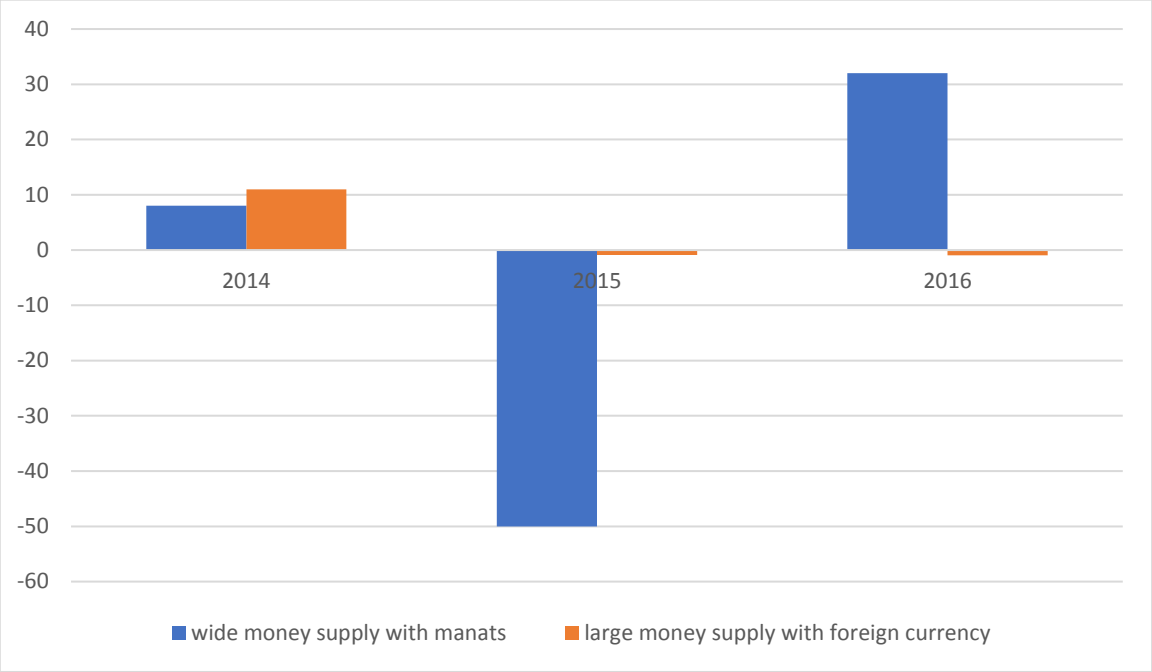
improving the operational framework related to the monetary policy. The attraction of funds for these operations carried out on the basis of the proposal of the CBA is carried out at interest rates that fluctuate between the lower limit of the interest corridor and the discount rate. The open market operations, which have the nature of issuance for the placement of funds, are carried out at interest rates that fluctuate between the discount rate and the upper limit of the interest corridor.

In order to accelerate the process of de-dollarization, as well as to strengthen the financial stability of the banking sector, in 2016 the CBA increased the mandatory reserve ratio from 0.5% to 1% of the foreign currency-denominated liabilities of the banks, liabilities of the financial sector considered non-resident, as well as also reduced from 0.5% to 0% for transactions with international financial institutions [22]. Mandatory reserve ratio of liabilities involved in national currency and precious metals has been kept unchanged. Taking into account factors accelerating inflation in 2016 and 2017, the channels of growth of the monetary base were managed through the monetary program. According to the monetary program, it is envisaged to limit the rate of growth of the monetary base in manat. During those times, the process of conducting liquidity operations by the CBA was directly based on the monetary program. Here, the main goal was to regulate the channels of additional money supply, not to create an additional effect on the current exchange rate of the manat and, as a result, to prevent the rise in prices and the level of inflation. With this, the monetary base has acquired the main operational position in monetary policy.

In general, in contrast to 2015, the growth rate of the monetary base in 2016 and 2017 was in line with the planned monetary program. As a result, in 2016, the monetary base expressed in manat increased by 13.9% and reached 7860.5 mln. manat. During this period, the mass of cash in circulation, which are components of the growth of the monetary base, increased by 28.5%, while correspondent accounts in manat decreased by 39.6% [22].

As can be seen in the Figure 5, the decrease of the wide money supply in terms of manat was different from the decrease of the foreign currency savings and deposits.

Figure 5. Change in money supply, in %



Source: [22]

Despite the fact that the regulated floating exchange rate regime is in effect in Azerbaijan, the CBA does not make predictions about the interval in which the exchange rate of the manat will change. As a result of not giving a forecast about the exchange rate, the CBA went to devaluation in 1 day in 2015, and in addition to those who benefited from the positive aspects of this process, there were also those who suffered from the negative aspects. In order to prevent such processes from happening, it is necessary to provide advance information. For example, the GFB annually publishes the corridor of money supply growth for the following year. This is related to the growth of production, changes in prices and the speed of money circulation. With this information, central banks help the economy and prepare it for growth, limiting inflation expectations. Every week in the US, FED announces the current money supply in the economy. Providing such information in our country would be positive. Another aspect of the problem is related to the extent of devaluation. For this purpose, the balance of payments should be examined by elements, a broad economic analysis should be conducted, and devaluation should be applied at the appropriate level for the competitiveness of the products of producers in Azerbaijan.

The CBA has decided to expand the list of assets that could be used as collateral when receiving a Central Bank loan secured by non-marketable assets or guarantees. In addition, the CBA has increased the list of organizations that are obligated on bills of exchange and rights of claim under loan agreements.

Also, during the crisis, the Lombard list of securities, which are used as collateral when receiving loans from the CBA was expanded. It was decided to reduce the requirements for the rating level of bond issuers, as a result of which the share of corporate bonds increased in 2009 from 17% to 25%. The Lombard list included shares of non-resident legal entities, exchange-traded bonds, mortgage-backed bonds, as well as securities of systemically important organizations. Of all the mechanisms presented for refinancing banks, pawn loans were used to the least extent, since, despite the expansion of the Lombard list of securities, banks had problems providing this type of collateral during the crisis; it was preferable for them to obtain unsecured loans or loans secured by non-marketable assets which prevailed at that time.

The easing of requirements for the quality of non-marketable assets and securities serving as collateral for loans from the CBA provided significant support to the stability of the banking sector. Not only large and state-owned banks, but also regional credit organizations, which, as a rule, are the most vulnerable during a crisis, received access to refinancing. Thus, this set of anti-crisis measures helped to avoid the collapse of the banking system and ensure the continuous functioning of the country's national payment system.

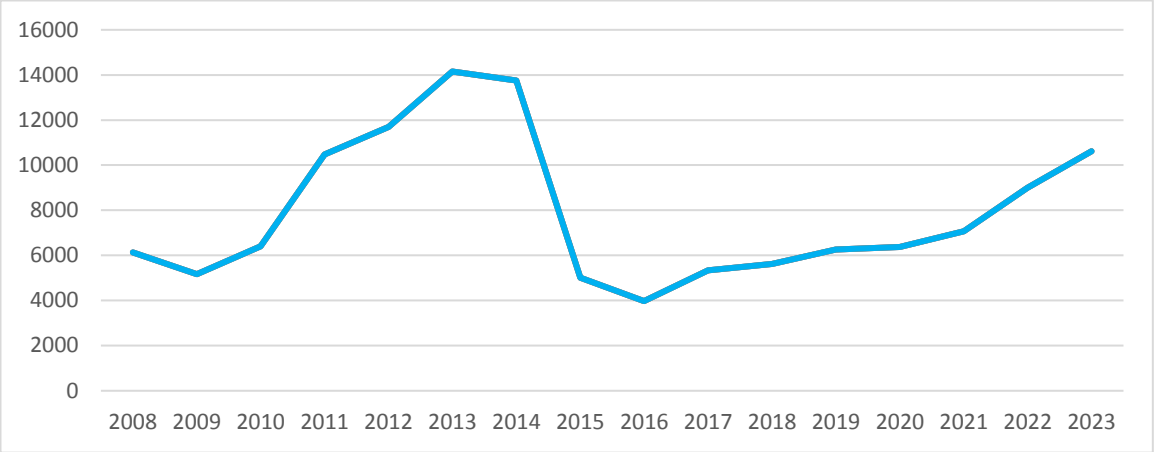
As a refinancing tool, the CBA actively used direct repo operations during the crisis in order to maintain the financial stability of the banking sector.

In October 2008, the CBA decided to compensate part of the losses of credit institutions on transactions in the interbank market. The essence of this mechanism was that the CBA placed a compensation deposit in the bank, which could be written off later if the license of the borrowing bank was revoked for transactions on the interbank market.

During the crisis, the CBA decided on the need to increase the capital of banks, since costs and risks that needed to be covered were growing. The presence of a high level of capital during a period of macroeconomic instability provides banks with a kind of "safety cushion" that allows them to mitigate the negative impact on their position. In addition, in the context of increasing riskiness of assets, the problem of compliance with the capital adequacy standard arises, which is extremely important for assessing the condition of banks, since its failure to comply leads to bank insolvency.

Declining export earnings, capital outflow and rising external debt have led to a significant foreign exchange shortage in the country. In order to make up for it and prevent a sharp depreciation of the manat, the CBA decided to first maintain the stability of the boundaries of the currency corridor, within which the exchange rate changes, at the expense of existing gold and foreign exchange reserves. However, during the crisis, it was increasingly difficult for the CBA to keep the manat within certain limits as well as gold and foreign exchange reserves were depleted at a rapid pace (Fig. 6).

Figure 6. Official foreign exchange reserves (million USD)



Source: [22]

The planned devaluation carried out by the CBA during the crisis brought a number of positive results. It allowed us to avoid panic that could occur in the event of a sharp depreciation of the national currency. In this way, the CBA gave economic agents time to think through a model of their future behavior, hedge risks on foreign currency obligations and thereby reduce the amount of losses incurred. In the context of a high level of external debt of the private sector in foreign currency, limiting the sharp increase in the exchange rate by the CBA eased the situation for banks and a number of enterprises, maintaining their stability.

The weakening of the manat, in turn, made it possible to support exporters and smooth out the threat of a balance of payments deficit, and increase the volume of export revenues to the state budget. In addition, the devaluation led to higher prices for imports, which had a beneficial effect on the development of domestic production. From all this we can conclude that in conditions of economic recession and instability of financial markets, a gradual devaluation was taken as an effective anti-crisis measure.

In other words, the actions of the CBA are aimed at weakening government intervention in the formation of the exchange rate and a gradual transition to free floating.

During the financial crisis, the banking sector was faced with a deterioration in the quality of loan portfolios and an increase in overdue debt caused by a decrease in the solvency of the population and enterprises of the real sector. As a result of the increased level of credit risk, banks were forced to accrue significant reserves for possible loan losses, which contributed to an increase in bank costs, a decrease in profits, and a reduction in the supply of credit, which was necessary to support enterprises in the real sector, which experienced a shortage of financial resources.

Under these conditions, the CBA decided to relax the requirements for the classification of loans and the formation of PPLL (Provision for possible loan losses). The period after which the

loan debt was considered overdue was increased. It was also allowed not to reduce the quality category of restructured and extended loans. In other words, the easing of the requirements was aimed at reducing the volumes of PPLL, which were growing at a rapid pace and had a negative impact on the profitability of credit institutions. These measures of the CBA allowed banks in 2016 to reduce the amount of required reserves for possible loan losses by 10% and made it possible to improve the financial stability of the banking sector in a crisis due to a positive impact on the financial results of credit institutions.

Since mid-2010, in the context of economic stabilization and growing liquidity in the banking sector, the CBA has been gradually winding down anti-crisis measures to maintain the financial stability of the banking sector, reducing the terms of loans provided and introducing restrictions on securities included in the Lombard list. In addition, the CBA stopped issuing loans without collateral, increased the required reserve requirements and restored the pre-crisis requirements for the formation of PPLL.

Summing up the effectiveness of the measures taken by the CBA to prevent a crisis in the banking sector, we can say that the task was solved. The CBA, with the help of various monetary policy instruments and a number of relaxations, managed to avoid the collapse of the banking sector and ensure the functioning of the national payment system. A wide range of refinancing mechanisms opened up access for a larger number of credit institutions to the CBA loans and thereby solved the problem of liquidity shortages and collateral compression in conditions of macroeconomic instability.

Due to subordinated loans, there was an increase in the capital of the banking sector. This support from the state was provided to banks that are most significant for the stability of the banking sector.

It is worth noting the role of the Deposit Insurance Agency in supporting Azerbaijani credit institutions, which effectively carried out the financial rehabilitation of 18 credit institutions and prevented a massive outflow of deposits due to the new deposit insurance system.

Thus, we see that the CBA, with the support of a number of government agencies, was able to quickly react in conditions of macroeconomic instability and take the necessary measures, thereby ensuring the stability of the banking sector and successfully overcoming the consequences of the global financial crisis.

In subsequent years, the CBA continued its activities to develop and improve macroprudential policy instruments aimed at maintaining the financial stability of the banking sector and long-term sustainable development.

In addition, as part of monitoring the state of the banking sector, depending on various macroeconomic conditions, the CBA conducts regular stress testing in order to identify the degree of stability of banks in relation to external shocks.

The CBA continues to improve the refinancing mechanisms necessary to maintain bank liquidity, as well as requirements for the size and structure of the capital base and risk assessment of the banking sector. Thus, the CBA is pursuing an active policy in ensuring the financial stability of the banking sector in conditions of macroeconomic instability.

2.2. Stress testing and its application by the CBA

Currently, to analyze the stability of banks to various factors of an exogenous and endogenous nature and assess risks, stress testing methods are becoming increasingly popular and widespread. The essence of this method is to predict with the smallest error the likely consequences of the impact of unexpected shocks on the banking system. For the CBA, stress testing of the banking sector is necessary to develop effective policies in the field of banking regulation and supervision that promote resilience to risk factors and increase financial stability. The development of measures to support the stability of the banking sector, taking into account the results of stress tests, significantly increases their effectiveness, since thanks to stress testing, banks identify factors to which the banking system is most vulnerable to change. Knowing what risks and how they affect the condition of credit institutions allows regulators to use tools aimed at mitigating the impact of these risks.

A number of sources provide the following definitions of the concept of stress testing. According to the definition approved by the IMF, stress testing is "methods for assessing the sensitivity of a portfolio to significant changes in macroeconomic indicators or to exceptional but possible events." [24].

In turn, the Bank for International Settlements defines it as follows: "stress testing is a term that describes the various methods that financial institutions use to assess their vulnerability to exceptional but possible events." [25].

As for the Azerbaijani understanding of this concept, the CBA considers stress testing "as an assessment of the potential impact on the financial condition of a credit institution of a number of specified changes in risk factors that correspond to exceptional but probable events" [22].

The above definitions confirm that the main purpose of stress testing is to identify how vulnerable banks are to certain factors and events. Moreover, the exact probability of these events occurring in the future, their timing and scale cannot be predicted. It is quite difficult to predict everything in advance, but at the same time, not paying attention to the possibility of their

occurrence is very dangerous, since this can negatively affect the economy of the country as a whole. And in this case, stress tests are a fairly effective method for determining the vulnerability of banks to shocks and monitoring the stability of the banking system.

Recently, the CBA has been paying more and more attention to the development and application of stress testing models for the Azerbaijani banking system. The main goal is to identify the main risks threatening the banking sector, assess possible losses as a result of their occurrence, and also compare the amount of damage incurred with the regulatory acceptable level.

As a rule, the CBA conducts stress testing quarterly. The exception was the period of the acute phase of the crisis in 2008-2009, when they were carried out with monthly regularity. To assess the stability of the banking sector, the CBA uses both single-factor stress tests and multifactor models (scenario approach).

Single-factor stress tests (sensitivity analysis) – these models examine the influence of a single factor on the stability of the banking sector. However, it is worth taking into account the fact that when a real stressful situation occurs, other risk factors tend to change, so the results obtained from sensitivity analysis may be imprecise and unreliable.

Multifactor stress test models (scenario approach) - unlike sensitivity analysis, where the vulnerability of the banking system in relation to one factor is assessed, within the framework of the scenario approach the impact of a combination of destabilizing factors is analyzed. In multifactor stress tests, several factors change simultaneously. This method, in my opinion, is the most complete and correct, since it takes into account the total impact of shocks that are interrelated.

Depending on the method of analyzing the stability of the banking system, the CBA uses two key approaches: “bottom-up” and “top-down”.

• The “bottom-up” approach is that the CBA itself conducts stress testing based on aggregated reporting for all banks and assesses the vulnerability of the banking sector as a whole to various risk factors.

• Top-down approach. Stress testing is carried out at the level of each bank independently. The responsibility of the credit institution is to determine the losses that may arise if a stress scenario occurs and send the results obtained for generalization and aggregation to the CBA. As a rule, in Azerbaijani practice, this approach covers only part of the banks, the total volume of assets, which constitutes more than 50% of the assets of the entire banking sector.

The dependent variable for assessing the stability of the banking sector in relation to a number of macroeconomic factors is the capital adequacy ratio of credit institutions. Using stress testing models, the CBA is trying to formulate a forecast of how certain factors will affect the capital adequacy of banks in conditions of macroeconomic instability and how many credit

institutions will not be able to overcome the minimum level of the N1 standard of 10%. In addition, stress tests make it possible to assess possible capital losses of credit institutions from the impact of a given level of risk from macroeconomic factors and the amount of necessary capitalization of banks to comply with prudential standards in the event of stress scenarios.

During stress testing, the impact on the balance sheet of each credit institution of three key types of risk is analyzed: credit, market and liquidity risk. Moreover, several options for the development of events are considered: pessimistic, conservative and extreme.

The main difference between the scenarios is the size of the shock, which affects the share of bad loans in the bank's loan portfolio. The value characterizing the strength of this credit risk is determined for each bank individually based on statistical data on the volume of bad loans over a long period of time. As a result, each bank calculates its own standard deviation value, the amount of which expresses the amount of credit risk.

Liquidity risk can also vary depending on the type of scenario. To assess the impact of the risk of loss of liquidity of banks, the following scenarios are considered:

• Outflow of funds from banks: household deposits from 10% to 20%, enterprise current accounts: 10% - 20%, enterprise deposits: 5% -10%, international bank deposits: 30%.

• Discount in the absence of access to the domestic interbank market with the forced sale of liquid assets to maintain bank liquidity: a discount of 5% on highly liquid assets, 20% on liquid assets, 60% on low-liquidity assets.

• Inaccessibility to operations on the interbank lending market.

The impact of market risk on the stability of the banking sector is assessed through changes in the currency, interest and stock risks included in it. According to the conditions of the stress scenario, the manat exchange rate falls by 20%, there is a depreciation of equity securities by 30% and a parallel shift in the yield curve for the CBA bond portfolio by 300 bp, for the corporate bond portfolio – by 900 bp [22].

During stress testing, the impact of stress test conditions on the balance sheets of each credit institution is analyzed, then the results are aggregated across the entire banking sector, and the total amount of possible cumulative losses upon realization from all types of risk in the event of a stress scenario is determined, as well as the possible capital deficit, which needs to be replenished to maintain the stability of the banking sector.

Stress tests carried out in 2009-2010 showed that as a result of the implementation of stress scenarios, the total losses of the banking sector averaged 4.2-5.8% of GDP, depending on the scenario. Stress testing in both cases revealed that the greatest danger for the banking sector is credit risk: in 2009 it amounted to 40-50% of total losses, in 2010 - 25%. Losses from the impact of the risk of loss of liquidity in 2009 were estimated at 12% of capital, in 2010 slightly higher -

13.8%. As for the size of the expected losses from the realization of market risk, in 2009 their value was estimated at 16.3-18.1% of the capital of the banking sector, depending on the scenario, in 2010 - 12.7%. In both cases, among the market risk factors, the most important is interest rate risk [22].

It is also worth noting that the CBA began to use the developed macroeconomic model to conduct stress testing, based on the international practice of the scenario approach. Its essence lies in the fact that it includes a system of several regression equations that explain the impact of a number of macroeconomic factors (GDP, inflation, dollar exchange rate, oil price, income level, etc.) on indicators of the state of the banking sector (size deposits of individuals and legal entities, revaluation of the securities portfolio, quality of the loan portfolio, the size of the loan portfolio and the share of overdue loans, etc.).

As a result, it was found that in the event of a pessimistic scenario, the losses of the banking sector are estimated at 27% of capital, in the case of an extreme scenario - 37% of capital. The greatest threat to the banking sector is credit risk caused by a significant increase in overdue and problem loans in the loan portfolio of banks. As for the capital adequacy ratio of the banking sector, in the worst case scenario its value was 10.8%, which is higher than the established level of 10%. A separate stress test for sensitivity to the risk of loss of liquidity revealed that only a number of banks, whose share in total assets is about 2.7%, can experience a significant liquidity shortage. That is, liquidity risks do not pose a serious threat to the stability of banks.

Stress testing for the CBA is used as a tool for analyzing potential banking risks associated with instability of the macroeconomic environment. The results of the conducted stress tests serve as an additional source of information necessary when analyzing systemic risks and developing macroprudential policies aimed at maintaining the financial stability of the banking sector.

2.3. Banking sector indicators reflecting the impact of macroshocks

The banking sector is an important element of the financial system, on the stability and well-being of which the state of the country’s economy depends. Recently, countries are increasingly exposed to negative macroeconomic shocks, which lead to the development of various crisis scenarios. In these circumstances, in order to ensure macroeconomic and financial stability, an important task is to identify whether and how macroeconomic shocks affect the banking sector. This study is necessary because if banks are exposed to macroeconomic shocks, and the effect of this influence is similar to the impact on the economy as a whole, then in the event of a recession and crisis, the state of the banking sector will further aggravate the current state of affairs and the scale of the crisis.

Let's consider how the phases of the economic cycle affect the state of the banking sector. As you know, for any economy the periods of recovery and peak are positive, while the stages of recession and crisis have a negative impact. During an economic expansion, firms typically increase profits, asset prices rise, and the public develops optimistic expectations about the future. The economy is experiencing an increase in aggregate demand, household incomes are growing, all this together leads to an increase in the rate of demand for bank loans. Banks, in turn, are actively increasing their loan portfolios, trying to meet the demand for credit resources and thereby increase their profits, since the main income of banks is lending. During a period of economic boom, banks, in order to attract as many clients as possible, tend to simplify the requirements for potential borrowers, thereby underestimating the risks associated with this. In addition, in favorable conditions, the probability of non-payment by customers, the volume of overdue and written-off loans decreases, which leads to a decrease in the volume of reserves for possible loan losses.

However, sooner or later, after the peak of economic activity there comes a period of recession in the economy. Demand and prices for assets are declining, firm profits are declining, unemployment is rising, which leads to a decrease in household incomes, a decrease in the value of their collateral, and an increase in the likelihood of loan defaults. In this situation, banks are faced with the fact that problem assets in the balance sheet of banks increase, the quality category of borrowers decreases, that is, risks increase sharply, which may require the formation of reserves and a higher level of capital. The banking crisis further aggravates the crisis in the country. Thus, we come to the conclusion that banks are influenced by trends occurring in the economy.

It is worth noting that, in principle, many banking indicators have the potential to act as indicators reflecting the degree of impact of macroeconomic shocks on the banking sector.

In the previous paragraph, we examined that bank capital is widely used in stress testing models as a variable characterizing the degree of influence of macroeconomic indicators on the condition of credit institutions. However, bank capital is not the only indicator that reflects the consequences of macroeconomic shocks and fluctuations in the economy. Therefore, let us analyze the influence of macroeconomic factors on two other variables - reserves for possible losses and return on assets.

Banks create loss provisions when they believe that there is a risk that the borrower will default on loan obligations. The growth of formed reserves, in turn, affects both the bank's profit, since they are expenses for the bank, and its capital, reducing the net asset value. Large volumes of reserves can lead to the fact that the bank will not receive a profit, but a loss from its activities.

However, it must be borne in mind that an increase in reserves does not always indicate a deterioration in bank affairs. The fact is that in favorable economic conditions, some banks do not

reduce reserves, as follows from the logic, but, on the contrary, increase them, thereby understating profits and smoothing out their fluctuations over time (income-smoothing effect). This practice is rarely used, since, as a rule, this is due to accounting features, underestimation of possible future losses, and also the fact that an increase in reserves may be perceived by shareholders as a signal of deterioration in the quality of the loan portfolio.

Thus, we conclude that loss provisions decrease during periods of economic expansion and increase during recessions and macroeconomic instability.

The next indicator to determine the impact of macroeconomic shocks on the banking sector is return on assets (ROA). Of the indicators of profitability of the banking sector (ROA and ROE), I gave preference to return on assets rather than capital because, in my opinion, it is this indicator that most characterizes the efficiency of the banking sector and the management of its assets, especially in the credit market.

A favorable economic environment in the country contributes to the activation of the banking sector, the growth of credit operations, which leads to an increase in the efficiency of banks and, as a result, an increase in ROA. In conditions of macroeconomic instability, declining demand and income of households and firms, liquidity shortages, declining lending volumes and rising costs of raising funds, the situation is reversed: bank revenues are declining, expenses are rising, which ultimately leads to a significant reduction in profits or even loss, that is, the profitability of banks' assets falls.

Currently, there is a fairly large amount of work devoted to studying the degree of influence of macroeconomic factors on these indicators using econometric models.

Since the risks associated with the provision of loans, as a rule, are the main sources of financial instability of banks, the dependent variable in the scientific works of foreign authors is often analyzed by bank indicators characterizing the level of quality of the loan portfolio. For example, Pesola (2001) devoted his work to the analysis of banking crises in the Nordic countries (Denmark, Sweden, Finland and Norway). It assesses the acceptability of using macroeconomic shocks to explain the dynamics of the share of loan losses in the loan portfolio, which is one of the main indicators of the state of the banking sector. In the course of research, he came to the conclusion that the high level of debt of the population and enterprises, rising interest rates, as well as a decrease in GDP growth rates above the forecast value lead to an increase in the share of loan losses and the development of banking crises in Norway, Sweden and Finland [26].

A number of authors in their works focused on studying the dynamics of bank reserves, since the size of reserves for possible losses reflects changes in the creditworthiness of borrowers and the mood of banks in relation to the situation in the economy. A study by the ECB showed that in the European Union, provisions for possible loan losses are formed only when the credit risk has

actually materialized, that is, they do not create a provision for the likelihood of credit risk occurring in the future. As a result, it was revealed that the deterioration of the economic situation in the country directly affects banks through an increase in reserves for possible losses.

Pain and Arpa et. al. also devoted their research to analyzing the extent to which economic cycles influence the level of loan loss provisions in English and Austrian banks. The results showed that a downturn in the economy has a negative impact on the stability of the banking sector. In addition, they confirmed that lending to sectors of the economy with a higher level of risk is accompanied by an increase in reserves, since the risk of non-repayment or delinquency on these loans will increase. For example, they noted that mortgage banks' reserves are significantly lower than those of commercial banks because their loans are secured by collateral, which reduces the bank's likelihood of losses on loans provided. Arpa et. al., estimating a simple econometric model with lagged variables, concluded that reserves increase during periods of declining GDP growth. He also found evidence that some banks use the income-smoothing hypothesis during periods of significant profit growth to smooth out its fluctuations ("income-smoothing hypothesis"), that is, contrary to the principle of reducing the income-smoothing hypothesis during periods of economic recovery, there is a slight upward trend [19].

Bikker and Hu (2002), who also assessed the dependence of reserves on macroeconomic shocks, come to interesting conclusions. They found that the coefficients on GDP growth and inflation are negative, while the unemployment rate is positive. However, during the period of growth in bank income, they found that the amount of reserves remained high, thereby confirming the income smoothing hypothesis. Ultimately, this leads to the fact that banks will be less vulnerable during periods of macroeconomic instability, since they formed some reserve when there were available funds for this [20].

There are also a number of works in which its profitability is used as an indicator of the impact of macroeconomic shocks on the banking sector. Arpa et. Al. further examined the impact of economic activity on the profitability of banking activities. He concluded that lower interest rates and higher inflation have a positive effect on banks' gross income, while net interest income is not correlated with GDP growth.

In a bank profitability model, Bikker and Hu found that both current and lagged GDP growth rates have a positive effect on profitability, while the unemployment rate has a negative effect. It was also found that neither short-term and long-term interest rates, nor stock prices and money supply have explanatory power.

Gambacorta, Gobbi and Panetta, estimating a panel regression for eight European countries and the United States, concluded that faster GDP growth and lower inflation have a positive effect

on banks' return on assets. As for the growth of interest rates, the authors were unable to identify a clear impact in one direction or another [27].

Quagliariello, analyzing the dependence of the Italian banking sector on the impact of macroeconomic factors, revealed that the profitability of the banking sector is negatively affected by a decrease in the country's GDP rates on long-term government bonds and rising unemployment [28].

Thus, as we see, in the foreign literature there is a fairly large amount of research that has confirmed that the stability of the banking sector of various European countries depends on stability in the economy and the absence of shocks. The effect of the spread of macroeconomic shocks to banks materializes in the form of an increase in reserves for possible losses and a decrease in return on assets.

As for our domestic economists, Mukhtarov Shahriyar, Mammadov Jeyhun and Ahmadov Fariz are analyzed the relationship between inflation, oil prices and exchange rate in Azerbaijan. Fluctuation of these determinants impact to banking sector of Azerbaijan ranging from 1995 to 2017. Estimation result of VECM model show that the oil prices and exchange rate have positive and significant impact on inflation in the long run period [29].

In the course of practical work, an analysis will be carried out of the dependence of reserves for possible loan losses and return on assets on various macroeconomic factors that are typical for the Azerbaijani economy, in order to understand and determine what factors influence the position of the banking sector, and after what time the banking sector feels the effect of their influence.

III CHAPTER. ANALYSIS OF THE STABILITY OF THE BANKING SECTOR OF THE AZERBAIJAN BASED ON AN ECONOMETRIC MODEL

3.1 Prerequisites for building the model

The practical stage of the work is to create a model that will reveal the degree of impact of macroeconomic shocks on the position of the Azerbaijani banking sector.

To carry out the analysis and construct regression equations, quarterly data for the period 2012-2023 were used. Information was taken from a number of sources:

1) Official website of the CBA;

2) Official website of Ministry of Finance of the Republic of Azerbaijan;

3) Official website of the State Statistical Committee of the Republic of Azerbaijan;

4) Reports on the development of the banking sector and banking supervision.

To calculate the values of the dependent variables of provisions for possible losses and return on assets, values for the banking sector as a whole are taken from annual reports on the development of the banking sector and banking supervision.

Since the source data in the work is quarterly, our model will be a time series estimated using the ordinary least squares (OLS) method. Lagged variables may be included in the time series. The lags in the explanatory variables take into account the degree of possible lag with which macroeconomic shocks affect banks. In other words, changes in the values of macroeconomic factors do not have an immediate impact on the position of banks, but appear after some time and are delayed [30]. Such lags need to be identified and taken into account in order to form a more accurate and complete picture of the impact of macroeconomic fluctuations on the banking sector.

During preliminary diagnostics of the data, the presence of heteroscedasticity and first-order autocorrelation was revealed. To eliminate it, Newey-West corrections are applied, adjusting the variation-covariance matrix to obtain more consistent estimates of regression coefficients.

When selecting indicators to study the degree of impact of macroeconomic factors on the stability of the banking sector, we took into account the peculiarities of the economy of our country. The fact is that Azerbaijan is a raw materials country, the export of which consists of almost 70% of fuel and energy products [31]. This means that the size of export revenues, the financial position of companies and the stability of the economy are highly dependent on the price situation in the global energy market, namely the price of oil.

In addition, Azerbaijan belongs to a number of countries with an emerging market, which is characterized by increased volatility of exchange rates and instability of financial markets and high interest rates and spreads. Therefore, our country is characterized by the risk of a sharp

outflow of capital in the event of a crisis in the world, as investors seek to withdraw their funds from countries that are most vulnerable to the influence of macroeconomic shocks.

GDP dynamics are one of the important indicators of the economic activity of the state. Its fall during the crisis negatively affects various spheres of economic and social life [32].

The Stock exchange index reflects the state of the stock market of large companies, which are the most important for the country's economy. The collapse of the index means a deterioration in the position of companies, a decrease in the market value of their assets and shares, and increases problems with paying external debt and obtaining new loans to ensure the functioning of their activities. In addition, the collapse of quotes on the stock market leads to large losses as a result of their negative revaluation.

When conducting a study of the sustainability of the banking sector in Azerbaijan based on an econometric model, it is necessary to take into account certain limitations. First, the availability and reliability of data is an important aspect that can affect the accuracy of the study results. Secondly, to fully understand the issues under study, it is necessary to take into account the context and specifics of the banking system of Azerbaijan. Finally, this study does not examine social and political factors that may also influence the sustainability of the banking system. Limitations of the study should be considered when interpreting the results and making recommendations.

3.2. Assessment of the dependence of reserves for possible losses of the banking sector on macroeconomic factors

At the first stage, a model will be built, the purpose of which is to study the influence of a number of macroeconomic indicators on the amount of reserves for possible losses in the Azerbaijani banking sector.

It is worth emphasizing that a decrease in the amount of reserves can be caused not only as a result of an improvement in the borrower’s creditworthiness, but also when bad loans are written off. Therefore, in our opinion, in order to obtain more accurate estimates, it is worth using not the absolute value of reserves of the banking sector, but their change over the period per manat of all issued loans, expressed as a percentage. In regression it will be referred to as LLP.

To construct a regression dependence of reserves for possible losses, the following indicators are included (Table 3).

Table 3. Macroeconomic factors with LLP

Designation	Variable name	Alleged dependence with LLP
GDPGR	GDP growth rate, %	negative
INW	Inflow(+)/outflow(-) of capital, billion dollars	negative
OP	Oil price, $	negative
DER	Dollar exchange rate, $	Positive/negative

BSEI	Baku stock exchange index, points	negative

Source: Compiled by the author

The correlation matrix between the dependent and explanatory variables confirms the signs of the hypothesized relationship (Table 4).

Table 4. Provisions for possible losses - correlation coefficients

	LLP	OP	DER	GDPGR	INW	BSEI
LLP	1.000000	-0.332309	0.186917	-0.263344	-0.284022	-0.304302
OP	-0.332219	1.000000	-0.354132	0.083111	-0.014876	0.887593
DER	0.186827	-0.354132	1.000000	-0.085418	-0.100980	-0.498243
GDPGR	-0.263344	0.083111	-0.085418	1.000000	0.368538	0.055321
INW	-0.283122	-0.014876	-0.100980	0.369438	1.000000	0.145351
BSEI	-0.303402	0.887593	-0.498243	0.054421	0.145351	1.000000

Source: Compiled by the author

Static model of LLP dependence on macroeconomic variables.

The estimated regression equation has the following form (static model):

$$LLP_t = \beta_0 + \beta_1 * x_{1t} + \beta_2 * x_{2t} + \beta_3 * x_{3t} + \cdots + \beta_n * x_{nt} + \varepsilon_t$$

Where β_n is the coefficient in front of the corresponding macroeconomic variable, t - is the quarterly values of the indicators.

During the analysis, the following results were obtained (Table 5).

Table 5. Model of dependence of reserves for possible losses on macroeconomic factors

Dependent Variable: LLP				
Method: Least Squares				
Sample (adjusted): 2012Q2 2023Q1				
Included observations: 44 after adjustments				
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.837674	0.867630	3.269926	0.0043
OP	-0.007169	0.002789	-3.392541	0.0027
DER	0.006271	0.026846	-2.436731	0.0298
GDPGR	-0.016927	0.005692	-2.849358	0.0072
L2GDPGR	-0.025245	0.007857	-3.125458	0.0035
L1INW	-0.009333	0.002207	-4.383809	0.0002
R-squared	0.679729	Mean dependent var		0.389141
Adjusted R-squared	0.589408	S.D. dependent var		0.398214
S.E. of regression	0.306976	Akaike info criterion		0.599170
Sum squared resid	3.464996	Schwarz criterion		0.844919
Log likelihood	-6.860748	Hannan-Quinn criter.		0.689794
F-statistic	6.820711	Durbin-Watson stat		1.375157
Prob(F-statistic)	0.001134			

Source: Compiled by the author on the [33]

$$LLP = 2.837 - 0.007*OP + 0.006*DER - 0.017*GDPGR - 0.025*L2GDPGR - 0.009*L1INW$$

The regression is generally significant at the 1% level because Prob (F-st)=0.001134<0.01. To check the significance of the constructed model, the observed and critical values of the Fisher criterion were calculated. These values are respectively 6.820711and 4.87 at the 5% significance level and degrees of freedom , . Due to the fact that 6.820711 > 4.87, the model is considered significant. The regression is generally significant at the 5% level because Prob (F-st)=0.001134<0.05. Next for significance of the model t statistic, the probability of the coefficients <0,05 , it means that the parametres of multiply regression model arasignificance.Tests support that model parametres are important.In addition, the value of R2= 0.67, which characterizes the quality of the regression fit, is at a fairly good level and within the limits obtained in other works that study the influence of macroeconomic factors on the stability of the banking sector.

Stability of the parametres of the multiply regression model checked by the CUSUM test.

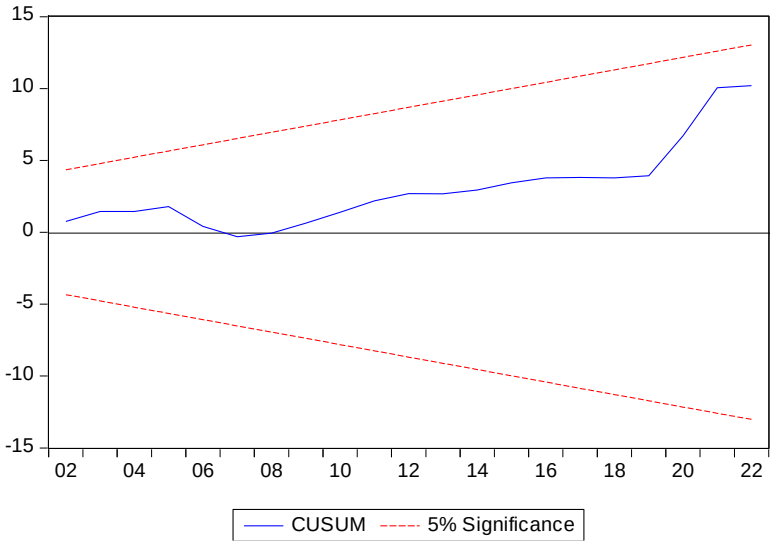


Figure 7. Result of CUSUM test

Blue line of the graphic doesn't cross red line , it means that multiply regression model parametres are stable.It is a significance factor of the model .

During the analysis, it turned out that for this model the Baku stock exchange index was not significant. On the one hand, this can be explained by the presence of multicollinearity between the oil price and the level of the Baku stock exchange index. It includes all major oil and mining companies in the country, therefore, its dynamics depend on market prices for the companies' shares, which in turn are determined by oil prices. Since the oil price is significant for our model, the Baku stock exchange index can be excluded without significant losses. In addition, in my

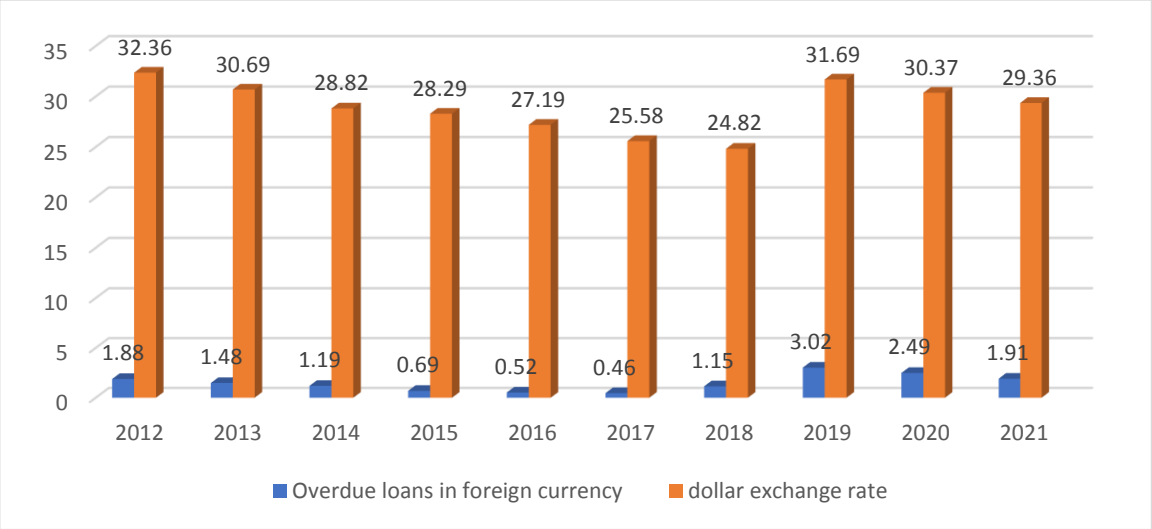
opinion, the dynamics of the Baku Stock Exchange index is unlikely to have a strong impact on the size of reserves for possible losses of banks, since basically these companies have strong support from the state and, if necessary, when credit risk increases, the state will provide them with financial assistance to replenish funds and fulfill loan obligations to banks. It is also worth noting that large companies prefer to take out loans abroad, since interest rates on loans there are much lower than in Azerbaijan. Thus, we can conclude that the fall in the Baku Stock Exchange index does not significantly worsen the bank's position by increasing reserves for possible losses.

The oil price (BRENT) turned out to be significant in the model and has a negative sign. It follows that a macroeconomic shock in the form of a decrease in oil prices leads to banks increasing reserves for possible losses, thereby worsening the financial position of the banking sector. The significance of oil prices confirms the vulnerability of economic sectors, including banks, to fluctuations in the international oil market. In the context of falling oil prices, the volume of revenues from its sales decreases. This negatively affects a large part of the country's economy, not just the energy sector. Budget revenues and expenses are reduced, the solvency of non-financial sector organizations and household incomes are reduced, and inflation is rising. Ultimately, this leads to a decrease in the creditworthiness of borrowers and the value of assets, and as a result, to an increase in credit risk and an increase in reserves for possible losses.

The exchange rate of the dollar against the manat (Dollar) in our model is significant in explaining the impact on the level of reserves for possible losses. At first glance, it is difficult to identify a clear impact of the dynamics of the dollar exchange rate; it all depends on the type of borrowers to whom loans were issued in foreign currency. On the one hand, if loans are issued to borrowers who receive income in foreign currency (for example, companies exporting goods), then the increase in the exchange rate will not significantly affect them, and they will not have difficulties repaying the loans. That is, there is a negative relationship between the manat and the dollar exchange rate. On the other hand, if the borrower does not have foreign currency income, the depreciation of the manat may have the opposite effect, since he will need much more manat to convert it and pay off the loan. In this case, the risk of non-payment and overdue debt increases, and banks are forced to increase the amount of manat.

Our model reveals a positive dependence of reserves for possible losses on the dollar exchange rate. Figure 8 shows that during a period of rising dollar exchange rates, the share of overdue loans in foreign currency increases, which means that banks create additional reserves for them.

Figure 8. Share of overdue loans in foreign currency (%)



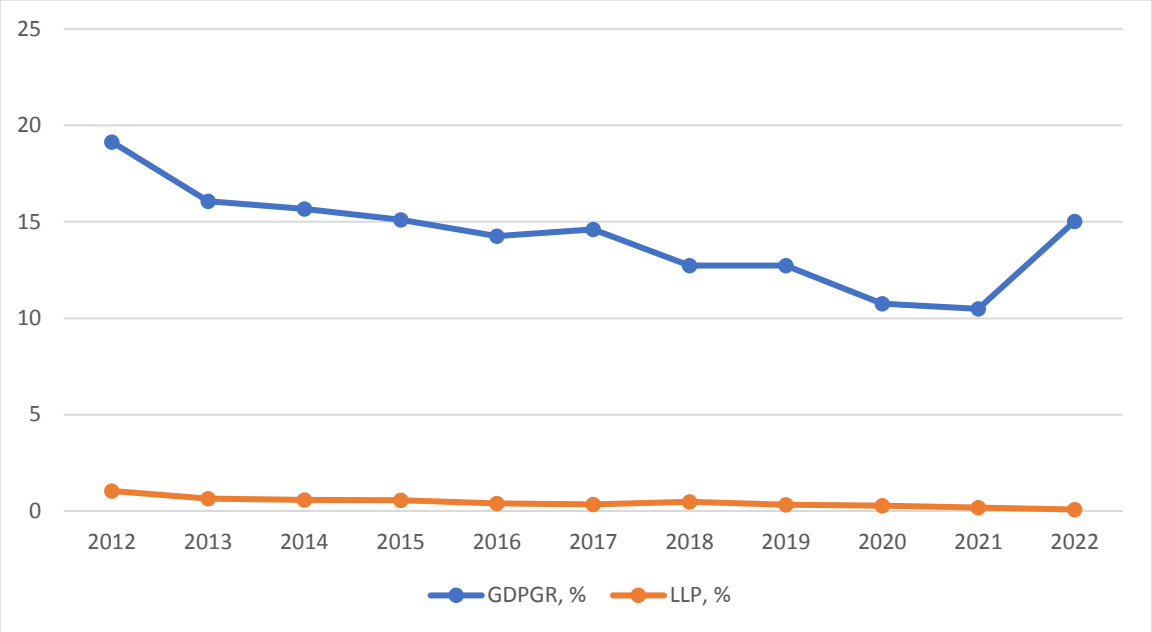
Source: [34]

GDP growth rate (GDPGR) is one of the important indicators of the state's economic activity. As we said earlier, banks reduce the amount of reserves for possible losses during periods of economic recovery, that is, when GDP growth rates increase, and increase them during periods of economic recession. The model confirms the negative relationship between the dynamics of GDP and reserves for possible losses. Together with the current value of the indicator, we included this lagged variable in the regression in order to determine the delay with which deteriorations in the real sector of the economy affect the quality of the loan portfolio.

As a result, the change in reserves is affected both by the current GDP growth rate and with a delay of 2 quarters, and the coefficient before L2GDPGR is significantly higher and has a higher level of significance. This fact means that GDP dynamics do not have an immediate impact on the state of the banking sector, but with some delay. The minus sign in front of GDPGR and L2GDPGR confirms that the decline in economic activity, manifested in the form of a decline in GDP, negatively affects the stability of the banking sector (Figure 9).

The fact is that when there is a shock in the economy, expressed by a drop in GDP, this is accompanied by a reduction in industrial production in the country, domestic and external demand for products. This leads to increased losses of enterprises, increased unemployment and reduced incomes of the population. As a result, the economic situation of borrowers worsens significantly and the level of credit risk increases, which is accompanied by an increase in reserves for possible loan losses. This is especially true for enterprises in the non-financial sector, the share of loans to which is the main component of the loan portfolio of the banking sector of Azerbaijan.

Figure 9. GDP growth rates and reserves for possible losses of the banking sector of Azerbaijan



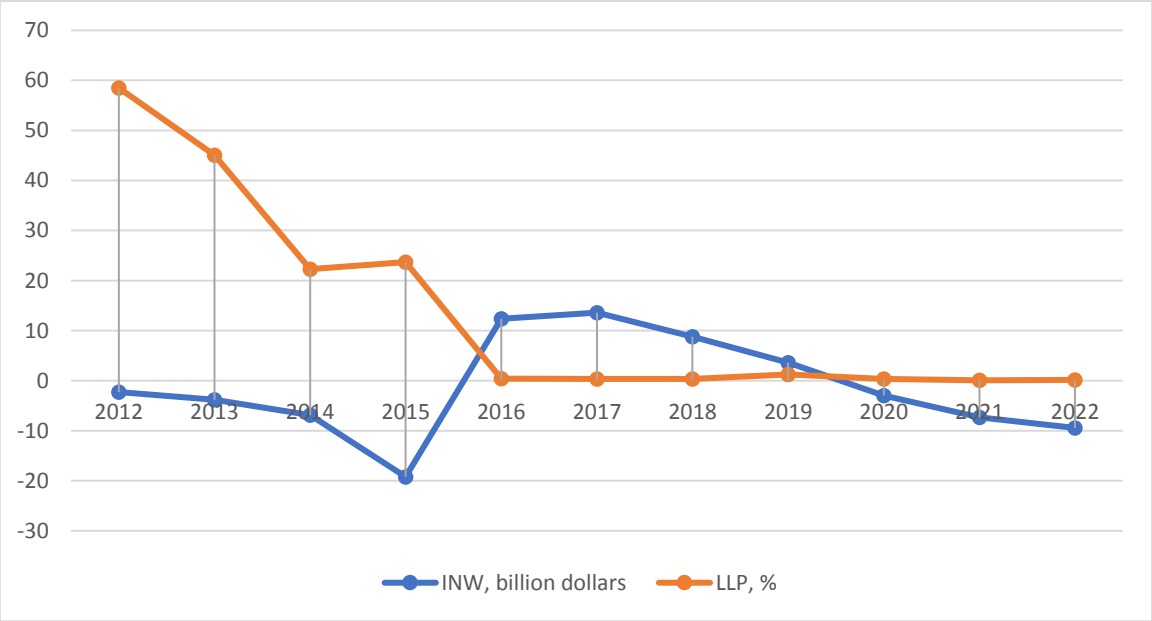
Source: [35]

INW - outflow/inflow of capital, billion dollars. The crisis in global financial markets is accompanied by an outflow of capital; money and investments leave the country in conditions of macroeconomic instability. Capital outflows in Azerbaijan are caused not only by risk aversion in Azerbaijani markets, but also by large external corporate debt, which enterprises are forced to repay. In these conditions, various sectors of the economy are faced with a cash shortage and a reduction in income from their activities, which negatively affects the assessment of their creditworthiness.

The removal of capital from the country leads to a slowdown in economic development and a weakening of the country's financial stability as a result of a lack of investment resources. The excess of capital outflow over inflow means a real reduction in financial resources for economic development. The annual leakage of a certain share of the gross domestic product abroad has a negative impact on national economic development, since it is a direct deduction from the resource base for domestic investment. Capital outflow destabilizes the system of macroeconomic regulation. Increasing the real interest rate to prevent capital flight has a negative impact on the domestic investment process, while simultaneously leading to a deterioration in the investment climate in the country and weakening the interest of foreign investors in Azerbaijan, which is increasingly classifying it as a "problem market." Capital flight from the country leads to a liquidity shortage in the banking system, which, in turn, affects the volume of lending to the real sector of the economy. In addition, capital outflow worsens the country's ability to service external debt.

In addition, the banking sector itself is faced with a lack of liquidity, and the costs of financing and raising funds are rising. To cover their expenses, banks are forced to increase the risk level of the loan portfolio, since an increase in risk is accompanied by an increase in interest rates on loans provided. Thus, there is a negative relationship between capital movements and the size of the manat (Fig. 10)

Figure 10. Capital outflow in Azerbaijan and reserves for possible losses in the banking sector



Source: [36]

The resulting model confirms the negative impact of capital outflow from the country on banks with a one-period lag (L1INW). It follows from this that the shock from capital outflow does not spread to banks instantly, but after a certain period of time.

Based on the obtained static model, we found that macroeconomic shocks in the form of a decrease in oil prices, a fall in the manat and the level of GDP, as well as capital outflow negatively affect the banking sector through an increase in reserves for possible losses. Moreover, the effect of some appears immediately, while of others after a certain period of time.

In the previous model, only macroeconomic factors that were exogenous to the equation were included as explanatory variables. However, it is worth noting that the amount of reserves for possible losses may also depend on the corresponding value in the previous period, since quarterly trends rarely change, and if banks increased reserves in the previous period, then there is a high probability of this indicator increasing in the current period. In order to test this premise,

we include in the regression the LLP indicator with a lag of one quarter. The equation will take the following form:

$$LLP_t = \beta_0 + \beta_1 * LLP_{t-1} + \beta_2 * x_{2t} + \beta_3 * x_{3t} + \cdots + \beta_n * x_{nt} + \varepsilon_t$$

Where LLP_{t-1} is the growth rate of reserves for possible losses per manat of loans provided in the previous period, %, β_n is the coefficient in front of the corresponding macroeconomic variable, t is the quarterly values of the indicators.

The results are presented in Table 6.

Table 6. Model of dependence of reserves for possible losses on macroeconomic factors

Dependent Variable: LLP				
Method: Least Squares				
Sample (adjusted): 2012Q2 2023Q1				
Included observations: 44 after adjustments				
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed				
bandwidth = 4.0000)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.648251	0.799545	3.318987	0.0032
LLP1	0.484843	0.138733	3.517280	0.0023
OP	-0.005301	0.002513	-2.983637	0.0063
DER	0.072357	0.025652	-2.903451	0.0074
GDPGR	-0.014802	0.005971	-2.813810	0.0089
L2GDPGR	-0.018493	0.006395	-3.285879	0.0034
L1INW	-0.007800	0.002842	-3.962719	0.0004
R-squared	0.742895	Mean dependent var		0.389151
Adjusted R-squared	0.694894	S.D. dependent var		0.398224
S.E. of regression	0.254772	Akaike info criterion		0.242465
Sum squared resid	2.317690	Schwarz criterion		0.529172
Log likelihood	1.789476	Hannan-Quinn criter.		0.348193
F-statistic	11.25214	Durbin-Watson stat		2.303597
Prob(F-statistic)	0.000000			

Source: Compiled by the author on the [33]

LLP = 2.648 + 0.484*LLP1 - 0.005*OP + 0.072*DER - 0.015*GDPGR - 0.018*L2GDPGR - 0.008*L1INW

The regression as a whole is also significant at the 1% level, since Prob (F-st) = 0.000000 < 0.01, the value of R2 = 0.74, which is significantly better compared to the static model. To check the significance of the constructed model, the observed and critical values of the Fisher criterion were calculated. These values are respectively 11.25214 and 4.87 at the 5% significance level and degrees of freedom. Due to the fact that 11.25214> 4.87, the model is considered significant. The

regression is generally significant at the 5% level because Prob (F-st)=0.001134<0.05. Next for significance of the model t statistic, the probability of the coefficients <0,05 , it means that the parametres of multiply regression model arasignificance.Tests support that model parametres are important.In addition, the value of R2= 0.74, which characterizes the quality of the regression fit, is at a fairly good level and within the limits obtained in other works that study the influence of macroeconomic factors on the stability of the banking sector.

Stability of the parametres of the multiply regression model checked by the CUSUM test.

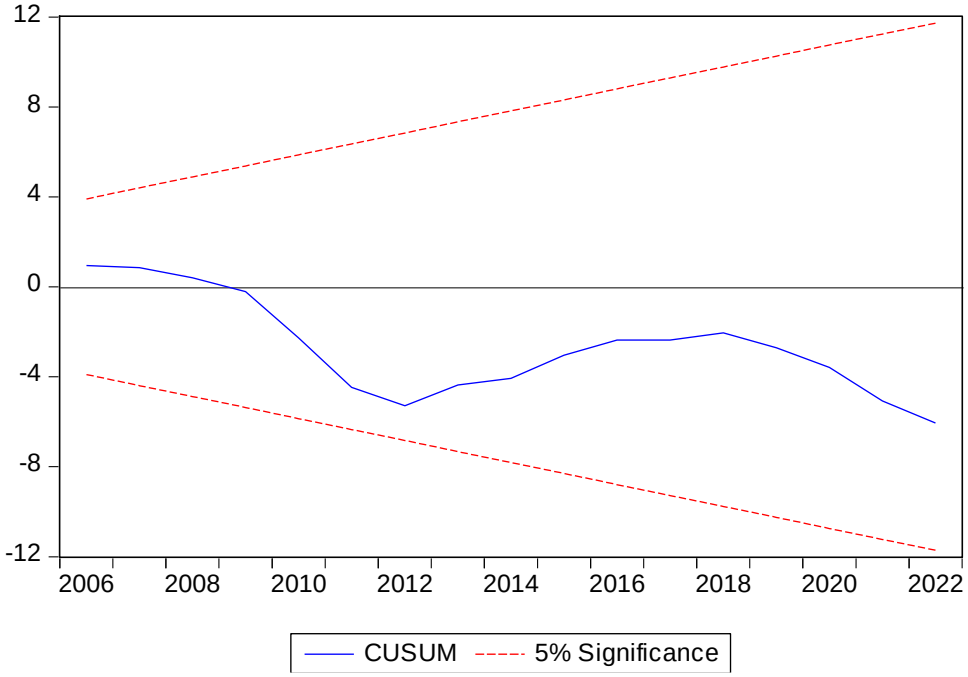


Figure 11. Result of CUSUM test

Blue line of the graphic doesn't cross red line , it means that multiply regression model parametres are stable.It is a significance factor of the model .

The lagged dependent variable in the model (LLP1) is significant at the 1% significance level and shows the expected sign. This means that an increase in provisions in the previous quarter causes an increase in provisions in the next quarter. That is, our assumption was confirmed, and the policy of forming reserves for possible losses is carried out taking into account the situation in the past and depends not only on macroeconomic indicators.

Next, we compare the results obtained for the static and dynamic models (Table 7).

Table 7. Comparison of static and dynamic models for assessing LLP from macroeconomic indicators

Designation	Static model		Dynamic model	
	Coefficient	Probability	Coefficient	Probability
OP	-0.007169	0.0027	-0.005301	0.0063

DER	0.006271	0.0298	0.002357	0.0074
GDPGR	-0.026927	0.0081	-0.024702	0.0089
L2GDPGR	-0.035245	0.0044	-0.028393	0.0034
L1INW	-0.018233	0.0011	-0.007800	0.0004

Source: Compiled by the author

From the table we see that all explanatory variables obtained in the first model remained significant and retained their original sign, but the degree of their influence became somewhat weaker. For example, a decrease in the price of oil by 1 dollar leads to an estimated increase in reserves for possible losses in the static model by 0.007%, in the dynamic model by 0.005%. A similar trend can be observed for other indicators. In other words, if the banking sector is consistent and takes into account the trends of the previous period, then it becomes less vulnerable to the effects of negative macroeconomic factors.

In addition, the shock of a decrease in GDP growth rates and capital outflow from the country does not affect the quality and risk of the loan portfolio immediately, but with a delay, which allows banks, if such a dependence is identified, to prepare and take the necessary measures to smooth out the negative consequences of the spread of shocks in the economy.

3.3. Assessment of the dependence of the return on assets of the banking sector on macroeconomic factors

The purpose of this model is to identify the vulnerability of the banking sector to changes in the economy, manifested through changes in the profitability of banking assets. To analyze the relationship between return on assets, the following explanatory variables are included (Table 8).

Table 8. Macroeconomic factors with ROA

Designation	Variable name	Inferred dependency with ROA
GDPGR	GDP growth rate, %	positive
INW	Inflow(+)/outflow(-) of capital, billion dollars	positive
OP	Oil price, $	positive
DER	Dollar exchange rate, $	positive
IIR	Interbank interest rate	negative
BSEI	Baku Stock Exchange Index	positive
CREDGR	Credits issued (growth rate, %)	positive

Source: Compiled by the author

As can be seen from the table, two more factors have been added to the variables analyzed in previous models: the growth rate of loans issued and the interest rate on the interbank market, which, in my opinion, also affect return on assets in conditions of macroeconomic instability.

The pairwise correlation matrix based on the available quarterly data confirms the expected sign of the explanatory variables (Table 9).

Table 9. Return on assets of the banking sector – correlation coefficients

	ROA	OP	DER	CREDGR	GDPGR	INW	IIR	BSEI	SPREAD
ROA	1.000000	0.219223	-0.381555	0.602195	0.437133	0.111568	-0.177895	0.401424	-0.283222
OP	0.219223	1.000000	-0.161392	0.118949	0.309352	0.229411	-0.491189	0.645844	-0.681745
DER	0.381555	-0.162392	1.000000	-0.647995	-0.144314	-0.133898	0.303188	-0.472806	-0.056828
CREDGR	0.602195	0.118949	-0.657895	1.000000	0.159872	0.168417	-0.208320	0.474693	-0.029848
GDPGR	0.437133	0.309352	-0.144314	0.159872	1.000000	0.436186	-0.301422	0.306400	-0.314224
INW	0.111568	0.229411	-0.133898	0.168417	0.436186	1.000000	-0.453361	0.629609	-0.269190
IIR	-0.177895	-0.491189	0.303188	-0.208320	-0.301422	-0.453361	1.000000	-0.796874	0.566314
BSEI	0.401424	0.645844	-0.472806	0.474693	0.306400	0.629609	-0.796874	1.000000	-0.598406

Source: Compiled by the author

Based on the available data, a regression was constructed to explain the impact of the included factors on the return on assets of the banking sector (Table 10).

Table 10. Model of dependence of the return on assets of the banking sector on macroeconomic factors

Dependent Variable: ROA				
Method: Least Squares				
Sample (adjusted): 2012Q2 2023Q1				
Included observations: 44 after adjustments				
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 3.0000)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.022618	1.042682	-3.596224	0.0038
DER	0.096829	0.029863	3.306358	0.0063
CREDGR	0.054723	0.023536	2.391131	0.0326
L2GDPR	8.85E-15	3.04E-15	2.918230	0.0124
L1INW	0.015588	0.003308	6.562407	0.0000
L2INW	0.009890	0.003718	3.358738	0.0058
L2IIR	-0.086258	0.032329	-2.727824	0.0175
BSEI	0.001677	0.001465	1.578815	0.0481
R-squared	0.798515	Mean dependent var		1.158859
Adjusted R-squared	0.682753	S.D. dependent var		0.669434
S.E. of regression	0.378189	Akaike info criterion		1.174603
Sum squared resid	1.991850	Schwarz criterion		1.618927
Log likelihood	-4.496382	Hannan-Quinn criter.		1.286349
F-statistic	6.889465	Durbin-Watson stat		2.988161

Prob(F-statistic)	0.001838			

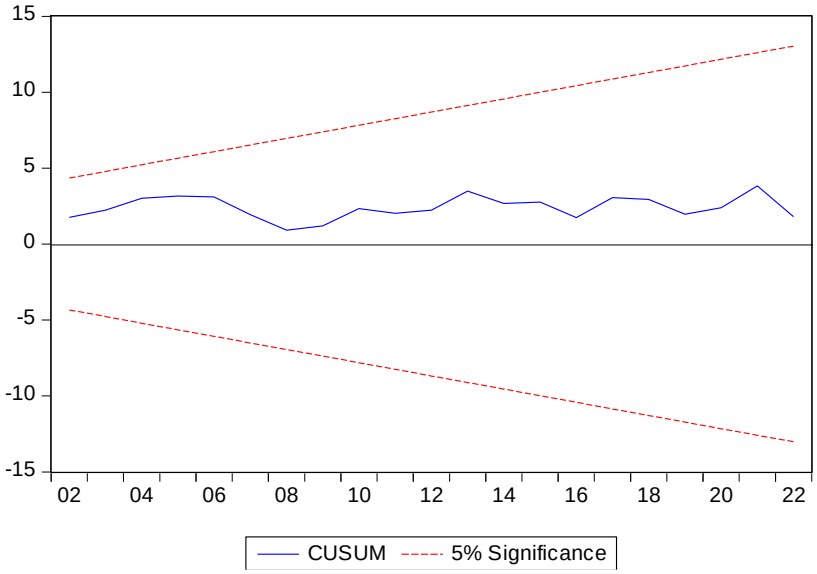
Source: Compiled by the author on the [33]

$$ROA = -3.022 + 0.097*DER + 0.055*CREDGR + 8.850*L2GDPGR + 0.016*L1INW + 0.010*L2INW - 0.086*L2IIR + 0.002*BSEI$$

Overall, the regression is also significant since Prob(f-st)=0.001838<0.01. The quality of fit is characterized by a fairly high level of R2=0.79. To check the significance of the constructed model, the observed and critical values of the Fisher criterion were calculated. These values are respectively 6.889465and 4.87 at the 5% significance level and degrees of freedom , . Due to the fact that 6.889465> 4.87, the model is considered significant. The regression is generally significant at the 5% level because Prob (F-st)=0.001134<0.05. Next for significance of the model t statistic, the probability of the coefficients <0,05 , it means that the parametres of multiply regression model arasignificance.Tests support that model parametres are important.In addition, the value of R2= 0.79, which characterizes the quality of the regression fit, is at a fairly good level and within the limits obtained in other works that study the influence of macroeconomic factors on the stability of the banking sector.

Stability of the parametres of the multiply regression model checked by the CUSUM test.

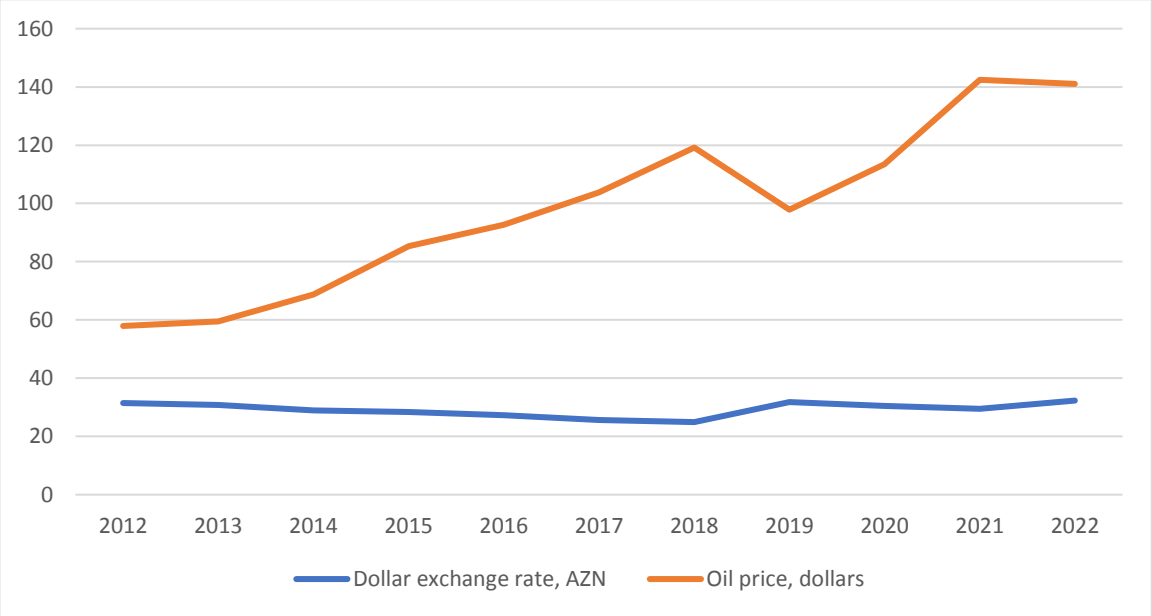
Figure 12. Result of CUSUM test



Blue line of the graphic doesn't cross red line , it means that multiply regression model parametres are stable. It is a significance factor of the model .

During the construction, the oil price (OP) turned out to be insignificant, but the US dollar exchange rate is significant at the one percent level. As is known, the dollar to manat exchange rate directly depends on the situation on the international oil market (Fig. 13).

Figure 13. Oil prices and the US dollar exchange rate



Source: [37]

This confirms the crisis of 2015, when the price of oil fell by 70% compared to the July maximum and reached $40/barrel by the end of 2015, as a result of which the dollar exchange rate over the same period increased from 23.45 to 29.38 manat/dollar. Thus, the price of oil affects the exchange rate, which in turn affects the financial position of banks. The impact of exchange rate dynamics can be ambiguous. It all depends on what banks have more on their balance sheets – foreign currency claims or foreign currency liabilities. If requirements in foreign currency exceed liabilities, then with the growth of the dollar, banks will receive additional income. If, on the contrary, obligations are greater than requirements, then an increase in the exchange rate in conditions of macroeconomic instability will entail an increase in costs and a decrease in profits. In our case, a positive coefficient in front of the dollar sign means a direct dependence of return on assets on the dollar exchange rate.

In 2015, the share of foreign currency assets of the banking sector in the context of the weakening of the manat (mainly in the 4th quarter) increased from 23.1% to 32.3%. The growth rate of foreign exchange claims outpaced the growth rate of foreign exchange liabilities, which ultimately led to a threefold increase in the net foreign exchange position from 3.02 billion manats. in 2014 to 10.774 billion manats in 2015. As a result, the share of banks' net income from operations with foreign currency and foreign currency assets, taking into account exchange rate

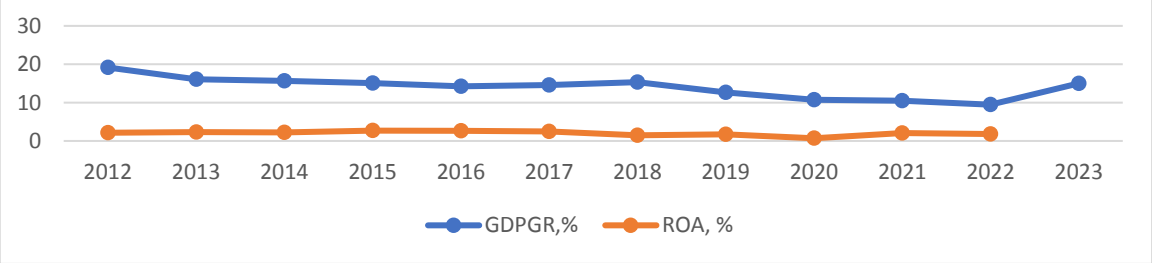
differences, in the total volume of net income amounted to 8.2% (2.4% in 2014), primarily due to operations in the second half of 2015. This allowed the banking sector to some extent compensate for the decline in income from other types of activities. As we emerged from the crisis in 2016, against the backdrop of a gradual strengthening of the manat in the second half of the year, the share of foreign currency assets in the total assets of the banking sector decreased to 27.6%, which led to a decrease in the impact of net foreign exchange earnings in total profit as of 01/01/2017 to 7.5% (in 2015-13.1%). Thus, the weakening of the manat in the context of macroeconomic instability has a positive impact, allowing the banking sector to increase income from foreign currency transactions, which, in turn, can to some extent compensate for the reduction in profits and return on assets.

One of the main indicators characterizing economic activity and the current state of the economy is the dynamics of GDP. During a period of macroeconomic instability, there is a decrease in the growth rate of gross domestic product, since a decrease in investment in fixed assets, rising prices, internal and external debt, a shortage of funds for activities and an increase in the cost of financing sources leads to a reduction in production volumes in the country.

Subsequently, as we mentioned earlier, a decrease in aggregate demand and an increase in unemployment cause a decrease in income for both enterprises and the population. All this ultimately leads to a deterioration in the economic situation of borrowers, a decrease in demand for loans and, as a consequence, a decrease in interest income of the banking sector. In addition, in conditions of instability, the population tends to withdraw their deposits from banks. As a result, banks have increased costs for attracting deposit sources to maintain the liquidity of their activities, increasing the bank's costs for financing raised funds. Taken together, this leads to a decrease in profits and profitability of banks.

Based on our model, the GDP growth rate (L2GDPGR) is significant with a lag of 2 quarters, which means that a decrease in the GDP growth rate has a negative effect not in the same period, but after some time. That is, the banking sector reacts to a fall in GDP during a crisis with some delay, since it takes time for its decline to affect the state of the population and their expectations (Fig. 14).

Figure 14. Return on assets of the banking sector of Azerbaijan and GDP dynamics

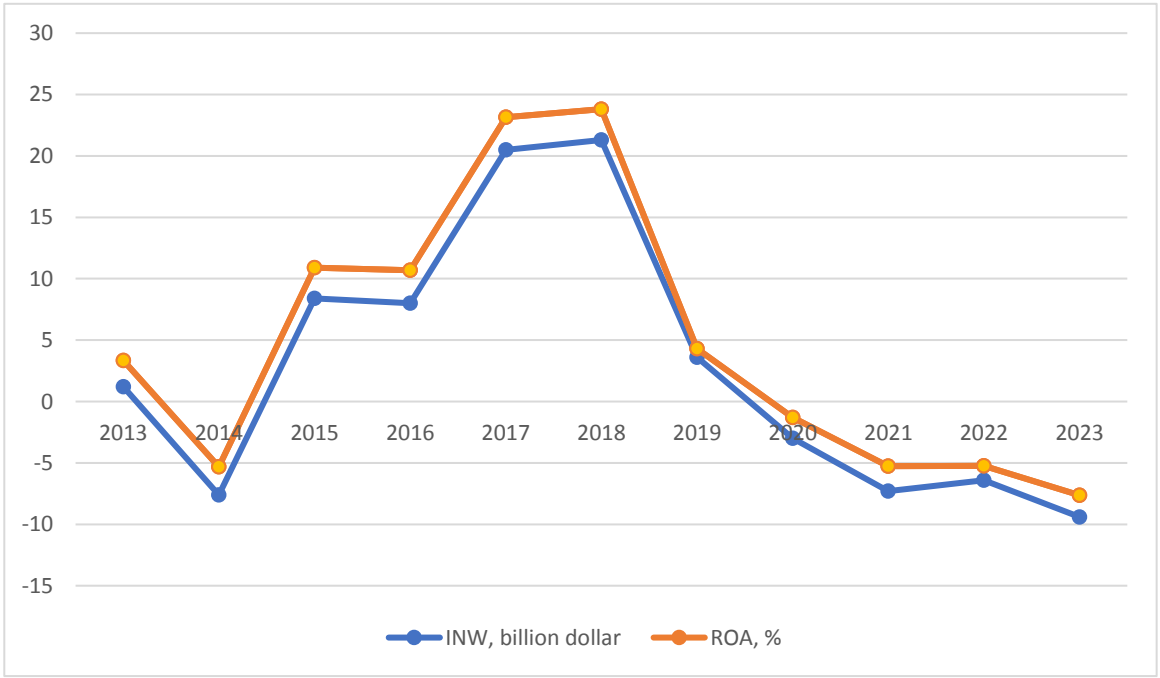


Source: [35], [37]

The growth rate of loans provided by the banking sector (CREDGR) also turned out to be a significant coefficient with a positive sign. This is understandable, since an increase in the amount of loans provided is, as a rule, accompanied by an increase in interest income, which has a positive effect on the profit of banks, and therefore on the profitability of their assets. In 2015, the deterioration of general economic conditions, a decrease in income of the population and enterprises, as well as a more conservative approach to assessing the risks and creditworthiness of potential borrowers caused a slowdown in the growth rate of lending to both legal entities and individuals. In 2015, the growth rate of loans to non-financial organizations amounted to 34.3% (in 2014 - 51.5%), to individuals - 35.2% (in 2014 - 51.8%). Since loans are the main source of income for Azerbaijani banks, credit compression leads to a reduction in the growth rate of interest income, which negatively affects the return on assets. As a result, the share of interest income received during this period decreased from 15.4% to 11.5% of total income. Thus, we see that a fall in credit supply from banks in the context of a deteriorating economic situation negatively affects bank profits. The efficiency of asset portfolio management deteriorates significantly, which leads to a decrease in ROA.

The outflow of capital from the country (INW) has a negative impact on the return on assets of the banking sector, and, as in the case of GDP dynamics, this shock does not spread immediately, but with some delay (Fig. 15).

Figure 15. Return on assets and net import/export of capital



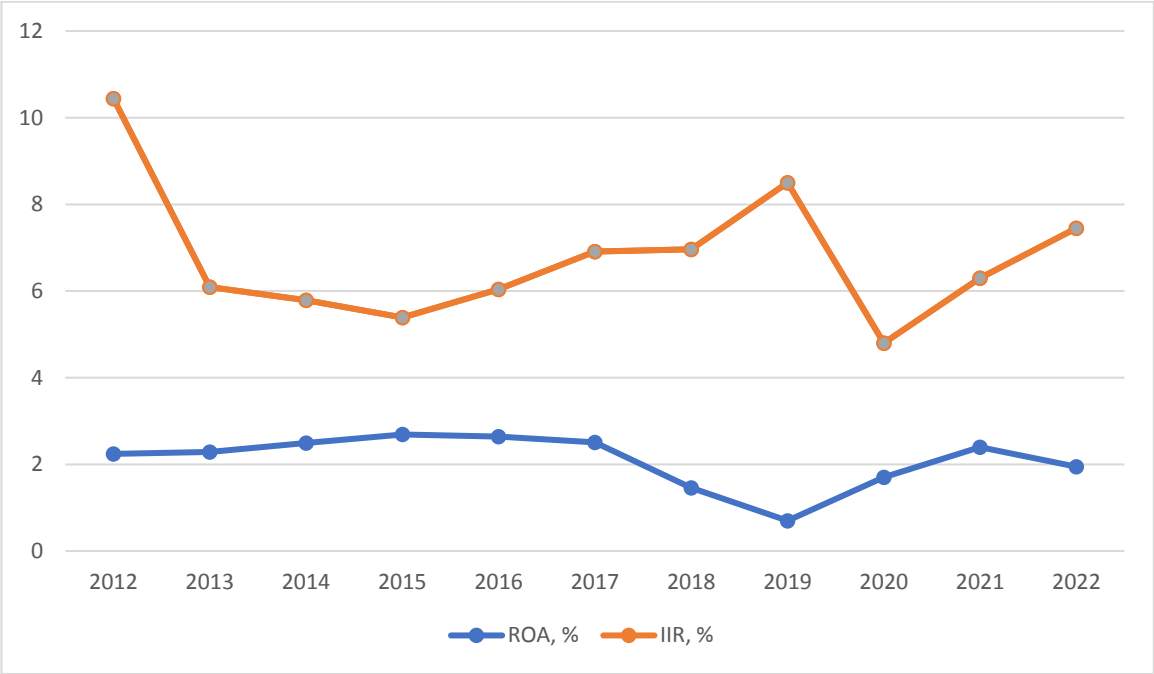
Source: [36], [38]

As a rule, capital outflow is observed during a crisis, when risks in emerging markets begin to grow, which leads to problems of funding and maintaining liquidity at a sufficient level in the banking sector, and, consequently, to an increase in the cost of financing their activities and a decrease in profitability.

The Baku Stock Exchange index indicator is also significant and has a positive sign, however, the coefficient in front of it 0.00057 shows that the dynamics of this indicator have little impact on the return on assets of the banking sector. This is explained by the fact that banks are weakly active in the stock market. The share of securities in the banks' portfolio is quite low; in addition, the bulk of them are debt securities with a low level of risk, and only a small part consists of equity securities. During the crisis, there is a decline in stock prices, which is reflected in the fall of the index. That is, the dynamics of the Baku Stock Exchange index reflects the general trend in the stock market. A decrease in quotations leads to a fall in the value of equity securities as a result of negative revaluation and banks incur expenses. For example, during the development of the crisis in the second half of 2015, the Baku Stock Exchange index fell from its July maximum of 1,788.66 to 657.21 points by the end of the year. A sharp drop in securities quotations during the crisis and an increase in negative revaluation led to losses for banks on securities purchase and sale transactions. The loss amounted to 92.6 million manat, which is 3.1% of the net income of the banking sector for 2015. In 2014, which was favorable for the Azerbaijani economy, when the Baku Stock Exchange index increased, income from this item of banking activity was received, the share of which was equal to 6.2% of the total net income of the banking sector. Thus, we see that a drop in the index in conditions of macroeconomic instability has a negative impact on the return on assets of banks.

The work revealed that interest rates in the interbank market negatively affect the return on assets of the banking sector. In the context of the global crisis, banks are faced with problems of lack of liquidity to carry out operations, while the source of external financing abroad becomes limited. This leads to money becoming more expensive, and the need for it from banks is growing. As a result, the country is experiencing an increase in interest rates in the interbank market, which is accompanied by an increase in deposit rates, which increases the interest costs of banks, thereby negatively affecting bank expenses and reducing return on assets. The model results are confirmed by figure 16.

Figure 16. Return on assets of the banking sector and the level of the interbank interest rate



Source: [36]

The econometric analysis revealed that macroeconomic shocks in the economy have an impact on the stability and condition of the banking sector. The fall in the dollar exchange rate has an ambiguous effect on the stability of the banking sector, on the one hand, increasing the costs of creating reserves for possible losses, and on the other, increasing income as a result of a positive revaluation of investments in foreign currency.

Risks such as a sharp decline in oil prices, capital outflow from the country and a drop in GDP negatively affect the activities of banks through an increase in reserves for possible losses and return on assets. In other words, risks in the economy increase risks in the banking sector, reducing banks' income, their activity and efficiency, as well as increasing their costs of financing and covering losses. In turn, problems in the banking sector in a deteriorating economic environment further increase the scale of the economic crisis, since banks are one of the main elements in the functioning of the entire financial system of the country. Moreover, it is worth noting that the negative effect of the export of capital from the country and the fall in GDP is reflected in banks and does not appear in their reports immediately, but after a certain period of time. Identifying this fact is very important, since it can help banks formulate a strategy that will somehow reduce the impact of shocks and get out of the current situation with the minimum possible losses.

In the course of practical work, two econometric models were built that assessed the dependence of the banking sector on the dynamics of macroeconomic factors.

Let us further assume that the country's economy is subject to a series of shocks. And our task is to see how this will affect changes in the level of reserves for possible losses and the return on assets of the banking sector.

As an initial assumption for the model for estimating reserves for possible losses, let us assume that the price of oil in the next period will drop to $60 per barrel. As a result, the manat exchange rate will fall by 20% against the dollar. The GDP growth rate will decrease by 2.9%. The values of the indicators that are taken into account in the model taking into account lags are taken from the available data. Thus, the initial conditions for analysis are presented in Table 11

.

Table 11. Analysis background

Index	Meaning
OP	60 dollar/barrel
DER	37,379 manat
GDPGR	-2,9%
L2GDPGR	9,4598 billion manat
L1INW	-9,5 billion dollar

Source: Compiled by the author

We substitute these values into the static and dynamic equations for the dependence of reserves on possible losses from macroeconomic factors. For the dynamic option, it is necessary to take into account the value of LLP in the previous period, its value was -0.0545%.

Static equation:

$$LLP = 2.847 - 0.007*OP + 0.006*DER - 0.0168*GDPGR - 0.035*L2GDPGR - 0.008*L1INW$$

Dynamic equation:

$$LLP = 2.658 + 0.494*LLP1 - 0.005*OP + 0.002*DER - 0.024*GDPGR - 0.028*L2GDPGR - 0.007*L1INW$$

During the substitution, the following results were obtained. Our assumptions are that the above factors negatively affect the level of credit risk, expressed in the dynamics of reserves for possible losses in the banking sector. The fall in oil prices, the rise in the dollar exchange rate and the slowdown in GDP growth under the given scenario led to a significant increase in the LLP

indicator, which means the need for banks to increase reserves. This, in turn, can lead to increased costs, a decrease in bank profits, and, consequently, threaten their financial stability. It is important to emphasize that in the case of the dynamic model, which takes into account the previous value of changes in reserves, the final LLP indicator was lower than in the static model: 2.3% and 2.6%, respectively. This serves as further confirmation that the size of reserves accumulated in the previous period allows us to slightly smooth out the impact of macroeconomic shocks.

Next, using the resulting model, we will evaluate how the identified macroeconomic shocks can affect the return on assets of the banking sector. We also outline the prerequisites necessary for the analysis.

Suppose that in the next period the dollar exchange rate increases by 20%, the Baku Stock Exchange index will fall by 20% compared to the figures for the 1st quarter of 2023.

As for the growth rate of the loan portfolio, for the period 2012-2022. its average was 7.29%. The standard deviation from the mean is 4.23%. Let us estimate the increase in the risk of credit compression at 1 standard deviation.

We will take the remaining values from previous quarterly data, since in our model they appear with a delay. The initial values are presented in Table 12.

Table 12. Prerequisites for analysis

Index	Meaning
DER	37,379 manat
Credgr	3,075%
L2GDPGR	9,469%
L1INW	-9,5 billion dollar
L2INW	-7,7 billion dollar
L2IIR	6,2%
BSEI	1008,85 b.p.

Source: Compiled by the author

Next, we substitute the values simulating the situation of instability in the economy into the resulting return on assets equation.

$$ROA = -3.022 + 0.096829*DER - 0.054723*CREDGR + 8.85E\text{-}15*L2GDPGR + 0.015588*L1INW + 0.01979*L2INW - 0.186258*L2IIR + 0.001677*BSEI$$

As a result of substituting values into the equation, we received that if the forecast scenario is implemented, the profitability of the banking sector in the next quarter could decrease from

1.95% to 0.6%, which is a fairly critical level for maintaining the financial stability of the banking sector.

Thus, our model confirmed that an increase in risks in the economy has a negative impact on the stability of the banking sector through a deterioration in indicators characterizing the current position of credit institutions. This fact must be taken into account when developing policies to increase the resilience of banks to systemic risks in the economy in order to increase the reliability of the banking sector and reduce the degree of vulnerability to external shocks.

The hypothesis framed earlier has been accepted or rejected as below:

H1: The concept of financial stability is multifaceted and can include such aspects as resistance to shocks, ability to maintain liquidity and sustainable profit growth.

H2: Indicators such as capital adequacy ratio (CET1), liquidity ratio (LCR), return on assets (ROA) and non-performing loans (NPL) are the most informative for assessing financial strength.

H3: Measures such as regulating interest rates, providing liquidity, introducing additional capital requirements and supervising bank assets help strengthen the financial strength of banks.

H4: Stress testing can identify weaknesses in the banking system, such as insufficient capital or liquidity in the event of economic shocks.

H5: Macroeconomic shocks, such as large fluctuations in exchange rates or sharp changes in interest rates, can significantly deteriorate banks' financial performance, including profitability and asset quality.

H6: Macroeconomic factors such as GDP growth, inflation rate, interest rates and exchange rate fluctuations have a significant impact on the sustainability indicators of the banking sector, including the level of risk and profitability.

H7: With rising inflation and changes in GDP, the need to form reserves for possible losses increases due to the increasing risk of loan defaults and deterioration in asset quality.

H8: Fluctuations in interest rates and changes in GDP directly affect the return on bank assets, profitability of lending operations and overall profitability of banks.

The correlation table shows the relationship between macroeconomic factors and the indicators of the banking sector, but does not include the specific results of stress tests. From this point of view, hypothesis H4 can be rejected.

CONCLUSION

Based on the results obtained during the research work, we will summarize and formulate a number of conclusions regarding the financial stability of the banking sector in conditions of macroeconomic instability.

First, we were able to explore different perspectives on what is meant by financial sustainability. A key feature of the financial stability of the banking sector is the ability to withstand internal and external shocks, maintain a state of equilibrium and ensure the continuous implementation of its main functions as a financial intermediary.

Secondly, it was shown that the FSI (Financial stability indicators) coefficient method developed by the IMF, as well as stress testing models, are widely used in many countries as methods for analyzing and assessing the level of financial stability of the banking system. In the process of implementing banking and macroprudential supervision, the CBA also uses these approaches to monitor the condition of credit institutions and develop measures to maintain their financial stability.

A comparative analysis of FSIs showed that the basic ratios calculated by the CBA are almost completely consistent with the list recommended by the IMF. Some differences are explained by the specifics of the activity and functioning of the Azerbaijani banking sector, for example: a large share of loans in bank assets and the weak activity of banks in the stock market.

Stress tests conducted by the CBA confirm that the implementation of crisis scenarios in the economy has an impact on the condition of credit institutions. The impact of the crisis is estimated in the amount of potential capital losses of banks and the likelihood of not exceeding the minimum level of capital adequacy standard N1 of 10%. The results of stress testing in various years have shown that the most significant is credit risk, however, in general, the Azerbaijani banking system is quite stable and can overcome a moderate crisis without significant losses.

In addition, the study examined not only how the CBA analyzes and controls the financial stability of the banking sector, but also what measures it takes in conditions of real macroeconomic instability in order to maintain stability and prevent collapse in the banking system. It was noted that a set of measures, such as expanding the possibilities for refinancing credit institutions, guarantees from the CBA, subordinated loans, a deposit insurance system and the financial recovery of economically significant banks, easing requirements for the accrual of reserves, really turned out to be effective and were able to support banks in a crisis.

As part of the practical research, we came to the conclusion that not only bank capital, but also reserves for possible losses and return on assets of the banking sector can act as an indicator reflecting the negative impact of macroeconomic shocks.

The results of the constructed econometric models confirmed our assumptions. The impact of the crisis in the economy is manifested in the banking sector in the deterioration of the quality of the loan portfolio, a decrease in income and an increase in expenses, which in turn leads to a sharp increase in reserves for possible losses and a drop in the profitability of the banking sector.

The country's banking system is vulnerable to GDP growth rates, oil prices, capital flows, foreign exchange rate dynamics and stock indices. These are the main macroeconomic shocks that are inherent to the economy. Moreover, some of them, such as capital outflow and the fall in GDP, do not have an immediate impact on banks, but after some time. Awareness of this fact is useful for developing measures to prevent crisis trends in the banking sector and strengthen the financial stability of the banking sector.

In conclusion, I would like to present a number of possible recommendations that, in our opinion, would reduce the vulnerability of the banking sector to the impact of macroeconomic shocks in the economy, and thereby increase its stability.

One of the measures is to increase the capitalization of banks. Banks should continue to increase the amount of their own capital, since the results of stress testing show that the implementation of crisis scenarios can lead to significant losses of banks' own funds. During a crisis, the riskiness of assets increases significantly, the profit of credit institutions decreases, which is reflected in a reduction in the capital adequacy ratio. In order to prevent the standard from falling below the minimum acceptable level, it is necessary to increase the amount of own funds, which will compensate for possible losses. In addition, it is worth adding that capital growth should be carried out primarily through first-tier capital, which is of a higher quality and enhances the reliability and stability of the banking sector. During a crisis in the economy, a certain reserve of capital at credit institutions will ensure that banks are able to cope primarily with emerging risks on their own and will reduce the burden on the state in providing assistance to systemically important banks to maintain their stability.

The work confirmed that the most characteristic for the Azerbaijani banking sector is credit risk, which during the crisis is expressed in a sharp increase in reserves for possible losses, which negatively affects the condition of credit institutions. In these conditions, in order to smooth out this effect, it is necessary, in our opinion, to develop and implement a countercyclical reserve mechanism, in which dynamic reserves occupy a key place. The main point is that dynamic reserves take into account not only actual current losses, as is happening now, but also expected ones. As is known, during economic recovery, banks underestimate risks and increase the growth rate of the loan portfolio, without accruing practically any reserves. However, during a crisis, bank incomes are significantly reduced, the quality of the loan portfolio deteriorates, and banks are forced to rapidly build up reserves for possible losses, which further increases the size of bank

losses. As a result, the current reserve mechanism further aggravates the financial instability of the banking sector, rather than helping to overcome it.

Dynamic reserves will help cope with this problem, since they should be accrued by credit institutions not at the time of crisis, but during a credit boom, when there is an excess of funds, thereby providing themselves with a kind of "buffer" that can reduce the size of potential losses in conditions of macroeconomic instability. The credit risk of banks during a crisis will be covered by reserves formed during the economic recovery, and banks will not need to "freeze part of the funds" when they need them most. Thus, this reservation will ensure smoother fluctuations in the financial results of banks, which are exposed to changing reserves and will help strengthen the financial stability of the banking sector.

In addition, given the sensitivity of the banking sector to the dynamics of capital flows, the CBA needs to solve the problem of reducing banks' dependence on external sources of funding. Measures must be developed that will make it more accessible and efficient to raise funds in the domestic market through improving refinancing instruments and increasing the activity of the interbank lending market, which will reduce the likelihood of a threat of liquidity shortage in cases of crisis spread.

As part of the increased volatility of the manat exchange rate, in order to maintain the financial stability of the banking sector, it is necessary to exercise control over the size of the open foreign exchange position of banks, introduce a number of restrictions on the provision of loans in foreign currency to persons receiving income in manat, and strengthen reserve requirements for obligations in foreign currency.

Thus, monitoring the current state of the banking sector, analyzing potential risks, developing and implementing tools of the CBA makes it possible to strengthen the financial stability of the banking sector and reduce the risks generated in the economy as a result of the crisis.

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Appendix A

Table 13. Data for econometric analysis with LLP

Indicators	Y LLP (billion dollars)	X1 GDP growth rate, %	X2 Inflow(+)/outflow (-) of capital, billion dollars	X3 Oil price, $	X4 Dollar exchange rate, $	X5 Baku stock exchange index, points
2nd quarter 2012	9,35	100,1	-8,3	128	0,46	206,7
3rd quarter 2012	9,38	100,2	-8,1	112,5	0,46	320,6
4th quarter 2012	9,37	100,3	-8,2	111,63	0,46	327,03
1st quarter 2013	13,71	101,0	-0,3	114,9	0,46	325,4
2nd quarter 2013	13,76	101,1	-0,4	115,3	0,46	327,5
3rd quarter 2013	13,78	101,1	-0,3	109,6	0,46	401,8
4th quarter 2013	13,78	101,2	-0,1	108,56	0,46	508,5
1st quarter 2014	14,49	102,6	-4,3	114,8	0,46	574,6
2nd quarter 2014	14,55	102,8	-4,2	115	0,46	585,9
3rd quarter 2014	14,57	102,6	-4,2	101,2	0,46	542,6
4th quarter 2014	14,58	102,6	-4,1	53,61	0,46	537,6
1st quarter 2015	20,58	100,8	- 13,9	54,9	1,55	743,7
2nd quarter 2015	20,63	100,5	-13,8	55,6	1,55	748,5
3rd quarter 2015	20,64	100,9	-13,7	42,2	1,55	889,5
4th quarter 2015	20,65	101,1	-13,3	37,04	1,55	917,2
1st quarter 2016	14,65	96,7	-5,2	42,8	1,04	1169,1
2nd quarter 2016	14,71	96,9	-5,3	43	1,04	1238,4
3rd quarter 2016	14,71	96,9	-5,5	48,7	1,04	1305,8
4th quarter 2016	14,72	96,9	-5,6	54,06	1,04	1391
1st quarter 2017	13,92	100,1	4,0	53,7	1	1647,1
2nd quarter 2017	13,97	100,1	4,1	54	1	1698,5
3rd quarter 2017	13,98	100,2	4,2	59,6	1	1798,2
4th quarter 2017	13,99	100,2	4,2	60,42	1	1854,4
1st quarter 2018	16,32	101,1	8,1	70,9	1	1364,1
2nd quarter 2018	16,36	101,3	8,1	71	1	1379,3
3rd quarter 2018	16,37	101,4	8,3	60,37	1	1031,3
4th quarter 2018	16,39	101,5	8,2	45,33	1	646,2
1st quarter 2019	19,06	102,1	3,3	66,15	1	985,6
2nd quarter 2019	19,09	102,2	3,4	66,79	1	991,2
3rd quarter 2019	19,09	102,4	3,5	62,89	1	1298,2
4th quarter 2019	19,11	102,5	3,5	61,06	1	1396,7
1st quarter 2020	18,56	95,4	-8,9	54,8	1	1562,3
2nd quarter 2020	18,56	95,6	-8,8	55	1	1571,6
3rd quarter 2020	18,57	95,7	-8,6	50,6	1	1566,1
4th quarter 2020	18,61	95,8	-8,5	48,52	1	1745,1
1st quarter 2021	21,22	105,1	5,8	70,9	1	1410,5
2nd quarter 2021	21,24	105,3	-5,9	71,2	1	1428,3
3rd quarter 2021	21,25	105,5	-5,7	74,4	1	1599,2
4th quarter 2021	21,27	105,6	-5,8	75,21	1	1695,7
1st quarter 2022	24,32	104,2	-4,9	98,1	1	1514,7
2nd quarter 2022	24,34	104,4	-4,4	98,4	1	1562,8

3rd quarter 2022	24,36	104,6	-4,3	83,5	1	1432,6
4th quarter 2022	24,38	104,7	-4,2	78,96	1	1441,3
1st quarter 2023	26,21	105,1	-4,1	83,52	1	1513,5

Appendix B

Table 3. Data for econometric analysis with ROA

Indicators	Y ROA	X1 GDP growth rate, %	X2 Inflow(+)/outflow (-) of capital, billion dollars	X3 Oil price, $	X4 Dollar exchange rate, $	X5 Baku stock exchange index, points	X6 Growth rate of loans issued (billion dollars)	X7 interest rate on the interbank market (%)
2nd quarter 2012	0,006	100,1	-8,3	128	0,46	206,7	4	-108
3rd quarter 2012	0,007	100,2	-8,1	112,5	0,46	320,6	4,6	-107
4th quarter 2012	0,008	100,3	-8,2	111,63	0,46	327,03	5	-107
1st quarter 2013	0,008	101,0	-0,3	114,9	0,46	325,4	4,1	20,5
2nd quarter 2013	0,0082	101,1	-0,4	115,3	0,46	327,5	4,6	22,9
3rd quarter 2013	0,0087	101,1	-0,3	109,6	0,46	401,8	4,69	24,8
4th quarter 2013	0,009	101,2	-0,1	108,56	0,46	508,5	4,75	25,6
1st quarter 2014	0,0097	102,6	-4,3	114,8	0,46	574,6	4	24,1
2nd quarter 2014	0,0098	102,8	-4,2	115	0,46	585,9	3,8	20,7
3rd quarter 2014	0,0099	102,6	-4,2	101,2	0,46	542,6	3,6	19,9
4th quarter 2014	0,01	102,6	-4,1	53,61	0,46	537,6	3,5	18,92
1st quarter 2015	0,011	100,8	- 13,9	54,9	1,55	743,7	3,3	25,9
2nd quarter 2015	0,010	100,5	-13,8	55,6	1,55	748,5	3,2	36,7
3rd quarter 2015	0,011	100,9	-13,7	42,2	1,55	889,5	3,15	52,8
4th quarter 2015	0,012	101,1	-13,3	37,04	1,55	917,2	3	58,1
1st quarter 2016	0,011	96,7	-5,2	42,8	1,04	1169,1	6	50,8
2nd quarter 2016	0,012	96,9	-5,3	43	1,04	1238,4	9	47,6
3rd quarter 2016	0,012	96,9	-5,5	48,7	1,04	1305,8	13	43,4
4th quarter 2016	0,013	96,9	-5,6	54,06	1,04	1391	15	41,6
1st quarter 2017	0,013	100,1	4,0	53,7	1	1647,1	15	41,3
2nd quarter 2017	0,014	100,1	4,1	54	1	1698,5	15	40,7
3rd quarter 2017	0,014	100,2	4,2	59,6	1	1798,2	15	40,2
4th quarter 2017	0,015	100,2	4,2	60,42	1	1854,4	15	40
1st quarter 2018	0,014	101,1	8,1	70,9	1	1364,1	13,2	39,7
2nd quarter 2018	0,013	101,3	8,1	71	1	1379,3	11,9	38,3
3rd quarter 2018	0,014	101,4	8,3	60,37	1	1031,3	10,1	37
4th quarter 2018	0,014	101,5	8,2	45,33	1	646,2	9,75	37,1
1st quarter 2019	0,014	102,1	3,3	66,15	1	985,6	8,89	33,2
2nd quarter 2019	0,014	102,2	3,4	66,79	1	991,2	8,1	29,9
3rd quarter 2019	0,013	102,4	3,5	62,89	1	1298,2	7,6	28,1
4th quarter 2019	0,014	102,5	3,5	61,06	1	1396,7	7,5	27
1st quarter 2020	0,018	95,4	-8,9	54,8	1	1562,3	7,1	36,7
2nd quarter 2020	0,019	95,6	-8,8	55	1	1571,6	6,68	38,2
3rd quarter 2020	0,02	95,7	-8,6	50,6	1	1566,1	6,32	39
4th quarter 2020	0,02	95,8	-8,5	48,52	1	1745,1	6,25	39,1
1st quarter 2021	0,021	105,1	5,8	70,9	1	1410,5	6,9	37,9
2nd quarter 2021	0,022	105,3	-5,9	71,2	1	1428,3	7,1	36,5
3rd quarter 2021	0,023	105,5	-5,7	74,4	1	1599,2	7,19	35,1
4th quarter 2021	0,023	105,6	-5,8	75,21	1	1695,7	7,25	35,3

1st quarter 2022	0,023	104,2	-4,9	98,1	1	1514,7	7,74	30,9
2nd quarter 2022	0,023	104,4	-4,4	98,4	1	1562,8	7,92	26,7
3rd quarter 2022	0,024	104,6	-4,3	83,5	1	1432,6	8,18	20,1
4th quarter 2022	0,024	104,7	-4,2	78,96	1	1441,3	8,25	19,5
1st quarter 2023	0,024	105,1	-4,1	83,52	1	1513,5	8,9	19,1