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Risks in the Banking Sector and Credit Risk Measurement Methods: Research on Azerbaijan Banking Sector

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Table of Contents

List of Figures

List of Tables

Introduction

As the economic relations between countries in the world progressed, the need for banks and other financial institutions increased rapidly. The financial sector plays an important role in the redistribution and efficiency of resources in the economy. Within the finance sector, banks play an active role in organizing the activities of companies, increasing their resource efficiency and providing resources. Thus, they undertake important functions besides the central bank in terms of providing liquidity by creating fiat money in the market. In the banking system, this lending process constitutes the basis of the asset management of the balance sheet, as well as the management of the resources collected through deposits. Therefore, the most important issue for banks is the timely and complete return of the loan extended from passive sources. Wrong company sector choices made during the lending process, adverse selection problem and moral degradation show a negative relationship with the return of the given loan. For this reason, banks have to choose appropriate customers, determine sufficient and necessary limits for customers, and obtain relevant guarantees. This process also necessitates effective supervision and evaluation.

Today, the crediting process is constantly being renewed in terms of theory and practice, and it gradually gains importance both in national and international legal regulations and in the implementation stages. It tries to transform the complex multiple structure into a qualified simple structure by paying attention to many different factors in the crediting process. Efforts are made to minimize the credit risk included in the bank's assets and to create an effective and safe financial loan portfolio. At this point, many banks pay attention to the steps to be taken at the credit rating stage. However, some banks do not show the necessary sensitivity to the credit management process and this situation increases the risk sensitivity in the banking sector. Therefore, the evaluation of loan requests and the sound measurement and follow-up of customer credit ratings are imperative. The evaluation of loan requests by the appropriate department of the relevant bank is a process consisting of preliminary examination, detailed research and financial analysis. In the preliminary examination, which is the first stage of the evaluation process of loan requests, the compliance of the loan request with the general and loan policies of the bank is measured. A more detailed research and financial analysis is carried out for large-volume loans that pass this stage. Confidentiality, impartiality, accuracy and consistency are observed during detailed research, and

banks collect and evaluate in detail information about the moral and financial status of individuals and companies from various sources.

Financial and technical analysis, which is frequently used by the banking sector during the lending phase, is generally aimed at determining whether the customer has the ability to repay the loan, taking into account his financial data and activities. During the financial analysis, the financial structure of the company, its risk situation, profitability, efficiency of its activity and its potential for the future are examined in detail. For this reason, the effectiveness of financial analysis primarily depends on the accuracy and reliability of the financial statements, which are the main source of information for analysis. All companies in the bank's portfolio are located in different sectors. Firm risk and sectoral risks affect the total credit risk in this sense. Various measurement models have been developed in order to measure the credit risk that the bank will face on a sectoral and firm basis. Linear probability model, logit model and probit model, Altman's Z-score model, risk-adjusted return on capital model and credit matrix can be listed as some of these models.

Credit risk is also affected by various specific shocks on a country basis. In this respect, it is necessary to measure the credit risk on the basis of country and bank. In country-based studies, the survey method is frequently used in terms of information extraction. If the content of the thesis is summarized in general: In the first part of the study, risks in the banking sector are defined and discussed within the framework of generally accepted rules and practices. Credit risk, operational risk, interest rate risk, market risk, capital risk, currency risk and operational risks are discussed in general information, taking into account the diversity and extent of the risks that banks are exposed to. In the second part, traditional and new credit risk measurement models and theories used in the banking sector to minimize the effects of credit risk are explained. In the third part of the study, the general structure of the Azerbaijani banking sector is presented and the legal regulations regarding the sector are explained. In particular, the events affecting the banking sector in recent years and the risk management system in banks are mentioned. At the last stage, a survey study questioning the role of bank management in credit risk assessment in the Azerbaijani banking sector is applied to 19 banks. By analysing the functioning of the credit risk mechanism in the Azerbaijani banking sector, it has been tried to reveal the strengths and weaknesses of the sector in terms of risk management.

Chapter I: Risks facing the banking industry

In the first part of the study, after defining the concept of risk, the risks arising from the banking sector and the measurement methods of these risks are emphasized. In addition, the reasons for the risks existing in the banking sector and their interaction with each other are examined.

1.1. The concept of risk

The main purpose of every business is to increase the market value by increasing the profit maximization to the highest level and to continue its life which is assumed to be endless. In today's market conditions, businesses encounter more threats or negative situations that limit their activities and affect their profitability. Financial risks come first among these threats and negative situations. Today, with the policies implemented by the countries in both national and international markets, businesses have started to face risks more in a competitive environment that has emerged with the elimination of barriers to free movement of money. Since these risks are larger and more rapidly developing than before, businesses felt the need to identify these risks in real terms and reduce their impact and started serious studies to prevent them. With the start of many businesses in this direction, the concept of financial risk management has entered our economic life and has been improved a lot every day. As a result of this, various hedging instruments have been developed and started to be used in business life. Risk is defined as the probability of encountering situations we cannot anticipate in the future (Usta, 2005).

The concept of risk also includes the concept of uncertainty. Although the two are known synonymously, risk and uncertainty create different actions. While risk arises for statistical events, there is uncertainty for non-statistical events. While risk is an external variable that can be measured and controlled depending on the cost of insurance, uncertainty is an external factor that cannot be changed by information that cannot be measured. In modern conditions, risk is defined as the possibility of an unexpected or undesirable outcome of an action, event or decision. Risk is usually a case of probability. When the probability distribution is objective, it is called risk, when it is subjective it is called uncertainty. In short, risk is the ability to deviate from what is expected. General definitions of risk in the literature are as follows: Risk is the likelihood of diminishing economic benefits that are believed to come from financial losses or costs (Riyad, 2013). Risk is the probability of occurrence of all kinds of events and situations that may prevent the achievement

of the organizational, strategic and financial objectives (Gupta, 2017). Financial risk is the risk that the assets or resources of businesses or individuals change financially in the face of price movements. Commodity prices, exchange rates, stock prices and interest rates are the main risk factors in these price movements. Among these risks, the exchange rate and interest rate risk that have affected people and businesses the most in recent years (Ramirez, 2007). The most important problem in the financial system is that the future is uncertain.

Today, growing financial risks have serious negative consequences for both the national economy and business. In particular, limiting the activities of enterprises in order to protect against financial risks leads to the fact that many opportunities are ignored. To avoid this situation, it is important to be aware of these risks and ensure that they are properly managed. The Bretton Woods Agreement, which was developed by developed countries in 1944 and was based on a fixed exchange rate, ended between 1972 and 1973 and caused exchange rate fluctuations. Fluctuations in exchange rates following the collapse of the Bretton Woods system have negatively affected the performance of international trading companies. However, in the 1970s, the Organization of the Petroleum Exporting Countries (OPEC) limited production to raise oil prices, and the US Federal Reserve (FRS) made policy-oriented policy changes in response to rising oil prices. increase in interest rates. he brought with him. The hike in US interest rates resulted in both increased price volatility and economic impact on other countries. Thus, fluctuations in interest rates, prices and exchange rates, which led to financial risks, became an important issue for institutions (D'Arcy, 2001).

Fluctuations in financial risk are the potential for negative consequences for our assets as a result of unpredictable changes in variables, which we call risk factors. These risk factors include negative factors that can give rise to a wide range of financial risks, from declines in stock prices to differences in the value of an investment portfolio and differences in exchange rates. We can provide examples of stock price fluctuations, exchange rate fluctuations, interest rate fluctuations, fair value and cash flow risks, and financial risk factors (Abu and Hmeidat, 2013). One of the most important issues related to financial risk is exposure, that is, the subject of financial risk. In order to speak of a financial risk, there must first be a risk issue that can be described as risk. It is the subject of the risk to be eliminated or reduced in financial risk.

For businesses to take precautions against financial risks, they must first identify the subject of the risk. For example, the subject of risk can be exchange rate differences or interest rates. We can also indicate the type of risk that should be protected from financial risk. These are risks that may arise, risks that are unlikely to arise, and risks that can be earned (Osterland, 2000).

There are aspects of financial risk that can increase the profitability of a business and increase its value. There are factors that can help improve the profitability of a business if financial risk is properly managed. This is only possible with effective risk management. When a risk arises, an understanding of exactly what the risk is can be achieved through effective financial risk management. The concept of risk management first emerged in 1967 from risk pools established in the London insurance industry. This concept was used as insurance until the 1970s, and then it began to be taken as a separate concept. During the 1973-1979 oil crisis and the end of the Bretton Woods Accord, consultancy requests came to the fore to raise the importance of risk and to identify and assess risk ratios. As a result, institutions have realized that the scale of the risks to which they are exposed has expanded and will continue to expand day by day, and they focused on the risks that could lead to bankruptcy. After this period, in order to cope with the risks, the importance began to be given to risk management (Prasad and Rajan, 1995).

The wave of the crisis that began in Mexico in 1995, continued in Asia in 1997 and spread to Russia and Latin America in 1998, making risk management important, especially for organizations operating in the financial markets. In the aftermath of this crisis, the economic crises in emerging markets, Azerbaijan and Argentina in 2001 could also affect the integration of other countries and the financial markets that it brought with it. The failure of the policies defined for the national economy affected the entire financial system.

With the impact of negative developments, the management of financial risks that have led country economies and companies to bankruptcy has become even more important. Today, country economies and companies, which are interconnected by the impact of globalization, continue to develop new methods and tools for financial risk management. Financial risk management includes the process of determining the risks that may arise as a result of the financial decisions taken by considering the variables such as exchange rate, interest, commodity price, finding suitable hedging techniques for these risks, and determining the sensitivity levels of these techniques, and fulfilling the appropriate solutions in a timely manner. In order to manage financial

risks correctly, the risks exposed must be constantly reviewed and necessary measures taken. The financial risk management process is a dynamic process that is determined specifically for the different situations of each business (Christoffersen, 2003). Overall, financial risk management activity consists of three basic steps (Bolak, 2004). A comprehensive description and classification of the risk that may affect the firm's operational results, measuring the risk related to the magnitude and probability of the expected loss and the situations affecting the value of the firm and the application of the best formulation in order to bring the risks of the business within acceptable limits on time.

In the process of managing financial risks, the risks to which the business activity may be exposed should be determined and these risks should be classified. Failure to detect or underestimate these risks, which can be different for each business, can create problems in terms of process management. When measuring risk, which is another step, it is important to choose the right method. The financial risk measurement methods identified for each type of risk should be defined accordingly. The last thing to apply is to use the methods used in financial risk management and create the best roadmap within the established risk limits. Every economy, institution or business is subject to different financial risks. These risks differ from many variables, such as the geographic location of a country and the institutions or organizations operating in that country, the productive resources it possesses, the potential of the labor force, and the capital situation. Because of this difference, different methods of financial risk management are used. There are three different methods used in financial risk management: insurance, asset and liability management, and hedging. Insurance is a contract that can only protect certain risks in cases such as natural disasters, fires, accidents, floods, and only provides elimination of losses. Asset and liability management is another method based on balancing assets and resources in the balance sheets of enterprises. In the hedging method, it aims to create positions that are opposite to existing risks and minimize risks using various financial instruments.

1.2. Risks Encountered in the Banking Sector

The banking sector, due to its structure, contains various risks. The probability of the bank to suffer represents the risk in terms of the banking. Banks, as a general framework, face macro (at a level that will affect the whole sector) risks or micro (competition between banks) risks (Allen and Santomero, 1997). The main risk in banks, as a result of the financial intermediation function

undertaken between those who supply and demand funds, is the credit risk. In fact, it is possible to classify the risks that banks may face into three groups as market risk, credit risk and operational risks. The following figure shows the main risks that the banking sector may face.

Figure 1. Market risk components

Source: Tabari et. al., 2013

1.2.1. Market risk

Market risk mainly arises as the risk arising from the fluctuations in financial prices and rates. The Basel Committee expressed the market risk as the risk of loss due to changes in market prices in positions held in banks' on-and off-balance sheet accounts. In other words, by defining the risks arising from fluctuations in bond, commodity or stock prices in financial markets, or changes in interest rates or exchange rates, as market risk, it emphasizes that banks are prone to market risk due to both their balance sheet management and their trading activities. From this point of view, it can be said that market risk is the most extensive of the risks faced by the banking sector (Tapiero, 2004).

Figure 2. Market risks

Source: Crouhy et.al., 2000

Market risks can be handled under two headings as dependent and independent risks. Dependent risks are risks arising from changes in stock prices, interest rates, foreign exchange rates and other financial instruments. Independent risks include other risk groups other than these. In this context, it is mandatory to show the current market values in the balance sheets of banks by valuing them with current prices or exchange rates:

- Derivative contracts and options based on interest or whose current values are sensitive to interest changes, entered for the purpose of hedging or mitigating risks arising from positions related to the trading / selling accounts / portfolio,
- Securities such as stocks, investment fund participation certificates, bonds and bills subject to purchase/sale,
- Net short and long on-and off-balance sheet positions in terms of each currency,
- Gold and other precious metals subject to purchase / sale are the subject of market risk.

There are four basic price variables that will affect the current market value of financial assets and positions held by banks. These are Commodity price change, Exchange rate, Interest rate and Security risks (Crouhy et.al., 2000).

In the most general sense, a commodity is defined as physical products such as 'agricultural products, precious metals excluding oil, gas, electricity and gold that can be bought / sold in organized markets. The volatility of the supply is the main factor determining the price of the commodity price change risk determined over the supply formed in the market. In this respect, commodity price change risk is different from other risk types, and therefore commodity prices generally have a higher volatility than other financial assets. The total loss risk arising from price changes (stock, interest, currency and commodity risks) related to financial assets and positions is called general market risk. However, although it can affect the current price of financial instruments, there are some additional risks outside of market risk. The gap or difference risk, which refers to the interest risk that may arise from maturity mismatches between assets and liabilities, the base risk that arises due to the differences in the reflection of the general price movements on the prices of financial instruments that are considered to balance each other in terms of maturity, and the stock investment risk that is the subject of purchase / sale are examples of additional risks. In addition, the specific risk that refers to the probability of loss that the issuers or guarantors of securities such as bonds or bonds may face due to developments in their

management or financial position, regardless of the general price movements in the market, can be cited as an example of such additional risks.

Exchange rate risk can be expressed as the probability of loss that banks may be exposed to as a result of changes in exchange rates due to all foreign currency assets and liabilities. In other words, it is the risk related to the negative effects of the foreign currency positions taken by banks due to unexpected exchange rate movements in their income and therefore in their own funds, cash flows, asset quality and finally in meeting their commitments. If the national currency gains value against the foreign currency, the bank with a foreign currency surplus will obtain less national currency for the same currency, and the bank with a foreign exchange surplus in its loss liabilities will make a profit because it will pay the same debt by paying less national currency (Kaval, 2000):

In mixed portfolios of interest rate sensitive assets, many different types of risk may arise depending on the maturity and nominal values of financial instruments (Crouhy et. al., 2000). Interest rate risk can be expressed as the decrease in the value of fixed income financial assets due to the increase in market interest rates. In other words, interest rate risk refers to the loss that the bank may be exposed to depending on the position of the bank due to movements in interest rates. Due to the fact that mostly long-term and fixed-interest funds are in the liabilities accounts of the bank, the bank costs are higher than the market interest rates as a result of the decrease in interest rates. As a result of the increase in interest rates, the return of fixed interest rate assets in the asset accounts will remain at a lower level than the market value.

Interest risk is the risks that banks are exposed to depending on their financial situation due to the movements in interest rates. Interest risk has an impact on both the bank's revenues and the economic values of on-balance and off-balance sheet items. The most common situations regarding the interest rate risk that the bank may be exposed to can be listed as follows (Oesterreichische Nationalbank, 1999):

- Repricing risk due to maturity differences and accordingly repricing bank balance sheet items,

- Yield curve risk (caused by changes in the yield curve),

- Basic interest risk (caused by incorrect correlation in adjusting interest rates applied to different instruments with the same pricing characteristics).

Interest rate risk management has become easier with derivative interest rate contracts that enable banks and businesses to transfer this risk to others. Since the cost of these products is high, cost-benefit analysis should be done carefully. In the study titled Interest Rate Risk Management and Oversight Principles published by the Basel Committee, it explains in detail the issues to be followed in order to effectively manage the said risk and what the activities should be implemented by the banking supervision and regulation institutions in this regard. The Basel Committee states that there are four main factors that cause interest rate risk. These elements are (BCBS. 2004):

- Repricing risk: It is the foremost and most controversial aspect of interest rate risk. Accordingly, it can be said that when there are fixed rates in the assets, liabilities and off-balance sheet positions of banks, if the term and time change, the positions have to be repriced according to these changing situations.

- Yield curve risk: Banks had to change the shape and slope of the yield curve due to the repricing mismatches they experienced. Yield curve risk can be expressed as the adverse effects of banks' incomes or major economic values due to unexpected changes in the yield curve.

- Basic risk: It is also expressed as the basic rate risk. This risk arises from the low correlation relationship that arises in balancing the ratio between the returns of different securities with repricing features and the amount paid for them. Changes in interest rates may cause unexpected changes in the spread of cash flow or income between assets and liabilities with similar maturities or repricing frequencies due to these differences.

- Option risk: It is called an interest option to have the right to borrow or lend at a certain interest within a certain period from any date. The interest option is a derivative product developed to manage the interest risk, which is more clearly revealed by the replacement of the fixed interest rate with variable interest. With interest options, the future interest risk can be eliminated and the profit potential can be preserved. Apart from this, interest options can be used for speculation as well as hedging.

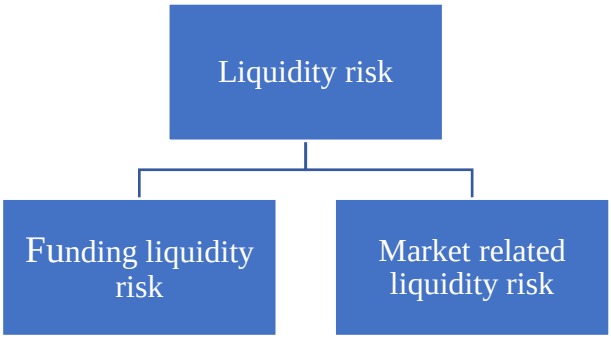
- Securities risk: In other words, the securities (shares, income partnership certificate, investment funds, affiliates, subsidiaries, affiliated securities and the like) arising from the risks arising from the volatility in the securities portfolio It is the probability of loss arising from the decrease in

dividends or similar revenues distributed by the enterprise or due to price decreases as a result of negative developments in the general economic conjuncture.

- Liquidity risk: Liquidity risk is one of the main risks in banking. Liquidity is the ability to meet fund demands and is a vital concept for financial institutions.

Depending on various factors such as fields of activity, funding sources and balance sheet structure, banks' liquidity requirements differ. For this reason, each bank has to keep sufficient funds in order to fulfil its obligations under normal and abnormal conditions or to plan where and in what form the funds in question can be obtained. Therefore, regardless of their field of activity and structure, all banks should determine, measure, monitor and control their liquidity requirements in detail. As shown in Figure 3, liquidity risk consists of funding-related liquidity risk and market-related liquidity risk.

Figure 3. Liquidity risk components



Source: Howell, 2010

The possibility of failing to fulfil the funding obligation at an appropriate cost due to liquidity risk related to funding, variations in cash inflows and outflows, and maturity-related cash flow mismatches; Market-related liquidity risk, on the other hand, refers to the probability of loss if the bank cannot enter the market properly, cannot close its positions at an appropriate price, sufficient amounts and pace or cannot leave the positions due to the shallow market structure in some products and the barriers and divisions in the markets (Choudhry, 2012).

- Legal risk: Legal risk refers to the cases where the receivables lose value due to incomplete or incorrect legal information and documents, or the liabilities are higher than expected. Banks can be exposed to legal risks in a variety of ways. Existing laws may be incomplete in solving legal

problems related to the bank, or a court decision regarding the special situation of a bank may partially or completely negatively affect the banking sector. In addition, laws regarding banking and other commercial businesses may change. Banks are particularly sensitive to legal risks that may arise in the implementation of current transactions and in the absence of legal right to be a party to the transaction (Moorhead and Vaughan, 2015).

- Reputational risk: Reputational risk arises due to the failure of a bank in its operations or as a result of not complying with the current legal regulations. Reputational risk can cause serious damage to the bank, as it is important for banks to ensure and protect the trust of bank customers and market participants.

1.2.2. Operational risk

The developments in financial markets, the use of more complex systems due to technological advances, and the diversification of products and services provided by banks have significantly changed the operational activities of banks today. Operational risk can generally be expressed as all risks other than credit and market risk. The Basel Committee defined operational risk as the risk of damage that may arise from inappropriate or inoperative internal processes, people, systems or external factors. The first step in determining operational risks is that these risks can be defined by the bank management. Inadequate internal controls, corruption and fraud, weak credit controls, erroneous accounting records, errors and malfunctions in information technology systems, information loss that may occur after natural disasters are various risk groups under the definition of operational risk. Operational risk is much broader than credit and market risks, which can be made more clearly and precisely and whose database can be supported by compatible information systems (Mainelli, 2002). Basel Banking Supervision and Audit Committee has gathered the transactions and events or reasons that cause operational risk under seven headings (Vasiliev et. al., 2018):

- Internal corruption actions: Damages arising from bank personnel's actions against the laws, regulations and bank policy, or crimes such as embezzlement, theft, forgery, fraud.

- External corruption acts: Damages arising from crimes committed by the bank or third parties such as fraud, theft and forgery,

- Practices and workplace conditions and environment: Payment of compensation claims and compensation for losses, including bodily injuries caused by practices contrary to work, workplace safety, health conditions or contracts,

- Customers, products and business practices: Damages arising from the failure to fulfil the obligations undertaken against customers as a result of ignorance or negligence or the nature and quality of the service provided,

- Physical damages and losses in assets: Damages arising from events such as terrorism or natural disasters, mass demonstrations, material damage or loss of bank assets,

- Business interruption and system failures: Damages arising from information technology system failures, work interruption and

- Transactions, delivery and management: These are the damages arising from the wrong or contrary to the instructions, management mistakes, relations with customers and sellers, and buying and selling transactions.

1.2.3. Credit risk

Credit risk is the risk of loss that may occur if the borrower fails to meet the agreed terms for financial or other reasons. One of the most important areas of expertise of banks is taking credit risk and managing these risks effectively. Credit risk is the possibility that the bank borrower will not be able to fully or partially fulfil its obligations at maturity. In other words, credit risk is the risk of non-repayment of all debts, the risk of delay in the credit service or the non-return of the loan (Donaldson, 1989).

In the distribution of losses due to credit risks, banks will cover the expected loss with their reserves, and unexpected losses with provisions and equity. Although credit risk consists of the counterparty's failure or unwillingness to fulfil its obligations, credit risk can be diversified. However, it is difficult to hedge this risk as most of the risk of default comes from systematic risk.

Credit risk is the most important banking risk undertaken by commercial banks. The risk of a loan portfolio is affected by the risks and concentration risk it contains. The credit risk of the portfolio consisting of funds offered by banks depends on internal and external factors. Internal factors can be expressed as deficiencies in banks' credit policies, deficits, lack of realistically established credit

concentration limits, insufficiently defined credit limits by the credit committee, not being fully evaluated by the borrower, not pricing the risk correctly, and the absence of a review system in the loans granted. As external factors, various factors such as fluctuations in prices, interest rate, exchange rate, trade restrictions, general economic situation and government policies can be said (Oldfield and Santomero, 1997). Management of credit risk in banking is one of the issues that senior management should focus on. The Scientific basis risk pricing, Measurement of risk as a result of credit rating, Digitizing the risk based on the estimated credit losses, An efficient credit review process of portfolio management and control should be included in the credit risk management process (Konovalova et. al., 2016). Credit risk can arise not only from credit products but also from financial products. Transactions with credit risk can be specified as cash loans given by banks, non-cash loans such as letters of guarantee, contractual guarantees, sureties, aval, endorsement, acceptance and commitments of this nature, purchased bonds and similar capital market instruments, loans given by making deposits or in any form and form, receivables arising from the term sales of assets, overdue cash loans, interest accrued but not collected, the cost of non-cash loans in cash bonds, receivables from reverse repo transactions, risks undertaken due to futures and options contracts and other similar contracts and partnership shares (Ong, 2000).

Credit risks mainly consist of four components which are the amount of the loan, the assets of the real or legal person who will pay the loan, default payment dates and paid/outstanding debt balance. We can express the factors that cause the occurrence of credit risk in banking activities as internal or external factors or factors that are or are not under the control of the bank. Internal factors that may cause credit risk, which are under the control of the bank, are risk sources that can be kept under control with good risk management practices. Failure to correctly analyse the economic activity or character of the person requesting a loan, problems that may arise due to an error in the loan guarantee can be cited as examples of internal factors that may cause credit risk. Factors not under the control of the bank, which are among the sources of credit risk, are risk factors whose emergence is not under the control of the bank. Natural disasters such as earthquakes and floods, economic and political crises, monetary, fiscal and income policies can be cited as examples of external factors (Pearson, 2004).

Table 1. Credit risk sources

Internal Factors	External Factors
Credit client specific factors - Supply, production and marketing structure - Competition power - Managerial skills - Product life cycle	Political, economic and social factors - Legal regulation changes - Changes in the political structure - Changes in economic policies - Volatility, shock and crises
Bank-specific factors - Financial analysis - intelligence structure - Risk assessment capability - Decision criteria - Risk - collateral balance	Natural and other factors - Natural disasters, drought etc. - Technological developments - Customer preferences - Product life cycle

Source: Sonbul, 2014

Another distinction that can be made regarding the sources of credit risk is systematic and specific risk. Systematic (non-mitigating) risks are the part of the fluctuations in the returns of the securities resulting from the factors affecting the prices of all financial assets in the market at the same time. The sources of systematic risk can be specified as natural factors such as changes in economic, political and social environment, natural disasters, drought, technological developments, customer preferences and other factors such as product life cycle. Specific (non-systematic) risks are the part of the total risk specific to the firm or the sector in which the firm is located.

Credit client-specific factors and bank-specific factors are among the components of the specific risk. Sometimes the components of the systematic risk and the components of the specific risk cannot be sharply categorized for a variety of reasons. Because natural factors that are under the influence of a local geography can turn into a risk factor belonging to the debtor or the debtors. According to modern portfolio theory, the total risk of the portfolio consists of systematic risk and firm (specific) risk. If we add new securities to our portfolio, the share of the systematic risk element of our portfolio in the total risk will increase while reducing our specific risk and thus our total risk. In other words, the systematic risk that will increase the relationship of our portfolio with the market will gradually replace the total risk.

The point to be considered here is whether the effects of diversification in the loan portfolio on specific and systematic risk are compatible with modern portfolio theory. Specific risk can be reduced by diversifying according to modern portfolio theory. However, this is not the case for systematic risk. In other words, it is not possible to eliminate it with diversification. In the loan portfolio, as in the share portfolio, increasing the diversity and the number of customers, in other words, avoiding concentration may reduce the credit risk that may arise from specific factors. However, due to the transition between systematic and specific risk factors, it may not be correct in all cases to make the assumption of the modern portfolio theory that systematic risk in the stock portfolio cannot be reduced by portfolio diversification for the loan portfolio. Avoiding concentration in the loan portfolio can help reduce loss, although it does not avoid the impact of systematic factors altogether (Yang et. al., 2019).

1.3. Risk Management in Banking

Risk management has become an indispensable function of today's banking in globalized markets where 24-hour trading is possible, and risks cannot be limited in time. The purpose of risk management is not to prevent the bank from taking risks. Risk management in banking basically has two purposes: Improving the financial performance of the bank and to prevent the bank from encountering major losses that are impossible to meet and accept.

The main purpose of risk management in banking is to create a system that can meet the ever-increasing and diverse demands of the market by correctly correlating the strong financial structure, return and risk of the bank with each other in order to increase the profitability of the bank. Increasing and diversifying risks in the banking system has increased the importance of risk management and revealed the necessity of controlling and managing risks. When the risks in the banking sector are not controlled, they may cause banking, foreign exchange and liquidity crises at micro level, as well as financial crises that can affect the whole world at the macro level. As seen in the example of the global economic crisis in 2009, banking and financial market crises spread very quickly and negatively affected the economies of the country (Altman, 2008).

Risk management, as a discipline and management system aiming to reduce uncertainties and the negative effects of uncertainty to an acceptable level, plays an active role in improving the financial performance of banks and preventing the bank from encountering large losses that are impossible to meet and accept. The reasons for banks to develop risk management functions can

be listed as follows (Lobanov and Chugunov, 2003). The business environment of banks has undergone enormous changes. Changing the working environment causes increased competition and pressure from shareholders. The structure of institutions has become more complex and it cannot be determined exactly who will take responsibility for risk taking. Operations and operations in the business environment have become more complex and therefore sufficient transparency could not be provided. Product lifetimes have risen to a level that senior management cannot appreciate. The cost of mistakes made in the strategic area increases, and the effect of a possible lack of control often leads to negative consequences. Regulators, investors, customers and shareholders have started to pay more attention to the risk management process.

Risk management policy in banking is established by the boards of directors. The international standards that determine the risk management organization and the duties and responsibilities of the management were determined in the document "Development of the Management System in Banks" published by the Basel Committee in September 1999, this document was revised in 2005. The board of directors, which determines the basic strategies, can ensure the execution and monitoring of low-level policies by establishing various sub-organs or committees (Arora et.al., 2005). Risk policies to be approved by the board of directors should include the organizational structure and scope of the risk management function, risk measurement methods, the scope of the duties and responsibilities of the units related to risk management, structure and meeting frequency of risk committees at different levels, procedures for determining risk limits, ways to be followed in occurrence of limit violations and notification and notification procedures to be established and their functioning methods (Summerhayes, 2010).

The risk management policies of banks can be preventive and protective (Terje, 2015). Preventive Policies are proactive policies in a sense that are implemented before risks occur. These are policies of priority, such as compliance in the positions of the bank, limitation of open positions, diversification in loans and securities portfolio, setting limits in various items, etc. Protective Policies can be described as buffers that will protect the bank after the risk arises, and that will cover the risks. Buffers are bank equity and provisions made up of different elements. There are three basic principles accepted in risk management (Bojidar, 2016):

1. The focus of risk management should be the risk caused by the whole of its transactions, rather than the risk to be caused by each transaction.

2. Different risks can trigger each other and grow even faster. Cumulative risk should not exceed the acceptable risk, ie the bank's total loss potential.

3. In determining the acceptable risk, equity and liquid resources should be taken as a reference and the maximum risk to be taken should be determined according to these criteria.

In order for risk management to be successful, internal audit, external audit should be carried out in coordination with legal regulations, and the information provided to the authorized audit and surveillance authorities and the public should be disclosed in line with the principle of transparency.

The risk management system consists of the stages of defining the risks, measuring the risks, application and monitoring, reporting and evaluation. In the risk management process, first of all, the risks faced by the bank should be defined and their characteristics should be determined. The risks that each bank may encounter vary depending on the area in which it concentrates its activities, the customer profile, and the market in which it operates. For this reason, each bank should identify significant risks for itself. Defined risks are expressed numerically or analytically using specific references or criteria. One of the concepts related to measuring risk is the concept of Value at Risk. VaR is defined as the expected loss to occur in a certain time interval and at a certain level of confidence. VaR models respond to the different needs of banks with different characteristics, allowing the risk to be measured more precisely and to ensure the risk-return balance. Against the measured and embodied risks, protective measures should be put in place, if necessary, or the decision to undertake the risk should be made. Risk management tools such as risk aversion, risk reduction or risk transfer come into play at this stage. The tools that can be used in risk reduction or transfer, the level of protection that the tools can provide and the cost to the bank are evaluated at this stage. Monitoring, Reporting and Evaluation stage, it is determined and evaluated whether the risks are managed well and whether the risks are kept within the determined limits. In this process, it is investigated whether there are areas out of evaluation or risks that have not been formally identified. The risk management group monitors and analyses various risks on a daily basis, determines the transactions that are likely to create risks, the volume of these transactions, taking into account the strength of their own resources, and reports them to the relevant units.

Chapter II: Credit risk in banking

The banking sector contains various risks due to its structure. The probability of the bank incurring a loss represents the risk in terms of banking. As a general framework, banks are faced with macro (at a level that will affect the entire sector) or micro (competition between banks) risks. Credit risk is the most fundamental risk that banks are exposed to as a result of the financial intermediation function undertaken between fund suppliers and fund demanders. In this section, the definition and classification of credit risk, which is one of the most fundamental risks in banks, and the sources, measurement and management of these risks will be discussed.

2.1. Credit risk definition and management

Although the concept of credit is generally known as debts given to natural and legal persons within the framework of contracts, its scope is actually wider. In the simplest terms, credit risk is the danger that the creditor will suffer a loss due to the debtor's failure to pay his debt on time or in full. Credit risk, the oldest type of risk in financial markets, in its most general definition, refers to the loss that the bank is exposed to due to the borrower's failure to fulfil its performance in a timely and complete manner. This loss may occur in the form of a decrease in income or capital, an increase in expenses or losses. Credit risk is a risk that can be encountered in different ways at every stage of economic activities. Anyone who lends a material, financial or nominal value in return for a material or financial degree that the counterparty promises or undertakes to fulfill in the future or sees a service faces a credit risk that he or she has to manage more or less (Perasan et.al., 2003).

Credit risk in terms of banking; It was the case that banks' loans did not return or partially returned, or the securities given as collateral in return for debt lost value and could not meet the unpaid debt. The borrower described here covers a wide spectrum, ranging from companies to natural persons and governments, and the action to be fulfilled can take many different forms, from credit cards to derivative instruments (Konovalova et. al., 2016). However, credit risk is not only a risk arising from credit accounts of banks, but also includes losses that may be incurred due to securities portfolio, deposit accounts with reverse balance, assets held with other financial institutions, letters of guarantee and other guarantees and commitments and derivative contracts. Credit risk is the most important type of financial risk banks are exposed to. How the bank chooses and manages its credit risk is decisive for its future performance. As a matter of fact, in the model

developed by the FED that determines the determinants of gold in bank bankruptcies, five out of ten variables are related to credit risk. Behind the majority of bank failures in our country is the capital loss and liquidity difficulties caused by credit losses (Santomero, 1997).

Credit risk can arise from internal and external factors. Internal factors are factors that depend on the bank and the customer, such as the activities of the loan client, its strength against competition, or the bank's credit analysis capability, credit risk management process. External factors, on the other hand, are risk factors whose emergence is not under the control of banks or customers. Changes in tax or incentive law, technological developments or macroeconomic shocks are examples of exogenous factors. Financial circles consider credit risk as the most important risk they may be exposed to due to the banks' assets and liabilities and the transactions they are a party to. With the diversification of financial instruments and the increase in the number of parties in the financial system, more factors in credit risk have emerged. In terms of credit risk management, new methods have been developed since the 2000s, including hedge funds of credit markets, private equity companies and other corporate players. Markets have become critical to the global economy. The major players of the markets, large banks (JPMorgan Chase, Goldman Sachs, Morgan Stanley et al.) On a global scale have begun to provide a broader range of investment and lending-related services, along with investment banking and commercial banking. Later, the concept of credit risk has been adopted by markets and financial institutions; financial institutions, hedge funds, asset management companies. With the classification of financial institutions, risk types such as reputation risk and operational risk have been added to the management of credit risk. Finally, some rules (Basel II, Solvency II) were introduced by the regulators regarding the management of credit risk, and credit rating agencies (CRA) started to carry out rating activities within the framework of these regulations. As sources of development regarding credit risk management in the banking system (Basel Committee on Banking Supervision, 2000):

1. Consolidation and globalization; less vulnerability than a single country or industry to promote the spread of good practices and help diversify.

2. Diversification was made by most banks to reduce the dependency on interest income among income items and to develop alternative income sources.

3. Advanced risk management techniques are widely accepted. Statistical methods for portfolio management, securitization and hedging methods through derivative instruments provided

efficiency in credit risk management. In addition, the development trend has strengthened with the transition to the applications included in Basel II by the banks. In addition, although the credit risk management practices of banks differ between banks depending on the nature and complexity of loan activities, four points are emphasized for a comprehensive and effective credit risk management (Basel, 2000):

1. Establishing an appropriate credit risk environment,

2. To have a solid lending infrastructure,

3. Appropriate management of loans, establishing a measurement and monitoring process,

4. Ensuring adequate control over credit risk.

Looking at the historical development of risk management, it is understood that regulations have gone through a long and complex process, but basically represent a compromise between various perspectives and areas of interest. It is important to determine the capital requirements on the basis of risk management. Basel I and II conventions published by the Basel Committee have become the basic standards for measuring credit risk within the framework of legal capital requirements. In Basel I, where the first Capital Reconciliation was officially implemented since 1992, the minimum Capital Adequacy Ratio for banks' on and off-balance sheet risks was determined as 8%. This consensus was amended in 1996 to include market risks. Debates about a new regulatory framework have arisen over time and a second Advisory was issued in 2001, after receiving a lot of comments from banks and national supervisors. Basel II was published in 2004 as the new capital agreement. In Basel II, with the inclusion of operational risks in risk weighted assets (denominator) within the framework of capital adequacy calculation, more risk-sensitive measurement methods are foreseen in the measurement of credit risk.

The new consensus had to be applied to national legislation and regulatory frameworks, and specifically, the Implementing Directive (CAD 2006) was issued by the European Union in June 2006. The Basel II agreement, which started to be implemented in European countries in the middle of 2007, could not be applied widely in the USA and other countries other than Europe due to the subprime mortgage crisis in the USA. Changes made within the framework of Basel II, especially in the field of securitization, as well as within the framework of market risk were published in July 2009. The reform called Basel III in December 2010 does not change its approach

to calculating capital requirements for classical credit risks but increases capital requirements for market risk and introduces credit valuation adjustments. The crisis in the USA has led to the questioning of Basel II, and it has emerged in the nature of completing the deficiencies in Basel III and Basel II. Unlike Basel II, the third generation capital application has been abolished in Basel III. The third generation capital application was used to meet the need arising from market risk. On the other hand, in terms of contributing to the main capital, only main and contributory capital parts are included in Basel III. Basel III, although it is not as radical as Basel II in terms of capital requirement calculation changes, it is a set of supplementary regulations that complement the shortcomings observed in the last financial crisis. Although it creates the impression that Basel III rules completely eliminate the Basel II regulation, Basel III is an important part of the new financial regulations and is not the only part. Matters that Basel III anticipates changes (Rouse, 2002):

1. More qualified capital,

2. Increasing capital adequacy quantitatively,

3. Establishing a capital buffer,

4. Non-risk based leverage ratio,

5. Liquidity regulations.

The points brought to Basel I as criticism are that there are only five risk classes in the separation of the loan, the ratio determined for the capital adequacy ratio cannot be adapted according to the countries and changing conditions, and the credit worthiness of the counterparty and the maturity are not taken into account. It has been criticized because of Basel I's emphasis on credit risk, not considering the other risks that banks may face, and the regulations introduced by banks without taking into account the differences in their fields of activity. In addition, it has been evaluated that it is not suitable for the risks and needs of the sector, since it does not include a regulation that takes into account the securitization transactions and derivative instruments in the on-balance and off-balance sheet positions of banks. Basel II was published by the Basel Committee in June 2004 and took its final form in 2006. Developing a more sensitive approach to credit risk management, Basel II enabled banks to develop risk management capacity based on their databases, internal experience, criteria, parameters, and models. Basel II, which adopts a more

sensitive approach to credit risk management; It also offered risk mitigation methods such as collateral, credit derivatives, netting and securitization. One of the cornerstones of Basel II is that financial institutions adopt an internal rating-based (IRB) approach that determines key model parameters such as unconditional default probabilities and default states. The use of IRB approaches for calculating credit risk with standard and advanced methods in Basel II depends on the approval of the supervisor. In order to apply the internal rating-based approach in capital adequacy calculation, minimum conditions are determined.

Table 2, which shows the risk calculation approaches according to Basel II, shows the process from basic approach to advanced approaches for each risk. Basic and standard approaches are those where parameter values are required by legal regulations and authorities and defined in advance. In basic and standard approaches, standard risk weights obtained from rating grades determined by credit rating agencies (CRA) are used. In advanced approaches, processes are carried out to collect data at a certain interval and to apply statistical estimates by using these historical data. Ratings are generated internally by stochastic approaches and include expert judgment.

Table 2. Risk Calculation Approaches According to Basel II

<table>
<tr><th>Level Of Development</th><th>Market Risk</th><th>Credit Risk</th><th>Operational Risk</th></tr>
<tr><td>Simple</td><td></td><td>Simplified Standard Approach</td><td>Basic Indicator Method</td></tr>
<tr><td rowspan="2">Average</td><td rowspan="2">Standard Method</td><td rowspan="2">Standard Approach</td><td>Standard Method</td></tr>
<tr><td>Alternative Standard Method</td></tr>
<tr><td rowspan="2">Advanced</td><td rowspan="2">Value-at-risk models</td><td>Basic Internal Rating Approach</td><td rowspan="2">Advanced Measurement Approaches</td></tr>
<tr><td>Advanced Internal Rating Approach</td></tr>
</table>

Source: Stephanou and Mendoza, 2005

With the standard approach, it is foreseen that the grades given by the rating agencies will be used in measuring the credit risk of the banks. Compared to Basel I, the most important innovation is the use of credit ratings given by independent rating agencies to countries, banks and companies in determining the risk weights related to the transaction that causes credit risk, and the application of different risk weights. In the Simplified Standard Approach in Basel I, the rating

grades given by export credit institutions were used in order to determine the risk weights. In order to calculate the capital requirement for credit risk, classification is made according to the standard approach to the party or asset from which the credit risk originates. Loans extended to the Treasury and central banks, Loans extended to public institutions and organizations that are not in the central government, Loans extended to multilateral development banks, Loans extended to banks, Loans extended to securities companies, Corporate loans, Retail loans, Loans against residential real estate mortgages, Loans against commercial real estate mortgages, Overdue receivables and High risk categories. The grades given by the CRAs will be used for the first six places according to the classification of the parties and financial assets listed above. Details regarding risk weights are given in Basel II for other classes. It has been stated that in the Basel II standard approach, the evaluations of independent credit rating agencies that are deemed appropriate by the national supervisory authorities regarding capital adequacy can be taken as basis.

Risk weights applied for financial assets and parties in Basel II vary between 0% and 150%. For example, for Corporate Loans, a 20% risk weight is applied for a business or financial asset with a rating between AAA + and AA-negative, while a risk weight of 150% is applied for a business or financial asset with a rating grade lower than Bnegatif with B +. . On the other hand, loans opened under residential real estate mortgages have 35% risk weight, while loans opened under commercial real estate mortgages have 100% risk weight. However, in Annex 1 of the Regulation on Measurement and Assessment of Capital Adequacy of Banks published by the BRSA in our country, it is stated that a 50% risk weight will be applied to receivables secured by commercial real estate mortgages.

In the Internal Rating Based Approach, risk weights and capital requirement are determined based on the internal measurement of the bank's risk components. The internal rating system of the bank must comply with the legislation. The purpose of the IRB is to meet the capital obligations by calculating the credit risks of the bank with the internal model derived in terms of its dynamics with the approval of the supervisory authority in the relevant country. With the transition to IRB, it is to reduce the capital requirement of the bank's portfolio risk amount required. In Basel II, some conditions are determined for banks to use the IRB approach. It also provides guidelines on the conditions in question and the methodology that can be used. The minimum requirements for the internal rating system to be used by banks are given in the table below.

There are two methods in this approach: The first is the approach based on simple internal ranking; While PD is determined internally, other variables are reported by the authority. Second, with the advanced internal rating-based approach Probability of default (PD), Loss given default (LGD), Exposure at default (EAD) and maturity (M) are determined internally. How banks will calculate capital obligations according to the parameters determined in both simple and advanced internal rating approach is determined in Basel II. In these approaches, different capital requirement calculations are foreseen for governments, banks and companies. In terms of portfolio size of firms, adjustments are envisaged for SME loans. In terms of retailing portfolio, there are risk weights for each sub-portfolio in the portfolio in the developed internal rating approach specific to the portfolio. In internal rating approaches, the calculation of the capital requirement is performed according to the parameters calculated within the framework of certain criteria of the data. Accordingly, risks are first classified (Rating) then digitized (parameter calculation). In the internal rating approach, there are five detailed groups in terms of loan classification: project finance, commodity financing, fixed asset financing, buying real estate with a return, purchasing commercial real estate with high price volatility. There are three groups of retail loans: residential real estate loans, revolving retail loans and other retail loans. There are principle-based qualitative requirements for classification and quantification of risks in Basel II internal rating approaches. With the internal rating approach (Varotto, 2008):

- Providing flexibility to banks' risk management practices and encouraging the development of risk management practices,

- Banks with different characteristics according to their operating structures can take into account different factors,

- To be able to take into account the experiences of data opportunities and theoretical developments in the calculation of capital obligation,

- It is ensured that they take into account local conditions that can significantly affect the parameters.

2.2. Credit risk measurement models

Credit risk measurement models help to analyse the most appropriate risk and return balance that can be obtained in a portfolio that can consist of a large number of loans, as well as

the possible effects that the assets to be added to or removed from the portfolio will have on the risk return balance of the portfolio within a certain method. It is possible to talk about a large number of credit risk models produced for various purposes by using different techniques. The history of credit risk estimation studies, which gained a great momentum in the 1990s, dates back to the 1960s. However, considering the measurement approach followed, we can say that these models are primarily evaluated in two main groups: portfolio-based models created in line with Value at Risk (VaR) analyses and models for credit pricing. It can be stated that portfolio based credit risk models are mostly based on top-down measurements based on VaR technique (Canbolat and Abdurrahman, 2015).

Credit pricing models are based on bottom-up risk measurement approach. The first use of credit risk models was made in the light of option pricing theories due to the lack of sufficient internal data. Due to the increase in the database, it has been seen that econometric techniques have been used intensively since the 90's and the use of actuarial approaches has gained importance in the 2000s (Duffie and Singleton, 2012).

2.2.1. Traditional models in credit risk measurement

While creating traditional models, numerical and non-numerical techniques can be used. Traditional models include risk measurement techniques that focus mostly on PD and LGD estimates and act on a loss-by-default approach. Model production is carried out by taking into account the classifications made in line with the predetermined definition of financial failure, regardless of the small changes in credit worthiness. Due to the problem of digitizing qualitative data, it is often not possible to use traditional econometric models. With the application of techniques such as artificial neural networks that allow the use of such data, standard model designs have begun to be created. However, it is problematic that such designs are based on subjective judgments and are very costly to install (Allen et.al., 2004).

Traditional models based on scoring and grading mostly use linear techniques such as multiple discriminants, binary logistic regression (logit) and probit analysis. Classical regression applications, which are mostly used, lose their validity in events based on sharp classifications. It is known that these techniques, which aim to explain the hypothetical linear relationship between the independent variables that are considered to be determinants on credit worthiness and the two-probability (default or non-default) dependent variables representing the state of default, through

an appropriate equation, differ due to the assumptions they are based on and the formulas they use in calculating the probabilities. Discriminant analysis is the technique with the most assumptions, and distributions are considered normal for both probit and discriminant analysis. In binary logistic regression, it is assumed that the distribution approaches the logistic distribution (Edelstein, 1975). The nonlinearity and random selection conditions apply to all three techniques. In all techniques, the numerical relationship between variables is presented with the help of a standard formula in the equation. The values obtained as a result of the formula are made suitable for the purpose by using the probability transformation formula related to the technique.

$$Y = \delta_0 \Sigma_{i=1}^{n} \delta i X i + \varepsilon$$

In the above equation, δi represents the coefficient of the model belonging to the variable i, represents the constant for the model and Xi represents the observation value of the I independent variable, and represents the error of the estimation made. Conversion of regression scores to discriminant probabilities is accomplished through the cumulative normal distribution probability function. Conversion in Probit models is performed by using the mean and standard deviation values of the regression scores calculated for all observations. In other words, a certain standard value is reached by dividing the regression value determined for each observation by the standard deviation of the distribution. This value is then transformed into a suitable probability value with the help of the cumulative normal distribution function. The equation in the following equation is used for the transformation process in the binary logistic regression analysis, which is another application.

$$P(Y) = 1 / (1 + e\text{-}Y)$$

The groups of each observation are determined by comparing the probability values obtained from the above equation with a certain threshold value that will provide the best prediction success. Methods such as ROC analysis and Gini coefficient are used to determine the most appropriate threshold value. However, there are also discriminant and logistic regression options suitable for cases where more than two failure or default state groupings are made. The use of non-financial factors related to the customer is also encountered in practical studies conducted to estimate the PD values of corporate loan customers. Due to the difficulty of accessing the required data from outside the bank, the number of studies on individual loan customers is quite low. Among the non-financial factors, there are some important macroeconomic indicators

and distinctive features such as age, education, income level, geographical region, type of collateral, loan usage purpose, loan amount and occupation, while financial ratios constitute a great part of the fiscal model variables (Edelstein, 1975).

Expertise model. In the Expertise model, the assets of companies requesting credit are evaluated by an analyst of the bank and a decision is made regarding the request. The analyst's subjective assessment is decisive. Although there are many variables that the analyst can evaluate, there are five basic elements that are considered to reflect the credit worthiness of a business defined as 5C (Characte, Capital, Capacity, Collateral, Cycle-Economic Conditions) in practice. The components of this method can be explained as follows (Altman and Saunders, 1997):

1. Character: The most important indicator of a business character is management skill. The character, on the other hand, reflects the honesty, sincerity, reputation, management skills and logical behaviour of the customer. A reputable company is one that has not defaulted on past loan payments. Although the production capacity of the company decreases in the face of some adverse situations, these can be ignored for a short time. On the other hand, if a company is constantly experiencing delays in loan repayments, this situation both shows that the company is misdirected and causes damage to the company reputation.

2. Capital: The loan client refers to the evaluation of the company's equity and its ratio (leverage ratio) to its total debts. The leverage ratio is considered one of the leading indicators of bankruptcies. Companies that work with a high leverage ratio, that is, outsource more than their equity capital, have higher bankruptcy risks.

3. Capacity: The ability of a company to repay its debts shows the capacity of that company. If a business is trying to make healthy loan repayments by increasing its debt or converting its assets into cash, this is unlikely. If the revenues exceed the expenses, a business can continue its activities in a healthy way. Therefore, if the payment ratio of the enterprise increases, the credit risk decreases.

4. Collateral: Since the bank has the right to apply for a loan collateral in case of default, the variability in the values of the collateral will create an element of risk. Therefore, guarantees and variations in their value are taken into account.

5. Cycle-Economic Conditions: An important factor in assessing credit risk is the economic conditions. Businesses with high credit risk are those that are present in industries that are more affected by economic fluctuations or that produce products that have a significant decrease in demand due to market developments. For example, businesses in the durable goods sector will be more sensitive to macroeconomic conditions than those that place food on the market. Along with these, developments in the market economy will also affect the companies that are in competition.

The state of interest rates is also an important component in making loan decisions in addition to the 5C assessment method. When the studies conducted between the level of interest rates and loan profitability are examined, it has been revealed that there is no linear relationship between high interest rates and loan profitability. In economies with high interest rates, the level of risks that borrowers are exposed to are increasing. High interest rates force borrowers to invest in projects with higher risk, and the increased probability of default leads banks to reduce their loan supply. In this case, the profitability of the banks decrease. The personnel who will make the loan allocation must comply with three basic lending principles. These basic principles can be listed as follows:

According to safety principle, granting customers credits should not adversely affect the financial strength and structure of the bank. The basic condition for securing the bank is that the loan decision is based on up-to-date and reliable information. All relevant units must show due diligence in collecting and analysing customer-related information. On the other hand, the situation of the sector in which the enterprises are located should also be taken into account. Thus, the risk of non-repayment of the loan is reduced by ensuring that the customer is adequately recognized by the branches and allocation offices.

Liquidity refers to the principle of non-dullness in the return of the loan, the constant use of the limit allocated to the customer, the regular repayment of the loans in accordance with the seasonal income and cash flow of the customer, in short, the mobile use of the loan. For the bank, it is important to determine the purpose of the loan correctly at the beginning and to close it on time. The loan to be made available to the customer should be of debt nature, not capital. Sometime after the loan relationship is terminated under the terms of the contract The same relationship can be revived again.

Productivity (Efficiency) means determining the loan interest rate in a way that will generate profit by considering market conditions, resource cost and inflation, and obtaining sufficient interest, commission, and income from the customer as a result of all activities in transactions such as loans, deposits, banking services, etc. Considering the 5C criteria stated above, in the traditional approach, the lender makes an estimate of the probability of default and the worthiness of the relevant borrower by taking these criteria into account. The main problems of the model are that this estimate is based on the personal opinion of the loan calculator and that it is difficult to determine the extent to which the 5C criteria will be evaluated. Expertise-based (Expertise) models used in determining the credit worthiness of a business are one of the traditional methods. These models shape the standards that make up the credit culture of many banks. However, it has been determined that banks' constantly increasing loan portfolios do not benefit from evaluation with expertise-based models and calculations for default probabilities and contain a high rate of error. For these reasons, different approaches are required in credit risk measurement (Saunders and Allen, 2002).

Credit rating model. In the rating model, the loans granted are evaluated in various categories that are specially defined, and there are capital reserves that the credit institution should keep in order to continue its activities and in response to unexpected losses. Continuous monitoring and evaluation of loans is an internationally widespread practice. One of the oldest rating methods of the banking system is The U.S., which operates in the USA. It is a reserve allocation system developed by the Office of the Comptroller of the Currency and later used in many countries of the world. The OCC model approach is the basis of today's common rating system. In the first step of the OCC credit rating model, the funds used as loans are evaluated in 5 main categories.

Table 3. The U.S. office of the comptroller of the currency loan categories chart

Evaluation Categories	Risk in%
Well-ranked Assets	0
Other Assets That Can Be Considered Well-Rank	0
Substandard Assets	20
Suspicious Assets	50
Sunken Assets	100

Source: Drees, 2007

In the second step, a 10-point rating is made and assets with 0 risk are handled in sequential subgroups from 1 to 6, and low-quality grade assets in sequential subgroups from 7 to 10. The rating made with this system can be converted to the ratings used by today's rating agencies as follows:

Table 4. The U.S. office of the comptroller of the currency loan categories current provision table

Rating	Score	Risk level
AAA	1	Low
AA	2	Reasonable
A	3	Average
BBB	4	Acceptable
BB	5	Carefully acceptable
B	6	Requires management attention
CCC	7	Other assets needing special attention
CC	8	Other substandard assets
C	9	Suspicious assets
D	10	Lost assets

Total Reserves = X1 L1 + X2 L2 + …… + X10 L10

Thus, the credit institution calculates the total loan reserves by multiplying the requirement coefficients determined by the credits it has made for each degree. It is possible to calculate the capital reserves required by the bank loan portfolios by taking the equivalents of the credit ratings used in this method as the standard grades of today's rating institutions.

Credit scoring model. In the credit scoring model, each asset in the balance sheet of the company requesting credit is scored according to a list created on the basis of risk criteria. Loan requests lower than the specified score are not approved. In this model, credit risk is determined with the help of an econometric model by using data from previous periods of companies that have gone into default. This model is based on estimating the effects of various characteristics of loan customers on the probability of default using a linear regression model. The coefficients estimated in the econometric model are used in estimating the probability of default of potential loan

customers. A score is determined for all applications in the final decision regarding the use of credit, and requests above the determined score are evaluated in accordance with the loan.

In a study, which was shown as the oldest among the modelling studies performed by using economic techniques in 1966 by Beaver, univariate analysis of variance was applied on 30 different financial ratios of 158 real sector firms, 79 of which had defaults, and Cash Flow / Total Debts and Net Profit / It has been concluded that the 6 financial ratios, especially the Total Assets ratios, are determinative on the failure situation. Correct classification percentages for the first year preceding the failure event were calculated as 87% and 80%, respectively. It was observed that the forecast performance decreased as the number of retrospective years increased, but the variables covered were statistically significant (Beaver, 1966).

In addition to Beaver's work between 1968 and 1977, Altman made a significant contribution to the financial literature by conducting three scientific studies on this subject. With the help of the Z-Score model developed by Altman in 1968, based on the idea that bankrupt and non-bankrupt companies can be distinguished by different financial indicators, in order to find various financial indicators that will help to predict the bankruptcy situation, a Z value was calculated using the financial ratios of the bankrupt and non-bankrupt companies that differ clearly from each other. In the 1968 study, known as the Z-Score model and expressing an equation consisting of the following 5 financial ratios, linear discriminant analysis was used on 22 financial ratios of 66 firms, 33 of which were identified as failure, and a very high correct classification of 95% in the first year before failure. performance has been captured. In addition, it has been observed that out of 22 financial ratios belonging to 33 companies that failed and did not go bankrupt, 5 of them, given below, showed a very high success in predicting bankruptcies (Altman, 1968).

X1 = Net Working Capital / Total Assets

X2 = Undistributed Profits / Total Assets

X3 = Profit Before Interest and Tax / Total Assets

X4 = Net Market Value / Total Debts

X5 = Sales / Total Assets

Altman has given the following coefficients to 5 ratios belonging to the Z-Score prediction function he created, and obtained the following equation;

$Z = 1.2\ X1 + 1.4\ X2 + 3.3\ X3 + 0.6\ X4 + 1.0\ X5$

The higher the Z-Score value calculated with Altman's prediction function, the less likely it is to bankruptcy. The coefficients given above for the USA were determined by Altman. Different coefficients can be determined for different markets and sectors. It is also possible to add other variables to the model. A low Z value means a high risk of default. In this model, the bank will reject loan requests that fall below a specified threshold. Altman's findings showed a threshold value of 1.81 for the USA and loan requests below this value were rejected. For the purpose of retrospective analysis of the estimation function given above, the financial statements of 33 insolvent companies determined by Altman were examined and the bankruptcy of 31 of the 33 companies could be predicted one year before. This means 94% success. The prediction success of the model from two years ago was also as high as 72%. This success of the model resulted in the widespread use of the model.

When the prediction success of the Z-Score model started to decrease over time, this model was updated by Altman in 1977 and the ZETA model was developed. Altman, Heldeman and Narayanan used the ZETA model in 1977, based on the financial statement data of 111 companies, 53 of which went bankrupt in the manufacturing and retail sector, and using discriminant analysis, the current ratio, EBIT / Total Assets ratio and asset size were also analysed. A linear equation system consisting of 7 variables was created. In this model, considering the relationship between bankruptcies and scale size, the average asset size was determined as $ 100 million, the leading indicator number was increased to 7 and the coefficients were changed. With the help of this equation, which they named the ZETA model, 92.8% of the companies in the sample were successfully classified. This rate was 96.2% for unsuccessful companies and 89.7% for successful companies. Financial ratios used in Zeta Model are as follows (Altman et.al., 1977);

X1 = Profit before interest and tax / Total assets

X2 = Stability in earnings (X1) (found by measurements based on the standard error of profitability estimates made in the period such as 5-10 years).

X3 = Profit before interest and tax / Total interest payments

X4 = Undistributed profits / Total assets

X5 = Working capital / Total assets

X6 = Issued capital / Total equity (5-year market value average)

X7 = Total assets (based on the logarithm of the total asset size).

In almost all of the studies where discriminant analysis was used, the prediction performance was over 90%. Other models developed based on the idea that financial ratios can be considered as an early warning indicator are the 6-variable Chesser Model, which predicts the probability of turning into a non-performing loan, and the Bathory Model, where liquidation probabilities are predicted with the help of 5 financial ratios. Today, various criticisms are put forward against scoring models. According to an approach, the scoring method establishes a linear model. However, the probability of bankruptcy is likely not to be linear. Scoring models take into account the past period data or book values related to the companies, but the data used may not fully reflect the current situation of the company. Model coefficients can be sensitive to changes in economic conjuncture and business cycles. It is also not clear what the credit score found with this model means economically. In addition to these, Z-Score and Zeta models are still able to give successful predictions in developing economies and companies at local or national level, but they are far from meeting the need today, when company bankruptcies can occur unexpectedly and quickly due to international and complex business processes. In the past, the scandalous bankruptcies of companies such as Barings, WorldCom, Enron and Parmalat, which have turned into scandals, have shown that the estimates based on financial statements may not give such reliable results and have shaken the confidence in these estimates.

2.2.2. Advanced models in credit risk measurement

Advanced models used in credit risk measurement are widely used, and they are based on the principle of examining the risk in a holistic manner at the portfolio level. The main purpose of the new generation advanced credit risk models, which try to determine the default probabilities of borrowing instruments using financial market data, is to determine how much of the loan portfolios consist of non-returnable loans. Increasing off-balance sheet risks in the banking sector, intense competition conditions, rapid changes in asset values and technological developments have encouraged the use of internationally recognized advanced techniques and systems in credit risk

measurement, which is one of the important elements of financial engineering. CreditMetrics, Moody's KMV Model, Credit Portfolio View, CreditRisk + models are among the most widely used advanced credit risk measurement systems today.

Value at risk approach: Creditmetrics. This model, developed by J. P. Morgan in 1997, is based on credit migration analysis. In the CreditMetrics model, there are transitions between the probability of default and credit degrees in a certain period of time. Therefore, transition matrices are used in the model. Thanks to these transition matrices, there is a possibility of improvement or deterioration in the credit ratings or the possibility of default (Bessis, 2002).

CreditMetrics model has been developed to measure the liquidity risk, credit risk and risks of corporate bonds, except for the measurement of market risk, considering Value at Risk. Value at risk approach for credit risk is a model based on estimating the distribution that may occur for the future periods, generally in a one-year period, related to changes in the loan portfolio value. Changes in the loan portfolio value are likely to occur in the upward or downward direction in the credit quality of the borrower, including the possibility of default. While calculating the value at risk in credit risk, it requires the simulation of the whole distribution of the changes in the portfolio value. The risk measurement model of CreditMetrics determines the degree distribution of the debtor randomly. The relevant model recalculates the value of the loan based on the forward premiums of the degrees awarded and the portfolio value. For this reason, it is considered as a forward-looking model. The model is not dependent on any economic or financial variables, and the mechanical adaptation of the transition matrices is also the negative aspect of the model.

CreditVaR building blocks First, a rating system should be determined that will include the possibility of switching from one credit risk to another on the credit risk dimension, including the rating categories. This transition matrix is the main component of the CreditVaR model proposed by J. P. Morgan. This may be the rating ranges of independent rating companies such as Moody’s, Fitch, Standard & Poor’s, or the range for an internal rating system of the bank. A strong assumption has been made in this model by CreditMetrics. According to this assumption, all issuers in the same degree class, with the same transition probability and the same probability of default have similar credibility. This situation is called conjugate credit. The KMV model differs from the CreditMetrics model in that each firm has its own unique structure and is characterized by its own distribution of asset returns, its own capital structure and its own probability of default.

Generalization in the CreditMetrics model gives the model its applicability. However, the specific features of the firm are also ignored. Second, the maturity period for the risk should be determined. Although this period is usually 1 year, multiple time periods such as 1 10 years can also be selected, since someone who is interested in the long-term risk profile needs long-term illiquid tools. In the third stage, forward discount curves are determined for each credit category on the basis of the risk maturity periods. In the last stage, this information is transformed into the future distribution of the change in portfolio value depending on the credibility change.

Option pricing models: KMV. In this model created by KMV company, the default process of enterprises is also related to the capital structure of the enterprises and the default process occurs when the assets of the enterprise fall below a certain critical value. Considering the studies conducted, the adaptation of option pricing theory to the valuation of loans and bills goes back to Merton (1974). The theory has been used by KMV and Moody's to create models that estimate the default status of all major companies and banks whose shares are public and traded. In modern approaches, when a company enters into a liability by borrowing it, it gives it an option to repay the amount owed or to leave the company's assets to the lender. Which option to choose is the economic decision of the borrower. For example, a company that borrows $ 75 million will choose to pay its debt if the value of its assets is more than this, and default if it is below (Kealhofer and Bohn, 2001).

In the KMV model, the default distance value is used to calculate the probability of default. This probability of default is determined by three factors. These are asset risk, asset size of the firm and leverage expressing the firm's liabilities. In the CreditMetrics model, the borrower rating is used to determine the probability of default, while in the Moody's KMV model, the expected default probability based on the Merton model is used for each debtor. The expected default is related to the firm, and it is matched with a rating system to establish the debtor's equivalent rating. The most important feature that distinguishes the KMV model from other portfolio models is that KMV Portfolio Manager is built on an infrastructure that can determine the credit worthiness of the borrowers by measuring their default distances. The KMV approach converts the information in the firm's stock price and balance sheet into the intended default risk in three steps. These steps are (Crouhy et. al., 2006):

• Estimation of the volatility and market value of the company's assets disclosed in the stock exchange,

• Calculation of the distance to default, which is the measure of the indicator of the default risk, and

• Scaling the default distance using the default database.

This model, developed by KMV, was preferred by many international banks in Europe and Asia, especially in the USA, after it gained great popularity in a short time. The prominence of the model is due to three features it has (Resti and Sironi, 2007). It is the rapid adaptation of the probability of default to the changes in the financial status of the companies under consideration. The primary reason for this advantage is that EDFs (Expected Default Frequency, Expected Loss Distribution) are based on market data. Unlike empirical default rates associated with Acenta grades, EDFs do not deviate significantly like changes in economic cycles. In general, default rates tend to increase during periods of recession and decrease during periods of expansion. While all companies with credit ratings by Agents share the same probability of default, the KMV model allows each company to assign a specific EDF value acquired through the default distance and empirical function associated with the EDF.

Credit portfolio view model (CPV). The Credit Portfolio View (CPV) model, developed by Thomas Wilson for McKinsey, is a multiple factor model used to estimate transition probabilities for different degree groups, suggesting that default depends on the value of various macroeconomic variables for each country. In CreditMetrics, transition matrices in value-at-risk calculations are considered constant in all types of borrowing and in all economic situations. However, this assumption can cause errors in calculations. Because, especially in credit segments with low credit quality, default probabilities are very sensitive to economic cycles. In the Credit Portfolio View model, all transition probabilities, including default probabilities, are based on macroeconomic variables to eliminate this sensitivity. Thus, while the probability of default and the degree changes in the direction of decline will be higher than the historical averages in the economic recession periods, the opposite will happen in the economic growth periods (Saunders and Allen, 2002).

Credit Portfolio View is based on causal observations that relate the transition probabilities to the economy in addition to the default probabilities. When the downturn in the economy begins, both credit rating declines and delinquencies increase. Conversely, when things improve in the economy, credit ratings rise and defaults decrease. In other words, loan returns follow the real sector very closely.

As long as the state of the economy is determined by macroeconomic variables, the CPV proposes a method to link these macroeconomic variables to default and transition probabilities. If data are available, this method can be applied to different classes of borrowers who react differently on different sectors and economic units in each country. Although the disclosure percentage of macroeconomic variables and the explanatory variables used vary from country to country, it reveals that the systematic credit risk explanation power is very high. The ability of macroeconomic variables to explain systematic credit risk may also differ between sectors. However, although the ability to systematically explain credit risk differs by country and sector, the number of macro variables that play a role in shaping the default rates and therefore that can be used in forecasting models is quite limited. Growth rate, interest, inflation and unemployment rates, exchange rates, public and private sector expenditure and savings rates and monetary aggregates are the main variables that can explain systematic credit risk.

Credit risk + model. The Credit Risk + model was developed in 1997 by Credit Suisse First Boston. This model is a model in which only default risk is calculated; In this model, no assumption is made about the reason for the default. The probability of default is considered the same for all periods for the loan and does not change. In the model, probability of default is estimated by the Poisson distribution (Gordy, 1998).

Credit Risk +, which carries the insurance industry's claim approach to credit risk, is an analytical model based on two options that includes only default and non-default. No assumption is made as to the cause of the damage. The Credit Risk + model assumes that default events are completely independent and random. Since the correlation between debtors is assumed to be zero, the relationship between default events and systematic risk factors is achieved by increasing and decreasing the predicted default rates within the framework of historical volatility information. In actuarial models (http://www.actuaries.org/ASTIN/Colloquia/Porto_Cervo/Micocci.pdf):

• Only the risk of default is dealt with and the risk of change in degrees is not taken into account.

• No assumptions are made as to the reasons for the deferrals.

• Traditional rates are taken as random variables.

• Correlations between default rates are not explicitly included in the model but are taken into account by using default rates distributions and distinguishing borrowers within sectors.

One of the applications related to the measurement of credit risks of actuarial approaches is the life insurance approach, in which Altman (1989) and others developed mortality tables for loans and bonds, and the other is the property insurance approach used in the Credit Risk Plus model developed by the Credit Suisse Group. In mortality rate analysis, marginal mortality rates in one-year forward default rate estimation are tabulated by calculating cumulative mortality rates in default rate estimation for periods longer than one year. For this, the default rates of the newly issued bonds at each grade level in the bond (loan) portfolio are calculated in each year of their life. The most important usage areas of the model; modelling of credit risks at portfolio level, determination of credit risk provisions, active portfolio management, credit derivatives, and advanced approaches to capital allocation, which more reflects economic risk. Two important features of the Credit Risk + model can be mentioned (Micocci, 2008):

• The Credit Risk Model includes the basic characteristics of credit defaults. Credit defaults are rare events, and when the default rates vary from year to year, it can be seen that they happen randomly. The approach adopted in the model also makes no assumptions about the causes and time of occurrence of defaults and reflects these characteristics by using the volatility of default rates. By using the portfolio approach in the model, the benefits of the diversification effect arising from the transfer of many separate risks are achieved. The concentration risk arising from the debtor groups affected by a number of common factors is measured in the model with a sector analysis.

• This model is scalable and computationally efficient. This feature provides the model with the ability to manage portfolios containing multiple risks. The low data requirement and the fewest assumptions make it easy to apply the model to a wide range of loan portfolios, regardless of the specific characteristics of the borrowers. In addition, the efficiency of the model also allows a comprehensive sensitivity analysis required to measure the effect of parameter uncertainty on a continuous basis.

2.3 Risk management system in the Azerbaijani banking sector

Banks establish an adequate risk management system according to the type and volume of their transactions, the characteristics and environment of their activities, their complexity and the risks they face. According to the regulation of the Central Bank of Azerbaijan titled Rules on Risk Management in the Banking Sector, the risk management system consists of the Risk management strategy, policy, process, organizational structure of risk management, risk limits, re-examination of risk information and reporting of risks (www.cbar.az/assets/1597/risks_idareolunmasi.pdf). Each bank prepares a risk management strategy that reflects the objectives in terms of risk management and includes at least risk appetite in line with the bank's strategic objectives, all risks that the Bank may be exposed to as a result of the implementation of its operational strategy, the bank's risk approach to the implementation of new types of activities and systems, strategic objectives related to the bank's capital, structure of assets and liabilities, management of risks that may arise from changes in the global and macroeconomic environment, control of the risk management system and risk management in emergency situations. After the completion of each calendar year, the risk management strategy is reviewed in the first quarter of the following year based on the results of the previous year and appropriate changes are made if necessary (www.cbar.az/assets/1597/risks_idareolunmasi.pdf). The risk management policy covers establishment of risk management work and distribution of powers, the process of managing risks related to the bank's types of activities, business processes and information systems.

The risk management policy is reviewed at least once a year and appropriate changes are made if necessary. The organizational structure of risk management in banks provides for:

- Clearly defined authorities and responsibilities for the management of risks;
- connectivity and information flow between all levels of the institutional structure;
- measures against the emergence of conflicts of interest between structural units and authorized persons;
- Independent and transparent decision-making process;
- Effective reporting system for risk management.

During the risk management process, the powers of the Bank's Monitoring Board, Risk Management Committee, Board of Directors, General Risk Manager, Risk Management Department, Business Units and Internal Audit are determined as follows. Observation Board:

- Ensures the establishment of an effective risk management system adequate to the bank's risk profile;
- approves the strategy, policy, internal rules and institutional structure for risk management;
- Supervises the activity of the Board of Directors regarding risk management and receives direct reports from the risk management department;
- Takes decisions on the issues presented by the Board of Directors and the Risk Management Committee regarding risk management in the bank;
- approves risk limits;
- Evaluates the effectiveness of the risk management system at least once a year;
- Approves the emergency plan.

Risk Management Committee:

- looks at risk management strategy, policies and rules as well as changes to them and submits them to the Monitoring Board for approval;
- Looks at the risk limits and submits them to the Observation Board for approval;
- Determines the frequency of application and selection of an appropriate method and tools for the identification and assessment of risks;
- Prepares a report on the status of the risks the Bank is exposed to and the effectiveness of the risk management system and submits it to the Observation Board;
- Supervises the compliance of the risks taken with the bank's risk management strategy;
- Prepares proposals for the Monitoring Board on the development of the risk management system;
- Evaluates the work of the risk management department and informs the Observation Board and the Board of Directors about the results of the assessment;
- Provides recommendations to the Monitoring Board regarding the powers of the structural departments and other internal committees that perform the risk management function;
- Considers the emergency plan together with the Executive Board and submits it to the Observation Board;
- It holds meetings at least once a month and reports on their results to the bank's Monitoring Board. Board of Directors:

- Ensures the implementation of risk management strategy and policy;
- Establishes the risk management process;
- Analyzes the risks that the bank is exposed to and takes the necessary measures to eliminate the identified weakness;
- decides on the implementation of the new bank product;
- Provides reports on risks and their management to the Risk Management Committee and the Observation Board;
- Creates an enabling environment to ensure adequate effectiveness of the risk management department on the bank's risks;
- Considers the emergency plan together with the Risk Management Committee and submits it to the Monitoring Board;
- It ensures cooperation with the risk management department of the other structural units of the bank, and also takes measures to prevent interference in its activities.

General risk manager (www.cbar.az/assets/1597/risks_management.pdf):

- Prepares the risk management strategy and policy, taking into account the opinions of the Board of Directors and the General Financial Manager, and presents it to the Risk Management Committee;
- Coordinates the activities of the Board of Directors and structural divisions for risk management;
- To ensure that periodic reports showing the types and extent of risks of the Bank's activity are prepared in a reliable, transparent and timely manner;
- Provides recommendations to the Risk Management Committee and the Observation Board for the development of the risk management system;
- Ensures that the risks to which the bank is exposed comply with its risk taking capability, risk management strategy and risk management demands;
- Takes measures to increase the knowledge and skills of the employees of the structural divisions that perform the risk management function;
- Participates in the Observation Board meetings in the evaluation of the risk management strategy, as well as in addressing issues related to risk management.

Risk management section:

- Coordinates the risk management work;
- Prepares the bank's internal rules on risk management, as well as amendments to them;
- Audits compliance with risk management strategy and policies and submits the report on changes to the Risk Management Committee and the Board of Directors;
- Provides suggestions to the Risk Management Committee and the Board of Directors on the calculation of risk limits for the Bank's fields of activity together with the relevant structural units and making changes to them;
- Prepares the risk map and supervises its implementation;
- Supervises whether the risk limits are complied with and immediately informs the General risk manager about the violations;
- Carries out studies (with the relevant structural units of the bank) on the selection and application of methods and models for the identification and assessment of risks;
- Presents the report on the assessment, analysis and result of risks to the Board of Directors, Risk Management Committee and Observation Board;
- Provides recommendations on all processes, new products and services covering the bank's activity in terms of recognizing and controlling risks;
- Implements stress-tests with the relevant structural parts and prepares a plan of measures to reduce the identified risks;
- Analyzes data from other structural divisions of the bank for risk management purposes;
- Submits suggestions to the Risk Management Committee regarding the determination and improvement of adequate and effective control procedures for the risk management process;
- Prepares the emergency plan together with the relevant structural units of the bank and presents it to the Risk Management Committee and the Board of Directors;
- Demonstrates methodological assistance to the relevant structural divisions of the bank in the risk management business

Bank's business units (www.cbar.az/assets/1597/risklerin_idareolunmasi.pdf):

• Controls risks within its own authority in its daily activities;

• It ensures compliance with the relevant risk limits.

Inner control:

• Audits the efficiency and adequacy of the risk management system.

• Presents reports, proposals and recommendations to the Observation Board and the Audit Committee on the results of the audits;

• Provides information exchange with the risk management department.

Risk management process - The risk management process covers the necessary procedures and evaluation methodologies for the effective management of risks in the bank. Methods for identifying and assessing the risks arising from the bank's activity are applied in accordance with the volume and complexity of the bank's risk profile. The methods applied and the assumptions about them are measured regularly. The frequency of assessment of risks should be appropriate to the scope and characteristics of the risks arising from the bank's operation. Identification of risks is carried out by at least the following methods;

(www.cbar.az/assets/1597/risks_idareolunmasi.pdf)

• Risk map. In the risk map, the risks that the bank may be exposed to, the internal and external reasons that create risk, other risks that the risk may create, and possible losses are reflected, in addition, the frequency of occurrence of the risk, management and evaluation tools, the person or structural department responsible for the management of the risk are determined. The risk map is reviewed at least twice a year and appropriate changes are made when necessary;

• Queries. Queries are used to identify various risk groups that are difficult to identify. Queries should be prepared in an enlightened, compact, and relevant manner.

• Empirical (based on real historical data) analysis. In order to identify risks, the bank essentially makes continuous analysis of its own or other banks' empirical information (e.g. about losses);

• Early warning systems. Early warning systems are used in the Bank to monitor the risks.

The early warning system provides information on the probability of occurrence of various hazards and risks as a result of the various precedents and factors used in the bank's activities approaching the limits set for them. The risks determined by the Risk Management Department are classified into appropriate categories, the results are documented, and a report is prepared about them. Evaluation of risks is carried out on the basis of the results obtained in the process of determining the risks. Based on the analysis of this time, quantitative and qualitative parameters,

the bank's risk-taking ability is determined, and the risk level is measured. A detailed description of the methods used to assess risks should be specified in the internal rules. The following models can be used to assess risks: Value-at-risk models. Value-at-risk can be defined as the maximum value at which a portfolio can lose within a certain confidence interval and a certain measurement period. When applying any value-at-risk model, the confidence interval is taken as a minimum of 99%. This tool helps in calculating credit risk by grouping loans according to their delay times. In general, delay groups should cover monthly for up to one year, annual for up to two years, and more than two years. These groups can also be grouped by the bank for shorter periods. risk equivalent to bankruptcy. The bankruptcy volume of the overall portfolio is estimated by giving the probability of bankruptcy to each lagging group. The probability of bankruptcy is determined by using the empirical information of the bank. As the delay period increases, this probability also increases and is defined as 100% for overdue loan groups with a delay period of more than one year.

Vintage analysis. This tool enables detailed analysis of the overdue loans according to the date of issuance, unit, manager, loan specialist and other criteria, and ensures that the problems that occur in the portfolio are eliminated more effectively. Depending on the structure of the loan portfolio, additional analysis indicators can be determined together with the criteria mentioned above.

Stress-tests. In order to identify and evaluate events that may adversely affect its risk profile in each bank, stress test models are prepared and renewed at least once a year, depending on the volume of the bank and the complexity of its activities. Within the framework of the stress-test model, the probability of each shock changing to the most unfavourable level is taken into account. These shocks can essentially aggregate the components of market, credit, liquidity, operational and other risks. As a result of stress tests, the resistance of the bank's capital to shocks, the maximum loss incurred by the bank as a result of shocks and other gaps in the bank's activity can be determined. While applying stress tests, very unfavourable and probable scenarios are drawn and criteria and shocks are determined for each scenario, including probabilities. During the preparation of stress tests, the bank can benefit from empirical information, possible scenarios that take into account potential risks and maximum losses. Based on the results of the stress test, a plan of measures is prepared and implemented to prevent the risks identified. Based on the results of

the stress test, the bank establishes a potential capital shortfall program. Quantitative models used to measure risks should follow the principle of cross-checking.

Cross-checking is done to determine the adequacy of the applied model by comparing the probable results with the actual results. If the predicted possible outcome differs sharply from the actual outcome, necessary modifications are made to the models and their suitability for current macroeconomic conditions is ensured.

The results of the stress tests are submitted to the Central Bank together with the prudential reports of the relevant period. The Risk Management Committee analyses the results and gives the necessary instructions to the risk management department regarding the acceptance, minimization and transmission of risks, as well as the implementation of measures such as risk avoidance, for the effective management of risks. If the general risk manager does not agree with the decisions of the Board of Directors and the intrabank committees on issues related to the issuance of loans, investments and new products, the Board of Directors brings the matter to the Monitoring Council within 7 working days (with written reasoning from the general risk manager). The Observation Council must decide on the matter within the next 15 working days. In this process, the execution of the decisions of the Board of Directors and the internal committees on related matters are suspended.

The general risk manager should be a member of the intrabank committees that make decisions regarding risk management, rewarding, granting of loans, investments, and new products. The head of the risk management department should have at least 4 years of work experience in risk management and should be appointed by the Observation Board with the presentation of the Risk Management Committee. Employees of the department should have access to the bank's information system, in-bank operating systems, as well as internal audit reports.

When introducing a new product or service, the Bank carries out a preparation process in advance. This process includes analysing the suitability of a product or service with the bank's strategy and identifying the risks associated with the product. In line with the bank's risk policy, the following are taken into account when introducing a new product or service (www.cbar.az/assets/1597/risklerin_idareolunmasi.pdf):

- Detailed description of the product or service.
- Evaluation of the risks that may arise from the product or service.
- Analysis of the impact of the product or service on the financial position of the bank.
- Identifying the resources needed to perform effective risk management for the new product or service.
- Risk management that may arise.

After introducing a new product or service, the bank should evaluate its impact on its risk profile and consider the results of this assessment when similar products or services are offered in the future.

Risk limits are set for the Bank's measurable credit, market, liquidity, and operational risks as well as other existing risks as soon as they occur. Risk limits can be determined in accordance with the size of the bank, its risk profile, types of activities, and the complexity of its products and services. Risk limits are reviewed at least once a month and changed in accordance with current market conditions and the bank's strategy.

A sufficient risk information re-examination and risk reporting framework is established and approved by the Monitoring Board to ensure the identification, assessment, management and supervision of credit, market, liquidity, operational risks as well as other existing risks in the bank. The Bank establishes a Management Information System, which ensures the re-examination of risk information and the effectiveness of risk reporting, and the following is done through this system:

- Identification, assessment, management, and control of daily risks.

- Supervision of compliance with established rules and limits.

- Monitoring trends in risk indicators.

- Preparation of reports in the format determined by prudential requests and internal rules.

The Management Information System should have the opportunity to monitor the risk limits and inform the Board of Directors and other users when it reaches a predetermined level. The reports prepared by the Management Information System should be accessible to the Observation Board, the Board of Directors, the Risk Management Committee and other relevant

employees of the bank. Analytical reports covering at least the following aspects are prepared by the risk management department and presented to the Risk Management Committee, Board of Directors and Observation Board:

- Key risks and their nature.

- Equity structure and level of competence.

- Analysis of current and future capital demand.

- liquidity status of the bank.

- Foreign currency assets and liabilities and open foreign currency position.

- use of risk limits.

- Results of stress tests.

Information in risk reports should be clear, concise and comprehensive enough to make a decision. In each bank, an emergency plan is drawn up, which includes the activities to be carried out in order to prevent the risks that arise in emergency situations and to ensure the continuous business efficiency of the bank. The emergency plan states the following:

- Classification of emergency situations.

- The powers of the persons responsible for the restoration of impaired activity in emergency situations.

- Activities to prevent various risks in emergency situations.

- The source of the capital to be summoned in extraordinary circumstances.

- Bank's image hedging policies in emergency situations.

- Classification of bank transactions and activities in extraordinary situations according to their importance.

The bank's emergency plan is reviewed at least annually, and appropriate changes are made if necessary. When the emergency plan is looked at again, various scenarios are tested by evaluating internal and external factors, and the results of the test are taken into account in the

changes to be made to the plan. Every employee of the bank, who is involved in the elimination of risks in emergency situations, should be informed by the risk management department about the emergency plan and the changes made to it, and they should attend the necessary trainings at least once a year.

An analysis of the current state of the banking sector showed how the recent events influenced the country's banking sector, namely, how the two devaluations affected the stability of the country's banking system. Thus, in this chapter, we have revealed that the main effect tool of the banking sector on economic growth is lending. Based on the analysis of the number, structures and dynamics of the loans granted, as well as the sectors of the economy that make up the most credit, it turned out that for the development of the real sectors of the economy, banks should effectively channel funds into the country's economy, and this is already to increase loans both quantitatively and qualitatively. It is necessary to develop appropriate measures to develop this area and to implement mechanisms to improve this sector.

Chapter III: Azerbaijani banking sector

3.1 Formation Stages of the Banking System in Azerbaijan

We can indicate 3 stages of the formation of the banking system in Azerbaijan:

Stage 1. 1992-1996 - the formation of the banking sector of Azerbaijan. After the restoration of the independence of Azerbaijan, on January 10, 1992, the Azerbaijan International Bank was established at the local base of the Foreign Economic Bank of the USSR, followed by the State Bank of the USSR, Agri-Industry Bank and Industry on February 11, 1992. The Central Bank was established on the basis of local branches of Construction Banks, the Savings Bank of Azerbaijan was established on the basis of the USSR Savings Bank. On August 7, 1992, the Law on Banks and Banking Activities in the Republic of Azerbaijan, the National Bank of the Republic of Azerbaijan was adopted, and on August 15, the national currency manat was issued.

In 1992-1994, the establishment of commercial banks in the country became widespread. Even in March 1994, the number of officially registered commercial banks reached 240. At the same time, high inflation played a stimulating role in the growth of banks. At that time, the registered capital was about 10,000-12,000 US Dollars. These banks played almost no role in the country's economy, most of them engaged in financial speculation.

In 1994, the banking system was shaken. Manat was declared the only means of payment in the country. One of the main problems at the time was the pressure of hyperinflation. In order to eliminate the demand for speculative money and loans that increased hyperinflation, the Central Bank started to sell central credit reserves in accordance with market requirements, that is, it started to follow a policy of real interest rates. Thus, a "legal" money market was created in Azerbaijan, and an important stage of development was the monetary regulation policy. Funds were received from the World Bank and the International Monetary Fund for this purpose.

The formation of the foreign exchange market, the establishment of the Baku Interbank Currency Exchange and foreign exchange trading on the basis of market laws formed the basis for the infrastructure of the foreign exchange market. The black money market has collapsed. All this is reflected in a number of important economic laws regarding Protection of Foreign Investments, Joint Stock Company, Tax, Securities etc. It was done with the reception.

The Azerbaijani banking system has been developing since 1996. The first stage of the development of the country's banking system is characterized by measures taken to restructure public banks and ensure the institutional formation of the private banking sector. In order to achieve these goals, liberal conditions have been set, i.e. not very high authorized capital demand and soft instruments regulating the banking system have been implemented. In 1995-1996, economic stability was observed in Azerbaijan again. On the recommendation of international financial and credit organizations, the President of the Azerbaijan Republic approved the laws of the Azerbaijan Republic on the National Bank of the Azerbaijan Republic on June 10, 1996, and on Banks and Banking Activity on June 14, 1996. (Ələkbərov and Sadıqov, 2018: p.15)

Stage 2 - 2000-2004 - is characterized by the beginning of radical reforms and restructuring. The strengthening of private banks since 2000 and the reforms made towards the globalization of the banking sector have created conditions for increasing financial stability in the banking sector. The consolidation process, which started in 1996, reduced the number of banks from 136 to 70 in 2000, and continued to decline in the following years. Since the number of banks decreased from 59 to 44 in 2000-2004, the increase in the registered capital of the Central Bank facilitated this process.

As a result, the inflow of income from the oil sector to Azerbaijan has significantly increased the level of the country's financial system. In terms of this factor, new development strategies have been developed for the national banking system for the 2002-2005 period. The main objective of these strategies was to ensure efficient transformation of oil revenues, increase access to banking services and create a truly competitive environment in the banking market. The desire to achieve these goals enabled the Central Bank to add the following principles to its activities in the upcoming period: (Məmmədov, 2013: p.24)

- Improving banking legislation and bringing it in line with international standards.

- Final transition to International Financial Reporting Standards (IFRS).

- Increasing the level of transparency of the banking system.

- Improving the quality of corporate governance of banks.

- Organization of effective banking supervision.

In response to the increasing interest of foreign investors in the local banking system, on January 1, 2004, the Central Bank lifted the restrictions on foreign capital in the Azerbaijani banking market. In 2004, important changes were made in the Central Bank Law in order to determine the macroeconomic regulation target of the Central Bank. The main purpose of the Central Bank is to ensure price stability.

In 2004, Azerbaijan increased its strategic foreign exchange reserves from $1.4 billion to $1.8 billion. The discount rate is 7% and the inflation rate in 2004 is 10.4%. The main cause of inflation is the increase in the money supply.

Stage 3 - Post-2005 period - First qualitative achievements, value of national currency, value monetary policy. To regulate the inflation process, the Central Bank strengthened monetary measures, raising the discount rate from 7% to 9% in 2005 and from 9.5 to 9.5 in 2006 and 9. changed to 13% three times during the year. The Central Bank does not hide its policy and systematically strengthens the exchange rate of the national currency against the US dollar.

With the decision of the Central Bank Supervisory Board dated April 2, 2007, the maximum and minimum limits of the interest rate corridor were determined. The maximum limit was set at 19%, the minimum limit was -5%, and the discount rate was 12%. According to the results of 2010, the maximum limit is 7%, the minimum limit is 1% and the discount rate is 5%. The purpose of changing the discount rate is to limit the excess money supply and reduce inflation. According to the new tactics, the Central Bank conducts its operations in the money market in two directions, through framework instruments and open market operations.

In 2010, 146 credit institutions were registered, including 101 non-bank and 45 banks. As of January 1, 2011, the number of branches of banks is 644. The number of non-bank credit institutions was 96 in 2010 and 101 in 2011. In 2010, the Central Bank granted licenses to 10 credit unions, but no credit institutions were revoked that year. Banking activities in our country are regulated by the Civil Code of the Republic of Azerbaijan, the Banks and Banking Law, the Chamber of Financial Markets Control, the laws of the Republic of Azerbaijan, the Constitution of the Republic of Azerbaijan, other normative legal acts, and legal regulations.

By the Decree of the President of the Republic of Azerbaijan dated February 3, 2016, the Control Chamber of Financial Markets of the Republic of Azerbaijan was established as a Public

Legal Entity. The Chamber operates independently and exercises licensing and control over the activities of the financial markets. The main purpose of the Chamber is to ensure the effective functioning of financial markets and to protect the rights of producers.

The implementation of the measures envisaged in the Strategic Roadmaps for the National Economy and Key Sectors of the Economy, approved by the Decree of the President of the Republic of Azerbaijan on December 6, 2016, is already yielding positive results. Relevant strategic roadmaps and relevant government programs focused on adapting the banking sector to the economic needs of the post-oil era and focused on new avant-garde sectors that would enable the sustainable development of the solution of existing problems.

3.2 Analysis and Evaluation of Key Indicators for the Activity of the Azerbaijan Banking System

The reforms carried out by the Central Bank of Azerbaijan in recent years to strengthen and strengthen the country's banking system have had a positive effect. These measures strengthened the capitalization of the banking system, strengthened the loan portfolio, increased liquidity, increased the number of systemic banks and eliminated many troubled banks that had no role in the country's economy. However, in addition to these positive changes, the country's banking system faces many challenges. Currently, one of the priorities is to reduce interest rates on loans. It is no secret that one of the important factors in improving the business environment and sustainable development of the non-oil sector is lending to businesses and society on favorable terms. (Məmmədov Z.F., 2013: p.75-85)

The Azerbaijani banking system consists of retail and corporate banks offering a wide range of traditional banking products. While institutional banks mainly serve government entities and large private entities, retail banks serve a broad segment of the population. The number of institutions specializing in the financing of micro, small and medium enterprises is limited.

Total assets of the country's banking system in 2018 amounted to 31.3 billion manats, loan portfolio 13.3 billion manat, deposit portfolio 20.4 billion manat and net profit 580 million manat. During this period, 5 banks accounted for 67% of all bank assets in the country, 70.5% of deposits and 88% of net profit. Therefore, while there are 30 commercial banks in the country, a significant part of the banking system is concentrated in the largest banks that make up 5-7 systems.

Although interest rates on bank loans have fallen somewhat in recent years, they are still high. The main factors that shape interest rates in loans are the Central Bank's discount rate, inflation, deposit interest rates, liquidity level in banks and interest margins in loans. (Bəşirov R. A., 2016: p.35-49) Considering the above factors, it can be concluded that the main reasons for the high cost of credit resources in the country are the high interest rates on deposits in banks and the current discount rate. It is known that banks offer high interest rates to customers in order to compete with financial resources in the domestic market, but such an approach ultimately leads to higher prices for loan resources. Banks pay deposits at an annual rate of 8-10%, while inflation is 2-2.5%, which is not in line with real market conditions. Thus, much of the responsibility for establishing high interest rates falls on the country's systemic banks. In the current macroeconomic environment, the average interest rate on deposits in national currency can be reduced from the current 9.27% to 5-5.25%, and the Central Bank's discount rate to 4-4.25%. Undoubtedly, with the support of FMA, the leading role in reducing deposit interest rates will fall on the systemic banks of the country. Reducing interest rates on financial resources will reduce the average interest rate on loans to 9-10%. Lower interest rates on loans will further strengthen the loan portfolio throughout the banking system and reduce reserves for potential losses. In this case, increasing interest rates and the profitability of banks will enable lending at lower interest rates in the future (www.cbar.az, Central Bank of the Republic of Azerbaijan, statistical bulletin, N:09 (222), 12/2018: N:09 (241), 2015-2019).

It is pleasing that the reforms implemented to ensure the sustainable development of the Azerbaijani economy, the achievements are appreciated at the international level, the positive trends of the reforms and the development prospects are reflected in the reports published by the World Bank, IMF and other leading international financial institutions. Therefore, it should be noted that in the most recent World Bank's Doing Business 2020 report, Azerbaijan ranked first among 190 countries in terms of credit availability, outstripping all countries. At the same time, Moody's, an international rating agency that analyses financial markets globally, reaffirmed Azerbaijan's position in Ba2 in a recent report, stating that targeted reforms will increase lending in the financial and banking sector, reduce potential financial risks and increase sector resilience. A similar position was confirmed by another international financial institution, Fitch, and it ranked first in the South Caucasus in its third-quarter report, which ranked 22 countries in Eastern Europe

and the post-Soviet space with a BB+ rating. (www.cbar.az, Central Bank of the Republic of Azerbaijan, statistical bulletin, N:09 (222), 12/2018: N:09 (241)).

Rehabilitation, reducing the share of toxic assets in the loan portfolio, strengthening the banks' currency position, meeting minimum requirements for liquidity and capitalization, the share of problem assets in the total loan portfolio decreased and the quality of loan portfolios increased. In 2018 alone, the volume of NPLs decreased by 1.67% compared to 2017.

Another important point is that the share of non-performing assets in the total loan portfolio continued to decrease, despite the orthodox expansionist policy maintained in the banking sector last year. This indicates that credit-based decisions are made based on the use of advanced risk mitigation tools within risk-based control mechanisms. On the other hand, on February 28, 2019, the President of the Republic of Azerbaijan signed a Decree on additional measures to deal with the problem loans of individuals in the Republic of Azerbaijan, which opened a completely new page for the banking sector. The related decree will create conditions for a healthy credit ecosystem, while also bringing new liquid funds to the real sector and, as a result, significantly improving the macroeconomic environment. Authorized international rating agencies have confirmed the importance of the decree for the country's banking sector and the role it will play in resolving non-performing loans. That's why Moody's International Rating Agency has released its most positive forecast for the country's banking sector in recent years. The agency changed its forecast for Azerbaijan and said that the forecast for non-performing loans will decrease from 12% to 10% by the end of 2019. This allows us to confidently say that the country's radical economic reforms and ongoing projects will benefit the country's financial and banking sectors and achieve their goals of reducing the NPL ratio to 8 percent.

As a result of the devaluation of the manat, the trend of the population to reduce bank deposits due to external economic shocks has stopped since mid-2017, and on the contrary, the amount of deposits is growing positively. According to the results of 2018, the volume of deposits of individuals in banks reached 8 billion 375 million manats. This figure is 12.44% compared to the same period of 2016 and 10.77% compared to 2017. According to the results of 2018, according to the results of 2017, the amount of deposits per capita also increased steadily over the past period, increasing by 9.78% to 846.16 AZN.

Table 5. Deposits of the Population

Date	Population (thousand people)	Total deposit volume (mln manat)	Average deposit amount per 1 person
2016	9705,6	7448,7	767,46
2017	9810,0	7561,2	770,76
2018	9898,1	8375,4	846,16

Source: Central Bank of the Republic of Azerbaijan, Statistical Bulletin, N:09 (222), 12/2018: N:09 (241), 04/2020. www.cbar.az , Statistical index of Azerbaijan 2015-2019

The decrease in the volatility observed in the manat exchange rate also affected the quality indicators on the deposit structure. Thus, it is an indicator of the confidence of the population both in the banking system and in the national currency, according to the statistics of the last 3 years, the share of manat in deposits in foreign currency has increased more than 2.5 times. Of course, in this context, it is important that the banks themselves act as stakeholders, together with the regulatory authorities of the banking sector.

Table 6. Number of Customers' Bank Accounts

Date	Number of bank customers (end of period)	including:			Number of customer accounts (end of period)
	Total	Individuals	Entrepreneurs	Legal individuals	Total
2015	5716385	5607028	181202	109357	16229206
2016	5352456	5282463	172664	69993	15161312
2017	5772040	5685215	231498	86825	16120944
2018	6335405	6233865	264371	101540	17953003
2016-2015	-6,37%	-5,79%	-4,71%	-36,00%	-6,58%
2017=2016	7,84%	7,62%	34,07%	24,05%	6,33%
2018-2017	9,76%	9,65%	14,20%	16,95%	11,36%

Source: Prepared according to the official statistics of the Central Bank

Analysis of the years 2015-2019 shows that the effect of the correction on the manat exchange rate initially led to stagnation in the banking system, a decrease in the number of bank customers and accounts, and in the following years, a positive change in the dynamics of the measures taken to establish a cashless economy, transparent tax, financial and banking system. Thus, according to the results of 2018, the number of bank customers increased by 10.83% compared to 2015. In addition, the number of customers engaged in entrepreneurship in 2018 increased by 45.90% compared to 2015 and by 53.11% compared to 2016. At the same time, the

number of customer accounts also increased significantly compared to 2016, increasing by 18.41% in 2018 and by 11.36% compared to 2017. According to the results of the 1st quarter of 2019, the number of customer accounts exceeded 17 million.

Table 7. Bank Market Structure and Service

Indicators	2005	2010	2015	2016	2017	2018	2019
Number of banks	44	45	43	32	30	30	30
Number of banks licensed since the beginning of the year	3	1	0	*0*	0	0	0
Number of banks whose licenses have been revoked since the beginning of the year	3	2	2	*11*	2	0	0
Number of state banks	2	1	2	2	2	2	2
Number of private banks	42	44	41	30	28	28	28
Number of banks with foreign capital	18	22	21	15	15	15	14
Banks with foreign capital of more than 50% of the authorized capital	*7*	*9*	*8*	*6*	*8*	*8*	*7*
including local branches of foreign banks	2	2	2	*2*	2	2	2
Banks with foreign capital up to 50% of the authorized capital	*11*	*13*	*13*	*9*	*7*	*7*	*7*
Number of bank branches	374	644	750	569	509	508	515
Number of ATMs	873	1892	2694	2454	2431	2502	2612
Number of POS Terminals	987	7872	80301	71806	-	66110	65608
Number of non-bank credit institutions	85	101	157	144	123	104	90

Source: Prepared according to the official statistics of the Central Bank of Azerbaijan.

As of December 1, 2016, the portfolio of banks and non-bank credit institutions in national currency decreased to 16 billion 275.5 million manats. The loan portfolio decreased compared to December 1, 2015. The amount of overdue loans corresponds to 8.9% of the total loan portfolio. As of December 1, 2016, the amount of deposits in national currency in banks was 7 billion 605.8 million manats. GDP per capita in 2016 was 6223.8 manats. In the January-November period of 2016, the average monthly nominal salaries of the employees increased by 7 percent compared to the same period of 2015 and amounted to 494.3 manats. In 2016, the income of the population increased by 8.7 percent in nominal terms compared to the previous year.

Table 8. Basic Indicators of the Banking Sector

Indicators	2005	2010	2015	2016	2017	2018	2019
Assets (mln. AZN)	2252.0	13290.8	34906.0	31439.5	27921.0	29502.4	31368.2
Assets (% of GDP in the last 12 months)	37.2	*72.1*	*92.7*	*87.5*	*63.4*	*63.2*	*63.2*
Total credit investments in the economy (mln. AZN)	1441.0	9163.4	21730.4	16444.6	11757.8	13020.3	14445.8
total credit (% of GDP in the last 12 months)	*23.8*	*49.7*	57.7	*45.8*	*26.7*	*27.9*	*29.1*
Expired loans (mln.AZN)	68.2	492.9	1508.5	1472.6	1626.7	1585.0	1384.9
Expired loans (%)	*4.7*	*5.4*	*6.9*	9.0	*13.8*	*12.2*	*9.6*
Total loan portfolio of banking sector (mln. AZN)	1401.4	8971.8	21152.0	15971.2	11337.6	12628.3	14075.0
Total loan portfolio of foreign banks (NBCO) (mln. AZN)	39.6	191.6	578.4	473.4	420.2	392.0	370.9
Credit investments in national currency (mln. AZN)	542.9	5865.3	10994.5	8663.1	6953.6	8073.6	9556.8
Loans in foreign currency (mln. AZN)	898.1	3298.1	10735.9	7781.4	4804.2	4946.7	4889.0
Loans in foreign currency (USD million)	977.7	4133.5	6884.6	*4394.5*	2825.8	2909.8	*2875.9*
Credit dollarization (in%)	*62.3*	*36.0*	*49.4*	*47.3*	*40.9*	*38.0*	*33.8*
Total capital (periods marked with * without IBA)	388.3	1897.1	3654.0	2438.0	3709.2	4071.8	4734.0
Total capital (in% of non-oil GDP for the last 12 months)	*6.4*	*10.3*	*9.7*	*6.2*	*8.4*	*8.7*	*9.5*
Total deposits (million AZN)	1368.7	7625.8	23431.4	22091.0	20599.1	21870.4	23413.5
Deposits in national currency (mln. AZN)	280.2	3205.3	4301.7	5459	5685.6	7581.7	8576.0
Deposits in foreign currency (mln. AZN)	1088.5	4420.5	19129.7	16632	14913.5	14288.7	14837.6
Foreign currency deposits (mln. USD)	1185.0	5540.2	12267.3	*9392.9*	8772.1	8405.1	8728.0
Deposit dollarization (%)	*79.5*	*58.0*	*81.6*	*75.3*	*72.4*	*65.3*	*63.4*
Deposits of households (mln. AZN)	494.5	3029.8	9473.9	7448.7	7561.2	8375.4	8811.1
Deposits in national currency (mln. AZN)	55.8	1410.0	1420.2	1517.2	2532.9	3142.3	3926.8
Foreign currency deposits (mln.AZN)	438.7	1619.8	8053.7	5931.5	5028.3	5233.1	4884.4
Deposits in foreign currency (USD million)	477.6	2030.1	5164.6	3349.8	2957.6	3078.3	2873.2
Deposit dollarization (%)	*88.7*	*53.5*	*85.0*	*79.6*	*66.5*	*62.5*	*55.4*
Deposits of financial institutions (mln. AZN)	-	2177	6358.8	5528	1935.0	1547.7	1704.1
Deposits of non-financial organizations (AZN million)	874.2	2419	7630.4	8139.1	11102.9	11947.4	12898.4
Foreign liabilities of the banking sector (mln.AZN)	158.2	2470.4	8204.5	9114.3	2308.3	1828.1	1607.2
External liabilities of the banking sector (USD)	172.2	3096.1	5261.3	7224.8	1357.7	1075.4	945.4

Source: Prepared according to the official statistics of the Central Bank of Azerbaijan.

According to the Central Bank of the Republic of Azerbaijan, between 2005 and 2014, the return on assets and volume of the banking system showed a high annual growth rate of approximately 30 percent. However, as of 2018, external economic shocks and the devaluation of the national currency increased the risk sensitivity of the sector and led to a deterioration in financial performance. The resilience of each bank against external shocks is not equal. Banks that applied sound risk management principles and had a high capital buffer showed greater flexibility. The violation of the financial stability of some banks is not only caused by the processes in the country and world economy. In the last 10-15 years, the lack of a business model and strategy that focuses on sustainable and long-term goals, unsustainable growth models and vulnerabilities arising from simple risk management by some banks are the main catalysts for problems in the banking system. Due to these institutional gaps, banks find it difficult to adapt to new economic and market conditions, flexibly transform their business models, and identify new sources of income.

While the dollarization of the deposit and loan portfolio after the first devaluation indicates a decrease in confidence in the national currency, the withdrawal of funds from the banking system after the second devaluation reflects concerns about the health of the sector. In this case, the adoption of the Law of the Republic of Azerbaijan dated January 19, 2016, served to increase the confidence of the public sector in the banking sector on full insurance of deposits. Thus, according to the new law, the protected deposits are fully insured for a period of 3 years, regardless of the amount, within the annual interest rate on the deposits determined by the Trustees of the Deposit Insurance Fund. At the same time, in order to increase the attractiveness of deposits, from February 1, 2016, the annual interest income paid on deposits of individuals is tax-free for 3 years.

Adverse developments during the year increased the pressure on banks' capital position. Although the minimum capital requirement for banks increased fivefold to AZN 50 million during the period of dynamic economic growth, it did create a certain financial cushion, but not enough to defuse internal and external shocks. While the net profit of the sector was 381 million manats in 2014, banks ended 2018 with a loss of 351 million manats. The total capital adequacy ratio in the banking sector declined from 18.9% to 14.7%.

Analysing the current state of the country's banking sector, it is impossible not to mention an important event in 2016: the decree on the liquidation of 3 departments: the Financial Monitoring Service under the Central Bank, the State Insurance Control Service of the Ministry of

Finance and the State Committee on Securities. The liquidated ones were replaced by a new body, the Chamber for Supervision of Financial Markets, which received the powers of the existing departments. In accordance with the decree of the President of the Republic of Azerbaijan dated February 3, 2016 with the aim of improving, as well as providing transparency to the securities market, investment funds, insurance institutions, credit institutions (banks, credit organizations) for the purpose of licensing, regulating the activities of payment systems, in order to improve management system to prevent financial terrorism, the Financial Markets Supervision Chamber of the Republic of Azerbaijan was established, which is the first public, legal institution that ensures the effective functioning of financial markets, as well as has the ability to protect the rights of creditors, investors and insured persons. The main tasks of the Chamber include improving the systems of regulation of the securities market, investment funds, credit and insurance institutions. To understand the peculiarities of the functioning of the institution, the following are the main tasks of the Chamber, or, in other words, the mission:

- Restructuring the financial system in order to ensure financial stability.

- Creation of a regulatory framework in accordance with international standards.

- Creation of effective mechanisms to ensure consumer rights in this area.

Further changes did not end there. On July 15, 2016, the President of the Republic of Azerbaijan signed a decree on the establishment of the Financial Stability Council. The next step was the creation of the Financial Stability Council, in order to ensure stability in the financial sector, and the committee included the Central Bank, the Ministry of Finance and the Chamber of Supervision over the Financial Markets of Azerbaijan. It should be noted that some progress has been made due to the adopted changes. For example, the capitalization of the banking sector in Azerbaijan has grown by almost 45%, according to the review of the banking sector, compiled by the Chamber for Supervision of Financial Markets for the first quarter of 2017.

The creation of the Chamber in Azerbaijan should ensure unified regulation of the country's financial market. Analysing the current state of the banking sector, it is necessary to take into account the main indicators in terms of profit. As can be seen from the table, in 2017, net profit amounted to 883.6 million manats, in 2018 this figure fell to 279.4 million manats. Table 9 details the items of profit and loss based on data from an official source from the Chamber of Financial

Markets Supervision. Based on the analysis, it can be concluded that there are factors that negatively affected the banking sector in Azerbaijan, as a result of which it is necessary to develop new development strategies.

Table 9. Profit and loss of the banking sector

	31.12.2017	31.12.2018
1. Interest and income on them	1,775.2	1,753.0
1.1 Interest on loans	1,282.7	1,224.5
2. Interest and expenses on them	824.9	581.9
2.1 Interest on deposits	373.4	377.8
3. Net interest income (loss)	950.3	1,171.1
4. Non-interest income	938.5	549.1
5. Non-interest expenses	980.6	1,025.6
6. Operating profit (loss)	908.2	694.6
7. Creation of special reserves to cover possible losses from assets (expenses)	(26.5)	345.4
8. Other income (expenses)	4.1	2.5
9. Profit before taxes (loss)	938.3	351.7
10. Income tax	55.2	72.3
11. Net profit (loss)	883.6	279.4

Source: Financial Markets Supervision Chamber, https://www.fimsa.az/

3.3 Structure of the Azerbaijan Banking System, Deposits Collected by Banks and Credits Used

For a more detailed study, it is necessary to consider the regulatory framework, the main credit indicators, and features. In recent years, the banking sector of Azerbaijan has undergone some changes as a result of the adoption of new laws. Let's highlight the features of the regulatory framework. The banking sector of the Republic of Azerbaijan consists of two levels from which The first level is the AR Central Bank and then second one is commercial banks, other credit institutions, branches and representative offices of foreign banks (Mamedov, 2016).

Other credit institutions, investment banks that issue and sell securities, mortgage banks that provide secured loans; municipal banks providing for the local budget, etc. In January 2004, the Law on the National Bank of the Azerbaijan Republic was adopted, which regulates the

banking sector of the Azerbaijan Republic by the National Bank of the Azerbaijan Republic. Later, in 2009, it was renamed the Central Bank of the Republic of Azerbaijan. Financial and legal regulation in the banking system is carried out by the Central Bank of the Republic of Azerbaijan. To fully disclose the main features of the regulatory framework, it is necessary to revise the functions of the Central Bank of Azerbaijan. The responsibilities of the Central Bank of Azerbaijan are determined by the Law on the Central Bank of the Azerbaijan Republic. (www.cbar.az, 2019)

1. To ensure the stability of the national currency, its purchasing power and the ratio of exchange rates to foreign currencies.

2. Development and regulation of the banking system of the Republic of Azerbaijan and strengthening of positions.

3. Ensure the protection of the national currency, plan monetary policy and implement the adopted policy in conjunction with government agencies.

4. Ensuring monetary monopoly and circulation.

5. Implementation of foreign exchange control and regulation.

However, the main function that worries us within the framework of this issue is the regulation of the banking sector, mentioned above. The main task of regulation is to create financial structures of banks and reflect their powers in various laws, especially in the Law on the Central Bank of the Republic of Azerbaijan, the Law on banks and the Law on banks and banking activities.

In fulfilling its main function, the Central Bank issues licenses for the activities of commercial banks and approves their statutes. After the adoption of the charter of a commercial bank by the Central Bank, the commercial bank is considered incorporated and acquires the status of a legal entity. With a license from the Central Bank, a commercial bank has the legal right to conduct banking operations. At the same time, the bank is included in the country's banking register. The opening of branches and representative offices of the bank is possible only with the permission of the Central Bank of Azerbaijan. Shareholders invest in manat or foreign currency, buildings and structures, securities, etc. they can invest. However, the share of any participant must not exceed 35%. According to the Banking Law, a bank is created as an open joint stock company

with the participation of at least three legal entities or individuals. The creation of commercial banks is a complex and responsible process. Before a bank can be created, the founders must be thoroughly informed about the future bank's ability to operate effectively, the scale of its activities and its client base. After confirming the successful activities of the bank, the founders must apply to the Central Bank with a license and an application for registration and attach some documents provided by the Central Bank to the application.

In the licensing process, special attention is paid to the composition of the shareholders, initial capital, field of activity and bank assets. If the Central Bank favourably decides to grant a license based on documents, a written notification will be sent within five calendar days. AR Central Bank issues the types of licenses such as Permission to trade in manats, License to trade in foreign and national currency and License to accept deposits and place gems (Mamedov, 2016). The Central Bank may refuse to issue a license if the bank does not meet the qualification level requirement of employees, if the founders' financial situation is insufficient and if the documents provided do not comply with the legal framework. Also, the Central Bank has the right to revoke licenses, which means their immediate closure if the bank was established more than one year after the license was issued, if false information is detected in the bank reporting, in case of illegal activities and activities outside the limits of the license granted and if the bank has gone bankrupt.

The legal framework provides for the voluntary closure of banks. The closure must be approved by the shareholders of the closing bank. The bank is considered closed from the moment of its derecognition. One of the main requirements for commercial banks is the size of the authorized capital, which must be higher than the minimum size established by the Central Bank. As stated in the Law on Banks, the authorized capital can be created only at the expense of funds denominated in the national currency of Azerbaijan (manat) (Law on Banks of Azerbaijan). Although until July 2012 the minimum total capital was 10 million manats, the Central Bank decided to increase this figure to 50 million manats. This decision entered into force on January 1, 2014, which means that all commercial banks had to comply with this requirement from January 1, 2014. Later, the Central Bank extended the term of this requirement and increased the minimum capital to 50 million manat by January 1. 2015. Having achieved a fivefold growth, the Central Bank set a course for a specific goal; this was to allow mergers and get rid of relatively small market participants. However, this did not happen, and new banks were created in their place. In

response, commercial banks began to take measures to increase capital and resorted to various methods: some raised additional funds from shareholders, others tried to merge.

Various indicators testify to the effectiveness of the decision to increase the authorized capital. Although the equity to assets ratio increased to 16% at the effective date of the decision, we can say that the minimum rate adopted by the Central Bank for this indicator is 12%, and the minimum amount adopted by Basel for comparison is 16%. eight%. In connection with the increased requirements for the minimum authorized capital, the Central Bank of Azerbaijan has decided to reduce the minimum level of capital adequacy. The new requirement was 10%. As a result of new needs, the capital base of the country's banks reached about 3 billion manat (for comparison, in 2012 this figure was about 2 billion manat), that is, the figure increased by 75%. Clear evidence of the effectiveness of the changes adopted by the Central Bank. sample. A fivefold increase in the minimum allowable capital strengthened the capital positions of the country's banks, and also led to a significant increase in the capital of banks. It should be noted that this law is also valid for the banking sector of Azerbaijan, and the stability of the entire sector has increased and stability has been achieved in a short time. This is evidenced by the presence of 45 commercial banks (43 private and 2 state) in Azerbaijan at the beginning of 2015. During the same period, foreign investments were made in the capital of twenty-three banks. It should be noted that over 14 years the number of such banks increased by 10. In addition, in the analysed period, the number of credit institutions increased and the share of foreign capital increased. Foreign capital was 51-100% in seven banks, <51% in fourteen banks, and two banks were branches of foreign banks. However, as of the end of 2015 and the beginning of 2016, licenses to operate 8 commercial banks were canceled due to two devaluations and, as a result, deterioration in financial performance. The Central Bank gave others time to merge.

Deposits collected by banks and loans provided by banks are regulated by the laws on banks of the Republic of Azerbaijan. While banks report using financial methods, the laws and regulations of the ACMB are specified with limitations. The concept of a deposit is money that is deposited on the bank's balance sheet, deposited or transferred to a current bank account and which must be withdrawn or transferred to another account at the end of a certain period at the request of the client. Payment of interest and commissions to banks and similar credit institutions in accordance with the relevant provisions of the contract. These deposits bring investors a certain

income in the form of balance sheet interest, which is reflected in the contract concluded with the bank. Deposits allow both the bank and the investors to make a profit at the same time: the investor now receives a certain percentage, as we said earlier, while the banks try to make a profit by keeping the investors' money in circulation. Deposits are classified according to the possibility of additional investments in distribution deposits, the maturity of the deposit, the method of calculating interest and the advance received (Sadigov, 2007).

It should be noted that interest rates depend on the deposit process. Thus, the longer the term of the deposit, the higher the monthly interest. Deposits can be divided into two categories by maturity: short-term and long-term deposits and demand deposits (Beshirov, 2007). Demand deposits are deposit accounts that can be withdrawn at any time. Short term deposits are deposits that usually cover a period of six months. Long-term deposits are deposits for several years. Deposits for additional investments can be divided into two parts: accumulative and standard (traditional).

In bulk deposits in case of accumulation of deposits, the client can regularly increase the amount of his deposits. The amount of added capital may be limited by contract. In addition, the possibility of replenishing the deposit several times a month (or an unlimited number) is determined by the terms and conditions of the bank (Kayhan, 2013). Standard Deposits, on the other hand, cannot see any additions. In contrast to savings deposits, standard deposits have higher interest rates. Deposits that are accepted in advance are of two types: term deposit and demand deposit in terms of the ability to invest money. According to the relevant agreement, demand deposit is a type of deposit in which the client must give all or part of the amount of the deposit immediately upon the first request of the client. Interest rates here are quite low. Term deposit is a type of deposit calculated to generate income during the period specified in the relevant contract. If the client wants to receive his money earlier than the specified time, it is not the bank that prevents him from doing so, but the interest accrued at this time can be cancelled. Interest rates on term deposits will be higher. Interest on deposits can be paid in three ways: in advance, periodically (monthly, quarterly) and at the end of the term.

- Advance payment: Payment of interest on the deposit can occur in advance, that is, at the time of signing the deposit agreement.

- Recurring: In addition, the client can receive interest on a regular monthly basis or periodically.

- At the end of the term: in this case, interest is paid after the end of the contract.

According to the calculation of bank interest, a deposit is considered the day following the day this amount is deposited to the bank, the day before the amount is returned to the client or for other purposes from the client's account. Interest on the deposit is calculated in two ways: a complex and a simple method of calculating interest (Makhmudov, 2008). The Simple Interest Method is the traditional method of calculating interest on a daily basis, based on the actual principal of the customer. The compound interest method calculates the variable equity in each period by adding the interest earned in each period to the principal. Compound interest management allows the customer to add interest to the principal and start earning interest on the principal. Obligation of a bank deposit agreement, types of deposits, legal relations on deposit accounts are regulated by the Civil Code of the Republic of Azerbaijan. In banking practice, deposits are classified in different ways depending on their nature. In this distinction, each major deposit group is also subdivided according to maturity, as explained above (Aliev, 2007).

A loan is a temporary monetary and non-cash resource with a maturity, loan, interest and repayment terms for people who need money. At least 2 parties are involved in credit transactions: the creditor and the recipient. The word "credit" means "dignity and confidence" and comes from the Latin root credere, which means faith, dignity. The word "credit" is used in everyday life to express great perseverance, trust and reputation. Generally speaking, a loan can be defined as the provision of certain goods, services or purchasing power with the promise of repayment at a specific time. In other words, debt is purchasing power that is planned to be paid in the future and can be used as needed.

In the banking sector of Azerbaijan, the prevailing share of the loan portfolio is concentrated in the hands of private commercial banks (about 62%). On the other hand, the share of the loan portfolio concentrated in commercial banks with foreign capital is thirty percent. In banks with 100% foreign capital, a little more than seven percent is about 1.5 billion manat in monetary terms. If we take the ratio of commercial bank loans to foreign capital to the total loan amount, then the indicator will be 37.5%. Thus, according to the above statistics, it can be said that Azerbaijan's economy is largely dependent on foreign banking capital.

Table 10. Lending in AR

Years	Loans volume in million manats
2005	1441
2006	2362,7
2007	4681,8
2008	7191,3
2009	8407,5
2010	9163,4
2011	9850,3
2012	12243,7
2013	15422,9
2014	18542,6
2015	21730,4
2016	16444,6
2017	11757,8
2018	13020,3

Source: Central Bank of Azerbaijan

It can be said that almost all financing in Azerbaijan consists of loans provided by commercial banks. As can be seen from Table 10, the loan volume amounted to 1.441 million manat in 2005 and 9.163.4 million manat in 2010, while the growth was not limited to this and reached 21.730.4 million manat in 2015. All the above statistics show how great is the potential of commercial banks in lending to the economy. Since 2015, the devaluation has affected the economy of Azerbaijan in general and the country's banking system in particular. Due to two devaluations and a decrease in the loan portfolio in 2016, the need for a loan increased, and, accordingly, the volume of loans decreased. It should be noted that if the total amount of the loan in manats decreases by only 10%, then there will be a significant decrease. 35% in dollar terms indicates the destabilization of the banking sector in Azerbaijan. In 2014, loans amounted to 18,542.6 million manat, and in 2015 loans to the economy - 21,730.4 million manat. However, in 2016 this figure decreased to 16.444.6 million. By the end of 2018, the loan amount amounted to 13.020.3 billion manat. All these data indicate a decrease in loans issued in the country. It should not be forgotten that lending to the real sector of the economy has its own characteristics. Figures 1 and 2 show the shares of bank loans in the economy by sector. For comparison, two periods of 2016 and 2018 are shown. Over the past 2 years, there have been minor changes in the denominator in the energy and chemical sectors, but in monetary terms, there has been significant growth.

In 2016, trade and services accounted for 15% of loans, which in monetary terms amounted to 2.467 million manat. The practice of lending to small and medium-sized enterprises is widespread in Azerbaijan (the state is actively promoting lending to medium and small enterprises), and the business and services sector almost entirely consists of small and medium-sized enterprises, although after 2 years (2016-2018) its share decreased. But, despite this, more significant growth is observed in monetary terms.

Figure 4. Distribution of Bank loans by economic sector (%) (2016)

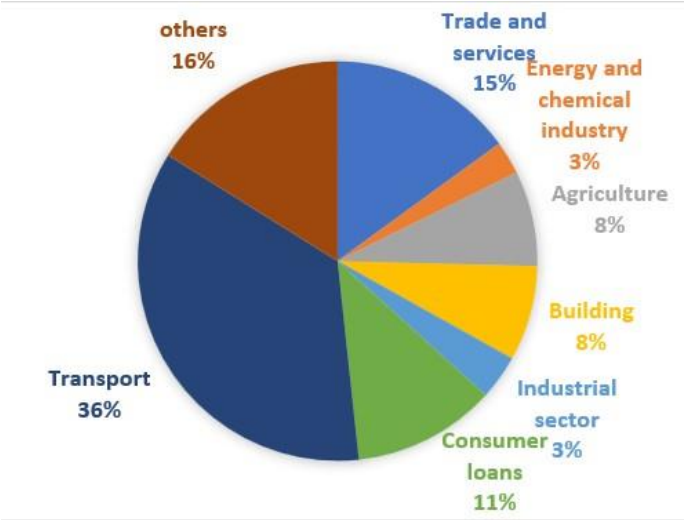
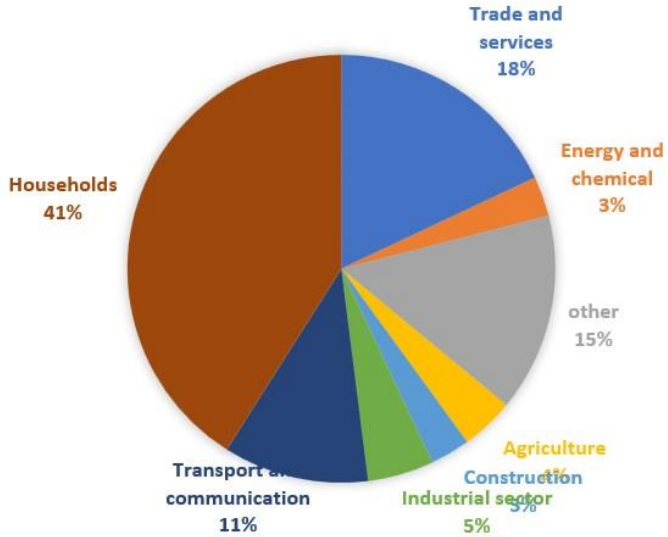


Figure 5. Distribution of bank loans by economic sector (%) (2018)



Source: Official website of the Central Bank of Azerbaijan, https: //www.cbar.az/

The share of the loan given to the construction sector at the end of 2016 was 11.6%, and it was 1908 million manats in monetary terms. Moreover, in addition to the monetary increase (152.2 million manata to 1908 million manata), the share of the construction sector in loans increased almost twice. The reason for this is the significant increase in construction in Azerbaijan in the last 2 years, and the emergence of major projects that will improve the country's infrastructure. Loans to the transport sector have increased in monetary terms over the last 2 years, but it can be said that their share in total credit volume has not changed in practice. It should not be forgotten that this sector is one of the most important sectors for the state and is therefore mostly financed by the state. Now let's talk about loans in the agricultural sector. The share of this sector in the total loan volume is 2.7%, at the end of 2016 it was 441 million manats in monetary terms. Although the share decreased in the period under review, the monetary value also increased. Credit growth rates given to the real sector follow the dynamics of oil prices. In particular, the highest loan growth was observed in the period when oil prices rose (2006-2008). In the following years, there was a decline in oil prices and this was accompanied by a decline in the lending growth rate. In 2011 alone, lending volume increased again after oil prices exceeded 2008 levels (Musaev, 2015).

Chapter IV: The role of bank management in the assessment of credit risk in the Azerbaijani banking sector: a survey on the Azerbaijani banking sector

As a result of the developments in the international financial markets, the habits of lending in the banking sector have changed very rapidly and have become more complex. Accordingly, the understanding of evaluating and calculating credit risk is also changing and developing. This situation is not different in Azerbaijan. Credit risk assessment methods, which were made with the individual evaluation of credit experts 5-10 years ago, are now being replaced by statistical-based methods. It was decided to apply a survey research in order to evaluate the credit risk through the eyes of the banks and to determine the problems faced by the banks while evaluating and calculating this risk.

4.1. Purpose, scope and limits of the research

The aim of the research is to determine the view of the risk management department heads of the banks operating in the Azerbaijani banking sector, the branch managers of this department and general risk experts on credit risk, to determine to what extent banks benefit from international experience in the assessment and calculation of credit risk, to analyse the functioning mechanism of credit risk in the Azerbaijani banking sector. and to share this information that the industry has created about itself with the industry as a whole. Heads of risk management departments of banks operating in Azerbaijan, branch managers related to this department and general risk experts constitute the main population of this research. It is thought that this research will enable banks to evaluate and compare the sector in general with their answers. 19 banks operating in the Azerbaijani banking sector were included in the research. Two of the banks are state banks (Azerbaijan Beynelhalk Bank, Azer-Turk Bank) and 17 are private banks. The banks participating in the survey are: International Bank of Azerbaijan, KapitalBank, PashaBank, Rabitebank, Azer-Turk Bank, Yapi-Kredi Bank, Unibank, Turanbank, Khalgbank, AFB Bank, Gunaybank, Bank Respublika, ExpressBank, ASB Bank, AccessBank, Premium Bank, Bank BTB, Bank of Baku, Yelobank.

4.2. Research methodology

Questionnaire research technique was used to collect data. The prepared questionnaire was presented to the main audience as a result of one-on-one interviews, and the answers were

requested to be conveyed both by one-on-one interviews and by e-mail. 19 banks were included in the evaluation and the participation rate (19/19) is 100%.

Table 11. Demographic indicators of survey

Banks	Participant N	Role
International Bank of Azerbaijan	3	Heads of risk management department Branch manager General risk expert
KapitalBank	2	Branch manager General risk expert
PashaBank	1	General risk expert
Rabitebank	2	Branch manager General risk expert
Azer-Turk Bank	1	Branch manager
Yapi-Kredi Bank	1	Branch manager
Unibank	2	Branch manager General risk expert
Turanbank	1	Branch manager
Khalgbank	2	Branch manager General risk expert
AFB Bank	1	General risk expert
Gunaybank	1	Branch manager
Bank Respublika	2	Branch manager General risk expert
ExpressBank	1	General risk expert
ASB Bank	1	Branch manager
AccessBank	1	General risk expert
Premium Bank	1	Branch manager
Bank BTB	1	Branch manager
Bank of Baku	1	Branch manager
Yelobank.	1	Branch manager

4.3. Analysis of survey data

The questionnaire was composed of 6 parts. The first part determines the nature of the sectoral distribution of loans, whether they are evenly distributed, in which sectors there is a lending direction, what measurement models are used by banks to measure and predict credit risk, at what intervals the credit risk is monitored and reported, and how top management fulfils its control and monitoring tasks. In the second part, entitled “Financial innovation from a risk assessment perspective,” banks were asked how a new product or service is assessed in terms of risk prior to launch. The third part also examines the factors used for corporate ratings, rating revision intervals, credit interest rates and credit limits. In the fourth and fifth sections, banks were asked questions about internal credit control and ethical rules. The sixth chapter explores how banks assess clients'

business capabilities, reliability, efficiency of business projects and repayment resources, and what they look for in this assessment. Findings about the role of top management are given in the table below:

Table 12. The role of bank top management

Questions (Role of top management of the bank)		Yes	No	Partially
Does the bank's senior management have sufficient information about the bank's exposure to credit risk in on- and off-balance sheet transactions and the importance of credit risk?	Number	17	0	2
	Percent %	89,5		10,5
Does the bank periodically check whether there is a credit concentration on a sectoral basis?	Number	14	1	4
	Percent %	73,7	5,3	21
Is care taken to distribute loans in a balanced way on a sectoral basis?	Number	14	2	3
	Percent %	73,7	10,5	15,8
Is credit risk regularly monitored and reported to senior management?	Number	17	0	2
	Percent %	89,5	0	10,5
Does the bank have a system or internal model for quantitatively measuring and estimating credit risk, and are these models reviewed regularly?	Number	9	3	7
	Percent %	47,4	15,8	36,8
Is there a second control mechanism where the loans approved by the branch managers are also evaluated by the bank's senior management?	Number	13	3	3
	Percent %	68,4	15,8	15,8

17 of the banks participating in the survey stated that the bank is exposed to credit risk in on- and off-balance sheet transactions and that they have sufficient information about the importance of credit risk, and this number comprised 89.5% of all participants. The other 2 banks declared that they partially have this information. In addition, it has been determined that 14 banks (73.7%) pay attention to the sectoral distribution of loans, 2 banks (10.5%) do not make such a distribution, and 3 banks partially pay attention to this distribution. The areas in which Azerbaijani banks mostly lend and control the credit concentration are given in the table below:

Table 13. Control of credit concentration on a sectoral basis

Does the bank periodically check whether there is a credit concentration on a sectoral basis? If your answer is “Yes”, explain: In which sectors is there	Number	%

credit concentration and in what period does your bank control this concentration?		
Trade and service sector (monthly)	4	28,6%
Personal loans (monthly)	5	35,7%
Industry and production sector (monthly)	2	14,3%
Construction industry (monthly)	3	21,4%
Total	14	100%

As can be seen from the table, 35.7% of banks generally focused on personal loans. Retail loans are followed by trade and service sector (28.6%), construction sector (21.4%), industry and production sector (14.3%), respectively. It has been observed that banks regularly control their credit concentration on a monthly basis. The Central Bank of Azerbaijan, which is the main authority in risk assessment and control in the Azerbaijani banking sector, recommends that the credit concentration be controlled periodically and observed within the framework of risk management.

The findings of the survey were compared with the Central Bank's report titled Structure of Total Credit Investments in the Economy in Areas. According to the report, 44% of the total loans given by the banks are personal loans, 14.3% are loans to the trade and service sector, 13.7% are loans to the construction sector, and 10.8% are loans to the industry and production sector. . In the Azerbaijan banking sector, sectoral limit practices are implemented within the framework of risk management. Banks included in the sample of the survey also apply concentration limits for each sector. For example, if the loans given to the construction sector exceed the predetermined concentration limit, some restrictions are applied to the loans given to this sector. According to the Central Bank's regulation titled "Rules for granting loans in banks," banks evaluate the balance sheet and income structure of the relevant sector and take into account the risk of the loan portfolio while determining the limits. The results of the periodic situation in the reporting of the banks' risk departments to the board of directors on credit risk are given in the following table:

Table 14. Reporting of credit risk impression

Is credit risk regularly monitored and reported to senior management?	N	%
Monthly	5	29,4%
monthly, quarterly, annually	3	17,6%
quarterly	2	11,8%
daily, monthly	3	17,6%

Daily, weekly, monthly, quarterly, annual	2	11,8%
weekly, biweekly, monthly	2	11,8%
Total	17	100%

The reporting period of the credit risk impression of the banks participating in the survey is as follows. 29.4% monthly, 17.6% daily, monthly, 17.6% monthly, quarterly, annually, 11.8% weekly, biweekly, monthly, 11.8% daily, weekly, monthly, quarterly and on an annual period. Questions to test the applicability of risk measurement models are given in the table below:

Table 15. Risk measurement models used by banks to measure credit risk

Does the bank have a system or internal model for quantitatively measuring and estimating credit risk, and are these models reviewed regularly?	N	%
Value at risk (RDM), portfolio at risk (RMP) models and "Vintage" analysis (monthly and annually)	4	44,5%
Scoring and risk rating models (monthly)	1	11,1%
Scoring models and stress-tests (monthly)	2	22,2%
Vintage analysis, portfolio-at-risk (RMP) model and stress-tests (monthly, quarterly and annually)	2	22,2%
Total	9	100%

Only 9 (47.4%) of the 19 banks surveyed stated that they use any model to measure and predict credit risk. Banks stated that they use value-at-risk, portfolio-at-risk, vintage analysis, scoring, risk-rating models and stress tests, and that these models are usually arranged monthly. The distribution of banks using credit risk measurement models is as follows: 44.5% value at risk, portfolio at risk and vintage analysis models; 22.2% scoring models, stress tests, vintage analysis and portfolio models at risk; 11.1% are scoring and risk rating models. The portfolio at risk model provides the calculation of credit risk by classifying loans according to their default periods. Value at risk is the maximum amount of loss estimated with a predetermined degree of safety over any given period (at least 1 year), and this amount represents the volume of loss estimated by the bank over various risk types. Vintage analysis provides the opportunity for detailed analysis according to the date of overdue loans, branch, manager, loan specialist and other criteria, and ensures that the problems that occur on the portfolio are eliminated more effectively. Stress tests are prepared to identify and evaluate events that may adversely affect the bank's risk profile, and within the framework of this model, the possibility of each shock to change to the most unfavorable level is taken into account. These shocks consist of components of market, credit, liquidity, operational and other risks. As a result of the application of stress tests, the resistance of the bank's capital to

shocks, the maximum loss suffered by the bank as a result of shocks and other gaps in the bank's activity can be determined.

According to the survey findings, it was revealed that 15.8% of the banks did not use any model while measuring or estimating the credit risk, and 36.8% of them were insufficient in determining the credit risk while applying these models. The reason for this is that the accounting statements of the enterprises are not formed correctly, do not reflect the truth sufficiently and are not subject to an effective audit by the inspection companies.

According to the regulation of the rules of risk management of the Central Bank of Azerbaijan, the quantitative models used in the measurement of risks must comply with the principle of cross-checking. Cross-checking is done to determine the adequacy of the applied model by comparing the probable results with the actual results. If the predicted possible outcome differs sharply from the actual outcome, necessary modifications are made to the models and their suitability for current macroeconomic conditions is ensured.

The mechanism and period of time by which the top management of the bank controls the loans approved by the branch managers is given in the table below:

Table 16. Control mechanism for loans approved by branch managers

Is there a second control mechanism where the loans approved by the branch managers are also evaluated by the bank's senior management?	N	%
Limits (monthly, biannually, quarterly, biannually and annually)	12	
LCS system and limits (monthly, quarterly and annually)	1	
Total	13	

Thirteen (68.4%) of the 19 banks participating in the survey answered yes to this question. Of the banks that answered yes, 12 (92.3%) stated that they control the loans approved by their branch managers through predetermined limits, and they generally do this on a monthly, bi-monthly, quarterly, bi-annually and annual basis. In addition to limits, 1 of the banks created an internal model called LCS. If there is a delay of even one day in the loans given by the branch managers and credit committees, the delay appears automatically in this system. In addition, all transactions related to loans are added to this system. Branch managers and credit committees operate freely

within certain limits. Limits are determined at the levels of branch, small credit committee and large credit committee, and upper limits are discussed by the board of directors.

In the 2008 crisis, the use of new financial products and leverage products with a high risk appetite without adequate risk management was one of the factors that triggered the crisis. In this respect, when a new product is launched in the Azerbaijani banking sector, it is very important to investigate whether the product is adequately reviewed by the marketing, legal and risk departments. The mists obtained from the risk assessment of a new product or service before it is introduced to the market are given in the table below:

Table 17. Financial innovation in terms of risk assessment

Questions (Financial innovation in terms of risk assessment)		Yes	No	Partially
Before a new financial product or service is introduced to the market, are the risks that this product (service) may involve calculated and evaluated by the senior management?	N	12	1	6
	%	63,1	5,3	31,6

12 (63.1%) of the participating banks answered yes to this question. These banks carry out a preparation process before offering new products or services. This process includes analyzing the suitability of the product or service with the bank's strategy and identifying the risks associated with the product. Banks' risk, legal and marketing departments calculate the competitiveness possibilities of the product in the market and the risks that the product may face on the basis of historical indicators of similar products. As a result of the data obtained, an opinion is written by the risk department and presented to the senior management in the form of a report in order to make the necessary decision. It has been determined that 31.6% of the banks do their product-related research depending on the accuracy of market research and statistical information. Findings related to institutional rating are given in the table below:

Table 18. Institutional rating

Questions (Institutional rating)		Yes	No	Partially
Are objective factors used for institutional ratings? If your answer is "Yes", please explain: What are these factors?	Number	15	0	4
	Percent %	78,9	0	21,1
Are grades checked periodically? If your answer is "Yes", explain: In which period are the degrees checked?	Number	17	0	2
	Percent %	89,5	0	10,5

Does the bank internalize the corporate rating stage and use it in determining credit limits?	Number	7	8	4
	Percent %	36,8	42,1	21,1
Are the company's past losses evaluated while making the corporate rating?	Number	9	2	8
	Percent %	47,4	10,5	42,1
Is the credit rating of the customers taken into account while determining the loan interest rates?	Number	11	4	4
	Percent %	57,8	21,1	21,1
Is credit rating used in credit approval and follow-up?	Number	12	1	6
	Percent %	63,1	5,3	31,6
If the customer's credit rating is found to be incorrect, is the reason for the error determined and the experience gained is used in the development of the credit rating system and related personnel?	Number	11	3	5
	Percent %	57,8	15,8	26,4

The factors used by banks in corporate ratings are given in the table below:

Table 19. Objective factors used in institutional rating

Does your bank use objective factors for corporate ratings?	n	%
Client's credit history, client's financial statements, client's identity, solvency, influence, client's liability, market value of collateral.	12	80
Altman Z-score model	3	20
Total	15	100

It has been determined that 80% of the banks participating in the survey use factors such as the customer's credit history, financial statements, customer's identity, ability to pay, influence, responsibility and the market value of the collateral in corporate rating, while 20% of the banks benefit from the ratios in the corporate rating Z-score model. . It has been revealed that 80% of the banks use the factors that are compatible with the 5C model of credit evaluation. In the 5C model, factors such as the identity of the customer, influence, ability to pay, capital, and the value of the collateral are used when determining corporate degrees. The ratios for the Altman Z-score, which 20% of banks benefit from, are as follows: Book value of equity/Total liabilities, Sales/Total assets, Cash/Total assets, Total liabilities/Total assets, Working capital/Total assets, Cash/Sales, Intangible assets/Total assets, Income before taxes and interest payments/ Sales, Income before taxes, interest, depreciation expenses for tangible and intangible assets/Total assets, Net

income/Total assets, Net income/Sales, Creditor payables/Sales, Debitor liabilities/Liabilities, The period in which the banks control the grades is in the table below given:

Table 20. Control of corporate degrees

Are grades checked periodically?	N	%
Monthly,	8	%47
A few months after the loan was given,	2	%11,8
quarterly,	3	%17,6
twice a year,	2	%11,8
Yearly	2	%11,8
Total	17	100

The review periods of the banks participating in the survey are as follows: 47% monthly, 17.6% quarterly, 11.8% bi-annually, 11.8% after a few months of loan, 11.8% annually. Credit ratings can be rearranged both on the basis of the bank's audit results and each time the customer applies for a new loan. Negative change in the credit rating of any evaluation criterion indicates the source of the problem and is an important determinant for the next impression.

According to other results, 36.8% of banks determine credit limits by taking into account the corporate rating, 21.1% perform this transaction partially, and 42.1% do not take into account the corporate rating when determining the limits. It was determined that 57.8% of the banks participating in the survey determined loan interest rates by taking into account the credit ratings of the customers, 21.1% did not take into account the credit ratings of the customers while determining the loan interest rates, and 21.1% partially took them into account. One of the important findings of the research is that 4 of 8 banks that do not take into account the corporate rating while determining their credit limits use the rating to determine loan interest rates. In addition, banks generally add customer-based credit ratings to the interest rates as a risk premium instead of reflecting them to the determined limits. A similar practice also manifests itself in bond interest rates. For example, in many countries, it is seen that bonds with low credit ratings have higher interest rates than bonds with high ratings due to the high risk premium.

Inspection board and internal control units of banks are important units that carry out periodic controls in determining the credit risk of customers. Inspection boards carry out branch checks for longer periods, while internal control units go to branch checks more frequently. Internal credit

control is an important tool for timely detection and prevention of potential errors, deficiencies and losses in credit effectiveness and minimizing credit risks. Establishing an internal control mechanism for loans is essential to ensure the security, efficiency and regulatory compliance of loan transactions. In this part of the survey, questions were asked to banks about internal credit control. The content of these questions is given in the table below:

Table 21. internal credit control

Questions (internal credit control)		Yes	No	Partially
Have the departments or persons conducting the internal credit audit and the departments or persons conducting the review based on the results of this audit been clearly identified?	Number	16	0	3
	Percent %	84,2	0	15,8
Do the personnel and managers in the internal credit audit and review departments have sufficient experience?	Number	17	0	2
	Percent %	89,5	0	10,5
Are internal credit audit results reported to senior management?	Number	18	0	1
	Percent %	94,8	0	5,2

The following table shows the departments that examine the internal credit control in banks and the results of this audit:

Table 22. Departments performing internal credit audit and review

Are the departments that perform the internal credit audit and the departments or persons performing the review based on the results of this audit clearly identified?	N	%
Inspection and monitoring branch	4	%25
Administrative branch of loans and analysis of credit risks	2	%12,5
Credit department and risk department	4	%25
Credit portfolio management branch and monitoring branch	3	%18,6
Finance monitoring branch and risk management branch	1	%6,3
Credit control branch and sales division control branch	1	%6,3
Analysis, control, reporting branch and problem assets management branch	1	%6,3
Total	16	100

In 25% of the surveyed banks, the internal credit audit is carried out by the bank's inspection branch and credit department. The departments that make an examination based on the results of the audit are the monitoring branch and the risk department. In 18.6% of the banks, this audit is carried out by the loan portfolio management branch, and the monitoring branch inspects according to the

audit results. According to other findings, internal credit control in banks is carried out by the administrative branches of loans, finance monitoring branch, credit control branch, analysis, control and reporting branch, and the branches that conduct research based on the results of this audit are credit risk analysis branches, risk management branch, control of sales departments.

It is noteworthy that the departments that analyze the internal credit audit and the results of this audit are different from each other in the participating banks. This is an important measure to avoid conflicts of interest. The number of years of experience of the personnel and managers in the departments that carry out internal credit audit and review are given in the table below:

Table 23. Experience of staff and managers in internal credit audit departments

Do the personnel and managers in the internal credit audit and review departments have sufficient experience?	N	%
2-6 years	5	%29,4
3-5 years	5	%29,4
at least 5 years	5	%29,4
10-15 years	1	%5,9
22-37 years	1	%5,9
Total	17	100

In 88.2% of the banks participating in the survey, it has been determined that the personnel and managers who perform internal credit audits and examinations generally have 2-6 years of experience. The fact that the assessment of credit risk measurement in banking has started to be standardized on an international scale supports the finding that the personnel working in this field have relatively little experience. The period in which the internal audit results are reported to the senior management is given in the table below:

Table 24. Reporting of internal credit audit results

Are internal credit audit results reported to senior management?	N	%
Monthly	5	%27,8
monthly, quarterly	3	%16,7
monthly, quarterly, annually	4	%22,2
daily, monthly, quarterly, annual	2	%11,1
Yearly	4	%22,2
Total	18	100

The reporting periods of the banks participating in the survey are as follows: 27.8% monthly, 22.2% monthly, quarterly and annually, 16.7% monthly and annually, 11.1% daily, monthly, quarterly and annually. As in many other countries in banking, ethical values have been brought to the forefront in customer-credit relations after the economic crisis in Azerbaijan. Especially in periods when risk appetite increases, banks are able to make a healthy credit assessment by taking excessive risks. In this respect, ethical research on banks in the sample is also important. The results of this part of the questionnaire are given in the table below:

Table 25. Ethic

Questions (Ethic)		Yes	No	Partially
Are there any declarations regarding conflicts of interest and ethical rules that all employees authorized to lend will sign and declare?	Number	13	0	6
	Percent %	68,4	0	31,6
Are the follow-up, evaluation and approval mechanisms of the loan segregated in order to avoid conflicts of interest?	Number	14	0	5
	Percent %	73,7	0	26,3
Is it ensured that all personnel working in the credits department participate in a training that covers conflict of interest and ethical rules?	Number	11	7	1
	Percent %	57,9	36,8	5,3
Are all employees with a lending authority aware that it is unacceptable to obtain any monetary or non-monetary benefit from any customer or potential customer, and in such a case, the employee will be terminated immediately?	Number	19	0	0
	Percent %	100	0	0

In 68.4% of the banks participating in the survey, it was determined that there are declarations regarding conflict of interest and ethical rules signed and declared by all employees authorized to lend. In addition, 57.9% of banks ensure that all personnel working in the loans department participate in a training that covers conflict of interest and rules of reason. Banks are required to inform their employees about the generally accepted principles and principles in the process of lending in advance, to take written commitments and to increase the activities for organizing periodic trainings.

It is generally accepted that the personnel working in the lending process in banks are separated from each other within the framework of a professional organization and the credit risk is minimized by cross-checks. In 73.7% of the banks participating in the survey, the follow-up, evaluation and approval mechanisms of loans are separated from each other in order to avoid

conflicts of interest. The units that follow up, evaluate and approve the loans are given in the table below:

Table 26. Follow-up, evaluation and approval mechanisms of the loan

Are the follow-up, evaluation and approval mechanisms of the loan segregated in order to avoid conflict of interest?	N	%
Inspection branch, business branch with customers and credit control branch	4	%28,6
Daily control of credit risks branch, credit department and credit committees	3	%21,4
Credit risk analysis branch, credit experts and credit committees	4	%28,6
Finance inspection branch, branches and credit committees	2	%14,3
Credit department, risk department and credit committees	1	%7,1
Total	14	100

As can be seen from the table, in 28.6% of banks, the follow-up, evaluation and approval of loans is carried out by the inspection branch, the business branch with customers and the control branch of loans, respectively. It is seen that in 28.6% of the banks, these tasks are performed by the credit risk analysis branch, credit specialists and credit committees. In addition, 21.4% of the banks perform these duties as credit risk control branch, credit department and credit committees, 14.3% finance inspection branch, branches and credit committees, 7.1% credit department, risk department and credit committees. In 71.4% of the banks participating in the survey, credit committees approve the loans. It has been observed that arbitrary practices in the banking sector, especially after the crisis, are gradually reduced and the lending phase is carried out more professionally.

Findings related to the evaluation of the financial situation of loan customers are given in the table below:

Table 27. Evaluation of the financial situation of the loan customer

Questions (Evaluation of the financial situation of loan customers)		Yes	No	Partially
Does the bank determine the financial situation of the customer by examining the balance sheet, profit loss and cash flow statements of the customer?	Number	16	0	3
	Percent %	84,2	0	15,8
Does the bank have sufficient information about the business capabilities, financial situation and reliability of its loan customers?	Number	15	0	4
	Percent %	78,9	0	21,1
	Number	13	3	3

Does the bank use its own research unit in sector assessments or does it outsource?	Percent %	68,4	15,8	15,8
Does the bank examine the efficiency of clients' business projects?	Number	11	0	8
	Percent %	57,9	0	42,1
Does the bank analyze the repayment sources of loan customers?	Number	17	0	2
	Percent %	89,5	0	10,5

The following chart shows what the banks pay attention to when examining the balance sheet, profit-loss and cash flow statements of the customers:

Table 28. Points to consider in examining the financial situation of the customer

Does the bank determine the financial situation of the customer by examining the balance sheet, profit loss and cash flow statements of the customer?	N	%
Authenticity of documents (signature, seal), authenticity, transparency and adequacy of data	6	%37,5
Firm's liquidity status, indebtedness, profit level and position in the sector	6	%37,5
The authenticity of the data stated in the balance sheet, profit-loss and cash flow statements through cross-checking	4	%25
Total	16	100%

37.5% of banks pay attention to both the authenticity of the documents submitted by the customer (signature, seal) and the authenticity, transparency and adequacy of the data. Another issue that banks (37.5%) pay attention to is the company's liquidity status, indebtedness, profit level and position in the sector. 25% of the banks participating in the survey pay attention to the authenticity of the data specified in the balance sheet, profit-loss and cash flow statements of the customers through cross-checking. Sources from which banks collect information about the business capability, financial status and reliability of the loan customer is given in the table below:

Table 29. Resources for collecting information about loan customers

Does the bank have sufficient information about the business capability, financial situation and reliability of its loan customers?	N	%
The customer's workplace, market, other customers or firms operating in the same industry as the customer, and competitors	6	%40
Credit registration center of the Central Bank of Azerbaijan	9	%60
Total	15	100

60% of the banks participating in the survey generally get this information from the credit registry center of the Central Bank of Azerbaijan. It has been determined that 40% of banks obtain this information from the workplace of the customer, from the market, from other customers or companies operating in the same sector as the customer, and from competitors. Which research unit or which external resources banks use in sector evaluations is given in the table below:

Table 30. Departments that make sector evaluations of banks and external resources they benefit from

Does the bank use its own research unit in sector assessments or does it outsource?	N	%
risk department	1	%7,7
Credit risks and sales dektek branch	1	%7,7
Sales and monitoring branch	1	%7,7
Business development department	1	%7,7
Strategy research and planning department	1	%7,7
Strategy management branch of credit risks	1	%7,7
Corporate banking branch	1	%7,7
External sources: Ministry of Economic Development, Central Bank, Statistics Committee,	6	%46,1
Business Aid National Fund	13	100

It has been determined that 53.9% of the banks participating in the survey use their own research unit in sector evaluations. Banks conduct this assessment through the risk department, the credit risks and sales support branch, the sales and monitoring branch, the business development department, the strategy research and planning branch, the strategy management branch of credit risks, and the corporate banking branch. On the other hand, 46.1% of the banks apply to external sources when making sector evaluations and benefit from the information obtained from the Ministry of Economic Development, the Central Bank, the Statistics Committee and the National Fund for Assistance to Businesses. What banks pay attention to when examining the efficiency of customers' business projects is given in the table below:

Table 31. Considerations when examining the efficiency of customers' business projects

Does the bank examine the efficiency of customers' business projects? If your answer is “Yes”, explain: What does the bank pay more attention to in this review?	N	%
The company's short- and long-term strategy plan and budget plan	2	%18,2

The strategy plan, from which sources the project is financed, the potential of the project and the revenues that it can bring in the future.	4	%36,4
Compliance with the bank's credit policy	3	%27,2
Compliance of the project with market reality and business development plan	2	%18,2
Total	11	100

While examining the efficiency of the customer's business projects, 36.4% of the banks identified the project's strategy plan, the sources from which the project was financed, its potential, and the cash flow and revenues that could be brought in the future. 27.2% of the participating banks pay attention to the compliance of these projects with the bank's credit policy. In addition, the company's short and long-term strategy plan, budget plan, compliance of the project with market reality and business plan are other important issues that banks pay attention to.

What banks pay attention to when analyzing the repayment sources of their loan customers is given in the table below:

Table 32. Analysis of customers' refund sources

Does the bank analyse the repayment sources of loan customers?	N	%
Analysis of balance sheet, profit and loss and cash flow statements	6	%35,3
Customers' income level, liquidity status, indebtedness status, working status with banks in the past and their habits of paying their debts	6	%35,3
Analysis of healthy and stable cash flows	5	%29,4
Total	17	100

Analysis of balance sheet, profit-loss and cash flow statements, income level of customers, liquidity status, indebtedness status, working status with banks in the past, payment habits, analysis of healthy and stable cash flows are important points that banks pay attention to when analyzing the repayment resources of their loan customers.

Conclusion

Due to its nature, the banking sector takes a significant risk in its transactions and is exposed to risk as a result of its intermediation function. The risks in the sector are tried to be minimized by a number of up-to-date methods by the bank management. At this stage, risk management has been transformed into an indispensable and important field of activity that banking institutions benefit from. The complexity of the transactions carried out by banks, the sharpening of global competition in the financial system and the emergence of new financial instruments have further increased the necessity of risk management. Early detection of risks and taking appropriate measures have become an indispensable process for the effective functioning of the banking system. Risk management plays an important role not only in ensuring the continuity of the bank's activities and preventing its bankruptcy, but also in obtaining a reasonable level of income in accordance with the risks undertaken by the bank.

Thus, risk management enables banks to undertake risks in a thoughtful and measured way and to obtain the highest capital income appropriate for this risk level. It is necessary to understand the risks to be taken in order to achieve the objectives and achieve the desired results in the banks. Another important finding obtained from the study is that risk management in the banking sector has improved further with the measures taken after the economic and financial crises, and more attention is given to the subject. In particular, the global crisis experienced in 2008 revealed how important financial risk management is for banks to maintain their existence and increase their share in the sector. In accordance with international standards, banks and companies that have debt-receivable relations with banks are required to have risk management. An effective risk management system will contribute to increase the performance of banks, to be more effective in reaching the key results they aim for, to strengthen the decision-making mechanisms, to increase the continuity and quality of the services provided, to reduce possible losses and reduce costs, and most importantly, to create a more positive image in the public. The 2008 global economic and financial crisis affected many countries, as well as manifested itself in the economy and financial structure of Azerbaijan. After the global recession, the world global crisis showed its effect on the Azerbaijan economy at the end of 2008 with the extreme decline in oil prices. As a result, in the first half of 2009, total exports decreased twice when compared to the same period of the previous year. In addition, there was a decrease in the rate of providing funds to banks from abroad. The global crisis also strengthened the effect of psychological factors on the economy, which was first

seen in the foreign exchange market and banking sector. After the crisis, some economic measures were taken in Azerbaijan. For example, President Ilham Aliyev, evaluating the year results at the Council of Ministers meeting on 16 January 2009, announced the package of measures against the crisis. Analyzing the point reached by the Azerbaijani economy in the context of economic developments in the world, the President explained the importance of the decision-making mechanism by taking into account the world economic crisis. Priorities of anti-crisis measures in Azerbaijan; It can be listed as the obligation to reduce consumer prices, the fight against monopoly, the policy of supporting national banks, the investment in the real economy, the strengthening of social policies, the orientation of industrial institutions to the domestic market, and the provision of food security (Mamedov and Zeynalov, 2011).

With the crisis precautionary package, it was envisaged that a certain amount of foreign exchange reserves deposited by the public in foreign banks could be used by domestic commercial banks, which are deemed reliable, on the condition that they are used only by companies operating in the real sector. This led to an increase in the loan volume in 2008 and 2009 and afterwards, contrary to expectations. In the fourth chapter, these issues are discussed in detail (Mamedov, 2010). This situation has increased the importance of the credit risk research for the banking sector of a country whose credit volume has increased after the crisis.

The Government of Azerbaijan and the Central Bank of the Republic of Azerbaijan acted quickly in the implementation of the anti-crisis program in order to minimize the effects of the global financial crisis on the economy. The urgent measures taken contributed to entering the crisis period with a much more balanced state budget, low external and domestic debt, as well as significant foreign exchange reserve assets. On July 9, 2009, upon the request of the President of Azerbaijan, some regulations and amendments were made to the Central Bank law in order to increase the effectiveness of the monetary policy of the Central Bank and the regulatory policies of the banking system.

For example, with the regulation, the maturity of the loans given by the Central Bank was extended. In addition, the Central Bank has introduced public guarantees for the loans given to the banking sector in order to increase the volume of loans to the real sector. With the law dated October 27, 2009, income tax exemption was introduced for the deposits of individuals in banks and credit institutions. Although the cost of the new law to the state budget is 60 million manat,

the government took the risk to support the banking system. The measures taken to increase the management, especially risk management performance of banks, were also continued. The performance of the supervision of banks in the financial stability and risk-preventing regime has been increased. Capital investments in the banking sector continued; capital adequacy level is maintained. Total capital adequacy ratio stood at 19%. Despite the global liquidity crisis, financial stability was preserved in the banking sector and banks showed financial resilience thanks to the measures taken.

When the Azerbaijani banking system is considered and analyzed as a whole in recent years, it is possible to state the following general results and observations. The development of the country's banking sector continues at a rapid pace. The share of foreign capital in the banking sector has increased significantly. In the Azerbaijani banking system, specialization and training in certain subjects began to be given importance. However, there are some problems that can be identified in the sector. Suggestions for sectoral development that need to be solved in the sector can be listed as follows (Mamedov and Zeynalov, 2011):

• Increasing the acceptability of the national currency in the international financial system, that is, its convertibility, and ensuring its positive reflections on the sector;

• Creation of banks with strong capital for the modernization of the financial sector;

• Limitation of anti-competitive activities;

• Reducing excessive credit risk appetite with macroprudential measures and increasing sectoral controls;

• Making more use of the banking sector by the society by giving importance to financial literacy activities and generalizing the banking activities.

Analysis of the findings of the survey study on the Azerbaijan banking sector as a whole

It is possible to specify the following results:

- 73.7% of the banks participating in the survey pay attention to the sectoral distribution of loans;

- Credit concentration in the Azerbaijani banking sector is in retail loans (35.7%), loans given to the trade and service sector (28.6%), loans to the construction sector (21.4%) and loans to the

industry and production sector (14%). ,3), and that these findings are also consistent with the report of the Central Bank of Azerbaijan titled Structure of Total Credit Investments in the Economy;

- 89.5% of banks regularly monitor and report their credit risk to senior management;

- 47.4% of banks generally use value-at-risk, portfolio-at-risk, vintage analysis, scoring and rating models and stress tests to quantitatively measure and predict credit risk, and these models are based on the Banks Risk Management Rules of the Central Bank of Azerbaijan its compliance with the models it recommends to banks in its regulation titled;

- 63.1% of banks carry out a preparation process before introducing a new product or service to the market and analyze the compatibility of the product or service with the bank's strategy during this process, as well as the competitiveness of the product in the market through banks' risk, legal and marketing departments, and historical indicators of similar products. calculates the risks that the product may encounter on the basis of;

- 78.9% of banks used factors such as the customer's credit history, identity, ability to pay, customer's market share and awareness, responsibility and market value of the collateral in determining corporate ratings, while 3 banks also benefited from the financial ratios in Altman Z-score models, as well as the compatibility of these factors with the 5C model of credit assessment;

- Ratings are regularly checked by 89.5% of banks;

- 57.8% of banks consider credit rating in determining loan interest rates;

- 36.8% of banks internalize the corporate rating and use it in determining credit limits;

- 63.1% of banks use credit rating in credit approval and follow-up;

- In 84.2% of the banks, internal credit control is generally carried out by inspection, administrative branch of credits, finance monitoring, credit control branches and analysis departments, where the departments performing internal credit inspection and the departments or persons conducting the inspection based on the results of this inspection are clearly identified. , control and reporting branch, and the departments that examine based on the results of the internal credit control, generally, monitoring, analysis of credit risks, control of sales units, management of problematic assets and risk department;

- Personnel and managers in departments performing internal credit audit and review generally have an experience of 3-6 years (59.2%);

- 94.8% of banks regularly report their internal credit audit results to the senior management;

- Existence of written statements regarding conflict of interest and ethical rules in 68.4% of banks;

- In 73.7% of banks, in order to avoid conflicts of interest, follow-up evaluation and approval mechanisms of loans are separated from each other, credit follow-up is generally done by inspection, daily control of credit risks, analysis of credit risks, finance inspection branches and credit department, credit evaluation is generally, the customers and the business branch, the credit specialists, the branches, the credit department and the risk department, and the credit approvals are usually done by the credit committees;

- 84.2% of banks determine the financial status of their customers by examining their balance sheet, profit loss and cash flow statements, and in this examination, attention is paid to the authenticity, transparency and adequacy of the documents and data presented by the customer, the liquidity, debt situation, profit level of the company and its place in the sector. they do;

- 68.4% of banks use their own research unit in sector evaluations and these evaluations are generally made by banks' credit risk and sales support, monitoring, strategy research and planning branches, risk department and business development department. Ministry, the Central Bank, the Statistics Committee, the National Fund for Assistance to enterprises;

- 78.9% of the banks have sufficient information about the business capabilities of their loan customers and this information is generally obtained from the workplace of the customer, the market, other customers or companies operating in the same sector as the customer, competitors and the Credit Registration Center of the Central Bank of Azerbaijan. acquired from;

- 57.9% of banks examine the efficiency of their customers' business projects and in this review, they usually review the company's short and long-term strategy plan, budget plan, from which sources the project is financed, the potential of the project and its future income, the suitability of the bank's credit policy and the project's compliance with the project. pays attention to its compliance with market reality,

- 89.5% of the banks analyze the repayment sources of the customers and in these analyzes, generally, the balance, profit-loss, healthy and stable cash flow statements, the income levels of the customers, their liquidity, indebtedness status, their working with banks in the past and their habits of paying their debts. he pays attention to;

- 89.5% of banks separate their non-performing loans from other loans and manage them separately;

- 89.5% of the banks have a clear policy for collecting non-performing loans and getting rid of these loans;

- In 84.2% of the banks, there is sufficient cooperation between the head office and branches in terms of non-performing loans;

- It has been determined that 52.6% of banks periodically check the business performance and fund flows of troubled customers.

However, there are some deficiencies identified in the sector. These shortcomings can be listed as follows:

- 15.8% of the banks do not use any model while measuring or estimating the credit risk, and 36.8% of the banks are insufficient in determining the credit risk while applying these models (this is because the accounting statements of the enterprises are not formed correctly and do not reflect the truth sufficiently). and not subject to an effective audit by inspection companies).

- 31.6% of banks conduct their product-related research based on the accuracy of market research and statistical information;

- 42.1% of the banks did not consider the corporate rating while determining the limits, while 21.1% partially realized this transaction;

- 21.1% of banks do not take into account the credit ratings of customers when determining loan interest rates, while 21.1% partially take into account;

- The banks generally add the customer-based credit rating to the interest rates as a risk premium instead of reflecting them to the determined limits;

- In 88.2% of the banks, the personnel and managers performing internal credit audit and examination generally have 2-6 years of experience, (the assessment of credit risk measurement in banking has just started to be standardized internationally, the personnel working in this field have relatively little experience. supports the finding).

- 57.9% of the banks ensure that all their personnel working in the loans department attend a training that covers conflict of interest and ethical rules (for banks to inform their employees about the generally accepted principles and principles in the loan granting process, to obtain written commitments and to organize periodic trainings). activities need to be increased).

- 42.1% of banks partially examine the efficiency of customers' business projects;

- 36.9% of banks partially examine the operating performance and fund flows of troubled customers;

- In general, it has been determined that the international banking activities in the Azerbaijani banking sector are not developed that much and the banks dedicate more to the local market.

Finally, it is believed that the Azerbaijani banking sector will come to a stronger position in the future with more positive changes.

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