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FACTORS AFFECTING BANKING SECTOR STABILITY IN KAZAKHSTAN

Abstract: *in the context of macroeconomic instability and tightening of monetary policy, the analysis of the stability factors of the banking sector is becoming particularly relevant. The purpose of the study is to assess the impact of economic and monetary factors on the level of overdue debt (NPLs) and the dynamics of the deposit base of the banking sector in Kazakhstan. The methodological framework of the study is based on descriptive statistics, correlation analysis, and multiple regression modeling. The empirical base includes macroeconomic and banking indicators of the Republic of Kazakhstan for the period 2020–2024, obtained from the Bureau of National Statistics and the National Bank of Kazakhstan. The results of the analysis show that household income and overall economic dynamics have the most significant impact on the development of the banking sector. A strong positive relationship has been identified between income, GDP, and the volume of deposits, indicating that the resource base of banks largely depends on the level of household welfare. The regression analysis demonstrates that an increase in the base rate leads to a rise in the level of non-performing loans (NPLs), while higher household income contributes to a reduction in credit risk and an increase in deposits. The findings confirm that macroeconomic stability and income growth are the key drivers of banking sector sustainability, whereas credit risks are shaped by a broader set of factors. The practical significance of the study lies in the potential application of the results for improving monetary policy and banking risk management in Kazakhstan.*

Keywords: *bank, banking stability, banking sector, monetary policy, base rate, inflation, household income, Kazakhstan.*

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ФАКТОРЫ, ВЛИЯЮЩИЕ НА СТАБИЛЬНОСТЬ БАНКОВСКОГО СЕКТОРА КАЗАХСТАНА

Аннотация: *в условиях макроэкономической нестабильности и ужесточения денежно-кредитной политики анализ факторов стабильности банковского сектора становится особенно актуальным. Целью исследования является оценка влияния экономических и монетарных факторов на уровень просроченной задолженности (NPL) и динамику депозитной базы банковского сектора Казахстана. Методологическая основа исследования основана на описательной статистике, корреляционном анализе и множественном регрессионном моделировании. Эмпирическая база включает макроэкономические и банковские показатели Республики Казахстан за период 2020-2024 годов, полученные от Бюро национальной статистики и Национального банка Казахстана. Результаты анализа показывают, что доходы населения и общая экономическая динамика оказывают наиболее существенное влияние на развитие банковского сектора. Была выявлена сильная положительная взаимосвязь между доходами, ВВП и объемом депозитов, свидетельствующая о том, что ресурсная база банков во многом зависит от уровня благосостояния населения. Регрессионный анализ показывает, что повышение базовой ставки приводит к росту уровня проблемных кредитов, в то время как более высокие доходы домохозяйств способствуют снижению кредитного риска и увеличению депозитов. Полученные результаты подтверждают, что макроэкономическая стабильность и рост доходов являются ключевыми факторами устойчивости банковского сектора, в то время как кредит-*

ные риски определяются более широким набором факторов. Практическая значимость исследования заключается в потенциальном применении результатов для совершенствования денежно-кредитной политики и управления банковскими рисками в Казахстане.

Ключевые слова: *банк, банковская стабильность, банковский сектор, денежно-кредитная политика, базовая ставка, инфляция, доходы населения, Казахстан.*

1. *Introduction.*

In modern conditions of macroeconomic instability and the increasing role of the financial sector, the analysis of factors determining the stability of the banking system is particularly relevant. The banking sector performs a key function in the economy, ensuring the redistribution of financial resources, maintaining investment activity and creating financial stability. In recent years, there has been a tightening of monetary policy, accompanied by an increase in the base rate and an increase in the cost of credit resources. This leads to an increase in the debt burden on borrowers, a decrease in the availability of financing and, as a result, an increase in credit risks. At the same time, the volatility of the exchange rate and the slowdown in the growth of real incomes of the population persist, which further worsens the solvency of economic agents. At the same time, despite the growth of the deposit base, the structure of the banking sector is characterized by a high concentration and significant dependence on internal sources of funding, which increases the sensitivity of the system to macroeconomic shocks.

According to existing scientific approaches, the stability of the banking sector is formed under the influence of a combination of macroeconomic, institutional and behavioral factors. Classical economic theories laid the foundation for understanding these processes: within the framework of the theory of financial intermediation (Schumpeter, 1934), banks are considered as key agents of resource redistribution, whereas Keynesian theory (Keynes, 1936) emphasizes the role of the interest rate as a tool for regulating investment activity.

Modern empirical research has significantly expanded the understanding of the factors of banking stability. It has been established that macroeconomic dynamics, primarily economic growth, inflation and interest rates, have a significant impact on the level of problem loans (Salas & Saurina, 2002; Quagliarello, 2007). At the same time, a stable inverse relationship has been revealed between the pace of economic growth and the level of overdue debt (Fofack, 2005), while tightening monetary policy, as a rule, leads to an increase in credit risks (Espinoza & Prasad, 2010; Nkusu, 2011). Additionally, the importance of the bank lending channel is emphasized, through which changes in interest rates affect the volume of loans and the quality of banks' assets (Bernanke & Gertler, 1995; Kashyap et al., 1993; Gambacorta, 2008).

Despite a significant amount of international research, this issue remains insufficiently developed for Kazakhstan. Existing work is mainly focused either on the analysis of problem loans or on individual aspects of the functioning of the banking sector, while comprehensive studies that take into account the simultaneous impact of macroeconomic factors, monetary policy and the behavior of economic agents are limited (Myrzhykbayeva et al., 2023; Kalimoldaev et al., 2025).

In this regard, it is necessary to conduct an analysis aimed at identifying key factors of the stability of the banking sector in Kazakhstan and assessing the nature of their impact on the quality of the loan portfolio and the dynamics of the deposit base. Thus, the purpose of the study is to assess the impact of economic and monetary factors on the level of overdue debt (NPLs) and the dynamics of the deposit base of the banking sector in Kazakhstan.

2. Literature review.

Stabilising the banking sector is a key area of economic research, as the banking system transforms savings into investments and ensures the economy's financial stability. In conditions of macroeconomic instability, analysing factors affecting the quality of the loan portfolio and the dynamics of the deposit base is of particular importance. Many scientific studies show that the stability of the banking sector is formed under the influence of a complex of macroeconomic, institutional and behavioral factors.

Classical economic theories laid the foundation for understanding the role of the banking system in the economy and the mechanisms of financial stability formation. According to the theory of financial intermediation developed by Schumpeter (1934), banks play a key role in economic development by facilitating the redistribution of resources from savers to investors. Within the Keynesian framework presented in Keynes (1936), special attention is paid to the role of the interest rate as a key instrument for regulating investment activity and aggregate demand. An increase in interest rates raises the cost of loans, reduces investment activity, and increases the financial burden on borrowers, which can negatively affect the quality of the loan portfolio.

The monetary school associated with Friedman (1963) focused on the role of money supply and inflation. According to this theory, inflationary processes directly affect the real incomes of the population and, consequently, their ability to service debt obligations. Further, Minsky's (1986) theory of financial instability is also important, which holds that financial systems are prone to cyclical crises. During periods of economic growth, risks accumulate as lending increases, further leading to overdue debts and financial instability.

Further scientific research confirms that the stability of the banking sector is largely determined by the macroeconomic environment. This area developed particularly actively in 2000–2010 against the background of financial crises and the growth of distressed assets. One of the key areas of research is analysing the impact of macroeconomic factors on the level of overdue debt (NPLs). In particular, a study by Salas and Saurina (2002) showed that the economic downturn and rising interest rates increase the level of problem loans in the banking system.

Further research has confirmed the importance of economic factors. For example, Quagliarello (2007) found that the dynamics of economic growth and interest rates significantly affect the quality of banks' loan portfolios. Special attention in the literature is paid to the fact that there is a stable inverse relationship between economic growth and the level of problem loans. Using sub-Saharan Africa as an example of sub-Saharan Africa, Fofack (2005) showed that the growth of problem loans is closely related to macroeconomic instability, including a slowdown in economic growth and a

deterioration in external economic conditions. Similar conclusions were drawn in the work of Ali and Daly (2010), where data from the USA and Australia established that the key macro factors of NPLs are GDP, interest rates, and debt levels. A study by Espinoza and Prasad (2010) showed that Inflation is also an important factor in banking stability, and that rising interest rates and deteriorating macroeconomic conditions lead to an increase in NPLs in the banking systems of the Persian Gulf countries. In addition, the Nkusu (2011) study showed that deterioration in macroeconomic conditions, particularly the decline in GDP and tightening of financial conditions, leads to a significant increase in deterioration of macroeconomic conditions, in particular, the decline in GDP and tightening financial conditions, leads to a significant increase in the level of problem loans.

One of the key areas of research on banking stability is the analysis of the impact of monetary policy on banks' credit activity and asset quality. As part of the credit channel of monetary transmission, a tightening of the central bank's policy reduces liquidity and raises interest rates. The theoretical rationale for this approach is presented in Bernanke and Gertler (1995), which shows that changes in monetary conditions affect the real economy not only through the market interest rate but also through the state of credit markets. Kashyap et al. (1993) showed that tightening monetary policy changes the structure of external financing and reduces bank lending, confirming the existence of a bank credit channel. A significant contribution to the development of this topic was made by a study by Gambacorta (2008), who noted that bank interest rates are formed under the influence of both economic and intrabank factors. Further, Disyatat (2010) noted that the traditional view of a bank credit channel as a mechanism based primarily on deposit changes is too narrow.

The financial behavior of households and the formation of the deposit base of banks are the most important elements of the stability of the banking sector. In the work of Loayza et al. (2000) based on a cross-country analysis, it has been shown that income growth is one of the most stable factors in increasing the level of savings. Further research focused on analysing factors affecting the structure and dynamics of deposits.

For example, Athukorala and Sen (2004) showed that income levels and financial liberalization have a significant impact on savings behavior in developing countries. Income growth is accompanied by an increase in the share of financial savings, including bank deposits. Additional evidence was obtained in Deaton (2005), which emphasizes that household savings are closely related to income levels, uncertainty, and access to financial instruments. During periods of economic instability, households may increase savings as a precaution, thereby affecting deposit volume.

Modern research has significantly expanded the understanding of the factors determining household savings behavior and the dynamics of banks' deposit base. For example, a study by Beck et al. (2017) showed that levels of financial development and access to banking services significantly increase households' propensity to accumulate savings in the formal financial system. Fung and Weill (2015), using the example of countries with economies in transition, established that trust in the banking system and institutional stability play a key role in deposit formation. Additional empirical results are presented in a study by Bachas et al. (2018), which shows that increased financial accessibility leads to higher household savings and a larger deposit base. Further, Demirgüç-Kunt et al. (2022), using global data, showed that in times of crisis and uncertainty, households tend to increase savings in formal financial institutions, which confirms the hypothesis of precautionary behavior.

Modern literature shows that the dynamics of NPLs is determined by a combination of macroeconomic conditions, characteristics of the banking sector and the institutional environment. Dimitrios et al. (2016) have shown that the key determinants of NPLs are macroeconomic and country factors, including the business cycle, as well as individual banking characteristics. Ozili (2019) showed that NPLs are closely related to financial development, and the expansion of financial intermediation and the presence of foreign banks do not always automatically reduce credit risk. Naili and Lahrichi conclude that NPLs are largely explained by both macroeconomic and bank-specific variables, with their quantitative impact varying across countries and banking models. Finally, Cortés and Soriano (2024) showed that for consumer and mortgage loans, the set of significant determinants largely coincides, but their impact varies, and real GDP

stands out among the key factors. This is especially important for interpreting the results for Kazakhstan, where the lending structure is also heterogeneous, and the retail segment is playing an increasingly prominent role.

For Kazakhstan, the topic of credit risk is particularly significant, since the banking sector remains relatively concentrated, and deposits account for more than 80% of banks' liabilities, which reinforces the importance of simultaneously analyzing the quality of the loan portfolio and the sustainability of the resource base (World Bank, 2024). However, the identified amount of literature on Kazakhstan remains limited. The closest empirical study is the work of Muratbek (2017), which analyzed the determinants of NPL in the banking sector of Kazakhstan on a panel of 29 banks for 2007–2014. Myrzhykbayeva et al. (2023) emphasize that effective management of problem loans (NPLs) is an important condition for the sustainable development of both the banking system and related sectors of the economy. Furthermore, Kalimoldaev et al. (2025) reveal a significant effect of macrofactors on the dynamics of NPLs, however, they show that this effect is significantly modified through additional channels. Additional publications on Kazakhstan are more often descriptive in nature and focus on the general state of the banking system and accumulated problem loans.

The analysis of the literature shows that the stability of the banking sector is formed under the influence of a combination of different factors. Classical economic theories have laid the theoretical foundation for understanding the role of banks in the economy, while modern empirical research has significantly expanded the understanding of the mechanisms of credit risk formation and the resource base of banks. At the same time, an analysis of scientific publications on Kazakhstan shows that existing research is limited. Most of the work focuses either on the analysis of problem loans or on a general description of the banking sector, while comprehensive studies that simultaneously take into account all factors, monetary policy and the behavior of economic agents, are not sufficiently presented.

3. Research methods.

The study uses a quantitative approach to identify factors affecting the sustainability of the banking sector in Kazakhstan. The methodological base includes methods

of descriptive analysis, correlation analysis and regression modelling, which helped consistently move from describing data to identifying relationships and assessing cause-and-effect effects.

The empirical basis of the study is the macroeconomic and banking indicators of Kazakhstan for the period 2020–2024. The data is obtained from official sources, including the National Bank of the Republic of Kazakhstan and the Bureau of National Statistics (Bureau of National Statistics 2025; National Bank, 2025). The analysis includes the following variables: gross domestic product (GDP); inflation rate; base rate of the National Bank; weighted average loan rate; household income; volume of deposits; volume of attracted deposits; level of overdue debt; exchange rate; inflow of foreign direct investment; budget deficit (in % of GDP). The choice of data is determined by its accessibility, comparability and the ability to comprehensively reflect the macro-financial environment and the state of the banking sector. So, Table 1 shows the variables used in the study.

Table 1

Description of the variables used in the study

Variable	Explanation	Unit of measurement	Source
GDP	Gross domestic product	mln USD	Bureau of National Statistics of the Republic of Kazakhstan
Inflation	The rate of inflation	percentage	Bureau of National Statistics of the Republic of Kazakhstan
BaseRate	Base rate	percentage	National Bank of the Republic of Kazakhstan
LendingRate	Loan rate	percentage	National Bank of the Republic of Kazakhstan
Income	Incomes of the population	tenge	Bureau of National Statistics of the Republic of Kazakhstan
Deposits	The volume of deposits	mln tenge	National Bank of the Republic of Kazakhstan
AttractedDeposits	Attracted deposits	mln tenge	National Bank of the Republic of Kazakhstan
NPL	Overdue debt (NPL)	mln tenge	National Bank of the Republic of Kazakhstan
ExchangeRate	The exchange rate	tenge/USD	National Bank of the Republic of Kazakhstan
FDI	Foreign direct investment	mln USD	Bureau of National Statistics of the Republic of Kazakhstan

BudgetDeficit	Budget deficit	% from GDP	Bureau of National Statistics of the Republic of Kazakhstan

Source: compiled by the author.

First group, the model includes key economic indicators such as inflation, GDP, the exchange rate, and the budget deficit. Thus, inflation reflects price dynamics and directly affects borrowers' real solvency, as well as monetary policy decisions. GDP is used as a generalizing indicator of economic activity, determining the level of income and business activity in a country. The exchange rate is considered a factor in the economy's external vulnerability and can affect the debt burden, especially foreign-currency obligations. The budget deficit reflects fiscal sustainability and indirectly affects the economy's financial conditions. The inclusion of foreign direct investment inflows complements the analysis, allowing us to consider the impact of external capital and investment activity on the development of the economy and the banking sector.

The second group consists of monetary indicators – the base rate and the weighted average loan rate. They characterize the cost of borrowed resources in the economy and are directly related to the debt burden of borrowers. An increase in interest rates, as a rule, leads to an increase in the cost of loans and an increase in the likelihood of delinquencies, which makes these variables key in the analysis of credit risks.

The third group of variables reflects the behavior and condition of the banking system. Household incomes are included in the model as the main factor determining borrowers' solvency and propensity to save. The volume of deposits and funds raised characterize the resource base of banks and the level of trust in the financial system. Their growth, as a rule, indicates the strengthening of the banking sector, but at the same time it can stimulate the expansion of lending and the growth of risks. The Overdue Debt Indicator (NPL), which is used as a key indicator of the quality of the loan portfolio and the stability of the banking system. This indicator allows you to directly assess the level of credit risk and serves as a dependent variable in one of the regression models.

To understand how the selected indicators are related, the study uses correlation analysis. It allows you to determine how strongly and in which direction the variables

change relative to each other. The calculation is carried out using the Pearson correlation coefficient according to the formula (1):

$$r_{xy} = \frac{\sum_{i=1}^{n}(x_i-\bar{x})(y_i-\bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i-\bar{x})^2 \cdot \sum_{i=1}^{n}(y_i-\bar{y})^2}} \quad (1)$$

where:

r_{xy} – the correlation coefficient between variables *x* and *y*;

x_i, y_i – values of variables in observation i;

$\bar{x}, \bar{y}$ – average values of variables;

n – the number of observation.

This coefficient ranges from -1 to +1: a value close to +1 indicates a strong positive relationship (variables grow together); a value close to -1 indicates a strong negative relationship (one variable increases while the other decreases); a value near 0 indicates a weak or no relationship.

For a deeper analysis, a regression approach is used, which allows us to assess exactly how a change in one indicator affects another. Two models are constructed in the study. The first model is aimed at analyzing the factors influencing the level of overdue debt (2):

$$NPL_t = \alpha + \beta_1 Inflation_t + \beta_2 BaseRate_t + \beta_3 Income_t + \varepsilon_t \quad (2)$$

where:

NPL_t – the amount of overdue debt in period t, reflects the level of credit risks;

$Inflation_t$- the inflation rate;

$BaseRate_t$ – the base rate of the National Bank;

$Income_t$ – the income of the population, characterize the solvency of borrowers;

α – the constant value (the base level of NPL, all other things being equal);

$\beta_1, \beta_2, \beta_3$ – coefficients showing the strength of each factor's influence;

ε_t – accidental error.

The second model is aimed at analyzing the factors determining the volume of deposits (3):

$$Deposits_t = \alpha + \beta_1 BaseRate_t + \beta_2 Income_t + \varepsilon_t \quad (3)$$

where:

$Deposits_t$ – total amount of deposits, reflects the resource base of banks;

$BaseRate_t$ – the base rate that affects the attractiveness of savings;

$Income_t$ – the income of the population, which determines the ability to accumulate;

ε_t- accidental error.

To verify the adequacy of the models, the following methods are used: the coefficient of determination ($R2$), which reflects the proportion of explained variation; visual analysis (scatter plots of actual vs calculated values); and interpretation of the signs and significance of coefficients. High values of $R2$ indicate a good explanatory ability of the models, which requires caution when interpreting the results.

4. Results.

4.1 The current situation in the banking sector of Kazakhstan.

In the context of ongoing macroeconomic uncertainty and tightening monetary policy, Kazakhstan's banking sector in 2024–2025 is operating under increased financial pressure. An increase in inflation, accompanied by an increase in the base rate, leads to higher borrowing costs and reduced availability of financing for economic agents. At the same time, there is a slowdown in the growth of the population's real incomes and an increase in exchange-rate volatility, which creates additional risks to borrowers' solvency and the quality of banks' assets. The banking sector includes 21 second-tier banks, which account for about 43% of GDP assets and almost 70% of the entire financial sector's assets; eight banks are subsidiaries of foreign groups, and two are state-owned. The stabilization of the number of banks reflects the completion of the consolidation phase and the formation of a stable oligopolistic market structure. At the same time, the high concentration of assets in the largest banks enhances the systemic importance of individual financial institutions. Deposits account for over 80% of banks' liabilities. The concentration is high: the three largest banks accumulate about 53% of assets, and in some niches (mortgages and consumer loans), she's even taller.

The structure of the banking sector and its high asset concentration determine the specifics of its response to macroeconomic changes. In these circumstances, the analysis of lending dynamics and asset quality, which reflect the stability of the banking

system, is of key importance. Despite continued positive growth in lending, its structure is becoming more risk-sensitive, especially in the retail lending segment. The key indicator of the banking system's stability is the level of overdue debt. In general, the formation of overdue debts in Kazakhstan's banking sector is determined by the combined impact of macroeconomic and financial factors. Within the framework of this study, interest rates, inflationary processes, population income dynamics, the exchange rate, and credit activity parameters are considered key factors.

The interest rate is the basic factor determining the cost of borrowed resources and the level of debt burden. Its increase leads to higher loan payments and, as a result, a higher probability of borrowers defaulting. As shown in Figure 1, the base rate in Kazakhstan increased from 9.25% in 2020 to a peak of 16.75% in 2023, then fell to 15.25% in 2024.

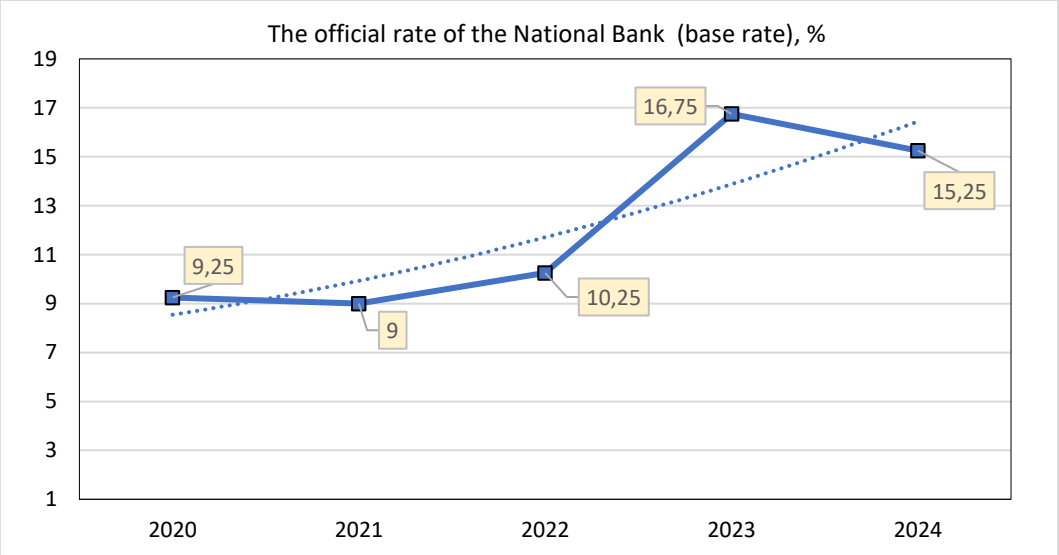

Fig. 1. Dynamics of the base rate of the National Bank of Kazakhstan for 2020–2024

Source: National Bank of Kazakhstan (2025).

Figure 1 shows how the base rate in Kazakhstan has changed over the years 2020–2024. In 2020–2021, the rate remained relatively low and stable at about 9%. In 2022, it rose to 10.25%, reflecting the transition to a more stringent monetary policy. The sharpest increase is observed in 2023, when the rate reached 16.75%. This is due to the need to contain inflation and stabilize the economy. In 2024, the rate dropped slightly

to 15.25% but remained high. In general, the chart shows an uptrend, indicating a tightening of financial conditions. An increase in the interest rate makes loans more expensive, increases the burden on borrowers and may lead to an increase in overdue debts in the banking sector.

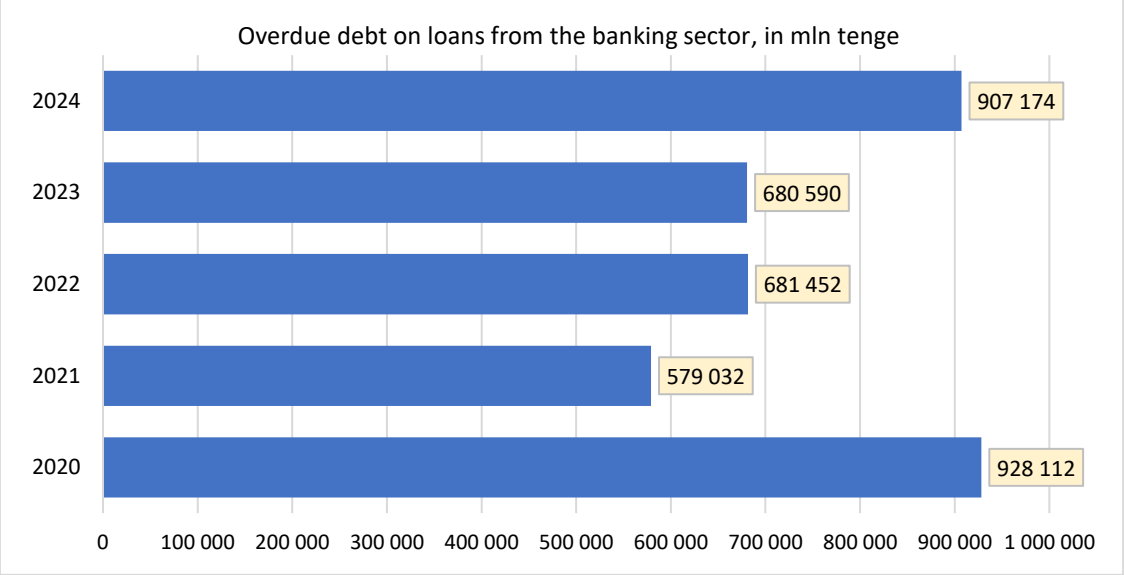

Fig. 2. Dynamics of overdue debt on loans in Kazakhstan's banking sector for 2020–2024

Source: National Bank of Kazakhstan (2025).

Figure 2 shows how the volume of overdue loans in Kazakhstan's banking sector has changed over the years 2020–2024. In 2020, the delay rate was quite high, about 928 billion tenge. In 2021, there was a noticeable decrease to 579 billion tenge, which may be due to government support measures and loan restructuring. In 2022–2023, the indicator stabilised at about 680 billion tenge, indicating temporary stability in loan portfolio quality. However, in 2024, there is a sharp increase in overdue debt to 907 billion tenge. This trend shows that after a period of relative stabilization, the banking sector has again faced a deterioration in the quality of loans. The main reasons may be an increase in interest rates, an increase in the debt burden of borrowers and a decrease in their real incomes. As a result, this confirms the strengthening of credit risks amid tightening monetary policy.

For a more detailed analysis of credit risks, consider the structure of overdue debt by currency (Table 2).

Table 2

Structure of overdue loans by sector and currency in Kazakhstan's banking sector for 2020–2024, in mln tenge

Indicator	*2020*	*2021*	*2022*	*2023*	*2024*
Households (total)	485,514	510,370	354,880	397,457	595,841
- national currency	97,399	66,588	352,666	396,160	595,034
- foreign currency	1,997	2,309	2,214	1,297	807
Businesses (total)	592,668	252,715	326,572	283,133	331,333
- national currency	495,052	217,352	279,304	271,252	298,938
- foreign currency	97,616	35,362	47,269	11,880	12,396

Source: National Bank of Kazakhstan (2025).

According to the data presented, it is clear how the overdue debt on loans to the population and businesses in Kazakhstan has changed over the years 2020–2024, as well as its distribution by currency. In the population segment, the total amount of overdue debt increased from 485.5 billion tenge in 2020 to 595.8 billion tenge in 2024. After a decrease in 2022 to 354.9 billion tenge, steady growth has been observed in subsequent years. The main part of the delay was in the national currency: in 2024, it amounted to 595.0 billion tenge, while the share of foreign-currency delay was extremely insignificant – only 0.8 billion tenge. This suggests that the main risks are concentrated in tenge-denominated retail lending.

The dynamics in the corporate sector are more stable. The volume of overdue debt decreased from 592.7 billion tenge in 2020 to 252.7 billion tenge in 2021, then gradually increased to 331.3 billion tenge in 2024. As with the population segment, the largest share of overdue loans is in national currency (298.9 billion tenge in 2024), while foreign-currency debt is significantly lower and has been declining in recent years.

Thus, the structure of overdue debt indicates that the key risks are concentrated in the domestic segment of the economy, primarily in retail lending. The increase in overdue debt is due not only to higher base rates but also to higher weighted-average loan rates and inflationary pressures that reduce borrowers' real incomes.

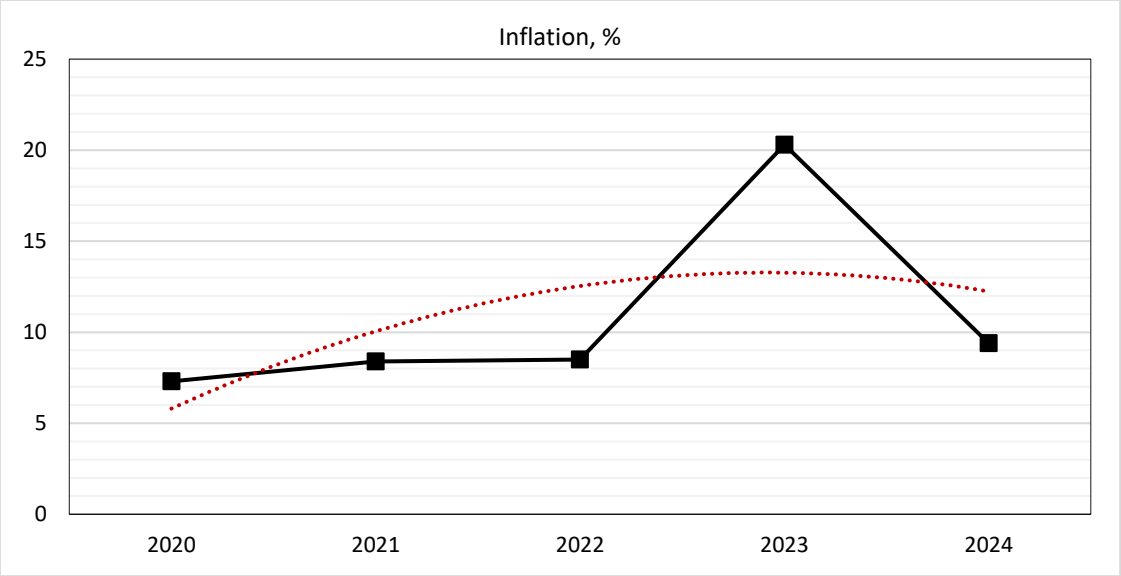

Fig. 3. Inflation dynamics in Kazakhstan for 2020–2024

Source: Bureau of National Statistics (2025).

Figure 3 shows the dynamics of inflation in Kazakhstan for 2020–2024. In 2020–2022, the inflation rate was relatively moderate, ranging from 7% to 9%, with a gradual increase. In 2023, there is a sharp jump in inflation to more than 20%, which is associated with increased external and internal economic factors, including rising prices and macroeconomic instability. In 2024, inflation decreased to about 9–10%, but remained above the values of the beginning of the period under review. The overall dynamics show the presence of an inflationary shock followed by a partial decrease. Rising inflation directly impacts the banking sector by reducing the real incomes of the population and increasing the financial burden on borrowers. This, in turn, can lead to a deterioration in the quality of the loan portfolio and an increase in overdue debts.

Table 3

Deposit dynamics in Kazakhstan's banking sector for 2020–2024

Year	*Deposits in deposit organizations* (*mln KZT*)	*Growth rate*, %	*Attracted deposits* (*mln KZT*)	*Growth rate*, %
2020	22,089,738	-	180,233,627	-
2021	27,101,567	22.7%	288,135,400	59.9%
2022	30,935,301	14.1%	450,523,434	56.4%
2023	34,661,910	12.0%	573,201,604	27.2%
2024	41,285,458	19.1%	799,120,341	39.4%

Source: National Bank of Kazakhstan (2025).

The dynamics of the banking sector's deposit base in Kazakhstan for 2020–2024 are shown above. The total volume of deposits in deposit organisations has grown steadily, rising from 22.1 trillion tenge in 2020 to 41.3 trillion tenge in 2024. The highest growth rate was observed in 2021 (22.7%), after which the dynamics slowed slightly but accelerated again to 19.1% in 2024. A similar trend is observed for attracted deposits, which have more than quadrupled from 180.2 trillion tenge in 2020 to 799.1 trillion tenge in 2024. At the same time, the sharpest growth was recorded in 2021–2022. (about 60% annually), which indicates a significant inflow of funds into the banking system. In general, the increase in deposits indicates an expansion of banks' resource base and greater financial stability in the sector. However, the accelerated growth of funds raised may also be accompanied by an increase in lending activity and, as a result, increased credit risks, especially in the context of rising interest rates and inflationary pressures.

In general, we can say that Kazakhstan's banking sector in 2024 is operating under more difficult conditions than before. Rising interest rates and rising inflation have made loans more expensive and increased the burden on borrowers. As a result, overdue debts have increased, especially among the population. At the same time, the decline in the population's real incomes increased the burden on households, further exacerbating credit risk growth. As the analysis of the overdue debt structure has shown, the majority of problem loans are denominated in the national currency, indicating the banking system's high dependence on the domestic economic situation.

At the same time, the banking sector remains stable due to the growth of the deposit base. The increase in deposits shows that the population and businesses continue to actively deposit funds with banks, supporting the system's liquidity. However, the rapid growth of deposits also creates conditions for the expansion of lending and, therefore, for a possible increase in future risks. Thus, it can be concluded that Kazakhstan's banking system as a whole remains stable but is becoming more sensitive to macroeconomic changes. The main risks are associated with rising interest rates, inflation and a decrease in borrowers' solvency, which requires more careful monitoring of the quality of banks' loan portfolios.

4.2 Determinants of Banking Sector Performance: *A Correlation and Regression Analysis.*

The analysis of the indicators enables assessment of the overall financial environment and identification of key trends affecting the stability of Kazakhstan's banking system. During the period under review, Kazakhstan's economy showed moderate recovery growth after a decline in 2020 (the GDP volume index was 97.5%). Already in 2021–2024, there is a stabilization of economic activity, where the index values range from 103–105%, indicating a transition to a stable growth phase. The use of descriptive statistics provides a primary assessment of the distribution of data, their variability and dynamics in the period under review. The analysis includes key indicators characterising the macro-financial situation, such as inflation, exchange rates, interest rates, household incomes, deposit volumes, and loan portfolio quality, for 2020–2024.

Summary statistical characteristics of the variables studied are presented in Table 4, which shows the average values, minimum and maximum levels, and measures of variation.

Table 4

Descriptive statistics of economic and banking indicators in Kazakhstan for 2020–2024

Variable	*Mean*	*Min*	*Max*	*Std. Dev.*
Budget deficit (% of GDP)	-2.74	-3.1	-2.3	0.30
Exchange rate	445.04	412.95	469.44	23.33
FDI inflow (mln USD)	22 153	17 155	28 171	4 569
GDP volume index	103.02	97.5	105.1	2.96
GDP (mln USD)	229 284	171 084	291 184	47 716
Inflation (%)	10.78	7.3	20.3	5.34
Non-performing loans (mln. tenge)	755 272	579 032	928 112	136 209
Deposits (mln. tenge)	31 214 795	22 089 738	41 285 458	7 493 611
Attracted deposits (mln. tenge)	458 242 881	180 233 627	799 120 341	239 238 314
Base rate (%)	12.10	9.0	16.75	3.49
Lending rate (%)	16.38	13.2	18.1	1.98
Income per capita (tenge)	177 156	126 551	232 679	39 909

As shown in Table 4, the indicator values vary significantly in both level and dynamics. The most stable indicators are economic growth and the exchange rate, where

fluctuations over the period under review are relatively small. At the same time, inflation and the base rate are highly volatile, especially in 2023, reflecting the instability of the economic situation. Household incomes and deposits have shown steady growth throughout the period, indicating an increase in the population's financial capabilities and an expansion of the banking sector's resource base. At the same time, the overdue debt indicator has significant fluctuations, which indicates instability in the quality of the loan portfolio. In general, the table data show that Kazakhstan's macro-financial environment in 2020–2024 was shaped by inflationary shocks and changes in monetary policy, while incomes and banking activity increased.

Despite the fact that descriptive statistics can reveal general trends and dynamics of macroeconomic and banking indicators, they do not give an idea of the nature of the relationships between them. In this regard, the next stage of the study is to conduct a correlation analysis to identify the degree and direction of mutual influence among key macrofinancial variables. The correlation matrix allows you to quantify the strength of the linear relationship between indicators such as inflation, interest rates, household incomes, deposits and overdue debt levels. The results of the correlation analysis are presented in Table 5.

Table 5

Correlation matrix of key indicators

Variable	(*1*)	(*2*)	(*3*)	(*4*)	(*5*)	(*6*)	(*7*)	(*8*)
Inflation	1.000	0.791	0.590	0.451	0.393	-0.281	0.491	0.370
Base rate	0.790	1.000	0.770	0.860	0.820	0.140	0.880	0.716
Lending rate	0.591	0.772	1.000	0.820	0.861	-0.340	0.870	0.753
Income	0.453	0.861	0.820	1.000	0.990	0.131	0.990	0.950
Deposits	0.390	0.821	0.861	0.990	1.000	0.100	0.990	0.920
NPL	-0.281	0.143	-0.340	0.130	0.10	1.000	0.101	-0.03
GDP	0.495	0.880	0.870	0.990	0.990	0.100	1.000	0.921
Exchange	0.378	0.710	0.750	0.950	0.921	-0.032	0.921	1.000

As shown in Table 3, there are strong correlations among key macrofinancial indicators. The highest positive correlation is observed between household incomes, GDP, and the volume of deposits – the coefficient is 0.990, indicating an almost linear relationship: as the economy and the population's income grow, the volume of savings increases. A strong positive relationship is also observed between the exchange rate

and incomes (0.950), as well as deposits (0.920), reflecting the impact of macroeconomic dynamics on the financial behavior of the population. The base rate shows a high correlation with GDP (0.880) and income (0.860), which indicates a close relationship between monetary policy and economic activity.

Inflation has the most pronounced relationship with the base rate (0.790), confirming the National Bank's response to inflationary pressures. At the same time, the correlation of inflation with incomes (0.451) and deposits (0.393) is moderate. The Overdue Debt index (NPL) does not show strong relationships with most variables. There is a weak negative correlation with the loan rate (-0.340) and inflation (-0.281), which may indicate a more complex nature of the factors affecting the quality of the loan portfolio.

In general, the results of the correlation analysis show that the strongest relationships are between indicators of economic growth, household incomes, and banking activity. In contrast, credit risks (NPL) depend on a broader set of factors.

Even though correlation analysis makes it possible to identify the presence and direction of relationships between indicators, it does not enable assessment of the causal effects of factors. In this regard, the next stage of the study is to build regression models that allow quantifying the impact of key macroeconomic variables on the state of the banking sector.

For a deeper analysis, two regression models were built reflecting the influence of factors on the quality of the loan portfolio and the dynamics of the deposit base. The evaluation results are presented in Table 6.

Table 6

Regression results

Variable	*Model 1*: *NPL*	*Model 2*: *Deposits*
Constant	809 300	1 576 000
Inflation	-58 750	-
Base rate	136 800	-207 800
Income	-6.075	181.494
R^2	0.814	0.978

The results of the regression analysis show that the impact of macroeconomic factors on the banking sector is heterogeneous.

In the first model, which explains the dynamics of overdue debt, demonstrates that the base rate has a positive effect, which means an increase in arrears with an increase in the cost of credit resources. Household incomes, on the contrary, have a negative impact (β = -6.075), reducing credit risk by increasing borrowers' solvency. The inflation term has a negative coefficient (β = -58,750), which may be due to sample peculiarities and the small number of observations. The coefficient of determination R2 = 0.814 indicates a sufficiently high explanatory power of the model.

In the second model, where deposits are the dependent variable, the key factor is population income (β = 181.494), which confirms the strong dependence of savings on the level of well-being. The base rate has a negative impact (β = -207,800), but this result is unstable and may be attributable to the characteristics of a short time series. The high R2 value of 0.978 indicates the model's almost complete explanatory power.

Furthermore, to provide a more visual assessment of the quality of the constructed regression models and the degree to which the calculated values correspond to the actual data, a graphical visualisation of the results was produced. As part of the analysis, graphs were constructed for two dependent variables, the level of overdue debt (NPL) and the volume of deposits, which makes it possible to compare the quality of models for various aspects of the banking sector. The visualization results are shown in Figure 4.

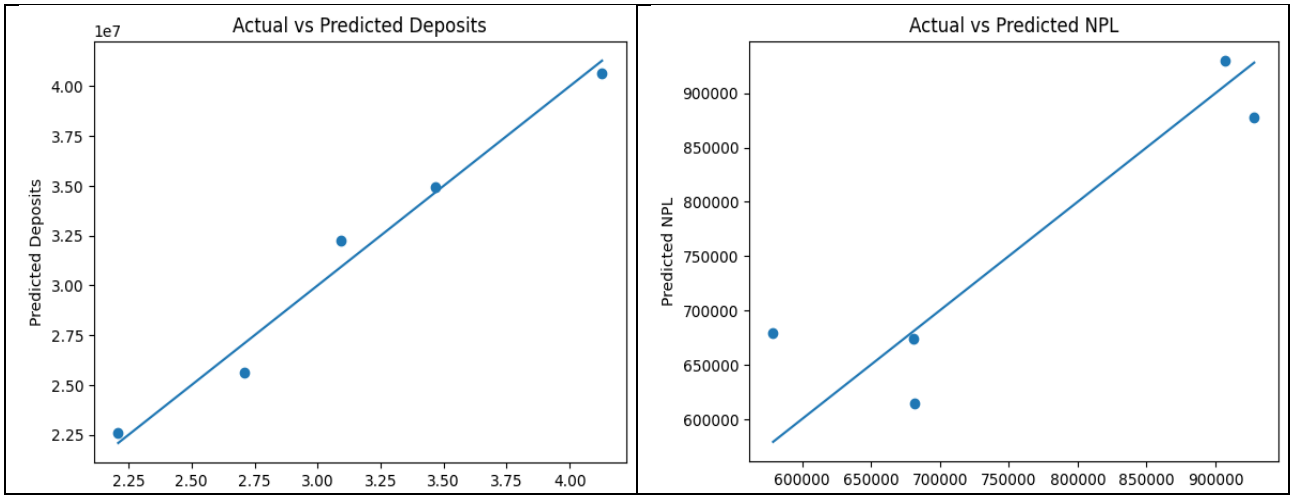

Fig. 4. Scatter plot of actual vs. predicted values of NPL and deposites for 2020–2024

As shown in the Scatter plot for deposits, the points practically coincide with the line of equality, indicating the model's high accuracy in explaining deposit dynamics. This means that the selected factors, primarily household incomes, well explain the changes in the volume of deposits. The model demonstrates a very high correspondence to the actual data. At the same time, in the Scatter plot for NPL, the dots are generally clustered near the equality line, indicating that the model reproduces the actual overdue debt values well. However, there are noticeable deviations for individual observations, which suggests that the model does not consider all the factors affecting the NPL level. In general, the accuracy of the model can be assessed as satisfactory.

Generally, the results show that Kazakhstan's banking sector in 2020–2024 developed against the backdrop of a gradual economic recovery and rising household incomes. This has led to an increase in deposits and an expansion of the banks' resource base, which can be considered a positive trend. An analysis of the relationships has shown that the key role is played by the income of the population and overall economic growth. They are most strongly related to the volume of deposits and GDP, which means that the higher the income and economic activity, the more the population saves. At the same time, the quality of the NPL proved less predictable. It is poorly correlated with most macroeconomic indicators, suggesting that the level of overdue debt is influenced not only by macroeconomic factors but also by other factors, such as borrower behaviour, banking policy, or lending structure.

The results of the regression analysis confirmed these conclusions. Household incomes are the main driver of deposit growth, and an increase in the base rate may worsen loan quality. However, due to the small number of observations, some of the results should be interpreted cautiously. As a result, we can draw a general conclusion that economic growth and household incomes are the main drivers of the banking sector's development in Kazakhstan, while a more complex set of factors shapes credit risks and require a more detailed analysis.

5. Conclusion.

The purpose of this study was to quantify the impact of macroeconomic and monetary factors on the stability of the banking sector in Kazakhstan through indicators of the quality of the loan portfolio and the dynamics of the deposit base. The analysis made it possible to identify key patterns in the development of the banking system in the context of macroeconomic changes over the period 2020–2024.

The results show that the development of the banking sector in Kazakhstan is largely determined by the general economic dynamics and the income level of the population. It has been established that income growth is accompanied by an increase in deposits, which indicates a direct dependence of the resource base of banks on the welfare of the population. This confirms the important role of households as the main source of funding for the banking system.

At the same time, an analysis of the factors affecting the quality of the loan portfolio showed that the key driver of the growth in overdue debt is the tightening of monetary policy. An increase in the base rate leads to an increase in the cost of credit resources and an increase in the debt burden on borrowers, which, in turn, contributes to an increase in the NPL level. At the same time, the influence of macroeconomic variables on credit risks is more complex and does not always manifest itself through direct linear relationships, which is confirmed by the results of correlation analysis.

The results of the study also show that, despite the growth of the deposit base and the continued stability of the banking sector, its development is accompanied by increased sensitivity to macroeconomic shocks. The main risks are related to inflationary pressures, changes in interest rates and the dynamics of real incomes of the population. This requires more careful monitoring of asset quality and more flexible regulation of banks' lending activities. However, the results of the study should be interpreted considering the existing limitations, first of all, a small sample size and a limited time period for analysis. In the future, it is advisable to expand the time horizon of the study, as well as supplement the model with banking and behavioral variables, which will allow for a more complete disclosure of the mechanisms of credit risk formation and the stability of the banking system.

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