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«*Liquidity risk management as a long – term strategic planning tool*»

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Liquidity risk management as a long – term strategic planning tool

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Abstract

In the modern world, it is difficult to imagine a field of activity in which banks would not take part. The daily tasks facing a person of the 21st century are inextricably linked to interaction with banks, making purchases at points of sale, applying for a mortgage to buy a home or buying a car on credit, and businesses, in turn, have to carry out many operations to transfer funds to pay or receive payments for goods and services. And this is only a small part of what a modern bank has to deal with. All these opportunities are provided to us by banks, and for this reason, banks are an integral part of the life of any economy.

As of January 1, 2021, 26 second-tier banks operate in Kazakhstan, including 15 banks with foreign participation and 1 bank with 100% government participation. The banks ' assets, in turn, amount to 31,171. 7 billion tenge, in the structure of which 15,792. 1 billion tenge is the main debt of borrowers, in other words, the loan portfolio. In turn, the deposits of the bank's clients amount to 21,559. 2 billion tenge, thus the share of assets to GDP is 44.7%, the share of the loan portfolio to GDP is 22.6% and the share of deposits to GDP is 30.9% (NBK, 2021).

The activities of the banks themselves and their sustainability affect not only the bank's shareholders and their employees, but also customers who have loans and credit lines, deposits and other products of the bank. In addition, loans have a long-term impact on inflation and the economy as a whole. After all, if the effect of the "bubble" that occurred in 2008 due to the mortgage boom is produced, then the country will have a low level of free cash to buy goods and services. In turn, it affects the consumer ability of the population and businesses, thereby reducing the growth of the economy (NBK, 2019). Also, in the period from 2005 to 2007, Kazakhstan's second-tier banks were funded by funds from Europe, which is about 44% of the country's GDP was raised in foreign currency. These funds were mainly directed to retail customers in the form of mortgages, as the requirements became tougher with the onset of the global financial crisis, banks lost access to foreign financing and the non-commodity sector of the economy showed a slowdown in growth (IMF 2014).

Key terms: Kazakhstan's banking sector, financial liquidity, assets liquidity.

1. Introduction

The concept of banks is extensive and since everything is considered on the example of Kazakhstan, based on the law "On Banks and Banking Activities", a bank is a legal entity that is a commercial organization that is authorized to carry out banking activities. In turn, banking activities include: accepting deposits, opening and maintaining accounts, cash, transfer and other types of operations, loan operations, exchange operations, and much more (the Law of the Republic of Kazakhstan)

A loan is an agreement where one party receives something of value and agrees to pay for the product or service later. Thus, when you give someone a loan, you have credit risks or the likelihood that your debtor will not comply with the terms of the agreement. (FRM, 2018)

Liquidity is a measure of the cash and other assets that banks have available to quickly pay bills and meet short-term business financial liabilities, while capital is a measure of the resources that banks have available to cover losses (Federal Reserve, 2019, https://www.federalreserve.gov/faqs/cat_21427.htm).

For banks, loans are assets, or in other words, 14.5 trillion loans issued are assets of banks. Since they are issued in the form of a loan by transferring funds, it is very important to look at the quality of these assets. For example, if a bank has a high level of credit risk on assets or loans issued, then the bank's financial position cannot be called healthy, which means that the bank, in turn, will not be able to meet its liabilities.

Relevance of the research topic. In 2019, an unprecedented event took place in Kazakhstan for banks, namely the "Asset Quality Assessment" (hereinafter referred to as the "AQR"). According to the press release of February 28, 2020, according to the results of the AQR, banks are stable at the system level, and at the level of individual banks participating in the AQR. There are no risks for depositors of the AQR member banks (NBK, 2020).

After a while, in February 2021, for example, Tengri Bank JSC and Asia Credit Bank JSC were deprived of their licenses. The reason for the revocation of licenses of these banks is the poor quality of assets of JSC "Tengri Bank" at the time of revocation of the license, 83% of loans issued were non-repayable, in turn, 70% of loans issued by JSC "Asia Credit Bank" were overdue for more than 90 days (NBK, 2021). Although the deprived banks were not participants of the AQR, but at the system level, this indicates a poor level of liquidity of banks ' assets, in addition, in 2014, the total number of banks was 38 units, by the time of consideration of this study, as mentioned above, only 26 banks remained (IMF, 2014). Thus, the number of banks in less than 7 years

decreased by 12 units, in turn, the volume of bank assets as of 2014 was 39% of GDP, thus this indicates an increase in the share of banks in the economy or an increase in the number of loans in the economy (Committee on Statistics of the Republic of Kazakhstan, 2021).

Since the main reason for the revocation of the license and further liquidation of banks is not a high-quality loan portfolio of banks associated with the non-repayment of loans issued, this can also display signals in the economy that borrowers in Kazakhstan can not repay their obligations and thus display the picture of the economy. After all, if the borrower does not service his debt according to the loan agreement, then this is accompanied by some economic reason in the form of a decrease in economic activity, a high level of debt burden, high borrowing costs, and so on. Thus, the research addressed the following questions:

1. How does the economic situation of the country affect the liquidity of banks;

2. Is it possible to use macroeconomic factors for long-term liquidity planning;

3. What liquidity indicators were registered in the banking sector of Kazakhstan during the crises.

Research Hypothesis: If the liquidity of banks at the system level reflects the current solvency of the population and businesses with obligations, then there should be a dependence on the level of the country's economy and/or its structure. Thus, managing the liquidity risk can be used as a tool for long-term planning, since the structure of the economy of Kazakhstan over the years of independence is focused on the commodity market, in other words, on oil and gas.

2. Literature review

2.1. Liquidity instruments in corporate finance

When analyzing the balance sheet in corporate finance, there are three main factors: liquidity, debt-to-equity ratio, and cost-to-cost ratio (Ross A.S., Westerfield R.W., Jaffe F, J., 2008).

In turn, liquidity is defined as the speed of conversion of assets into cash. From the balance sheet, current assets are the most liquid and include cash, accounts receivable (amounts not yet paid by customers for a product or service), inventories that consist of raw materials and materials used in production, including finished products and work in progress. Fixed assets are the least liquid assets. If the debt - to-equity ratio is a clear and logical phenomenon, then the cost-to-cost ratio is not unambiguous. The fact is that in accounting, assets on the balance sheet are taken at the actual costs incurred, while the fair value of this asset may be less or more than the value that was taken on the balance sheet (Ross A.S., Westerfield R.W., Jaffe F, J., 2008).

The above information about liquidity is related to the short-term activities of the company or related to the financial situation up to one calendar year. Basically, this information is necessary for creditors, such as a supplier of raw materials and materials, who need to understand whether their counterparty is solvent. All this means that in the understanding of corporate finance, asset liquidity is the part of assets that covers short-term liabilities and has the following formulas (Ross A.S., Westerfield R.W., Jaffe F, J., 2008):

Formula 1.

$$Current\ ratio = \frac{Current\ assets}{Current\ liabilities}$$

Formula 2.

$$Quick\ ratio = \frac{Current\ assets - Inventory}{Current\ liabilities}$$

Formula 3.

$$Cash\ ratio = \frac{Cash}{Current\ liabilities}$$

From formula 1-3 above, the coverage of assets over liabilities is determined, and the more liquid assets on the balance sheet, the greater the opportunity to repay the liabilities without losing the value of the asset. This is a good tool for quickly analyzing the financial stability of an enterprise for a non-long-term period of time. Next, we will discuss the importance of the quality of assets in the banking system and their liquidity, since the structure of banks ' assets differs from the structure of a production company and requires a systematic approach.

In corporate finance, for long-term calculation of financial stability, long-term indicators of solvency are used, they have the following formulas (Ross A.S., Westerfield R.W., Jaffe F, J., 2008):

Formula 4.

$$Total\ debt\ ratio = \frac{Total\ assets - Total\ equity}{Total\ assets}$$

Formula 5.

$$Debt - equity\ ratio = \frac{Total\ debt}{Total\ equity}$$

Formula 6.

$$Equity\ multiplier = \frac{Total\ assets}{Total\ equity}$$

Formula 7.

$$Times\ interest\ earned\ ratio = \frac{EBIT}{Interes}$$

Formula 8.

$$Cash\ coverage\ ratio = \frac{EBIT + Depreciation}{Interest}$$

In the part of the analysis of the financial position or balance sheet, the formulas from 4 to 8 include total debt ratio, debt-equity ratio and equity multiplier. These formulas reflect the share of the source of formation of assets, capital coverage of liabilities and capital coverage of assets. This means that the results of the ratio of these coefficients explain the structure of the balance

sheet and in a retrospective analysis will reflect the normal ratio of debt to capital as a source of asset formation.

Thus, in corporate finance, liquidity is an indicator of the short-term activity of the company, the above formulas from 4 to 8 are indicators of long-term solvency, which does not reflect the risks associated with the liquidity of assets or liquidity in the banking system.

2.2. Liquidity in risk management

In risk management, there are two types of liquidity risk – funding liquidity risk and market liquidity risk (FRM, 2018).

Financing liquidity risk arises when a company is unable to repay or refinance its debt, meet any monetary obligations to counterparties, or finance a capital withdrawal. There are 3 forms of financing liquidity risk (FRM, 2018):

- margin / haircut funding risk: the risk that occurs when a decrease in the collateral value of an asset leads to an increase in margin requirements that require additional equity;
- rollover risk: the risk that investors will not be able to extend short-term financing to buy assets;
- redemption risk: the risk that depositors will withdraw funds from banks or investors will sell off their assets.

Margin / haircut funding risk can be attributed to a company that has a credit line to replenish working capital and in the event of a decrease in the collateral value, the bank may reduce the credit limit, at the time of the company's operating activities, there may be a possibility of default. Whereas in the financial market, the most striking example is REPO and reverse repo operations, which are mainly carried out by the NB to maintain liquidity (NB, 2021). In repo transactions, it provides short-term financing secured by securities, and if the market value of the securities decreases, the bank will also have to cover this difference, thereby withdrawing cash and increasing its liquidity risk.

Rollover risk can be attributed to the situation when banks attract customers for deposit services, then they will conclude a contract with them for no more than 5 years. This means that depositors usually have savings goals, whether it's a down payment on a mortgage, buying a car, or taking a vacation abroad. But in turn, banks provide loans for a longer period, for example, the same mortgage can be provided for 20 years. As a result, we get that the term of funding may be shorter than the terms of financing by banks as financial agents.

Any bank can face a redemption risk, and a panic over early withdrawal of funds can be overtaken for both internal and external reasons. For example, when the national currency is devalued or when the devaluation expectations of the population are high, depositors can withdraw funds ahead of time for the purchase of imported products or for conversion into foreign currency, which can be attributed to external shocks from the bank. On the other hand, the internal capital flight can be attributed to the reputation of the bank, if the bank was caught in any negative actions with financial consequences, then the depositors are likely to change the bank in which they held their funds.

Market liquidity refers to the ease or complexity of selling assets for cash. Market liquidity is expressed in the following forms (FRM, 2018):

- bid-ask spread: this is a loss incurred by a trader who sells and then immediately buys an asset. The higher this spread, the lower the market liquidity;
- market depth: this is the number of units of assets that can be sold or bought by a trader at the current market quote. The greater the depth of the market, the higher its liquidity;
- market resiliency: this is the period of time it will take for an asset to recover its value after a temporary decline in price.

The bid-ask spread can be attributed to a situation in which a foreign currency is bought against the background of speculative devaluation and thus there is a margin at which this currency is sold, and if this agent purchased the currency for a short period and the use of these funds requires a reverse conversion, but at the time of the sale, the currency can come to its equilibrium price.

Market depth is the total amount of assets found in the market, the greater its quantity, the more freely it is converted to other assets, for example, the US dollar is an international currency for making transactions and when working in foreign markets is a frequently used currency.

Market resiliency within Kazakhstan includes oil prices on international markets. The higher the price of oil, the higher its economic value on the balance sheets of oil companies and the more liquid it is, because the difference between the price in the markets and its cost is the earnings of companies and in the case of a high oil price, the company can sell it more at a certain discount, thereby using its quotation. The reverse side means that when the price of oil is low, then its consumption and production are at a level where the oil company no longer has the opportunity to maneuver with the sale of products in the form of a discount.

The difference between market liquidity and funding liquidity is that with market liquidity, assets are sold for further financing, while with funding liquidity, assets are used as collateral to raise financing. Liquidity-related trends in the banking industry resulted in the financial and economic crisis of 2007-2008 (FRM, 2018).

Thus, the risks associated with the liquidity of financing and market liquidity associated with the management of liquidity in the banking system may have threats across the entire country or more. In addition, the bank can afford to be insolvent, that is, not generate enough income to repay obligations and repay loans and avoid bankruptcy while there is liquidity.

The stress testing conducted by banks before the 2008 crisis did not reflect the nature, scale, duration and intensity of the financial and economic crisis. Stress testing did not adequately assess the liquidity risk of financing, nor did it recognize the relationship between the liquidity risk of financing and market (or trade) liquidity. It is noted that in the future, stress tests should focus on the correlation of various factors in stressful conditions that can increase the risk for banks. For example, a decline in the value of an asset (or category) may dry up its liquidity, pressure on liquidity may increase due to contractual or reputational problems, and damage to the bank's financial condition may limit access to financing markets (FRM, 2018).

FRM recommendation for stress testing (FRM, 2018):

- Evaluate stress testing methods. The supervisory authorities, represented by the central bank, should conduct frequent and comprehensive assessments of the bank's stress testing procedures. This includes assessing the bank's compliance with good stress testing practices and understanding how stress testing affects strategic decision-making at various levels of management. It is also recommended that supervisors share their views on the direction of global financial markets and how the bank can develop forward-looking stress tests to deal with the consequences of future market crises.;
- Take corrective measures. In the event that the stress testing or analysis procedures are found to be inadequate, the bank should insist on corrective actions. It is important to constantly check the effectiveness of the key assumptions of stress testing and their relevance in the future;
- Go beyond the conventional scenarios. The central bank needs to question the use of stress tests that produce unrealistic results or do not match the bank's risk appetite. Central banks should also encourage banks to evaluate scenarios that could damage their reputation or the effectiveness of strategic planning. It is also recommended to test scenarios that may affect certain areas of the bank's activities.;

- Assessment of capital and liquidity needs. Under the Basel 2 Agreement, banks are required to review their stress tests when assessing both capital requirements and liquidity. Therefore, supervisors are advised to consider the bank's potential capital needs under stress. For reliable analysis, Central banks should use capital adequacy ratios when assessing capital adequacy and determine capital mobility across business lines. The ability to meet capital needs during stressful scenarios is critical to ensuring that the bank remains solvent should such an event occur. If the capital is low, the Central Bank may recommend that the bank increase its capital beyond the requirements set out by the Basel Committee. Liquidity buffers should also be evaluated for stressful situations. If the liquidity is insufficient, unforeseen expenses should be discussed with senior management;
- Apply additional stress scenarios. It is advisable for the Central Bank to conduct additional stress tests using common scenarios within the bank's jurisdiction. These additional scenarios will complement the bank's existing stress scenarios and should be relatively easy to implement. It should be clear to the bank's management that the proposed stress tests are not a replacement for the existing stress tests developed by senior management;
- Consultation with assimilation resources. To expand their knowledge of stress testing, managers should consult with other experts to identify potential vulnerabilities in stress. Discussing the behavior of banks in the industry can provide a deeper understanding of the imbalances created by banks and how these imbalances can affect financial markets. It is also important that banks evaluate their own performance and, if necessary, acquire new skills, such as knowledge of updated quantitative models.

Thus, when choosing a stress testing method or in principle conducting an analysis, any possible data and methods are welcome within the framework of a logical and objective explanation. For example: you need to be able to read financial data, use both liquidity ratios and other parameters, understand how the indicators affect each other, or in other words, whether the selected parameters have a correlation, which refers to statistical analysis tools. It is also very important to monitor the macroeconomic trend, such as monetary policy, GDP growth rates, and other indicators that affect the banking system.

2.3. The impact of liquidity on Kazakhstan's banks

In 2019, the National Bank of the Republic of Kazakhstan (hereinafter – NB) carried out an unprecedented work on the Asset Quality Review (hereinafter – AQR). The purpose of this event was to assess the NB's view of the current practice of banks in financial accounting and risk management. In other words, an objective view of bank assets, as well as reliability in a fair

assessment of capital adequacy. 14 system-forming banks of Kazakhstan, which account for 87% of the assets of the country's banking system, were selected as the object of evaluation (NB, 2020).

The essence of these measures carried out by the National Bank is described in the part of liquidity above, this is the liquidity of financing and market liquidity. And speaking about the quality of assets, the NB means that as far as banks reflect reality, that is, when banks issue loans, they can be very optimistic in their decisions. Thus, banks can issue a potentially insolvent borrower a deliberately non-refundable loan, which will hang on the bank's balance sheet. In turn, in order to prevent the National Bank from learning about the true level of non-performing loans, banks carry out such measures as restructuring, refinancing or issuing a new loan to repay the old one. Since loans are assets of the bank, in turn, the bank's liabilities are deposits, there is a very high risk of financing liquidity, because if the loan is not repaid, the bank will not be able to return the money to the depositor.

NB in the final report of the AQR notes the following 9 blocks of analysis (NB, 2020):

1. Analysis of accounting processes, policies and practices;

2. Creating a loan form and verifying data integrity;

3. Creating a selection of portfolios;

4. Analysis of credit files;

5. Valuation of collateral;

6. Projection of the results of the credit file analysis;

7. Reserve analysis based on a collective assessment;

8. Analysis of assets measured at fair value;

9. Determination of capital adequacy ratios adjusted for the results of asset quality assessment.

Of the 9 blocks that were analyzed by the National Bank, 4 of them relate to the assets of banks, these are: the assessment of collateral, the analysis of reserves based on collective assessment, the analysis of assets measured at fair value, the determination of capital adequacy ratios adjusted for the results of asset quality assessment. In turn, the block on the assessment of collateral is a vivid example of market liquidity, namely, due to the inflated value of collateral in the event of default or bankruptcy of the borrower, the bank will not be able to repay the entire

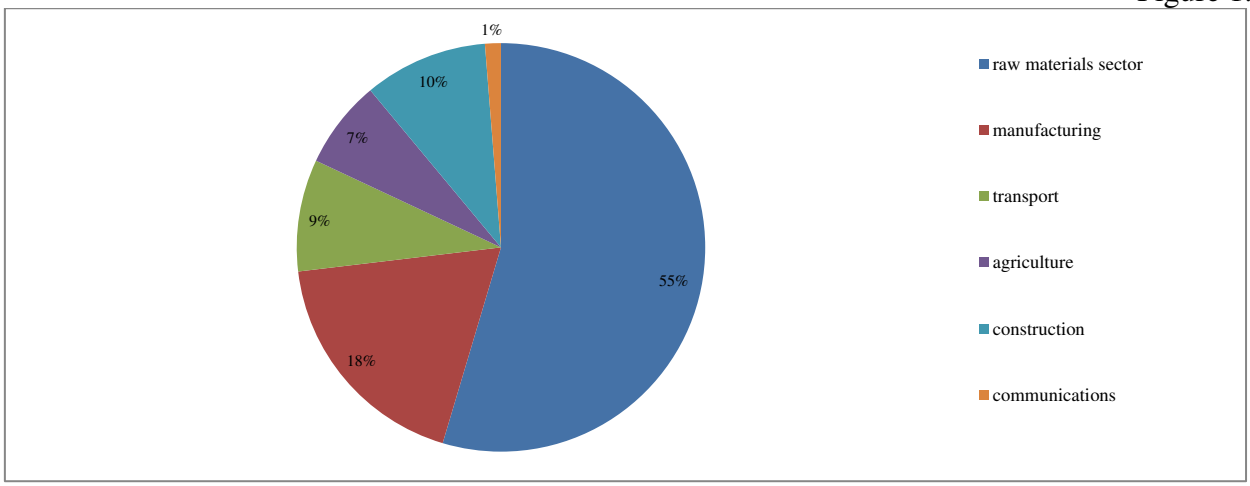
amount of the loan and for this reason the bank will have to recognize a loss, which in turn will affect the capital of the latter.

23.8% of the value of the collateral was revalued based on the results of the AQR analysis, the reason for this level of revaluation according to the National Bank in the final report of the AQR (NB, 2020):

- Unsubstantiated judgment of the appraiser;
- Application of the cost approach (the use of this approach is also a reflection of how the accounting value differs from the economic value, if the market value of the asset is lower than the actual costs incurred, using this method the asset will be revalued);
- Use of outdated valuation methods.

In its recommendations, the National Bank will further improve the supervision of banks and introduce risk-based supervision into their system. In the future, banks were recommended to generate transparent statistical data, assess the impact of macroeconomic indicators on the loan portfolio, segment borrowers, stress testing, and much more (NB, 2020). Thus, the National Bank recognizes the need in the modern world to use statistical methods for assessing macroeconomic indicators and their impact on the financial stability of banks to reduce liquidity risks, both market and financial. But what is the rationale for risk management and the impact of economic indicators on financial stability. Below is a pie chart of the structure of the economy of Kazakhstan in relation to the country's GDP as of 2020.

Figure 1.

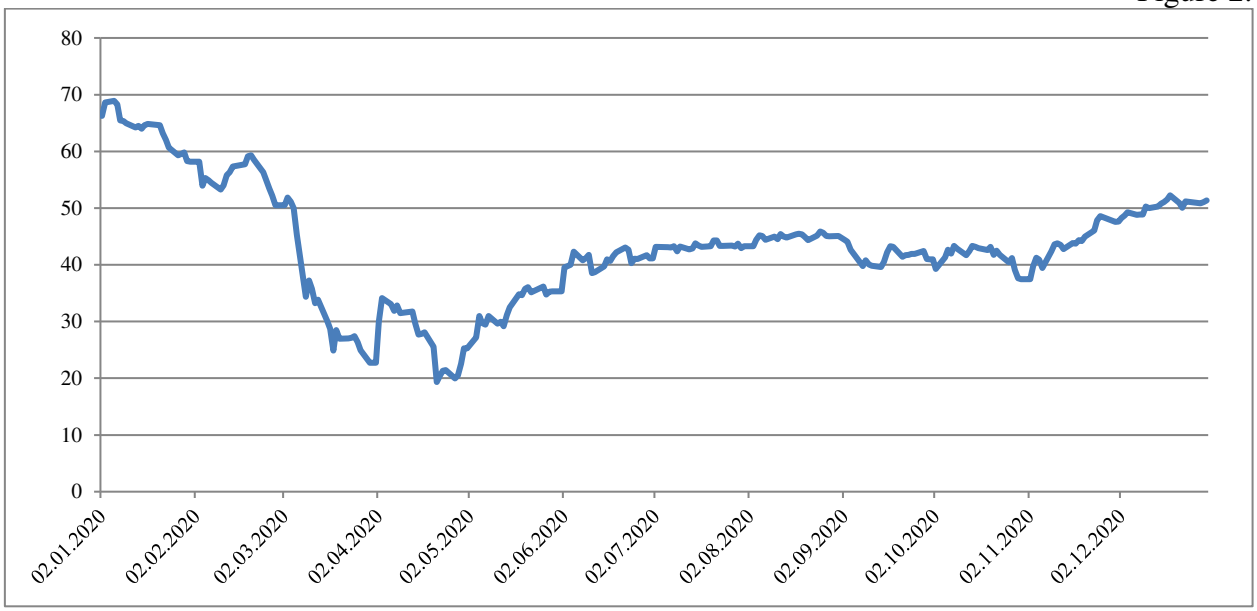


Source: Bureau of National Statistics Strategic Planning Agencies planning and reform Republic of Kazakhstan, Main socio-economic indicators of the Republic of Kazakhstan

From figure 1, it is determined that the raw materials market of Kazakhstan occupies 55% of the country's GDP, thereby determining a greater dependence on the extraction of natural resources. Having determined this fact, Kazakhstan as a country is dependent on the volume of

sales of natural resources and prices for resources, and then the graph considers the dynamics of prices per barrel of oil for 2020, the production and sale of which is the main export product of the country.

Figure 2.



Source: Yahoo finance, (2021)

From figure 2 of the dynamics of oil prices, it is observed that the price for only one calendar year is not constant and has variability. So since the beginning of 2020, the price of oil has steadily fallen and reached less than 20 US dollars per barrel in April. Of course, the fact of the price change is that the coronavirus epidemic (COVID 19) has started all over the world. But this only confirms the fact described in risk management and in the report of the National Bank that banks need to use in their calculations macroeconomic indicators, including dependent variables of the economy of Kazakhstan. After all, in the event of the most negative scenarios, this will lead to capital outflows, a decrease in the solvency of borrowers and thus an increase in market liquidity risks, a deterioration in the quality of banks ' assets and the risk of financing liquidity.

Despite the stability of the banks at the system level according to the results of the AQR, two banks in Kazakhstan had their licenses revoked after the publication of the results of the AQR. Although these banks, namely Tengri Bank JSC and AsiaCredit Bank JSC, did not participate in the AQR analysis, these actions are still negative for Kazakhstan. First of all, for the reason that the deposits of depositors of these banks are insured by JSC "Kazakhstan Deposit Guarantee Fund" and thus the return of funds to depositors will be carried out at the expense of the country's budget funds. In addition, the compensation will be paid in the amount of deposits not exceeding 15

million tenge in the national currency and not exceeding 5 million tenge in foreign currency (NB, 2020, 2021). This means that funds in excess of these amounts may not return to their owners or return after a long period of time.

Measures such as the liquidation of banks undermine confidence in the country's banking system and can cause panic among the population, thereby withdrawing funds from deposits ahead of figure, which was described above as redemption risk. In the event of a mass panic on the withdrawal of deposits from the bank's accounts, then at the system level, banks would face the risk of financing.

The reason for the revocation of the license from JSC "Tengri Bank" is due to the deterioration of the financial condition of the bank, due to the poor quality of the loan portfolio. The main share of non-performing loans was issued to persons related to the bank's shareholders, who account for 58% of the bank's loan portfolio. As well as the high share of non-performing loans, which accounts for 83% of the loan portfolio, led to a deterioration in the quality of assets. And according to official data, it is noted that this situation with the bank arose based on the results of its activities in the period from 2015 to 2017 (NB, 2020).

In the audit annual report of JSC "Tengri Bank" for 2018, that is, in the period after 2015 to 2017, when, according to the data described above, the bank issued problem loans, the difference between assets and liabilities, in other words, the risks associated with liquidity are:

Table 1.

thousands of tenge

Receipts and disposals for 2018	Receipts	Disposals	Difference	liquidity ratio
Up to 1 month	34 806 058	37 394 166	-2 588 108	93%
From 1 to 3 months	13 278 343	8 653 837	4 624 506	153%
From 3 months to 1 year	43 218 652	31 464 930	11 753 722	137%
From 1 year to 5 years	23 560 044	23 200 803	359 241	102%
More than 5 years	6 945 306	5 935 080	1 010 226	117%

Receipts and disposals for 2017	Receipts	Disposals	Difference	liquidity ratio
Up to 1 month	35 086 395	32 713 217	2 373 178	107%
From 1 to 3 months	9 703 539	4 181 388	5 522 151	232%
From 3 months to 1 year	30 299 312	32 593 312	-2 294 000	93%
From 1 year to 5 years	37 507 889	29 327 474	8 180 415	128%
More than 5 years	5 198 567	382 928	4 815 639	1358%

Source: «Deloitte» Ltd, (2019)

Table 1 shows that the liquidity ratio decreased in comparison with 2018 and 2017. In addition, the auditor does not identify any risks related to liquidity, declares profit for 2018, and does not reflect information on the issuance of loans to related shareholders of the bank. In addition, the total loan portfolio of the bank amounted to 108 billion tenge and more than 60% were recognized as "healthy" (Deloitte, 2019).

The reason for the revocation of the license from the second bank of AsiaCredit Bank JSC is that 70% of the bank's loan portfolio was represented by non-working loans with a delay of more than 90 days. The size of the bank's liquid assets was only 75 million tenge, since October 2019, due to the lack of liquid assets to cover the outflows of customer funds, the bank began to violate the standards established by the National Bank (NB, 2021).

As with Tengri Bank JSC, the depositors of AsiaCredit Bank JSC were guaranteed by Kazakhstan Deposit Guarantee Fund JSC. Thus, the bank's problems with liquidity were transferred to the state, namely, payments on deposits.

Like Tengri Bank JSC, the audit report does not highlight the liquidity risk, and it also includes the following quote: "The Group maintains the necessary level of liquidity to ensure the continued availability of cash necessary to meet all obligations as they mature" (BDO, 2019). But the same report provides data on the difference between assets and liabilities:

Table 2.

thousands of tenge

Receipts and disposals for 2017	Receipts	Disposals	Difference	liquidity ratio
Up to 1 month	40 233 739	27 505 285	12 728 454	146%
From 1 to 3 months	3 093 147	3 398 389	-305 242	91%
From 3 months to 1 year	11 890 737	21 260 677	-9 369 940	56%
From 1 year to 5 years	35 565 543	31 786 947	3 778 596	112%
More than 5 years	14 280 228	9 524 656	4 755 572	150%

Receipts and disposals for 2017	Receipts	Disposals	Difference	liquidity ratio
Up to 1 month	40 416 175	34 803 617	5 612 558	116%
From 1 to 3 months	4 131 537	2 370 230	1 761 307	174%
From 3 months to 1 year	20 676 358	30 319 822	-9 643 464	68%
From 1 year to 5 years	57 724 710	36 687 234	21 037 476	157%
More than 5 years	26 125 198	30 708 385	-4 583 187	85%

Source: «BDO Kazakhstan» Ltd, (2019)

Although the liquidity ratio up to 1 month for 2018 is 146%, whereas in 2017 it was 116%, the situation is more positive in terms of indicators up to 3 months and from 3 months to 1 year in 2017. It is also an interesting observation that AsiaCredit Bank JSC and Tengri Bank JSC have significantly reduced the disposal of funds in terms of indicators from 1 month to 3 months. And even if you add up all the receipts for the year and disposals for the year for the two banks presented, then Tengri Bank JSC for 2018 has a liquidity ratio of 118% against 108% in 2017, and AsiaCredit Bank JSC has a liquidity ratio of 106% in 2018 and 97% in 2017. At the same time, it is also necessary to understand that the repayment of loans issued as mentioned above by the National Bank is very low and since the banks were deprived of their licenses, the receipt of funds is not justified.

Taking into account all the above, as well as the fact that as of 01.01.2021, 79.2% of the banks ' liabilities are customer deposits (NB, 2021). Banks urgently need to monitor their reputation to reduce the liquidity risks of financing, as the main creditors of banks are the subjects of Kazakhstan, both legal entities and individuals, and with a high level of distrust can lead to a systemic liquidity risk.

2.4. The importance of macroeconomics indicators for financial stability

In turn, the main macroeconomic indicator is GDP or gross domestic product, which is an indicator of total production in the system of national accounts (Blanchard O., 2002).

There are three ways to determine GDP in an economy, all of them are equivalent (Blanchard O., 2002):

1. GDP is the value of the final products and services produced in the economy during a given period;
2. GDP is the sum of the added values in the economy over a given period of time (value added is the value that was added after transformation into the final product);
3. GDP is the sum of income in the economy over a given period of time (sales tax collections, wages, firm profits).

The definition of GDP and the methods of its calculation make it clear that this is an indicator of the growth of goods in the country expressed in monetary terms. Of course, GDP is still nominal and real, but in the case of accounting for Kazakhstan's GDP in US dollars, the GDP indicator will be more adequate to understand.

One of the reasons for studying macroeconomic indicators when understanding the financial stability of a country is only that in most countries there is a relationship between the rate

of GDP growth and unemployment. This means that a high GDP growth rate reduces the country's unemployment rate (Blanchard O., 2002).

From the above, it makes sense that the GDP indicator shows the well-being of the country or its economic growth. For understanding, in the case of low GDP growth or negative growth rates, it signals that the country's economy is insolvent, the unemployment rate will increase and all this may lead to a non-stable state of the country's financial system. Since the solvency of bank borrowers depends on the quality of banks ' assets and, in turn, on the savings of depositors, the liquidity of their financing depends. Next, the structure of GDP and its main aggregates will be considered for a full understanding of its importance:

Formula 9.

$$Z = C + I + G + X - IM$$

, where:

Z: denotes GDP;

C: consumption;

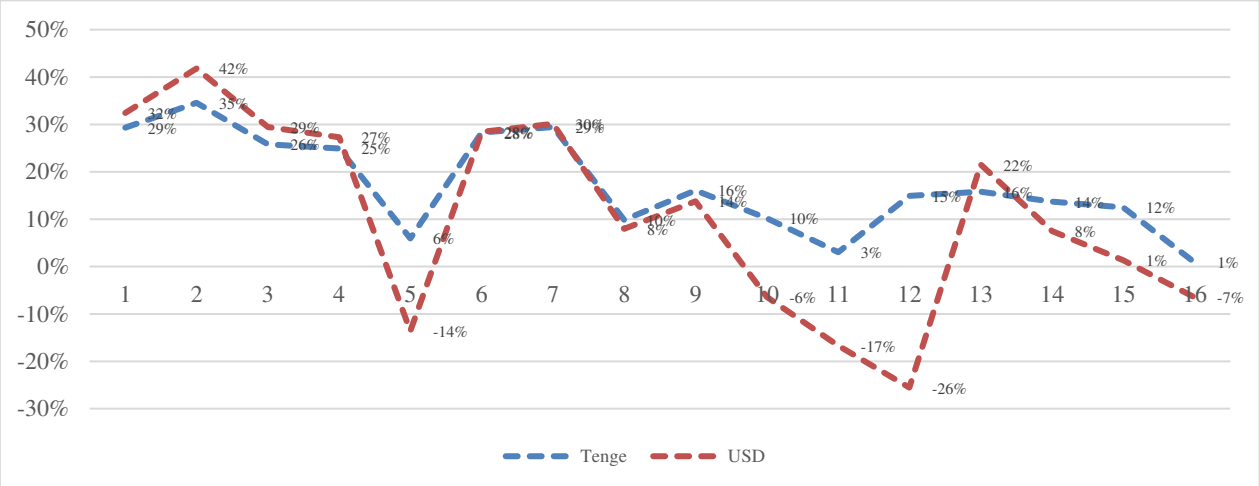
I: investment;

G: Government spending;

X-IM: net exports (exports minus imports)

Source: (Blanchard O., 2002)

Figure 3.



Source: Bureau of National Statistics Strategic Planning Agencies planning and reform Republic of Kazakhstan, Main socio-economic indicators of the Republic of Kazakhstan

Figure 3 shows the dynamics of changes in Kazakhstan's GDP from 2001 to 2020, as can be seen, the dynamics of changes in GDP in tenge is more stable in comparison with the US dollar. First of all, this picture is observed due to the high level of volatility of the national currency, thus a more accurate indicator of the country's well-being is determined by GDP in US dollars.

Above, in graph 1, the shares of Kazakhstan's economic sectors in relation to Kazakhstan's GDP for 2020 were determined. The introduction of formula 9 was necessary to understand the structure of GDP as a whole, which is the state of the economy and requires paying attention to its indicator when forecasting. And since the structure of GDP includes such indicators as consumption, investment, government spending and net exports. Banks need to take into account the dynamics of available macroeconomic indicators, as this affects the solvency of their borrowers and, as a result, their financial stability.

3. Methodology

The choice of the research method is part of the research itself, within the framework of the research, three research approaches can be defined, namely (Creswell J.D., Creswell W.H., 2020):

1. Quantitative approach;
2. Quality approach;
3. A mixed approach.

Next, we will analyze all three approaches of the study and determine the appropriate one within the framework of this work.

The quantitative approach is an approach for testing theories by examining the relationship between variables. In turn, the variables should be measured, usually using measuring instruments to obtain data, analyzed using statistical tools (Creswell J.D., Creswell W.H., 2020). The quantitative approach conducts (Creswell J.D., Creswell W.H., 2020):

- Tests objective theories;
- Explores the relationships between the observed variables;
- Uses survey tools;
- Uses statistical analysis of the received data;
- Tests theories deductively;
- Uses the specified structure for the final report

A qualitative approach is the study and understanding of the meaning that individuals or groups assign to a social or human problem. The qualitative approach conducts (Creswell J.D., Creswell W.H., 2020):

- Focuses on understanding meaning;
- Uses emerging issues;
- Collects data in the participant's environment;
- Has a written report that is flexible in structure.

A mixed approach this as the name suggests uses both quantitative and qualitative approaches. The point is that combining the two approaches provides additional data for the study (Creswell J.D., Creswell W.H., 2020). The mixed approach conducts (Creswell J.D., Creswell W.H., 2020):

- Collects both quantitative and qualitative data;
- Combines two data forms;
- Uses various forms, which may include philosophy or theory.

One of the research issues of this paper is to determine the impact of macroeconomic indicators on the liquidity of the banking sector. This means that for this study, it is necessary to use quantitative approaches, due to the fact that liquidity is measured in monetary terms, while liquidity instruments are measured in coefficients. Thus, the possibility of data influencing each other is the study of the issue of statistics. The following three components are also included in the quantitative approach (Creswell J.D., Creswell W.H., 2020):

- Causal-comparative study (A researcher compares two or more groups in terms of a cause (or independent variable) that has already occurred.•;
- Correlation design (Researchers use correlation statistics to describe and measure the degree of association (or relationship) between two or more variables or score sets);
- Survey research (Provides a quantitative or numerical description of a population's trends, attitudes, or opinions by examining a sample of that population).

Since the study will use macroeconomic data, banking sector data, and other data, in other words variables, there can be no other approach to the study than a quantitative approach. Next, a statistical analysis tool will be defined to identify the dependent variables and determine the solution to this work.

The main tools of statistical analysis for the study will be a linear regression with a liner regression, determined by the following formula:

Formula 10.

$$Y = \beta_1 + \beta_2 X + \varepsilon$$

,where:

Observed variables: *Y, X*;

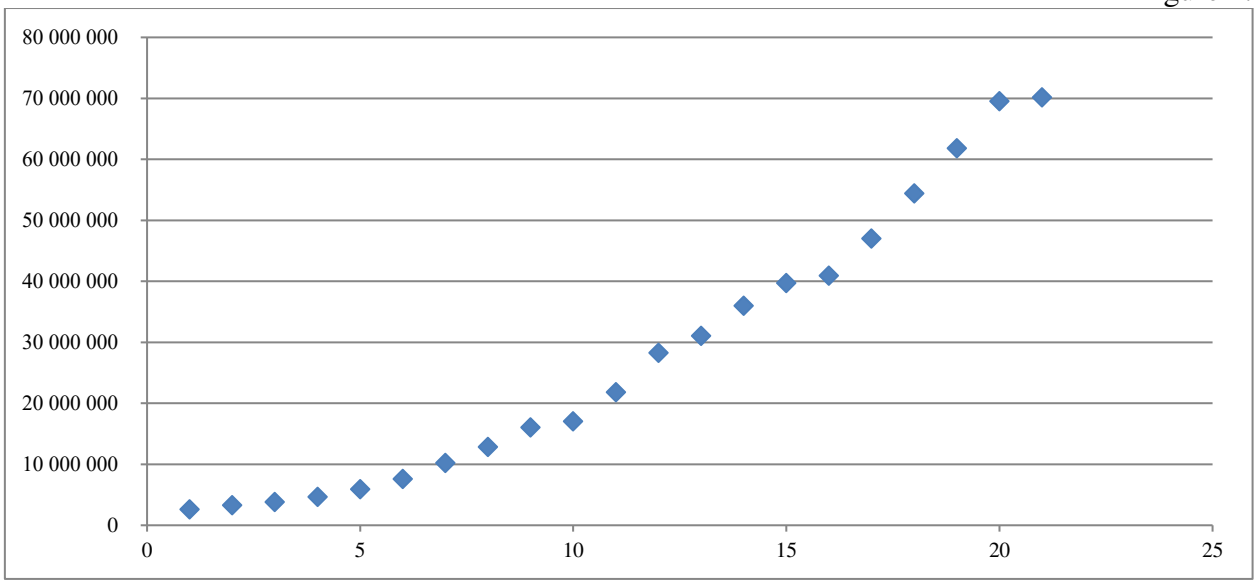
Unknown parameters (coefficients): β_1, β_2

Random component, error: ε

Source: Tindova M. G., Kuznetsova O. S., (2015)

Linear regression is a model of the dependence of a variable on one or more other variables (factors, regressors, independent variables) with a linear dependence function (), below is a graphical example of linear regression:

Figure 4.



Source: Bureau of National Statistics Strategic Planning Agencies planning and reform Republic of Kazakhstan, Main socio-economic indicators of the Republic of Kazakhstan

In figure 4, you can observe the presence of a linear regression over a time series, since the graph shows data on Kazakhstan's GDP from 2000 to 2020 and has a positive trend from indicator to indicator, but the data is given in tenge. In other words, based on graph 4, we can conclude that Kazakhstan's GDP on the time horizon of 20 years since 2000 has a positive correlation to the time series and theoretically it is possible to build predictive models using linear regression for Kazakhstan's GDP. Unfortunately, the nominal GDP of Kazakhstan in the national currency is not a complete reflection and reliable tool for reflecting the economic situation of the country. But for the example of linear regression, it shows it well using the time series method, and if this were the only indicator, the conclusion would be obvious that the country's economy since 2000 has only

positive dynamics and can indicate its well-being. In addition, as can be seen from the observation of the dynamics of Kazakhstan's GDP above Figure 3, there is a significant difference in the calculation of Kazakhstan's GDP in the national currency and in US dollars.

To build a model, you must:

- Come up with an adequate model (the model must have a logical explanation);
- Get estimates of unknown parameters;
- Predict by replacing unknown parameters with estimates.

Regression properties (*Tindova M. G., Kuznetsova O. S., 2015*):

- Expected error value is zero;
- All observations (X, Y) are independent and equally distributed (normal);
- No emissions;
- There is a linear relationship between the dependent variable and the independent variable;
- The model includes the necessary dependent variables;
- The independent variable does not correlate with errors;
- The error variance is constant;
- There is no consistent correlation of error;
- Errors are distributed normally.

The quantitative approach is the only one for research within the framework of this work, since it examines the effects of the measured data on each other, in turn, linear regression is used as a tool for analyzing the influence of variables in statistics. But there are rules that must be followed, one of them is the adequacy of the model, there must be a relationship between the variables, there must not be a correlation with errors, and much more. Thus, having evaluated the linear regression model taking into account the above conditions for it, you can apply this estimate to form a conclusion from the results obtained.

In corporate finance, it is defined by liquid assets that are quickly converted into cash, this is necessary to determine the amount of liabilities that can be repaid immediately or up to one year. Thus, the liquidity ratios determine the short-term stability of the company. In turn, in corporate finance, long-term instruments of financial stability are also defined, they include the total debt ratio, debt-equity ratio and equity multiplier, in a general sense, these are indicators of the sources of asset formation, in other words, the determination of the company's own participation in the activities.

In risk management, there are two types of liquidity: financial liquidity and market liquidity. Both types of liquidity have their own risks and at the system level can significantly affect the country's economies. It highlights the fact that in the US, the crisis caused in 2007-2008 arose precisely because of the liquidity risk, that is, mortgage loans were overvalued, which in turn were a pool on the stock market in the form of CDOs. Thus, increasing lending to the economy, this resulted in a financial and economic crisis. In other words, at the system level, liquidity risks cannot be ignored and stress-testing methods should be used for the financial stability of the banking sector with reference to the country's macroeconomic indicators.

Kazakhstan in 2019 held an unprecedented event as an AQR, 14 banks were included in the sample and accounted for 87% of the total number of banking assets of the country. According to these reports, there were no risks at the system level, but since the report was published already in 2020 with the start of the coronovirus pandemic (COVID 19), it is still unknown how relevant this conclusion is. However, the AQR report highlights the fact that banks need to improve their business models, including having stress-testing models with the country's macroeconomics indicators, and thus study any possible scenarios and their impact on the bank. And it is also a strange fact that after the AQR, the NB revoked the license of two banks, namely JSC "Tengri Bank" and JSC "AsiaCredit Bank". In addition to the revocation of the license, it is also observed that the financial statements for 2018 of these banks did not reflect any risks, and also claimed the normal state of the loan portfolio. While the reason for the revocation of licenses from these banks was still a poor-quality loan portfolio.

Describing the above-mentioned situation of the banking system of Kazakhstan and the availability of liquidity instruments, as well as the need to determine the impact of the macroeconomic situation on the banking sector, this paper will further apply a quantitative approach. In turn, the statistical method of analyzing the quantitative approach will use linear regression to determine the relationship between the data parameters.

4. Data analysis

4.1. Analysis of assets of the banking sector of Kazakhstan

In this research, the official data of the National Bank of the Republic of Kazakhstan or the NBK were considered. The generated data on assets starts from 2004 to the end of 2020, the frequency is determined quarterly, thus there is a general set of data from 65 observations. Regarding the assets of the banking sector, the following indicators are defined:

1. Cash, refined precious metals and correspondent accounts;

2. Securities;

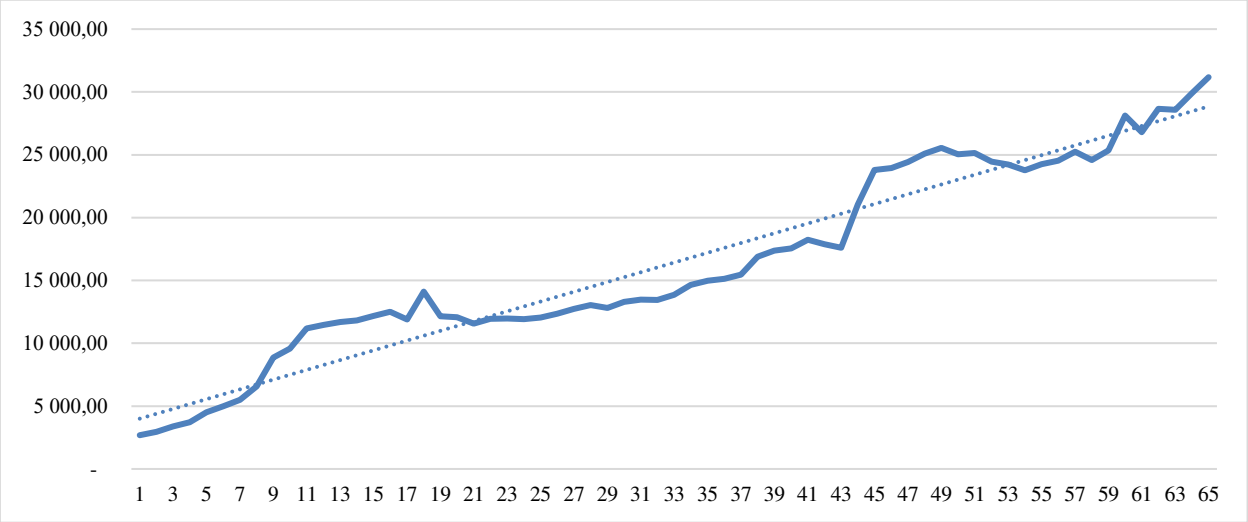
3. Deposits placed with other banks;

4. Bank loans and reverse repo operations»;

5. Other assets and reserves;

6. Total assets.

Figure 5.

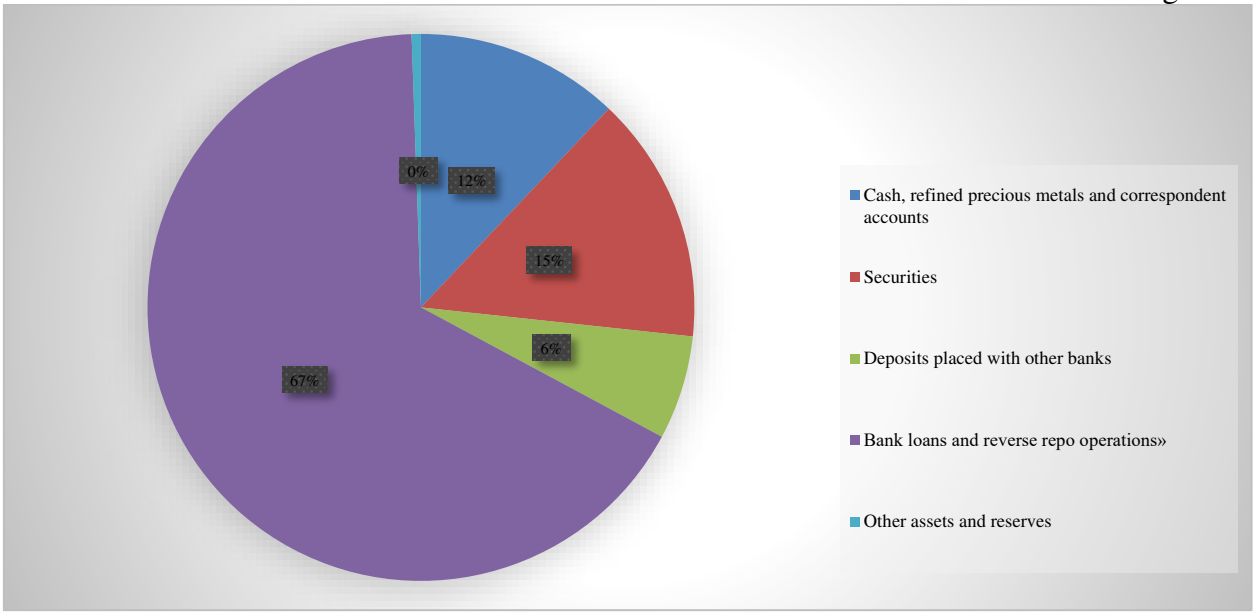


Source: NBK from 2004 to 2020 «Current state of the banking sector»

From the graph 5 above, we have an idea that the dynamics of the assets of the banking sector has an upward view and there is a dependence in relation to the period in the past, since the line is ascending. In turn, when building models for forecasting, this is not enough because the reasons are not defined. The chart of bank assets only gives an understanding that since 2004, the assets of the banking sector have been growing and as of the end of 2020 amount to more than 30 trillion tenge.

As well as for determining the liquidity of assets, the total total assets of the banking sector do not give an idea. In this regard, 5 of the above indicators were selected and the reason for their choice is statistical significance, since these 5 indicators have a greater weight in the structure of the assets of the banking sector, the graph below shows.

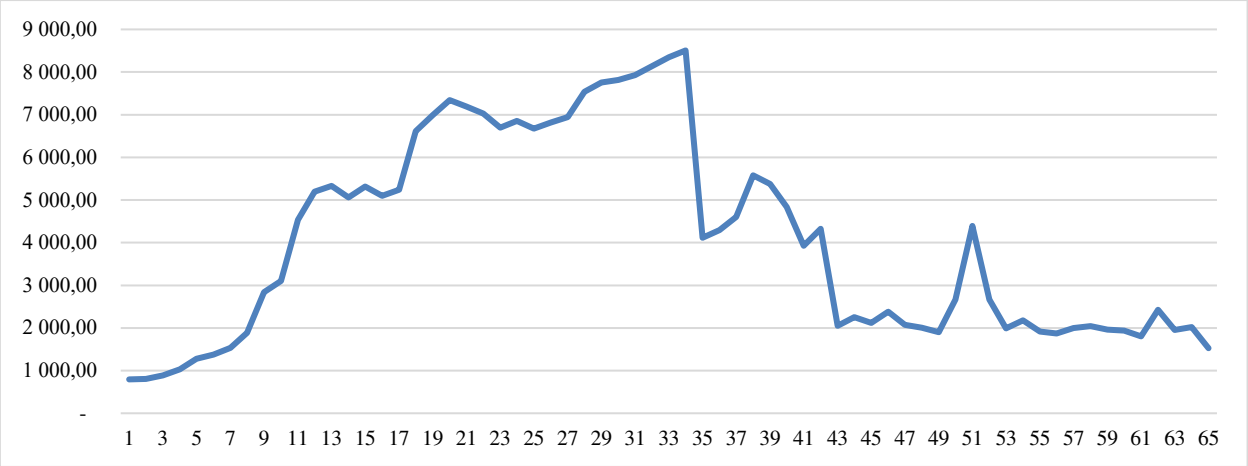
Figure 6.



Source: NBK from 2004 to 2020 «Current state of the banking sector»

Figure 6 above shows the five indicators that were calculated from the sum of all five indicators from 2004 to 2020, that is, all 65 observations. Thereby determining their significance for the study of the liquidity of banking sector assets. Also, in this graph 6, it is determined that the most significant indicator in the structure of bank assets are loans issued to bank customers, further securities, cash and cash equivalents, deposits placed with other banks and other assets. And having such a significant share of loans issued on the balance sheet determines the importance of research and the liquidity of the assets of the banking sector of Kazakhstan. In this connection, it is necessary to consider the structure of loans in the banking sector to determine its liquidity, the only problem is that during the existence of the banking sector in Kazakhstan, the state saved them, poured funds for liquidity, wrote off bad loans, implemented a policy of credit amnesty and other measures that affect the real picture of the quality of bank assets. Below is a chart on bad and doubtful loans of the banking sector of Kazakhstan.

Figure 7.



Source: NBK from 2004 to 2020 «Current state of the banking sector»

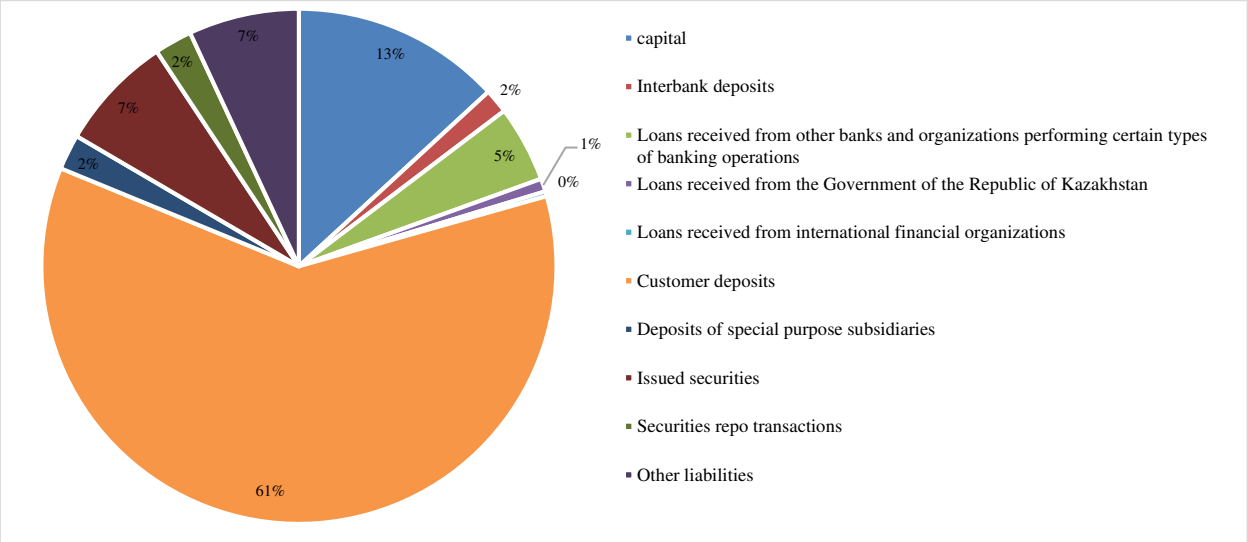
From graph 7 above, it can be seen that since 2004, the problem loans of the banking sector have only grown along with the volume of assets. But since the 34th period or the 1st quarter of 2013, there has been a sharp reduction in problem loans in the banking sector and then we see a constant reduction in problem loans in the banking sector, regardless of the constant increase in total assets, so if at the beginning of 2013 the total volume of total assets was about 14 trillion tenge, and the volume of problem loans is more than 8 trillion tenge, then at the end of 2020, with a total volume of assets of more than 30 trillion tenge, the volume of problem loans is just over 1.5 trillion tenge. For this change, it is necessary to understand that either the structure of the economy of Kazakhstan has changed, or the data on problem loans in the banking sector do not reflect reality. And since the structure of the economy of Kazakhstan mainly consists of the commodity sector, as in 2004, the data on problem loans will not be considered in this study.

Taking into account that in order to determine the quality of banking sector assets, it is necessary to evaluate each bank and the assessment will depend on the current economic situation in Kazakhstan or global influences such as the coronovirus pandemic (COVID 19) that began in 2020, this study does not provide a possibility to determine the quality of loans issued. In this connection, it leads to the understanding that the banking sector of Kazakhstan needs to work on the ethics and transparency of its activities, as well as the regulator represented by the NBK.

In turn, the study provides data on absolutely liquid assets of the banking sector in the form of cash and cash equivalents. This indicator is also statistically significant, because, as mentioned above, it has a 12% share for the entire period under review since 2004 and in corporate finance, this indicator is necessary for calculating the absolute liquidity ratio, and it is also possible to use

this indicator to determine the liquidity of financing or what affects cash and cash equivalents from the structure of banking sector liabilities.

Figure 8.



Source: NBK from 2004 to 2020 «Current state of the banking sector»

As shown in Figure 8, the main indicators of the structure of liabilities of the banking sector of Kazakhstan from the period 2004 to 2020 are defined, namely::

1. Capital;

2. Interbank deposits;

3. Loans received from other banks and organizations engaged in certain types of banking operations;

4. Loans received from the Government of the Republic of Kazakhstan;

5. Loans received from international financial organizations;

6. Customer deposits;

7. Issued securities;

8. Repo transactions with securities;

9. Other obligations.

Of the above indicators of liabilities of the banking sector of Kazakhstan, the most significant will be customer deposits, that is, customer deposits provide 61% of the formation of assets of the banking sector of Kazakhstan. And since customer deposits are the most significant,

but the cash and cash equivalents of the banking sector account for 12% of the total assets, it is necessary to determine the relationship by the source of their formation. For this reason, the impact of the above-mentioned indicators of liabilities on absolutely liquid assets will be considered, the P – value <0.1 coefficient will be used for statistical significance, and data from 65 observations of the banking sector of Kazakhstan from 2004 to 2020 are available in appendices 1 and 2 to this study.

Table 3.

Multiple R	0,958		
R-square	0,919		
Normalized R-square	0,906		
Standard error	367,654		
Observations	65		
	Coefficients	*Standard error*	*P-value*
Y-intersection	-280,510	188,410	**14%**
Interbank deposits	1,160	0,677	**9%**
Loans received from other banks and organizations performing certain types of banking operations	0,040	0,191	83%
Loans received from the Government of the Republic of Kazakhstan	0,207	0,851	81%
Loans received from international financial organizations	-0,673	2,992	82%
Customer deposits	0,180	0,033	**0%**
Issued securities	0,125	0,135	36%
Securities repo transactions	-0,134	0,311	67%
Other liabilities	-0,029	0,127	82%
Capital	0,012	0,075	87%

Table 3 shows a regression of 9 indicators of liabilities as independent variables and absolutely liquid assets as a dependent variable. It should be noted that absolutely liquid assets respond only to interbank deposits and customer deposits. Since the P-value is less than 10% and there is a statistical significance of the indicators, but the P – value of the dependent variable in the form of absolutely liquid assets is more than 10% , and thus, for the accuracy of the model, it is necessary to conduct a separate regression and thereby confirm the significance of the indicators. The table below shows a regression with only two independent variables: interbank deposits and deposits of clients of the banking sector of Kazakhstan.

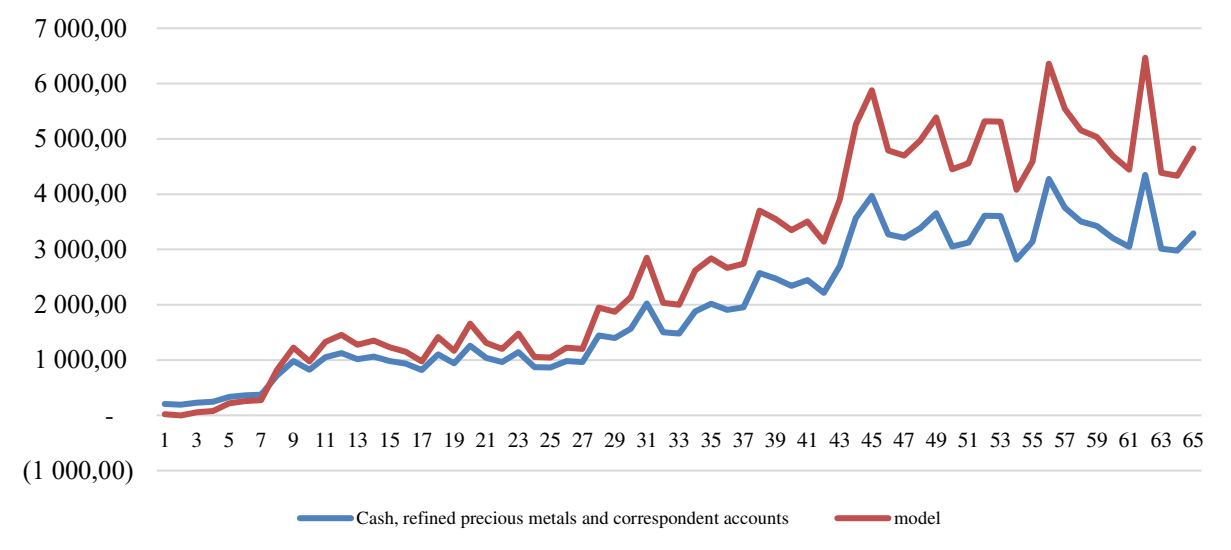
Table 4.

Multiple R	0,957		
R-square	0,916		
Normalized R-square	0,914		
Standard error	352,209		
Observations	65		
	Coefficients	*Standard error*	*P-Value*
Y-intersection	-301,168	119,360	1%
Customer deposits	0,188	0,008	0%
Interbank deposits	1,367	0,475	1%

When constructing a regression with only two independent variables, as shown above, a P – Value of less than 10% is observed, thereby confirming the statistical significance of the model,

but in the future, it is not possible to use interbank deposits as a variable for predicting liquidity. The reason is the fact that interbank deposits are insignificant in the structure of the liabilities of the banking sector of Kazakhstan, which is about 2%, and also because of the very definition of an interbank deposit. In other words, an interbank deposit arises when there are contractual obligations between one bank and another. Thus, there is a possibility that interbank deposits in the banking sector of Kazakhstan are used to cover the term liquidity of financing with the help of funds from other participants in the banking sector. This means that interbank deposits can be independent of economic, social, global and other variables that could be used for forecasting. Below is a graph of the accuracy of the model, using two independent variables in the form of interbank deposits and customer deposits.

Figure 9.



Source: NBK from 2004 to 2020 «Current state of the banking sector»

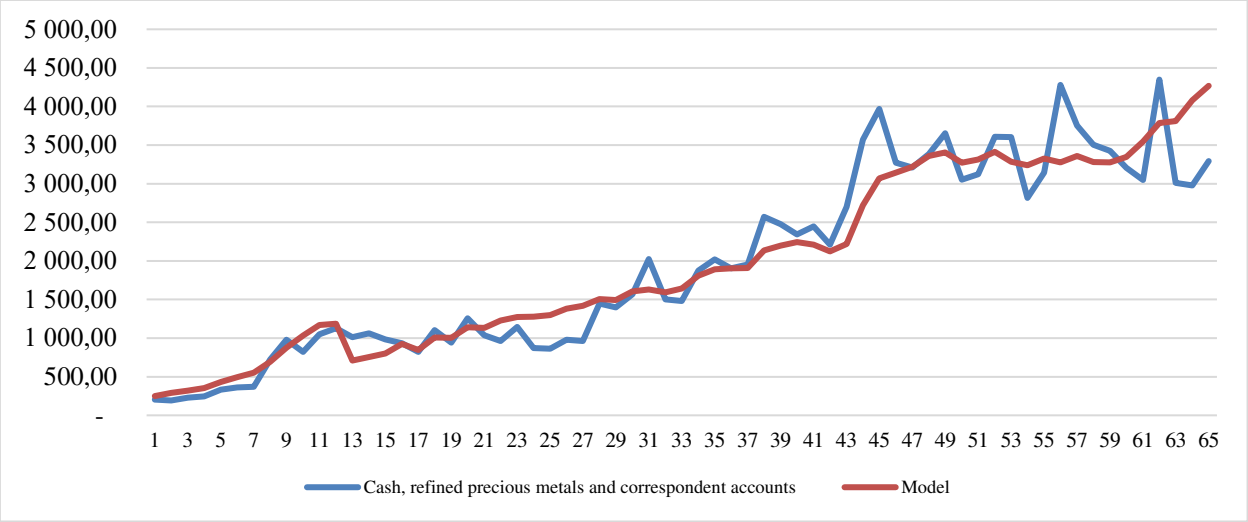
Figure 9 shows that the model follows the contours of the actual data of absolutely liquid assets from the period 2004 to 2020. And you can also see that the closer to 2020, the less accurate the regression model with two variables. In this regard, and the reason for excluding interbank deposits mentioned above, we will further consider a linear regression with an independent variable in the form of customer deposits and a dependent variable in the form of absolutely liquid assets.

Table 5.

Multiple R	0,951		
R-square	0,905		
Normalized R-square	0,904		
Standard error	372,010		
Observations	65		
	Coefficients	*Standard error*	*P-Value*
Y-intersection	-76,901	95,496	42%
Customer deposits	0,201	0,008	0%

When using only one independent variable, as shown in the table above, the absence of statistical significance for the dependent variable is determined, that is, the dependent variable of an absolutely liquid asset has more than 10% P-value. But in turn, the independent variable has a P – value of less than 10%, which indicates a high statistical significance and is shown in the graph below. With a high P-Value of the dependent variable, the "model" line moves away much later and has the form of an average value.

Figure 10.



Source: NBK from 2004 to 2020 «Current state of the banking sector»

Thus, although absolutely liquid assets of the banking sector account for only 12% of the asset structure, the source of their formation is customer deposits and a small share is made up of interbank deposits.

In turn, the certainty of the source of the formation of absolutely liquid assets in the form of customer deposits can say that the remaining liabilities, including the capital of the banking sector, are targeted and the banking sector of Kazakhstan may have a high liquidity risk. Since the study does not contain a detailed structure of customer deposits, for example: in what currency deposits are made, the terms of these deposits, the interest rates on deposits, the owners of deposits by legal status, the industry of the economy to which the owners of deposits belong, and much more. This indicates a high level of uncertainty and forecasting accuracy, but the available macroeconomic indicators will be used to predict the contributions in this study.

4.2. Building a model of deposits of clients of the banking sector of Kazakhstan

Macroeconomic data in Kazakhstan are published by the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan (hereinafter referred to as the Statistics Committee). The report published by the Statistics Committee is called "Socio-economic indicators of Kazakhstan", within the framework of this report, data on demography, industry, GDP and other indicators are reflected.

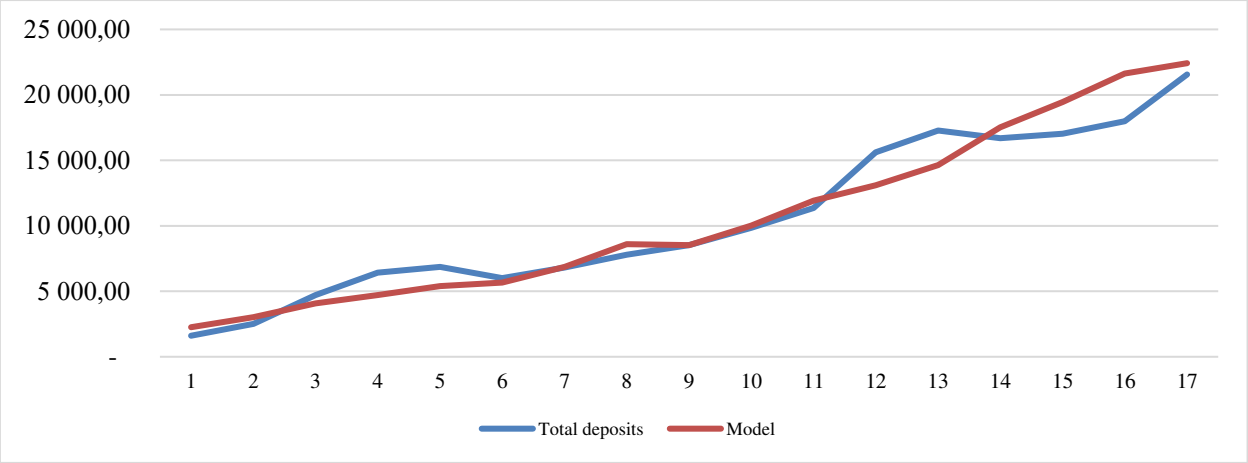
Two macroeconomic indicators were used to predict the deposits of clients of the banking sector of Kazakhstan: the economically employed population and the country's GDP. The periodicity of data published by the Committee of Statistics is annual and taking into account the availability of data from the banking sector of Kazakhstan from 2004 to 2020, we get 17 observations. In turn, when forming the regression, the P-Value indicator exceeds the specified coefficient "0.1", thus does not accurately reflect the statistical significance of the study.

Table 6.

Multiple R	0,972		
R-square	0,944		
Normalized R-square	0,936		
Standard error	0,180		
Observations	17		
	Coefficients	*Standard error*	*P-Value*
Y-intersection	46,542	29,028	13%
Employed population	-5,720	3,565	13%
GDP	1,379	0,309	0%

The table above shows data with independent variables of the economically employed population, GDP, and the dependent variable in the form of customer deposits. These indicators were logarithmed for the statistical significance of the study, and although the indicator of the dependent variable in the form of customer contributions and the indicator of the independent variable in the form of the economically employed population exceed the posterior P – value coefficient by 3%, other variables will not be considered in this study. Below is a graph of the regression model and the actual data of customer deposits, which more clearly shows their accuracy and in this regard, it is the model above that will be used for forecasting later. It should also be noted that forecasting bank deposits by annual values from 2004 to 2020 by using time series regression is not possible, since the P – value indicator will be more than "0.9" and thus the data is more distorted than in the above model.

Figure 11.



Source: NBK from 2004 to 2020 "Current state of the banking sector»

From Graph 11, the deposits of banking sector customers are inversely converted to absolute values, and the regression model is also converted to absolute values from the indicators of the economically employed population and the country's GDP. As can be seen from Graph 11, the model relative to the real value passes between the growth and decline of the actual data and forms its average value. In the long term, the average value is expected, and therefore a forecast model of the economically employed population, GDP and assets of the banking sector of Kazakhstan will be constructed over a time series in order to build a forecast model of customer deposits from which a forecast model of liquid assets will be built for comparison with the forecast model of assets of the banking sector. And thus, these data will reflect the level of liquid assets in the structure of the balance sheet of the banking sector of Kazakhstan in the long term. The horizon for long-term forecasting in this study is defined as 10 years.

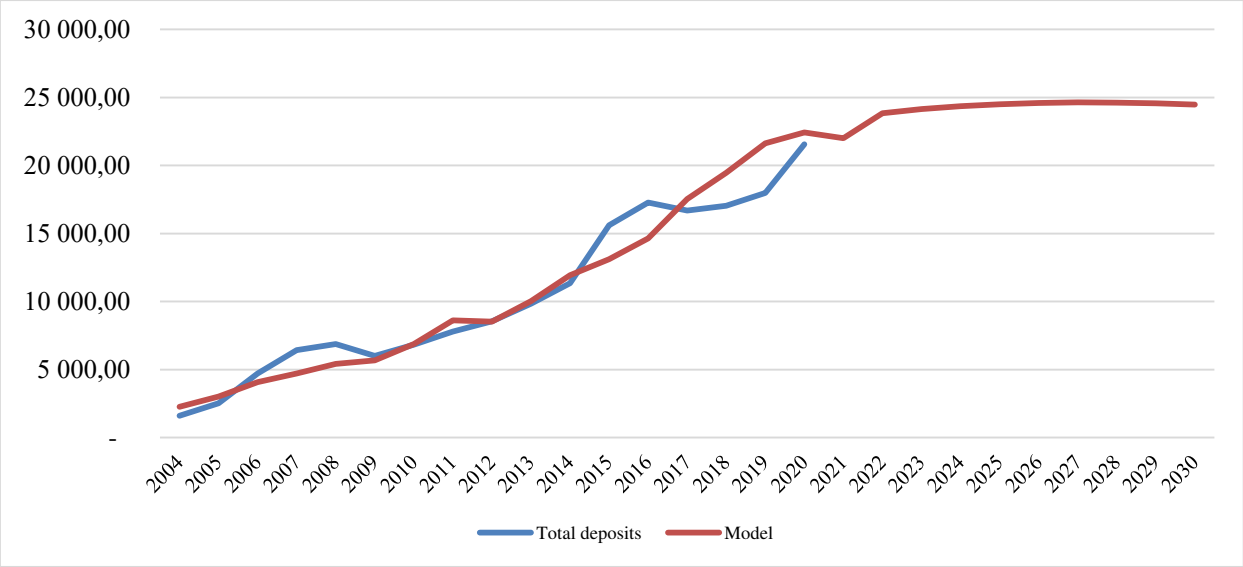
Table 7.

Multiple R	0,945		
R-square	0,894		
Normalized R-square	0,887		
Standard error	180,169		
Observations	17		
	Coefficients	*Standard error*	*P-Value*
Y-intersection	7271,948	91,399	0%
Employed population	100,723	8,919	0%

Multiple R	0,986		
R-square	0,973		
Normalized R-square	0,971		
Standard error	3596,990		
Observations	17		
	Coefficients	*Standard error*	*P-Value*
Y-intersection	-4050,474	1824,752	4%
GDP	4175,894	178,077	0%

The above time series regression reflects the statistical significance of both indicators of the economically employed population and GDP. From the data obtained in Table 7 below the forecast model of deposits of clients of the banking sector of Kazakhstan is constructed and has the following form:

Figure 12.



Source: NBK from 2004 to 2020 "Current state of the banking sector»

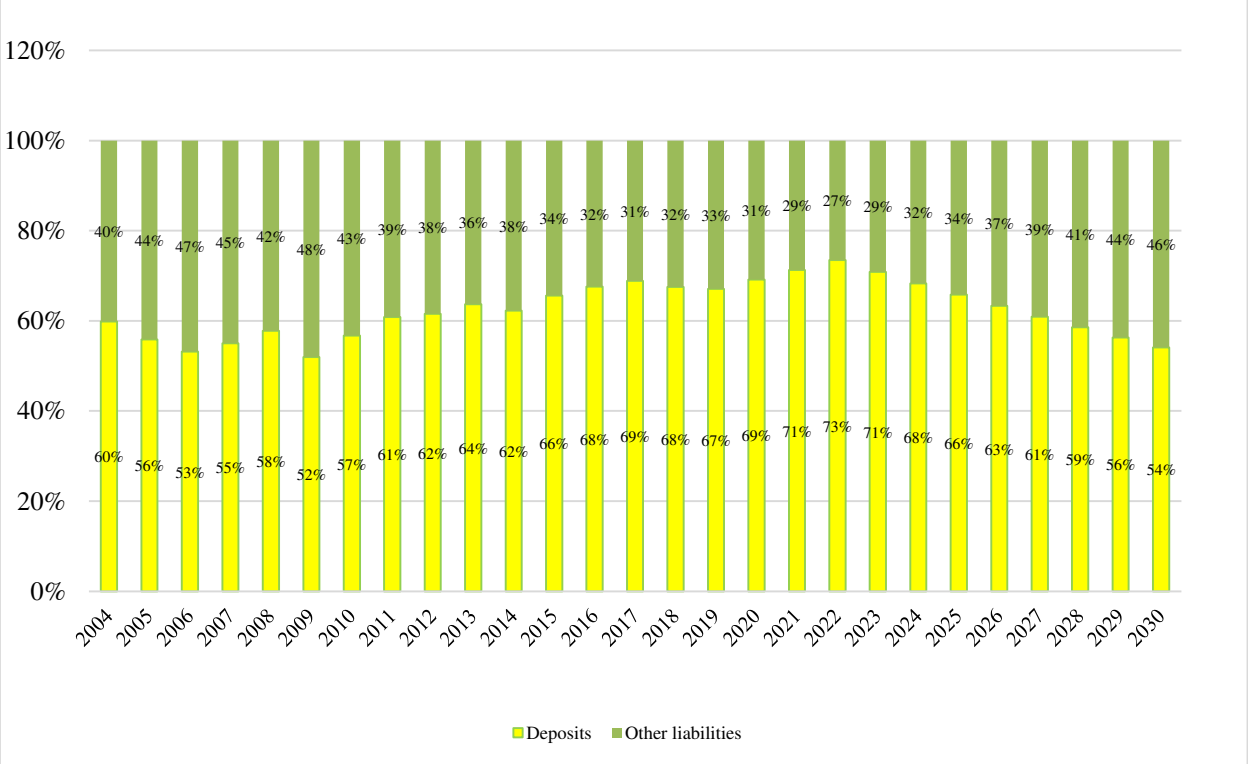
As shown in Figure 12, the regression model of customer deposits follows the contour and, starting from the forecast year 2021, tends to moderate growth. Since 2026, the forecast model shows a downward trend and thus proves that the forecast horizon of more than 5 years is no longer correct and it is not worth referring to this model when making a decision. In turn, the forecast model with deposits with clients was made to predict absolutely liquid assets, and then the forecast model of absolutely liquid assets will be considered.

Before considering the forecast model of absolutely liquid assets, it is necessary for understanding to consider the graph below, which reflects the share of customer deposits in the total structure of liabilities of the banking sector of Kazakhstan with a similar forecast until 2030. And also, unlike the previous charts, this one was built by shares, and since the forecast model of customer deposits in the banking sector of Kazakhstan does not have strong growth, the share of customer deposits in the chart decreases from 71% in 2020 to 54% in 2030. Although the share of customer deposits in the banking sector decreases to 54% until 2030, it is impossible to say that this scenario is absent, since only in 2009 the share of deposits of customers in the banking sector of Kazakhstan was 52%, and the average historical value of the share of deposits of customers in the banking sector of Kazakhstan from 2004 to 2020 was 61%, while the forecast value is 64%. This study does not consider the nature of Kazakhstan's bank deposits, but the reason for the aggressive growth of deposits may be the Global financial and economic crisis that occurred in 2007. Then the share of deposits increased to 58%, in 2012-2013 the share of deposits was first established at 62% and 64% and did not fall below this level, at that time, the main partner of Kazakhstan, Russia, had foreign policy shocks and in 2020, the share of deposits was 69%. That year, the coronovirus pandemic was declared. In other words, in the event of a crisis, the deposits

of clients of the banking sector of Kazakhstan have a dynamic to increase. And the forecast model of this study can not reflect the probability of another crisis in this regard, the dynamics of deposits tends to decrease.

But on the other hand, crises are cyclical phenomena and relative to the long-term horizon, the average value determines the expectation of the indicator. And if we consider the average value of the share of deposits of municipalities relative to the liabilities of the banking sector of Kazakhstan, from 2004 to 2020 is 61%, whereas in the forecast model from 2021 to 2030, the average value of the same indicator is 64%. And with regard to the crises, it can be noted that during the crisis of 2007 – 2008, the decline in deposits by 2009 is from 58% to 52%, a similar situation in the crisis of 2013 by 2014, the share of deposits in the banking sector decreased from 64% to 62%. Since the coronovirus pandemic began in 2020, the share of deposits of customers in the banking sector of Kazakhstan increased from 67% to 69% in 2020, thus it can be assumed that the share of deposits of customers in the banking sector will decrease after the end of the pandemic. In other words, the banking sector of Kazakhstan should expect this scenario and form alternative sources of financial liquidity.

Figure 13.

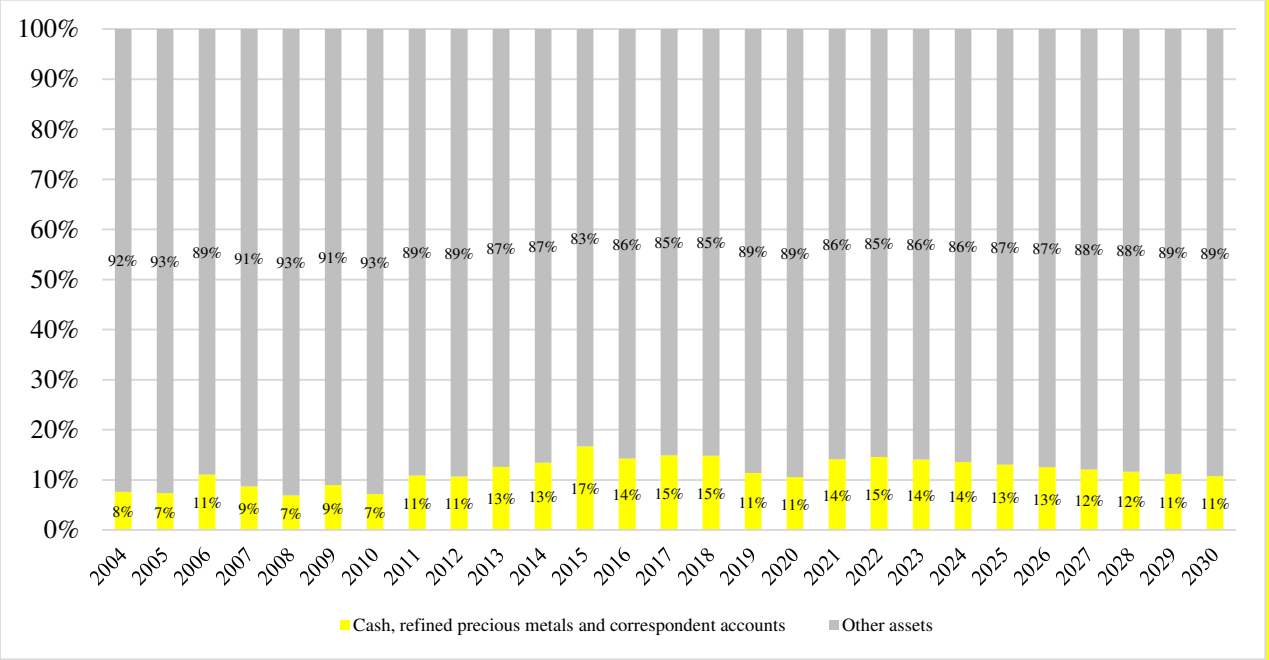


Source: NBK from 2004 to 2020 "Current state of the banking sector»

In turn, if during a certain crisis the share of deposits of clients of the banking sector of Kazakhstan increases, then in the case of absolutely liquid assets this is not observed. The graph

below shows the share of absolutely liquid assets in the structure of assets of the banking sector of Kazakhstan, and despite the fact that the share of deposits is growing in 2020, there is no change in absolutely liquid assets compared to 2019. And if we talk about the historical data of the indicator of absolutely liquid assets, then since 2011 it has been observed that the share of absolutely liquid assets of the banking sector of Kazakhstan is at the lowest. It should also be noted that the average historical value of absolutely liquid assets is 11% from 2004 to 2020, while the average forecast value is 13% or an increase in the share of absolutely liquid assets by 15% in the forecast model. In other words, determining the liquidity of financing the banking sector in Kazakhstan through customer deposits, where dependent macroeconomic variables like GDP and the economically employed population represent an optimistic volume in the asset structure.

Figure 14.



Source: NBK from 2004 to 2020 «Current state of the banking sector»

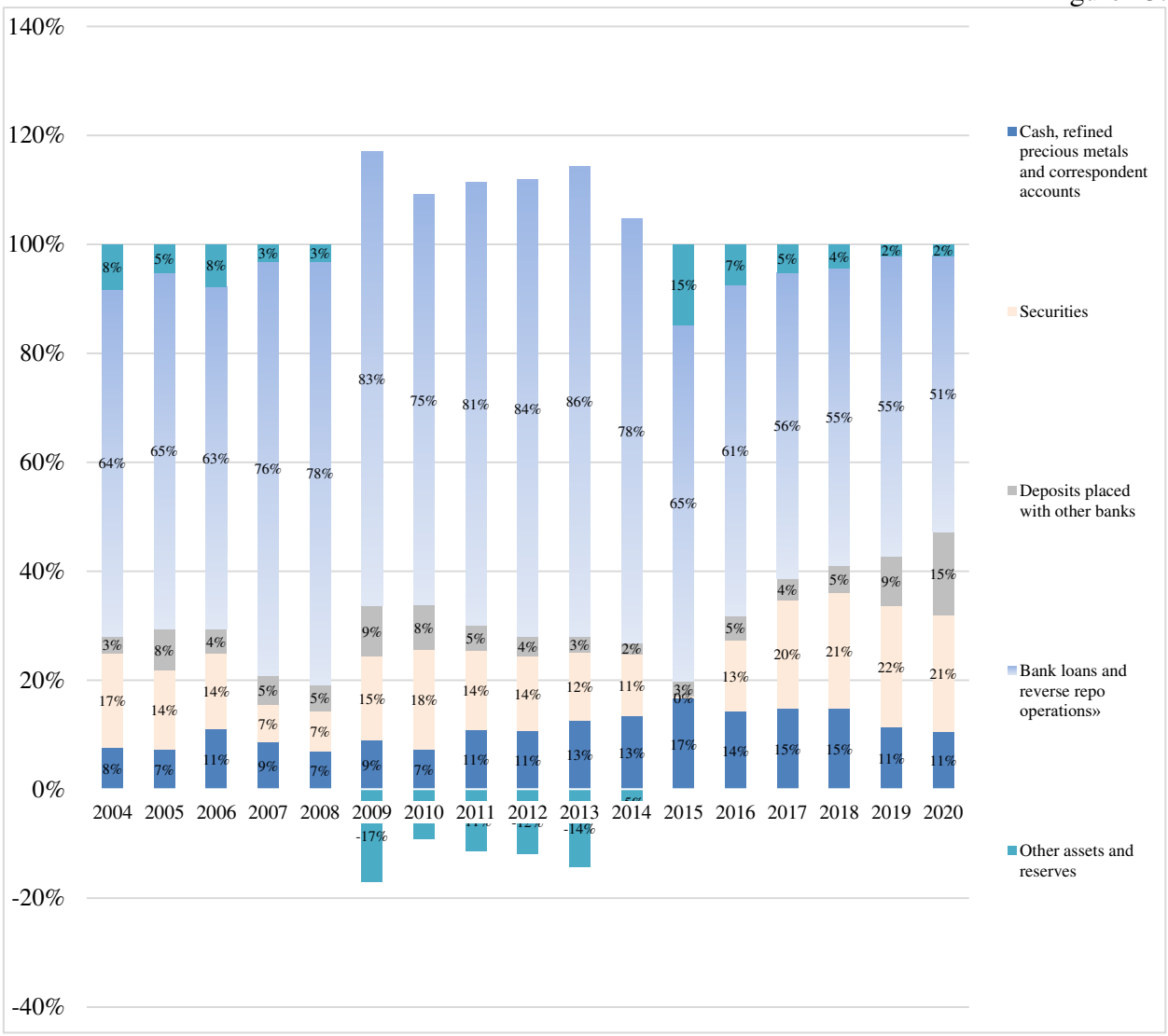
4.3. Reconciliation of research results with historical data

It should be emphasized that the maximum historical share of absolutely liquid assets was 17% in 2015 and began to decline until 2019. In turn, the growth began in 2013, that is, during the period when there were foreign policy shocks in Russia, but at the time of 2020, the share of absolutely liquid assets has not changed. This may be due to the following reasons:

1. The structure of assets of the banking sector of Kazakhstan has changed;

2. Kazakhstan's banking sector is too optimistic in its performance during the crisis.

Figure 15.



Source: NBK from 2004 to 2020 «Current state of the banking sector»

As shown in the graph, up to 2013, the share of loans issued was 86%, in 2015, the banking sector of Kazakhstan gained the maximum level of absolutely liquid assets of 17% and from 2016 to 2020, the amount of absolutely liquid assets decreased to 11%, then the size of deposits placed in other banks and securities increased. This means that the banking sector in Kazakhstan is diversifying its asset structure, but there are certain risks associated with deposits in other banks and securities. First, the banks that place funds in other banks should be more stable and, accordingly, the premium for the maintenance of them is lower than if the banks took funds from depositors. This means that in the long run, such a strategy is only a deterrent and will not meet the profitability. Secondly, if the bank in which other banks place funds is focused exclusively on the banking sector, then at a time when the creditor banks urgently need funds (most likely due to a crisis or a "bad" loan portfolio), and the depositor bank will not be able to fulfill them, then a situation may arise when the entire banking system will be under threat. With securities, it is even

more difficult, since during the urgent sale period they will have to be sold at a discount and the value of the security depends heavily on the market. In other words, if there is a systemic problem with the liquidity of the banking sector in Kazakhstan, banks may have problems. If the indicators of the asset structure were for a single bank, then perhaps the structure would be quite satisfied and the problems with financial liquidity and the liquidity of assets would be insignificant and would depend on the counterparty. But at the system level, in the case of a global problem in the economy or the world, the banking sector of Kazakhstan has a vulnerability, namely dependence on each other, a low level of absolutely liquid assets, the only protective tool is the placement of deposits in other banks and securities. In addition, the growth of securities in the asset structure from 0% in 2015 to 21% in 2020 indicates the likely profitability of this instrument and its alternative in comparison with loans. Accordingly, if the banking sector of Kazakhstan increases the share of securities in the asset structure, then corporate and private creditors of the banking sector can similarly determine the securities market as an alternative to bank deposits.

The banking sector of Kazakhstan is significant in the structure of the economy, in turn, the data used in this study is the quarterly data on the state of the banking sector published by the NBK. We used data from both assets and liabilities, and graph 5 clearly shows that the assets of the banking sector in Kazakhstan are increasing annually and have a positive trend over the time series. In other words, it would not be correct to use only time series and assets of the banking sector of Kazakhstan in this study.

Considering the structure of the banking sector in Kazakhstan, it is observed that the main direction is lending, which occupies 67% of the total share of assets. But in turn, it is not possible to consider loans or loans to determine liquidity, since if you look at Graph 7, it is observed that the share of "problem" loans increased annually until 2013, after which, despite the annual increase in assets, the share of "problem" loans decreased, even despite the pandemic in 2020.

Because of the above, the asset liquidity indicator identified absolutely liquid assets, which occupy a share of 12% of the asset structure of the banking sector of Kazakhstan from 2004 to 2020. Regarding the determination of financial liquidity, 9 indicators of liabilities were regressed to determine the dependence on absolutely liquid assets. Among the 9 indicators of liabilities, interbank deposits and deposits of clients of the banking sector of Kazakhstan were statistically significant. In turn, interbank deposits could not be used in the study due to the large difference between the actual data of deposits of clients of the banking sector of Kazakhstan and the regression model, as well as the low level in the structure for the periods under review.

After excluding interbank deposits from further research, a regression was performed between absolutely liquid assets and customer deposits. In Graph 10, it is observed how the model range to the actual data is in the relative average. In turn, the time series was also not used to predict the deposits of clients, and the indicators of GDP and the economically employed population were used to determine the dependence. The correlation between these indicators turned out to be more than 90%, but the statistical significance is slightly greater than the specified one or more by 3%. Since Kazakhstan's GDP and the economically employed population are important macroeconomic indicators, these indicators were used for further research.

It should be noted that the Statistics Committee publishes the main macroeconomic indicators once a year. In this connection, the analyzed data in this study further have 17 observations. Also, the regression of GDP and the economically employed population of Kazakhstan was made by time series, with a correlation of 90% and within the framework of statistical significance. Figure 12 shows the forecast model of deposits of clients of the banking sector of Kazakhstan, and figure 13 shows the actual data in shares and forecast data in shares. If we consider the forecast historical data, then there is a pattern that during crises, the share of customer deposits in the structure of liabilities of the banking sector of Kazakhstan increases. As well as an increase in the share of deposits of customers of the banking sector of Kazakhstan, but despite this, the forecast results from 2021 to 2023 were higher than the historical ones up to 4%, but if we consider the average forecast, the share of deposits is 64%, while the historical 61%. The deviation is not significant if we take into account the fact that the share of customer deposits in 2010 was 57%, and in 2020 it was 69%, in other words, an annual growth of 1.2%. And if the forecast model was based on historical data, then by 2030 the share of deposits in the banking sector of Kazakhstan would be 81%, and the average forecast value would be 75.6%, which is 11.6% more than the forecast model based on regression.

As for absolutely liquid assets, the forecast model based on the regression was higher by 2% or from the historical average share of 11% to the average forecast share of 13%. Although it is worth noting that in comparison with the forecast model of customer deposits, absolutely liquid assets had historical indicators above the average forecast. For example, in 2015, the share of absolutely liquid assets was 17%. In addition, in comparison with the deposits of clients of the banking sector of Kazakhstan, absolutely liquid assets do not have a dynamic growth in 2020 and are at their historical minimum since 2011. To understand this difference, it is necessary to consider the entire asset structure of the banking sector of Kazakhstan, that is, in 2021, the share of loans was 51%, while in 2015, the share of loans was 65% and reached a maximum of 86% in 2013. In turn, in 2015, the share of interbank deposits was only 5%, and the share of securities was

0%, while at the end of 2020, the share of interbank deposits was 15%, and the share of securities was 21%. In other words, since 2016, the banking sector of Kazakhstan has been diversifying its asset structure, but given the fact that interbank deposits are a tool for restraining costs, and the securities market requires high competence, a significant reduction in the share of absolutely liquid assets during the crisis is not correct.

Conclusion

As of January 1, 2021, there are 26 second-tier banks operating in Kazakhstan, with total assets of 31,171. 7 billion tenge, thus accounting for 44.7% of the share of GDP (NBK, 2021). Taking into account this fact, the banking sector may occupy a significant share in the economy, but despite the scale of the banking sector in Kazakhstan, there are such negative scenarios as the liquidation of banks. A recent example is the revocation of the licenses of Asia Credit Bank JSC and Tengri Bank JSC (NBK, 2021).

The reason for the revocation of licenses of the above-described banks is a poor-quality loan portfolio and non-compliance with regulations (NBK, 2021). In turn, it should also be noted that as of 2014, there were 38 second-tier banks in Kazakhstan (IMF, 2014) and, accordingly, the number of second-tier banks decreased by 12 units. And every time a bank is liquidated, the state bears certain costs, both with the payment of the insured part of the deposits of customers of the banking sector of Kazakhstan, and with the proceedings with the loan portfolio.

In corporate finance, liquidity is distinguished as the part of assets that covers liabilities, from the part of assets, absolutely liquid assets, urgently liquid assets and current assets can be distinguished (Ross A. S., Westerfield R. W., Jaffe F, J., 2008). Their formulas are not difficult to understand, this is the ratio by type of assets to liabilities. In practice, these ratios are used in the structure of loans by period, that is, the amount that will pay off before the 1st month, up to 3 months, up to the 1st year, up to 5 years and above to the amount of disposal of similar periods of time. In practice, this indicator will reflect the possibility of covering the banks liabilities to their creditors as a percentage.

In risk management, much attention is paid to financial liquidity, since regardless of whether a bank is profitable or sustainable, in the absence of financial liquidity, this can lead to irreparable consequences (FRM, 2018). The lack of financial liquidity may lead to a situation where the amount of collateral will have to be increased to cover the increase in the value of liabilities, due to capital flight, such as withdrawal of deposits, banks will have to sell at non – market conditions, thereby incurring losses and other negative scenarios that may affect financial liquidity (FRM, 2018). In turn, at the system level, the lack of financial liquidity will not only

affect the reporting of an individual bank, but also the entire system as a whole. Since banks serve the population, business and even the government, which require constant operations with cash and loans.

Given the fact that the economy of Kazakhstan is focused on the commodity market, and the price of oil has a high level of volatility, the risk of financial liquidity remains relevant. It is necessary to understand that all economic shocks like the coronovirus pandemic (COVID 19) make their own changes in foreign markets. In the case of the coronavirus pandemic, all countries were isolated and reduced production, while oil, which is the main raw material for transporting goods, decreased in price. Thus, all this situation affects the export income of Kazakhstan, the reduction of a significant source of income leads to problems at the system level and as a result affects the solvency of borrowers.

To be able to predict the level of asset liquidity and financial liquidity, two indicators were considered: absolutely liquid assets in the form of cash, refined precious metals and correspondent accounts and deposits of clients of the banking sector of Kazakhstan. In the first case, with absolutely liquid assets, in the time horizon from 2004 to 2020, it occupies a 12% share in the structure of assets of the banking sector of Kazakhstan. One of the reasons why loans issued are not considered is due to incorrect data, for example, before the 1st quarter of 2013, the volume of assets is growing and the volume of problem loans is growing with it, but after 2013, the volume of problem loans is decreasing regardless of the growth in the volume of assets and by 2020 has the lowest value.

In turn, to predict absolutely liquid assets, it was necessary to understand what indicators of liabilities affect it. For this purpose, a regression was carried out on 9 indicators of liabilities, and despite the fact that the share of absolutely liquid assets is only 12%, the source of its formation is customer deposits and interbank deposits. When running the model with actual data, the model as an independent variable in Graph 10 showed an average value of and a correlation value of 90%.

When constructing the model of deposits of clients of the banking sector of Kazakhstan, two macroeconomic indicators were used: GDP and the economically employed population, where the correlation was 94%. To be able to build a regression model using macroeconomic indicators with customer contributions, the data were standardized using the natural logarithm. It was also necessary to predict the macroeconomic indicators to predict the deposits of clients of the banking sector of Kazakhstan.

To predict the macroeconomic indicators, time series regression was used separately for each indicator, thus the forecast horizon was determined in 10 years, starting from 2020 to 2030. Figure 12 shows a forecast model of customer deposits in the banking sector of Kazakhstan, where customer deposits have a moderate growth rate until 2025. But for a full understanding of the situation and the forecast model of deposits of the banking sector of Kazakhstan, a model of total assets of the banking sector of Kazakhstan was built by time series, where the share of customer deposits is determined. When looking at graph 13, there is an increase in the share of customer deposits in the event of a crisis, that is, the share of customer deposits is growing in 2008, 2013 and 2020. The average historical value is 61%, and the average forecast value is 64%. Since the model was built on macroeconomic indicators, the growth of GDP and the economically employed population will increase the share of deposits of customers of the banking sector of Kazakhstan. For absolutely liquid assets, the average historical value is 11% and the average forecast value is 13%, as shown in Figure 14.

Summing up the results of this study, it is necessary to understand that for the forecast model, it is not enough to use only a macroeconomic indicator such as GDP and economic employment. Although these indicators respond to the deposits of customers of the banking sector of Kazakhstan, the indicator of the banking sector itself is not segmented. For example, the age, gender, wealth, industry of the depositor's economy and other indicators, and for further research on the issue of liquidity, it is necessary to conduct research and model the available data. Thus, the quality of research on the financial liquidity and asset liquidity of the banking sector will increase, help to build more accurate forecasts and models that will signal potential risks and help in making decisions for the sustainable stability of the banking sector in Kazakhstan.

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Appendix 1.

Assets of the banking sector of Kazakhstan in the period from 2004 to 2020.

Date	Q	#	Cash, refined precious metals and correspondent accounts	Securities	Deposits placed with other banks	Bank loans and reverse repo operations	Other assets and reserves	Total assets
01.01.2005	4Q	1	204,90	465,50	85,00	1 707,80	224,30	2 687,50
01.04.2005	1Q	2	192,20	562,30	134,10	1 860,70	205,80	2 955,10
01.07.2005	2Q	3	228,50	550,90	223,00	2 171,10	203,70	3 377,20
01.10.2005	3Q	4	244,70	523,30	284,10	2 417,80	239,80	3 709,70
01.01.2006	4Q	5	331,20	651,70	345,60	2 953,80	232,80	4 515,10
01.04.2006	1Q	6	359,30	735,00	226,00	3 130,80	536,20	4 987,30
01.07.2006	2Q	7	370,50	897,50	228,30	3 552,30	459,50	5 508,10
01.10.2006	3Q	8	723,20	776,70	253,60	4 420,90	403,70	6 578,10
01.01.2007	4Q	9	980,70	1 231,20	393,10	5 583,00	684,00	8 872,00
01.04.2007	1Q	10	821,90	1 254,20	355,80	6 307,30	833,60	9 572,80
01.07.2007	2Q	11	1 048,30	1 104,30	386,40	7 902,00	732,80	11 173,80
01.10.2007	3Q	12	1 127,40	855,90	396,30	8 421,90	667,80	11 469,30
01.01.2008	4Q	13	1 013,90	787,80	639,60	8 868,30	373,80	11 683,40
01.04.2008	1Q	14	1 060,80	763,80	733,00	8 861,50	395,00	11 814,10
01.07.2008	2Q	15	983,70	909,30	838,90	8 936,40	505,20	12 173,50
01.10.2008	3Q	16	933,50	1 079,40	943,20	9 094,00	450,20	12 500,30
01.01.2009	4Q	17	820,20	888,20	576,80	9 238,40	375,70	11 899,30
01.04.2009	1Q	18	1 102,20	1 670,70	983,40	10 254,50	90,10	14 100,90
01.07.2009	2Q	19	941,50	1 476,40	1 095,80	10 220,90	- 1 585,00	12 149,60
01.10.2009	3Q	20	1 258,90	1 504,30	1 191,40	10 138,30	- 2 016,00	12 076,90
01.01.2010	4Q	21	1 037,00	1 779,70	1 072,10	9 638,90	- 1 972,80	11 554,90
01.04.2010	1Q	22	964,50	2 167,30	1 221,20	9 471,90	- 1 879,20	11 945,70
01.07.2010	2Q	23	1 142,90	2 311,20	993,20	9 124,40	- 1 609,40	11 962,30
01.10.2010	3Q	24	871,50	2 354,20	839,80	9 258,90	- 1 397,30	11 927,10
01.01.2011	4Q	25	863,70	2 221,70	984,40	9 066,00	- 1 097,70	12 038,10
01.04.2011	1Q	26	979,90	2 563,50	778,40	9 127,20	- 1 088,70	12 360,30
01.07.2011	2Q	27	964,00	2 454,20	1 029,70	9 354,30	- 1 062,50	12 739,70
01.10.2011	3Q	28	1 445,80	2 081,20	757,10	10 080,40	- 1 329,50	13 035,00
01.01.2012	4Q	29	1 396,40	1 859,00	604,00	10 425,50	- 1 463,10	12 821,80
01.04.2012	1Q	30	1 566,96	1 847,60	994,34	10 564,20	- 1 674,10	13 299,00
01.07.2012	2Q	31	2 025,30	1 795,30	393,90	10 935,20	- 1 675,20	13 474,50
01.10.2012	3Q	32	1 500,90	1 837,20	660,20	11 164,60	- 1 718,00	13 444,90
01.01.2013	4Q	33	1 479,30	1 890,30	520,20	11 623,00	- 1 642,50	13 870,30
01.04.2013	1Q	34	1 876,70	1 982,90	733,10	11 782,90	- 1 726,50	14 649,10
01.07.2013	2Q	35	2 019,50	1 971,60	656,40	12 255,80	- 1 934,50	14 968,80
01.10.2013	3Q	36	1 904,60	1 974,90	545,00	12 673,30	- 1 961,20	15 136,60
01.01.2014	4Q	37	1 953,60	1 916,60	465,00	13 348,20	- 2 221,70	15 461,70
01.04.2014	1Q	38	2 570,60	1 949,20	582,30	14 503,50	- 2 727,30	16 878,30
01.07.2014	2Q	39	2 474,80	1 938,50	762,20	14 535,70	- 2 332,10	17 379,10
01.10.2014	3Q	40	2 343,60	2 017,70	702,80	14 452,00	- 1 973,50	17 542,60
01.01.2015	4Q	41	2 446,70	2 075,40	382,30	14 184,80	- 849,90	18 239,30
01.04.2015	1Q	42	2 212,30	1 900,00	481,30	14 133,20	- 849,10	17 877,70
01.07.2015	2Q	43	2 701,60	41,40	627,40	12 503,90	1 720,20	17 594,50
01.10.2015	3Q	44	3 571,80	47,90	603,80	14 350,10	2 475,90	21 049,50
01.01.2016	4Q	45	3 969,20	56,30	692,00	15 553,70	3 513,20	23 784,40
01.04.2016	1Q	46	3 271,00	52,60	1 426,00	15 619,30	3 575,20	23 944,10
01.07.2016	2Q	47	3 210,60	63,30	1 129,80	15 315,50	4 706,30	24 425,50
01.10.2016	3Q	48	3 385,00	3 286,20	1 129,40	15 490,20	1 811,80	25 102,60
01.01.2017	4Q	49	3 654,50	3 326,20	1 168,20	15 510,80	1 901,50	25 561,20
01.04.2017	1Q	50	3 052,70	3 780,40	1 061,50	15 248,10	1 900,70	25 043,40
01.07.2017	2Q	51	3 123,20	3 579,70	903,90	15 533,30	2 001,50	25 141,60
01.10.2017	3Q	52	3 609,00	4 305,60	1 081,30	13 902,90	1 544,70	24 443,50
01.01.2018	4Q	53	3 605,50	4 812,50	955,60	13 590,50	1 256,40	24 220,50
01.04.2018	1Q	54	2 815,10	5 482,30	1 006,00	13 306,30	1 158,90	23 768,60
01.07.2018	2Q	55	3 142,90	4 994,00	1 302,00	13 482,10	1 334,50	24 255,50
01.10.2018	3Q	56	4 277,90	4 943,80	963,80	13 194,10	1 159,30	24 538,90
01.01.2019	4Q	57	3 753,40	5 335,70	1 267,20	13 762,70	1 122,00	25 241,00
01.04.2019	1Q	58	3 505,70	5 824,00	1 751,30	13 044,80	451,60	24 577,40
01.07.2019	2Q	59	3 426,30	5 562,10	1 913,30	13 646,90	801,40	25 350,00

01.10.2019	3Q	60	3 206,80	5 730,10	2 157,60	14 256,60	2 767,20	28 118,30
01.01.2020	4Q	61	3 049,70	5 977,10	2 449,80	14 743,00	581,30	26 800,90
01.04.2020	1Q	62	4 348,30	5 991,40	2 578,40	15 261,00	485,10	28 664,20
01.07.2020	2Q	63	3 012,40	6 283,60	3 743,80	14 992,50	553,50	28 585,80
01.10.2020	3Q	64	2 976,60	6 591,50	4 470,60	15 306,30	557,70	29 902,70
01.01.2021	4Q	65	3 293,20	6 650,40	4 777,70	15 792,10	658,30	31 171,70

Appendix 2.

Liabilities of the banking sector of Kazakhstan in the period from 2004 to 2020.

Date	Q	#	Interbank deposits	Loans received from other banks and organizations performing certain types of banking operations	Loans received from the Government of the Republic of Kazakhstan	Loans received from international financial organizations	Customer deposits	Deposits of special purpose subsidiaries	Issued securities	Securities repo transactions	Other liabilities	Total liabilities
01.01.2005	4Q	1	79,10	343,90	5,40	19,20	1 618,50		101,60	72,20	176,30	2 416,20
01.04.2005	1Q	2	80,30	351,10	4,80	18,50	1 832,40		136,10	28,60	216,40	2 668,20
01.07.2005	2Q	3	113,10	422,10	4,00	16,60	1 968,50		210,30	67,80	229,90	3 032,30
01.10.2005	3Q	4	120,50	444,40	3,70	23,80	2 140,10		222,00	63,70	301,70	3 319,90
01.01.2006	4Q	5	185,10	576,80	3,10	26,50	2 532,90		273,00	163,50	312,50	4 073,40
01.04.2006	1Q	6	178,70	667,80	2,80	30,20	2 835,70		315,20	72,80	406,80	4 510,00
01.07.2006	2Q	7	138,30	721,80	2,60	28,70	3 127,80		369,60	137,90	435,70	4 962,40
01.10.2006	3Q	8	148,40	925,50	2,60	31,00	3 829,60		388,10	113,10	514,60	5 952,90
01.01.2007	4Q	9	257,60	1 414,30	2,20	27,40	4 729,40		418,80	530,00	621,90	8 001,60
01.04.2007	1Q	10	217,50	1 365,80	2,00	24,90	5 511,70		434,60	313,80	750,60	8 620,90
01.07.2007	2Q	11	299,30	1 726,20	1,90	26,40	6 191,00		429,10	494,40	825,20	9 993,50
01.10.2007	3Q	12	290,20	1 713,10	1,90	75,80	6 267,60		462,30	332,80	985,70	10 129,40
01.01.2008	4Q	13	319,90	1 798,20	7,70	85,10	3 894,90	2 529,00	467,60	245,40	908,90	10 256,70
01.04.2008	1Q	14	358,90	1 815,20	4,00	87,40	4 125,60	2 445,50	449,90	144,60	921,00	10 352,10
01.07.2008	2Q	15	361,60	1 701,00	4,00	94,20	4 361,40	2 532,30	443,40	157,50	990,00	10 645,40
01.10.2008	3Q	16	255,00	1 577,10	23,50	87,90	4 962,40	2 348,20	445,70	170,40	1 110,50	10 980,70
01.01.2009	4Q	17	319,00	1 450,20	32,00	88,90	4 588,10	2 284,50	375,10	269,10	1 034,10	10 441,00
01.04.2009	1Q	18	117,80	1 648,40	48,60	117,40	5 393,10	2 696,70	1 133,00	353,30	1 205,60	12 713,90
01.07.2009	2Q	19	140,50	1 404,10	47,90	119,10	5 369,80	2 437,20	1 309,40	484,40	1 213,80	12 526,20
01.10.2009	3Q	20	126,20	1 369,90	48,00	108,30	6 033,90	2 225,50	1 322,60	510,00	1 320,50	13 064,90
01.01.2010	4Q	21	237,00	1 247,10	47,50	98,70	6 003,90	1 795,50	1 307,60	534,70	1 264,70	12 536,70
01.04.2010	1Q	22	295,70	1 044,00	46,10	88,50	6 470,30	827,60	1 843,50	583,20	1 246,20	12 445,10
01.07.2010	2Q	23	227,50	1 016,10	46,30	74,20	6 708,50	830,10	1 778,80	492,70	1 302,60	12 476,80
01.10.2010	3Q	24	245,70	552,80	49,10	75,70	6 730,70	25,30	1 539,30	558,90	920,10	10 697,60
01.01.2011	4Q	25	215,00	548,50	58,40	77,80	6 825,30	25,40	1 577,90	577,20	809,90	10 715,40
01.04.2011	1Q	26	197,20	486,40	59,40	72,50	7 238,90	25,00	1 571,10	571,60	846,90	11 069,00
01.07.2011	2Q	27	167,50	478,00	62,20	65,10	7 411,90	1,70	1 639,30	607,70	868,90	11 302,30
01.10.2011	3Q	28	110,80	422,10	64,90	63,20	7 847,50	1,80	1 566,30	537,40	1 011,10	11 625,10
01.01.2012	4Q	29	106,40	491,30	72,20	54,90	7 797,60	1,50	1 498,10	497,00	997,30	11 516,30
01.04.2012	1Q	30	131,50	468,60	70,70	51,80	8 338,10	1,20	1 446,30	612,00	1 015,80	12 136,00
01.07.2012	2Q	31	156,00	464,00	70,80	39,60	8 460,40	1,20	2 143,30	677,40	1 049,70	13 062,40
01.10.2012	3Q	32	186,40	443,70	77,90	40,00	8 286,30	0,80	2 156,80	652,30	1 131,00	12 975,20
01.01.2013	4Q	33	161,90	263,30	317,70	33,80	8 532,80	0,60	996,50	640,00	926,10	11 872,70
01.04.2013	1Q	34	187,90	357,10	327,70	27,50	9 351,80	0,60	1 069,90	550,50	713,30	12 586,30
01.07.2013	2Q	35	256,90	320,50	327,50	13,80	9 756,30	0,60	992,60	625,40	765,00	13 058,60
01.10.2013	3Q	36	262,60	246,20	325,80	22,00	9 825,70	0,60	1 021,00	649,10	809,70	13 162,70
01.01.2014	4Q	37	283,00	235,10	325,70	24,80	9 844,90	0,70	978,20	804,30	887,40	13 384,10
01.04.2014	1Q	38	276,70	492,50	325,00	26,00	10 976,80	0,80	1 030,80	774,60	897,40	14 800,60
01.07.2014	2Q	39	323,00	635,00	336,00	28,40	11 288,30	0,80	995,40	732,60	927,40	15 266,90
01.10.2014	3Q	40	357,80	487,00	409,30	25,80	11 505,40	0,80	1 001,10	642,70	1 005,30	15 435,20
01.01.2015	4Q	41	384,40	567,40	399,80	25,70	11 351,00	-	1 215,10	860,30	1 075,90	15 879,60
01.04.2015	1Q	42	325,00	607,30	413,80	30,70	10 926,10	1 319,10	2 896,70	854,60	- 1 896,60	15 476,70
01.07.2015	2Q	43	446,40	643,40	178,30	32,60	11 397,50	-	1 510,90	71,40	1 020,90	15 301,40
01.10.2015	3Q	44	334,10	651,30	187,20	39,10	13 886,30	-	1 972,70	193,70	1 395,00	18 659,40
01.01.2016	4Q	45	501,70	806,50	162,00	46,30	15 605,10	-	2 100,90	210,60	1 856,80	21 289,90
01.04.2016	1Q	46	483,60	714,90	229,10	39,00	15 985,10	-	2 117,00	115,90	1 682,80	21 367,40
01.07.2016	2Q	47	535,00	707,80	241,60	36,30	16 355,80	-	1 974,80	174,10	1 760,90	21 786,30
01.10.2016	3Q	48	480,70	737,80	239,10	35,10	17 039,80	-	1 937,60	182,90	1 685,00	22 338,00
01.01.2017	4Q	49	418,30	956,40	227,50	52,50	17 268,60	-	1 778,10	432,70	1 582,20	22 716,30
01.04.2017	1Q	50	393,90	1 279,90	221,90	50,40	16 621,70	-	1 572,70	426,10	1 531,40	22 098,00
01.07.2017	2Q	51	378,10	1 451,70	219,40	59,90	16 816,90	-	1 408,00	411,60	1 403,10	22 148,70
01.10.2017	3Q	52	315,20	859,90	145,20	60,80	17 310,00	-	1 365,70	192,10	1 322,10	21 571,00
01.01.2018	4Q	53	315,60	608,90	150,60	54,00	16 680,50	-	1 321,10	406,00	1 592,80	21 129,50
01.04.2018	1Q	54	292,90	620,80	170,20	44,80	16 443,80	-	1 311,20	318,10	1 489,30	20 691,10
01.07.2018	2Q	55	314,40	622,70	168,50	62,10	16 874,90	-	1 228,00	362,10	1 578,00	21 210,70

01.10.2018	3Q	56	249,30	795,60	158,70	68,00	16 639,40	-	1 431,10	410,60	1 875,30	21 628,00
01.01.2019	4Q	57	254,10	815,40	148,50	67,60	17 043,00	-	1 665,10	335,40	1 894,30	22 223,40
01.04.2019	1Q	58	202,20	576,20	142,10	54,50	16 657,60	-	1 769,60	136,00	1 978,70	21 516,90
01.07.2019	2Q	59	278,60	573,70	142,90	46,40	16 645,70	-	1 819,90	525,20	2 189,20	22 221,60
01.10.2019	3Q	60	254,00	562,60	184,30	49,60	16 982,10	-	1 877,70	518,70	2 394,40	22 823,40
01.01.2020	4Q	61	206,20	677,80	195,40	25,90	17 977,00	-	1 798,10	360,90	1 920,20	23 161,50
01.04.2020	1Q	62	216,90	661,60	195,10	53,70	19 163,50	-	1 899,30	433,60	2 306,00	24 929,70
01.07.2020	2Q	63	234,70	692,00	246,60	49,70	19 297,70	-	1 832,50	322,90	2 087,40	24 763,50
01.10.2020	3Q	64	235,80	660,70	251,90	49,80	20 639,60	-	1 874,70	247,60	2 248,10	26 208,20
01.01.2021	4Q	65	234,30	572,30	262,90	55,90	21 559,20	-	31,10	330,10	4 171,40	27 217,20

Appendix 3.

GDP and economic employed population of Kazakhstan in the period from 2004 to 2020.

Period	#	Gross domestic product by production method	Employed population
2004	1	5 870 134,30	7 181,80
2005	2	7 590 593,50	7 261,00
2006	3	10 213 731,20	7 403,50
2007	4	12 849 794,00	7 631,10
2008	5	16 052 919,20	7 857,20
2009	6	17 007 647,00	7 903,40
2010	7	21 815 517,00	8 114,20
2011	8	28 243 052,70	8 301,60
2012	9	31 015 186,60	8 507,10
2013	10	35 999 025,10	8 570,60
2014	11	39 675 832,90	8 510,10
2015	12	40 884 133,60	8 433,30
2016	13	46 971 150,00	8 553,40
2017	14	54 378 857,80	8 585,20
2018	15	61 819 536,40	8 695,00
2019	16	69 532 626,50	8 780,80
2020	17	70 134 099,80	8 744,50

Appendix 4.
Regression interbank deposits.

Y bar	1 980,78
X bar	258,14
$\sum$(X - X bar)^2	724 866,11
$\sum$(X - X bar)(Y - Y bar)	4 586 441,59
b_2	6,33
b_1	347,47

Y	X1	(X - X bar)	(Y - Y bar)	(X - X bar)(Y - Y bar)	(X - X bar)^2	(Y - Y bar)^2	Model
204,90	79,10	-179,04	-1 775,88	317 947,43	32 054,22	3 153 736,66	847,96
192,20	80,30	-177,84	-1 788,58	318 074,91	31 625,97	3 199 005,21	855,55
228,50	113,10	-145,04	-1 752,28	254 144,76	21 035,71	3 070 472,26	1 063,08
244,70	120,50	-137,64	-1 736,08	238 948,20	18 943,92	3 013 960,95	1 109,91
331,20	185,10	-73,04	-1 649,58	120 479,98	5 334,39	2 721 101,99	1 518,65
359,30	178,70	-79,44	-1 621,48	128 805,09	6 310,22	2 629 185,42	1 478,16
370,50	138,30	-119,84	-1 610,28	192 970,56	14 360,89	2 592 989,79	1 222,53
723,20	148,40	-109,74	-1 257,58	138 002,55	12 042,19	1 581 498,17	1 286,44
980,70	257,60	-0,54	-1 000,08	536,96	0,29	1 000 152,62	1 977,38
821,90	217,50	-40,64	-1 158,88	47 093,17	1 651,36	1 342 994,30	1 723,65
1 048,30	299,30	41,16	-932,48	-38 383,59	1 694,40	869 512,06	2 241,23
1 127,40	290,20	32,06	-853,38	-27 361,87	1 028,04	728 251,12	2 183,65
1 013,90	319,90	61,76	-966,88	-59 717,26	3 814,68	934 849,79	2 371,57
1 060,80	358,90	100,76	-919,98	-92 699,64	10 153,20	846 356,41	2 618,33
983,70	361,60	103,46	-997,08	-103 160,58	10 704,61	994 161,16	2 635,42
933,50	255,00	-3,14	-1 047,28	3 285,23	9,84	1 096 787,66	1 960,93
820,20	319,00	60,86	-1 160,58	-70 636,25	3 704,31	1 346 937,37	2 365,87
1 102,20	117,80	-140,34	-878,58	123 296,70	19 694,45	771 896,33	1 092,82
941,50	140,50	-117,64	-1 039,28	122 257,27	13 838,45	1 080 095,24	1 236,45
1 258,90	126,20	-131,94	-721,88	95 242,14	17 407,35	521 105,40	1 145,97
1 037,00	237,00	-21,14	-943,78	19 948,53	446,77	890 713,72	1 847,04
964,50	295,70	37,56	-1 016,28	-38 174,47	1 410,98	1 032 817,53	2 218,45
1 142,90	227,50	-30,64	-837,88	25 669,95	938,62	702 036,71	1 786,93
871,50	245,70	-12,44	-1 109,28	13 795,98	154,68	1 230 493,93	1 902,08
863,70	215,00	-43,14	-1 117,08	48 187,23	1 860,79	1 247 859,48	1 707,84
979,90	197,20	-60,94	-1 000,88	60 990,32	3 713,31	1 001 753,38	1 595,21
964,00	167,50	-90,64	-1 016,78	92 157,48	8 215,05	1 033 834,06	1 407,29
1 445,80	110,80	-147,34	-534,98	78 821,76	21 708,17	286 199,65	1 048,53
1 396,40	106,40	-151,74	-584,38	88 671,46	23 024,09	341 495,67	1 020,69
1 566,96	131,50	-126,64	-413,82	52 404,42	16 036,91	171 243,94	1 179,51
2 025,30	156,00	-102,14	44,52	-4 547,51	10 431,95	1 982,36	1 334,53
1 500,90	186,40	-71,74	-479,88	34 424,85	5 146,19	230 281,27	1 526,88
1 479,30	161,90	-96,24	-501,48	48 260,54	9 261,55	251 478,49	1 371,86
1 876,70	187,90	-70,24	-104,08	7 310,00	4 933,23	10 831,88	1 536,37
2 019,50	256,90	-1,24	38,72	-47,90	1,53	1 499,52	1 972,95
1 904,60	262,60	4,46	-76,18	-339,98	19,92	5 802,83	2 009,02
1 953,60	283,00	24,86	-27,18	-675,69	618,17	738,55	2 138,09
2 570,60	276,70	18,56	589,82	10 948,94	344,59	347 891,99	2 098,23
2 474,80	323,00	64,86	494,02	32 043,90	4 207,22	244 059,41	2 391,18
2 343,60	357,80	99,66	362,82	36 160,13	9 932,73	131 641,03	2 611,37
2 446,70	384,40	126,26	465,92	58 828,96	15 942,36	217 084,89	2 779,68
2 212,30	325,00	66,86	231,52	15 480,39	4 470,67	53 603,22	2 403,84
2 701,60	446,40	188,26	720,82	135 704,49	35 442,99	519 586,80	3 171,97
3 571,80	334,10	75,96	1 591,02	120 859,06	5 770,39	2 531 356,39	2 461,42
3 969,20	501,70	243,56	1 988,42	484 306,59	59 322,97	3 953 828,78	3 521,87
3 271,00	483,60	225,46	1 290,22	290 897,80	50 833,60	1 664 677,18	3 407,35
3 210,60	535,00	276,86	1 229,82	340 492,77	76 653,16	1 512 466,31	3 732,57
3 385,00	480,70	222,56	1 404,22	312 528,35	49 534,32	1 971 844,18	3 389,00
3 654,50	418,30	160,16	1 673,72	268 068,74	25 652,21	2 801 351,00	2 994,18
3 052,70	393,90	135,76	1 071,92	145 527,66	18 431,61	1 149 020,40	2 839,79
3 123,20	378,10	119,96	1 142,42	137 048,66	14 391,14	1 305 131,89	2 739,82
3 609,00	315,20	57,06	1 628,22	92 911,45	3 256,19	2 651 112,39	2 341,83
3 605,50	315,60	57,46	1 624,72	93 361,62	3 302,01	2 639 727,08	2 344,36
2 815,10	292,90	34,76	834,32	29 003,66	1 208,47	696 096,02	2 200,73
3 142,90	314,40	56,26	1 162,12	65 384,65	3 165,53	1 350 531,48	2 336,77
4 277,90	249,30	-8,84	2 297,12	-20 299,51	78,09	5 276 777,26	1 924,86
3 753,40	254,10	-4,04	1 772,62	-7 155,95	16,30	3 142 194,75	1 955,23
3 505,70	202,20	-55,94	1 524,92	-85 299,54	3 128,94	2 325 392,27	1 626,85
3 426,30	278,60	20,46	1 445,52	29 579,86	418,74	2 089 538,75	2 110,25
3 206,80	254,00	-4,14	1 226,02	-5 071,97	17,11	1 503 134,09	1 954,60
3 049,70	206,20	-51,94	1 068,92	-55 516,61	2 697,44	1 142 597,86	1 652,16
4 348,30	216,90	-41,24	2 367,52	-97 629,39	1 700,48	5 605 168,43	1 719,86
3 012,40	234,70	-23,44	1 031,62	-24 178,09	549,29	1 064 247,44	1 832,48
2 976,60	235,80	-22,34	995,82	-22 243,64	498,94	991 664,83	1 839,44
3 293,20	234,30	-23,84	1 312,42	-31 284,14	568,20	1 722 455,95	1 829,95

Appendix 5.

Regression loans received from other banks and organizations performing certain types of banking operations.

Y bar	1980,78
X bar	808,63
$\sum(X - X\ bar)^2$	12422755,15
$\sum(X - X\ bar)(Y - Y\ bar)$	-6418860,61
b_2	-0,52
b_1	2398,60

Y	X2	(X - X bar)	(Y - Y bar)	(X - X bar)(Y - Y bar)	$(X - X\ bar)^2$	$(Y - Y\ bar)^2$	Model
204,90	343,90	-464,73	-1 775,88	825 298,90	215 971,83	3 153 736,66	2 220,90
192,20	351,10	-457,53	-1 788,58	818 323,19	209 331,59	3 199 005,21	2 217,18
228,50	422,10	-386,53	-1 752,28	677 303,32	149 403,66	3 070 472,26	2 180,50
244,70	444,40	-364,23	-1 736,08	632 327,07	132 661,81	3 013 960,95	2 168,97
331,20	576,80	-231,83	-1 649,58	382 417,47	53 744,08	2 721 101,99	2 100,56
359,30	667,80	-140,83	-1 621,48	228 348,77	19 832,44	2 629 185,42	2 053,54
370,50	721,80	-86,83	-1 610,28	139 816,58	7 539,05	2 592 989,79	2 025,64
723,20	925,50	116,87	-1 257,58	-146 975,85	13 659,14	1 581 498,17	1 920,39
980,70	1 414,30	605,67	-1 000,08	-605 718,53	366 838,94	1 000 152,62	1 667,82
821,90	1 365,80	557,17	-1 158,88	-645 693,79	310 440,98	1 342 994,30	1 692,88
1 048,30	1 726,20	917,57	-932,48	-855 614,44	841 938,94	869 512,06	1 506,66
1 127,40	1 713,10	904,47	-853,38	-771 855,24	818 070,16	728 251,12	1 513,43
1 013,90	1 798,20	989,57	-966,88	-956 794,02	979 253,35	934 849,79	1 469,46
1 060,80	1 815,20	1 006,57	-919,98	-926 022,68	1 013 187,81	846 356,41	1 460,68
983,70	1 701,00	892,37	-997,08	-889 763,29	796 328,34	994 161,16	1 519,69
933,50	1 577,10	768,47	-1 047,28	-804 802,84	590 549,69	1 096 787,66	1 583,71
820,20	1 450,20	641,57	-1 160,58	-744 593,62	411 615,03	1 346 937,37	1 649,27
1 102,20	1 648,40	839,77	-878,58	-737 804,05	705 217,53	771 896,33	1 546,86
941,50	1 404,10	595,47	-1 039,28	-618 860,26	354 587,27	1 080 095,24	1 673,09
1 258,90	1 369,90	561,27	-721,88	-405 169,18	315 026,60	521 105,40	1 690,77
1 037,00	1 247,10	438,47	-943,78	-413 819,78	192 257,96	890 713,72	1 754,22
964,50	1 044,00	235,37	-1 016,28	-239 203,30	55 400,12	1 032 817,53	1 859,16
1 142,90	1 016,10	207,47	-837,88	-173 836,13	43 044,76	702 036,71	1 873,57
871,50	552,80	-255,83	-1 109,28	283 783,60	65 447,81	1 230 493,93	2 112,96
863,70	548,50	-260,13	-1 117,08	290 582,48	67 666,42	1 247 859,48	2 115,18
979,90	486,40	-322,23	-1 000,88	322 510,06	103 830,69	1 001 753,38	2 147,27
964,00	478,00	-330,63	-1 016,78	336 174,40	109 314,67	1 033 834,06	2 151,61
1 445,80	422,10	-386,53	-534,98	206 783,16	149 403,66	286 199,65	2 180,50
1 396,40	491,30	-317,33	-584,38	185 438,79	100 696,86	341 495,67	2 144,74
1 566,96	468,60	-340,03	-413,82	140 709,00	115 618,83	171 243,94	2 156,47
2 025,30	464,00	-344,63	44,52	-15 344,10	118 768,25	1 982,36	2 158,85
1 500,90	443,70	-364,93	-479,88	175 120,15	133 172,22	230 281,27	2 169,34
1 479,30	263,30	-545,33	-501,48	273 468,92	297 382,29	251 478,49	2 262,55
1 876,70	357,10	-451,53	-104,08	46 993,34	203 877,26	10 831,88	2 214,08
2 019,50	320,50	-488,13	38,72	-18 902,11	238 268,64	1 499,52	2 232,99
1 904,60	246,20	-562,43	-76,18	42 843,66	316 324,91	5 802,83	2 271,38
1 953,60	235,10	-573,53	-27,18	15 586,37	328 934,01	738,55	2 277,12
2 570,60	492,50	-316,13	589,82	-186 459,60	99 936,72	347 891,99	2 144,12
2 474,80	635,00	-173,63	494,02	-85 776,19	30 146,58	244 059,41	2 070,49
2 343,60	487,00	-321,63	362,82	-116 694,15	103 444,37	131 641,03	2 146,96
2 446,70	567,40	-241,23	465,92	-112 393,70	58 190,80	217 084,89	2 105,42
2 212,30	607,30	-201,33	231,52	-46 612,13	40 532,84	53 603,22	2 084,80
2 701,60	643,40	-165,23	720,82	-119 100,04	27 300,19	519 586,80	2 066,15
3 571,80	651,30	-157,33	1 591,02	-250 312,09	24 752,00	2 531 356,39	2 062,07
3 969,20	806,50	-2,13	1 988,42	-4 230,75	4,53	3 953 828,78	1 981,88
3 271,00	714,90	-93,73	1 290,22	-120 929,69	8 784,88	1 664 677,18	2 029,21
3 210,60	707,80	-100,83	1 229,82	-124 000,28	10 166,22	1 512 466,31	2 032,87
3 385,00	737,80	-70,83	1 404,22	-99 457,92	5 016,56	1 971 844,18	2 017,37
3 654,50	956,40	147,77	1 673,72	247 330,01	21 836,65	2 801 351,00	1 904,42
3 052,70	1 279,90	471,27	1 071,92	505 167,95	222 097,59	1 149 020,40	1 737,27
3 123,20	1 451,70	643,07	1 142,42	734 661,04	413 541,99	1 305 131,89	1 648,50
3 609,00	859,90	51,27	1 628,22	83 482,79	2 628,85	2 651 112,39	1 954,28
3 605,50	608,90	-199,73	1 624,72	-324 502,31	39 891,15	2 639 727,08	2 083,98
2 815,10	620,80	-187,83	834,32	-156 709,09	35 279,24	696 096,02	2 077,83
3 142,90	622,70	-185,93	1 162,12	-216 070,98	34 569,11	1 350 531,48	2 076,85
4 277,90	795,60	-13,03	2 297,12	-29 926,22	169,72	5 276 777,26	1 987,51
3 753,40	815,40	6,77	1 772,62	12 004,75	45,86	3 142 194,75	1 977,28
3 505,70	576,20	-232,43	1 524,92	-354 434,49	54 022,63	2 325 392,27	2 100,87
3 426,30	573,70	-234,93	1 445,52	-339 593,55	55 191,02	2 089 538,75	2 102,16
3 206,80	562,60	-246,03	1 226,02	-301 635,78	60 529,63	1 503 134,09	2 107,90
3 049,70	677,80	-130,83	1 068,92	-139 844,82	17 115,89	1 142 597,86	2 048,38
4 348,30	661,60	-147,03	2 367,52	-348 091,54	21 617,14	5 605 168,43	2 056,75
3 012,40	692,00	-116,63	1 031,62	-120 315,89	13 602,02	1 064 247,44	2 041,04
2 976,60	660,70	-147,93	995,82	-147 309,90	21 882,60	991 664,83	2 057,21
3 293,20	572,30	-236,33	1 312,42	-310 162,06	55 850,78	1 722 455,95	2 102,89

Appendix 6.
Regression loans received from the Government of the Republic of Kazakhstan.

Y bar	1 980,78
X bar	137,78
$\sum(X - X\ bar)^2$	967 869,46
$\sum(X - X\ bar)(Y - Y\ bar)$	5 963 173,86
b_2	6,16
b_1	1 131,91

Y	X3	(X - X bar)	(Y - Y bar)	(X - X bar)(Y - Y bar)	$(X - X\ bar)^2$	$(Y - Y\ bar)^2$	Model
204,90	5,40	-132,38	-1 775,88	235 085,04	17 523,65	3 153 736,66	1 165,18
192,20	4,80	-132,98	-1 788,58	237 839,37	17 682,86	3 199 005,21	1 161,49
228,50	4,00	-133,78	-1 752,28	234 414,13	17 896,27	3 070 472,26	1 156,56
244,70	3,70	-134,08	-1 736,08	232 767,77	17 976,62	3 013 960,95	1 154,71
331,20	3,10	-134,68	-1 649,58	222 159,86	18 137,87	2 721 101,99	1 151,01
359,30	2,80	-134,98	-1 621,48	218 861,88	18 218,77	2 629 185,42	1 149,17
370,50	2,60	-135,18	-1 610,28	217 672,20	18 272,80	2 592 989,79	1 147,93
723,20	2,60	-135,18	-1 257,58	169 995,30	18 272,80	1 581 498,17	1 147,93
980,70	2,20	-135,58	-1 000,08	135 587,27	18 381,10	1 000 152,62	1 145,47
821,90	2,00	-135,78	-1 158,88	157 348,66	18 435,37	1 342 994,30	1 144,24
1 048,30	1,90	-135,88	-932,48	126 702,01	18 462,54	869 512,06	1 143,62
1 127,40	1,90	-135,88	-853,38	115 954,15	18 462,54	728 251,12	1 143,62
1 013,90	7,70	-130,08	-966,88	125 768,30	16 920,01	934 849,79	1 179,35
1 060,80	4,00	-133,78	-919,98	123 071,60	17 896,27	846 356,41	1 156,56
983,70	4,00	-133,78	-997,08	133 385,80	17 896,27	994 161,16	1 156,56
933,50	23,50	-114,28	-1 047,28	119 679,51	13 059,22	1 096 787,66	1 276,70
820,20	32,00	-105,78	-1 160,58	122 762,19	11 188,76	1 346 937,37	1 329,07
1 102,20	48,60	-89,18	-878,58	78 348,73	7 952,52	771 896,33	1 431,35
941,50	47,90	-89,88	-1 039,28	93 406,96	8 077,86	1 080 095,24	1 427,03
1 258,90	48,00	-89,78	-721,88	64 807,83	8 059,90	521 105,40	1 427,65
1 037,00	47,50	-90,28	-943,78	85 201,22	8 149,92	890 713,72	1 424,57
964,50	46,10	-91,68	-1 016,28	93 169,08	8 404,66	1 032 817,53	1 415,94
1 142,90	46,30	-91,48	-837,88	76 646,35	8 368,03	702 036,71	1 417,17
871,50	49,10	-88,68	-1 109,28	98 367,21	7 863,60	1 230 493,93	1 434,43
863,70	58,40	-79,38	-1 117,08	88 670,08	6 300,70	1 247 859,48	1 491,72
979,90	59,40	-78,38	-1 000,88	78 445,61	6 142,94	1 001 753,38	1 497,89
964,00	62,20	-75,58	-1 016,78	76 844,82	5 711,87	1 033 834,06	1 515,14
1 445,80	64,90	-72,88	-534,98	38 987,43	5 311,05	286 199,65	1 531,77
1 396,40	72,20	-65,58	-584,38	38 321,60	4 300,33	341 495,67	1 576,75
1 566,96	70,70	-67,08	-413,82	27 757,52	4 499,31	171 243,94	1 567,51
2 025,30	70,80	-66,98	44,52	-2 982,06	4 485,91	1 982,36	1 568,12
1 500,90	77,90	-59,88	-479,88	28 733,52	3 585,25	230 281,27	1 611,87
1 479,30	317,70	179,92	-501,48	-90 227,16	32 372,31	251 478,49	3 089,31
1 876,70	327,70	189,92	-104,08	-19 766,49	36 070,78	10 831,88	3 150,92
2 019,50	327,50	189,72	38,72	7 346,78	35 994,85	1 499,52	3 149,69
1 904,60	325,80	188,02	-76,18	-14 322,90	35 352,68	5 802,83	3 139,21
1 953,60	325,70	187,92	-27,18	-5 107,06	35 315,08	738,55	3 138,60
2 570,60	325,00	187,22	589,82	110 428,61	35 052,48	347 891,99	3 134,28
2 474,80	336,00	198,22	494,02	97 926,90	39 292,39	244 059,41	3 202,06
2 343,60	409,30	271,52	362,82	98 515,01	73 724,78	131 641,03	3 653,67
2 446,70	399,80	262,02	465,92	122 082,76	68 656,09	217 084,89	3 595,14
2 212,30	413,80	276,02	231,52	63 905,88	76 188,74	53 603,22	3 681,39
2 701,60	178,30	40,52	720,82	29 209,99	1 642,12	519 586,80	2 230,44
3 571,80	187,20	49,42	1 591,02	78 633,29	2 442,64	2 531 356,39	2 285,28
3 969,20	162,00	24,22	1 988,42	48 165,74	586,76	3 953 828,78	2 130,02
3 271,00	229,10	91,32	1 290,22	117 827,20	8 339,90	1 664 677,18	2 543,43
3 210,60	241,60	103,82	1 229,82	127 684,08	10 779,23	1 512 466,31	2 620,44
3 385,00	239,10	101,32	1 404,22	142 280,27	10 266,37	1 971 844,18	2 605,04
3 654,50	227,50	89,72	1 673,72	150 171,64	8 050,23	2 801 351,00	2 533,57
3 052,70	221,90	84,12	1 071,92	90 173,52	7 076,69	1 149 020,40	2 499,07
3 123,20	219,40	81,62	1 142,42	93 248,14	6 662,33	1 305 131,89	2 483,67
3 609,00	145,20	7,42	1 628,22	12 086,43	55,10	2 651 112,39	2 026,51
3 605,50	150,60	12,82	1 624,72	20 833,96	164,43	2 639 727,08	2 059,78
2 815,10	170,20	32,42	834,32	27 051,34	1 051,26	696 096,02	2 180,54
3 142,90	168,50	30,72	1 162,12	35 704,02	943,91	1 350 531,48	2 170,07
4 277,90	158,70	20,92	2 297,12	48 062,90	437,78	5 276 777,26	2 109,69
3 753,40	148,50	10,72	1 772,62	19 007,98	114,98	3 142 194,75	2 046,84
3 505,70	142,10	4,32	1 524,92	6 592,36	18,69	2 325 392,27	2 007,41
3 426,30	142,90	5,12	1 445,52	7 405,53	26,25	2 089 538,75	2 012,34
3 206,80	184,30	46,52	1 226,02	57 038,39	2 164,40	1 503 134,09	2 267,41
3 049,70	195,40	57,62	1 068,92	61 594,67	3 320,42	1 142 597,86	2 335,80
4 348,30	195,10	57,32	2 367,52	135 713,74	3 285,94	5 605 168,43	2 333,95
3 012,40	246,60	108,82	1 031,62	112 264,46	11 842,46	1 064 247,44	2 651,25
2 976,60	251,90	114,12	995,82	113 646,46	13 024,08	991 664,83	2 683,90
3 293,20	262,90	125,12	1 312,42	164 214,49	15 655,78	1 722 455,95	2 751,68

Appendix 7.
Regression loans received from international financial organizations.

Y bar	1 980,78
X bar	51,26
$\sum$(X - X bar)^2	43 792,00
$\sum$(X - X bar)(Y - Y bar)	-196 757,82
b_2	-4,49
b_1	2 211,08

Y	X4	(X - X bar)	(Y - Y bar)	(X - X bar)(Y - Y bar)	(X - X bar)^2	(Y - Y bar)^2	Model
204,90	19,20	-32,06	-1 775,88	56 931,86	1 027,74	3 153 736,66	2 124,82
192,20	18,50	-32,76	-1 788,58	58 591,01	1 073,12	3 199 005,21	2 127,96
228,50	16,60	-34,66	-1 752,28	60 731,20	1 201,21	3 070 472,26	2 136,50
244,70	23,80	-27,46	-1 736,08	47 669,98	753,97	3 013 960,95	2 104,15
331,20	26,50	-24,76	-1 649,58	40 840,97	612,98	2 721 101,99	2 092,02
359,30	30,20	-21,06	-1 621,48	34 145,80	443,46	2 629 185,42	2 075,39
370,50	28,70	-22,56	-1 610,28	36 325,36	508,88	2 592 989,79	2 082,13
723,20	31,00	-20,26	-1 257,58	25 476,56	410,41	1 581 498,17	2 071,80
980,70	27,40	-23,86	-1 000,08	23 860,28	569,23	1 000 152,62	2 087,97
821,90	24,90	-26,36	-1 158,88	30 546,20	694,77	1 342 994,30	2 099,21
1 048,30	26,40	-24,86	-932,48	23 179,93	617,94	869 512,06	2 092,47
1 127,40	75,80	24,54	-853,38	-20 943,17	602,29	728 251,12	1 870,51
1 013,90	85,10	33,84	-966,88	-32 720,58	1 145,25	934 849,79	1 828,73
1 060,80	87,40	36,14	-919,98	-33 249,36	1 306,21	846 356,41	1 818,39
983,70	94,20	42,94	-997,08	-42 815,99	1 843,98	994 161,16	1 787,84
933,50	87,90	36,64	-1 047,28	-38 373,82	1 342,60	1 096 787,66	1 816,15
820,20	88,90	37,64	-1 160,58	-43 685,88	1 416,89	1 346 937,37	1 811,65
1 102,20	117,40	66,14	-878,58	-58 110,39	4 374,70	771 896,33	1 683,60
941,50	119,10	67,84	-1 039,28	-70 506,10	4 602,47	1 080 095,24	1 675,96
1 258,90	108,30	57,04	-721,88	-41 176,94	3 253,74	521 105,40	1 724,49
1 037,00	98,70	47,44	-943,78	-44 774,20	2 250,70	890 713,72	1 767,62
964,50	88,50	37,24	-1 016,28	-37 847,69	1 386,93	1 032 817,53	1 813,45
1 142,90	74,20	22,94	-837,88	-19 222,17	526,31	702 036,71	1 877,70
871,50	75,70	24,44	-1 109,28	-27 112,42	597,39	1 230 493,93	1 870,96
863,70	77,80	26,54	-1 117,08	-29 648,92	704,45	1 247 859,48	1 861,52
979,90	72,50	21,24	-1 000,88	-21 260,15	451,20	1 001 753,38	1 885,34
964,00	65,10	13,84	-1 016,78	-14 073,75	191,59	1 033 834,06	1 918,59
1 445,80	63,20	11,94	-534,98	-6 388,44	142,60	286 199,65	1 927,12
1 396,40	54,90	3,64	-584,38	-2 128,03	13,26	341 495,67	1 964,41
1 566,96	51,80	0,54	-413,82	-224,10	0,29	171 243,94	1 978,34
2 025,30	39,60	-11,66	44,52	-519,08	135,92	1 982,36	2 033,16
1 500,90	40,00	-11,26	-479,88	5 402,67	126,75	230 281,27	2 031,36
1 479,30	33,80	-17,46	-501,48	8 755,00	304,80	251 478,49	2 059,22
1 876,70	27,50	-23,76	-104,08	2 472,69	564,46	10 831,88	2 087,52
2 019,50	13,80	-37,46	38,72	-1 450,53	1 403,14	1 499,52	2 149,08
1 904,60	22,00	-29,26	-76,18	2 228,80	856,06	5 802,83	2 112,23
1 953,60	24,80	-26,46	-27,18	719,04	700,05	738,55	2 099,65
2 570,60	26,00	-25,26	589,82	-14 898,04	637,99	347 891,99	2 094,26
2 474,80	28,40	-22,86	494,02	-11 292,62	522,51	244 059,41	2 083,48
2 343,60	25,80	-25,46	362,82	-9 236,93	648,13	131 641,03	2 095,16
2 446,70	25,70	-25,56	465,92	-11 908,29	653,23	217 084,89	2 095,61
2 212,30	30,70	-20,56	231,52	-4 759,77	422,65	53 603,22	2 073,15
2 701,60	32,60	-18,66	720,82	-13 449,46	348,14	519 586,80	2 064,61
3 571,80	39,10	-12,16	1 591,02	-19 344,40	147,83	2 531 356,39	2 035,40
3 969,20	46,30	-4,96	1 988,42	-9 859,52	24,59	3 953 828,78	2 003,05
3 271,00	39,00	-12,26	1 290,22	-15 816,16	150,27	1 664 677,18	2 035,85
3 210,60	36,30	-14,96	1 229,82	-18 396,27	223,76	1 512 466,31	2 047,98
3 385,00	35,10	-16,16	1 404,22	-22 690,09	261,10	1 971 844,18	2 053,38
3 654,50	52,50	1,24	1 673,72	2 077,99	1,54	2 801 351,00	1 975,20
3 052,70	50,40	-0,86	1 071,92	-920,21	0,74	1 149 020,40	1 984,63
3 123,20	59,90	8,64	1 142,42	9 872,30	74,68	1 305 131,89	1 941,95
3 609,00	60,80	9,54	1 628,22	15 535,76	91,04	2 651 112,39	1 937,91
3 605,50	54,00	2,74	1 624,72	4 454,24	7,52	2 639 727,08	1 968,46
2 815,10	44,80	-6,46	834,32	-5 388,45	41,71	696 096,02	2 009,79
3 142,90	62,10	10,84	1 162,12	12 599,21	117,54	1 350 531,48	1 932,07
4 277,90	68,00	16,74	2 297,12	38 457,38	280,28	5 276 777,26	1 905,56
3 753,40	67,60	16,34	1 772,62	28 967,40	267,05	3 142 194,75	1 907,35
3 505,70	54,50	3,24	1 524,92	4 943,10	10,51	2 325 392,27	1 966,21
3 426,30	46,40	-4,86	1 445,52	-7 023,02	23,60	2 089 538,75	2 002,61
3 206,80	49,60	-1,66	1 226,02	-2 033,31	2,75	1 503 134,09	1 988,23
3 049,70	25,90	-25,36	1 068,92	-27 106,26	643,05	1 142 597,86	2 094,71
4 348,30	53,70	2,44	2 367,52	5 780,40	5,96	5 605 168,43	1 969,81
3 012,40	49,70	-1,56	1 031,62	-1 607,75	2,43	1 064 247,44	1 987,78
2 976,60	49,80	-1,46	995,82	-1 452,37	2,13	991 664,83	1 987,33
3 293,20	55,90	4,64	1 312,42	6 091,67	21,54	1 722 455,95	1 959,92

Appendix 8.
Regression customer deposits.

Y bar	1980,78
X bar	10210,52
$\sum$(X - X bar)^2	2063937940,62
$\sum$(X - X bar)(Y - Y bar)	415935797,79
b_2	0,20
b_1	-76,90

Y	X5	(X - X bar)	(Y - Y bar)	(X - X bar)(Y - Y bar)	(X - X bar)^2	(Y - Y bar)^2	Model
204,90	1618,50	-8592,02	-1775,88	15258362,02	73822781,24	3153736,66	249,27
192,20	1832,40	-8378,12	-1788,58	14984904,18	70192868,96	3199005,21	292,37
228,50	1968,50	-8242,02	-1752,28	14442293,68	67930868,32	3070472,26	319,80
244,70	2140,10	-8070,42	-1736,08	14010862,28	65131654,14	3013960,95	354,38
331,20	2532,90	-7677,62	-1649,58	12664817,51	58945825,24	2721101,99	433,54
359,30	2835,70	-7374,82	-1621,48	11958093,41	54387947,34	2629185,42	494,56
370,50	3127,80	-7082,72	-1610,28	11405133,73	50164900,81	2592989,79	553,43
723,20	3829,60	-6380,92	-1257,58	8024491,88	40716120,41	1581498,17	694,86
980,70	4729,40	-5481,12	-1000,08	5481536,71	30042659,59	1000152,62	876,19
821,90	5511,70	-4698,82	-1158,88	5445349,39	22078894,93	1342994,30	1033,85
1048,30	6191,00	-4019,52	-932,48	3748105,73	16156528,66	869512,06	1170,74
1127,40	6267,60	-3942,92	-853,38	3364793,20	15546605,99	728251,12	1186,18
1013,90	3894,90	-6315,62	-966,88	6106421,86	39887036,55	934849,79	708,02
1060,80	4125,60	-6084,92	-919,98	5597980,82	37026232,68	846356,41	754,51
983,70	4361,40	-5849,12	-997,08	5832017,44	34212186,78	994161,16	802,03
933,50	4962,40	-5248,12	-1047,28	5496230,12	27542747,39	1096787,66	923,15
820,20	4588,10	-5622,42	-1160,58	6525245,66	31611589,36	1346937,37	847,72
1102,20	5393,10	-4817,42	-878,58	4232469,72	23207520,63	771896,33	1009,94
941,50	5369,80	-4840,72	-1039,28	5030844,01	23432555,22	1080095,24	1005,25
1258,90	6033,90	-4176,62	-721,88	3015001,91	17444141,77	521105,40	1139,08
1037,00	6003,90	-4206,62	-943,78	3970106,84	17695638,88	890713,72	1133,04
964,50	6470,30	-3740,22	-1016,28	3801095,41	13989234,14	1032817,53	1227,03
1142,90	6708,50	-3502,02	-837,88	2934258,30	12264133,30	702036,71	1275,03
871,50	6730,70	-3479,82	-1109,28	3860080,17	12109136,53	1230493,93	1279,50
863,70	6825,30	-3385,22	-1117,08	3781547,34	11459704,03	1247859,48	1298,57
979,90	7238,90	-2971,62	-1000,88	2974222,51	8830516,28	1001753,38	1381,92
964,00	7411,90	-2798,62	-1016,78	2845568,95	7832265,29	1033834,06	1416,78
1445,80	7847,50	-2363,02	-534,98	1264158,89	5583856,25	286199,65	1504,57
1396,40	7797,60	-2412,92	-584,38	1410052,38	5822175,50	341495,67	1494,51
1566,96	8338,10	-1872,42	-413,82	774837,29	3505950,90	171243,94	1603,44
2025,30	8460,40	-1750,12	44,52	-77921,74	3062914,63	1982,36	1628,08
1500,90	8286,30	-1924,22	-479,88	923386,85	3702616,69	230281,27	1593,00
1479,30	8532,80	-1677,72	-501,48	841336,06	2814739,24	251478,49	1642,67
1876,70	9351,80	-858,72	-104,08	89372,25	737397,40	10831,88	1807,72
2019,50	9756,30	-454,22	38,72	-17589,02	206314,41	1499,52	1889,24
1904,60	9825,70	-384,82	-76,18	29314,05	148085,25	5802,83	1903,23
1953,60	9844,90	-365,62	-27,18	9936,16	133676,86	738,55	1907,09
2570,60	10976,80	766,28	589,82	451971,01	587187,40	347891,99	2135,20
2474,80	11288,30	1077,78	494,02	532449,62	1161613,04	244059,41	2197,98
2343,60	11505,40	1294,88	362,82	469813,70	1676718,20	131641,03	2241,73
2446,70	11351,00	1140,48	465,92	531377,37	1300698,14	217084,89	2210,61
2212,30	10926,10	715,58	231,52	165674,08	512056,94	53603,22	2124,98
2701,60	11397,50	1186,98	720,82	855604,42	1408925,17	519586,80	2219,98
3571,80	13886,30	3675,78	1591,02	5848255,52	13511369,92	2531356,39	2721,54
3969,20	15605,10	5394,58	1988,42	10726713,74	29101509,98	3953828,78	3067,92
3271,00	15985,10	5774,58	1290,22	7450501,91	33345791,94	1664677,18	3144,50
3210,60	16355,80	6145,28	1229,82	7557612,83	37764485,19	1512466,31	3219,21
3385,00	17039,80	6829,28	1404,22	9589838,94	46639086,33	1971844,18	3357,05
3654,50	17268,60	7058,08	1673,72	11813278,29	49816515,00	2801351,00	3403,16
3052,70	16621,70	6411,18	1071,92	6872297,39	41103248,72	1149020,40	3272,79
3123,20	16816,90	6606,38	1142,42	7547286,79	43644277,03	1305131,89	3312,13
3609,00	17310,00	7099,48	1628,22	11559544,04	50402638,11	2651112,39	3411,50
3605,50	16680,50	6469,98	1624,72	10511932,29	41860661,11	2639727,08	3284,64
2815,10	16443,80	6233,28	834,32	5200574,47	38853798,74	696096,02	3236,94
3142,90	16874,90	6664,38	1162,12	7744835,68	44413981,29	1350531,48	3323,82
4277,90	16639,40	6428,88	2297,12	14767936,10	41330517,84	5276777,26	3276,36
3753,40	17043,00	6832,48	1772,62	12111418,65	46682803,97	3142194,75	3357,69
3505,70	16657,60	6447,08	1524,92	9831307,38	41564860,36	2325392,27	3280,03
3426,30	16645,70	6435,18	1445,52	9302207,38	41411561,43	2089538,75	3277,63
3206,80	16982,10	6771,58	1226,02	8302119,40	45854316,53	1503134,09	3345,42
3049,70	17977,00	7766,48	1068,92	8301776,12	60318235,49	1142597,86	3545,92
4348,30	19163,50	8952,98	2367,52	21196395,91	80155878,43	5605168,43	3785,03
3012,40	19297,70	9087,18	1031,62	9374551,77	82576868,31	1064247,44	3812,07
2976,60	20639,60	10429,08	995,82	10385526,49	108765741,74	991664,83	4082,50
3293,20	21559,20	11348,68	1312,42	14894278,53	128792572,66	1722455,95	4267,82

Appendix 9.
Regression issued securities.

Y bar	1980,78
X bar	1224,17
$\sum$(X - X bar)^2	27692628,55
$\sum$(X - X bar)(Y - Y bar)	30537862,63
b_2	1,10
b_1	630,84

Y	X6	(X - X bar)	(Y - Y bar)	(X - X bar)(Y - Y bar)	(X - X bar)^2	(Y - Y bar)^2	Model
204,90	101,60	-1122,57	-1775,88	1993538,64	1260154,77	3153736,66	742,87
192,20	136,10	-1088,07	-1788,58	1946089,34	1183887,96	3199005,21	780,92
228,50	210,30	-1013,87	-1752,28	1776573,64	1027924,58	3070472,26	862,74
244,70	222,00	-1002,17	-1736,08	1739836,92	1004337,00	3013960,95	875,64
331,20	273,00	-951,17	-1649,58	1569021,15	904717,05	2721101,99	931,88
359,30	315,20	-908,97	-1621,48	1473867,08	826219,47	2629185,42	978,42
370,50	369,60	-854,57	-1610,28	1376087,63	730283,31	2592989,79	1038,41
723,20	388,10	-836,07	-1257,58	1051416,99	699006,61	1581498,17	1058,81
980,70	418,80	-805,37	-1000,08	805427,61	648614,64	1000152,62	1092,66
821,90	434,60	-789,57	-1158,88	915009,51	623414,71	1342994,30	1110,09
1048,30	429,10	-795,07	-932,48	741380,35	632130,19	869512,06	1104,02
1127,40	462,30	-761,87	-853,38	650158,53	580440,04	728251,12	1140,63
1013,90	467,60	-756,57	-966,88	731505,89	572392,35	934849,79	1146,48
1060,80	449,90	-774,27	-919,98	712306,52	599488,08	846356,41	1126,96
983,70	443,40	-780,77	-997,08	778483,43	609595,79	994161,16	1119,79
933,50	445,70	-778,47	-1047,28	815269,16	606009,55	1096787,66	1122,33
820,20	375,10	-849,07	-1160,58	985406,06	720913,33	1346937,37	1044,47
1102,20	1133,00	-91,17	-878,58	80096,42	8311,27	771896,33	1880,24
941,50	1309,40	85,23	-1039,28	-88581,52	7264,81	1080095,24	2074,77
1258,90	1322,60	98,43	-721,88	-71057,06	9689,22	521105,40	2089,32
1037,00	1307,60	83,43	-943,78	-78742,89	6961,21	890713,72	2072,78
964,50	1843,50	619,33	-1016,28	-629414,31	383574,41	1032817,53	2663,74
1142,90	1778,80	554,63	-837,88	-464714,56	307618,70	702036,71	2592,40
871,50	1539,30	315,13	-1109,28	-349570,51	99309,34	1230493,93	2328,29
863,70	1577,90	353,73	-1117,08	-395147,70	125127,63	1247859,48	2370,85
979,90	1571,10	346,93	-1000,88	-347237,87	120363,09	1001753,38	2363,36
964,00	1639,30	415,13	-1016,78	-422098,26	172336,11	1033834,06	2438,56
1445,80	1566,30	342,13	-534,98	-183033,50	117055,57	286199,65	2358,06
1396,40	1498,10	273,93	-584,38	-160080,45	75039,75	341495,67	2282,86
1566,96	1446,30	222,13	-413,82	-91922,61	49343,45	171243,94	2225,73
2025,30	2143,30	919,13	44,52	40923,23	844807,03	1982,36	2994,35
1500,90	2156,80	932,63	-479,88	-447548,89	869805,89	230281,27	3009,23
1479,30	996,50	-227,67	-501,48	114169,18	51831,88	251478,49	1729,72
1876,70	1069,90	-154,27	-104,08	16055,45	23798,05	10831,88	1810,66
2019,50	992,60	-231,57	38,72	-8967,10	53622,88	1499,52	1725,42
1904,60	1021,00	-203,17	-76,18	15476,45	41276,49	5802,83	1756,74
1953,60	978,20	-245,97	-27,18	6684,45	60499,35	738,55	1709,54
2570,60	1030,80	-193,37	589,82	-114051,94	37390,47	347891,99	1767,54
2474,80	995,40	-228,77	494,02	-113015,90	52333,95	244059,41	1728,51
2343,60	1001,10	-223,07	362,82	-80933,69	49758,51	131641,03	1734,79
2446,70	1215,10	-9,07	465,92	-4224,14	82,20	217084,89	1970,78
2212,30	2896,70	1672,53	231,52	387231,21	2797369,47	53603,22	3825,15
2701,60	1510,90	286,73	720,82	206684,55	82216,30	519586,80	2296,97
3571,80	1972,70	748,53	1591,02	1190935,08	560302,92	2531356,39	2806,22
3969,20	2100,90	876,73	1988,42	1743318,35	768662,24	3953828,78	2947,59
3271,00	2117,00	892,83	1290,22	1151955,38	797152,28	1664677,18	2965,34
3210,60	1974,80	750,63	1229,82	923147,29	563451,17	1512466,31	2808,53
3385,00	1937,60	713,43	1404,22	1001820,71	508987,85	1971844,18	2767,51
3654,50	1778,10	553,93	1673,72	927132,20	306842,71	2801351,00	2591,62
3052,70	1572,70	348,53	1071,92	373601,69	121475,84	1149020,40	2365,12
3123,20	1408,00	183,83	1142,42	210016,14	33794,88	1305131,89	2183,50
3609,00	1365,70	141,53	1628,22	230448,76	20031,83	2651112,39	2136,85
3605,50	1321,10	96,93	1624,72	157490,72	9396,17	2639727,08	2087,67
2815,10	1311,20	87,03	834,32	72614,40	7574,89	696096,02	2076,75
3142,90	1228,00	3,83	1162,12	4455,40	14,70	1350531,48	1985,00
4277,90	1431,10	206,93	2297,12	475352,64	42821,62	5276777,26	2208,97
3753,40	1665,10	440,93	1772,62	781609,78	194422,66	3142194,75	2467,01
3505,70	1769,60	545,43	1524,92	831744,99	297498,08	2325392,27	2582,25
3426,30	1819,90	595,73	1445,52	861147,39	354898,82	2089538,75	2637,72
3206,80	1877,70	653,53	1226,02	801247,98	427106,49	1503134,09	2701,46
3049,70	1798,10	573,93	1068,92	613491,49	329400,06	1142597,86	2613,68
4348,30	1899,30	675,13	2367,52	1598395,38	455805,71	5605168,43	2725,28
3012,40	1832,50	608,33	1031,62	627571,61	370070,07	1064247,44	2651,61
2976,60	1874,70	650,53	995,82	647817,02	423194,28	991664,83	2698,15
3293,20	31,10	-1193,07	1312,42	-1565808,29	1423406,85	1722455,95	665,13

Appendix 10.
Regression securities repo transactions.

Y bar	1980,78
X bar	398,15
$\sum$(X - X bar)^2	3106931,82
$\sum$(X - X bar)(Y - Y bar)	1420998,26
b_2	0,46
b_1	1798,68

Y	X7	(X - X bar)	(Y - Y bar)	(X - X bar)(Y - Y bar)	(X - X bar)^2	(Y - Y bar)^2	Model
204,90	72,20	-325,95	-1775,88	578848,25	106243,90	3153736,66	1831,70
192,20	28,60	-369,55	-1788,58	660969,75	136567,77	3199005,21	1811,76
228,50	67,80	-330,35	-1752,28	578865,83	109131,63	3070472,26	1829,69
244,70	63,70	-334,45	-1736,08	580632,06	111857,32	3013960,95	1827,81
331,20	163,50	-234,65	-1649,58	387074,35	55060,98	2721101,99	1873,46
359,30	72,80	-325,35	-1621,48	527548,56	105853,12	2629185,42	1831,97
370,50	137,90	-260,25	-1610,28	419075,65	67730,46	2592989,79	1861,75
723,20	113,10	-285,05	-1257,58	358473,09	81253,94	1581498,17	1850,40
980,70	530,00	131,85	-1000,08	-131859,29	17384,22	1000152,62	2041,08
821,90	313,80	-84,35	-1158,88	97752,11	7115,05	1342994,30	1942,20
1048,30	494,40	96,25	-932,48	-89750,13	9263,91	869512,06	2024,80
1127,40	332,80	-65,35	-853,38	55768,80	4270,72	728251,12	1950,89
1013,90	245,40	-152,75	-966,88	147691,10	23332,80	934849,79	1910,91
1060,80	144,60	-253,55	-919,98	233260,70	64287,99	846356,41	1864,81
983,70	157,50	-240,65	-997,08	239947,18	57912,79	994161,16	1870,71
933,50	170,40	-227,75	-1047,28	238517,98	51870,41	1096787,66	1876,61
820,20	269,10	-129,05	-1160,58	149773,27	16654,10	1346937,37	1921,75
1102,20	353,30	-44,85	-878,58	39404,82	2011,59	771896,33	1960,26
941,50	484,40	86,25	-1039,28	-89636,78	7438,93	1080095,24	2020,22
1258,90	510,00	111,85	-721,88	-80741,31	12510,25	521105,40	2031,93
1037,00	534,70	136,55	-943,78	-128871,93	18645,69	890713,72	2043,23
964,50	583,20	185,05	-1016,28	-188061,15	34243,22	1032817,53	2065,41
1142,90	492,70	94,55	-837,88	-79220,56	8939,56	702036,71	2024,02
871,50	558,90	160,75	-1109,28	-178315,31	25840,32	1230493,93	2054,30
863,70	577,20	179,05	-1117,08	-200011,65	32058,63	1247859,48	2062,67
979,90	571,60	173,45	-1000,88	-173601,23	30084,64	1001753,38	2060,11
964,00	607,70	209,55	-1016,78	-213064,69	43910,88	1033834,06	2076,62
1445,80	537,40	139,25	-534,98	-74495,04	19390,35	286199,65	2044,46
1396,40	497,00	98,85	-584,38	-57765,15	9771,17	341495,67	2025,99
1566,96	612,00	213,85	-413,82	-88494,30	45731,49	171243,94	2078,58
2025,30	677,40	279,25	44,52	12433,21	77980,13	1982,36	2108,49
1500,90	652,30	254,15	-479,88	-121960,19	64591,83	230281,27	2097,01
1479,30	640,00	241,85	-501,48	-121281,66	58491,05	251478,49	2091,39
1876,70	550,50	152,35	-104,08	-15855,95	23210,29	10831,88	2050,46
2019,50	625,40	227,25	38,72	8799,93	51642,21	1499,52	2084,71
1904,60	649,10	250,95	-76,18	-19116,39	62975,52	5802,83	2095,55
1953,60	804,30	406,15	-27,18	-11037,64	164957,20	738,55	2166,53
2570,60	774,60	376,45	589,82	222038,68	141714,02	347891,99	2152,95
2474,80	732,60	334,45	494,02	165225,84	111856,29	244059,41	2133,74
2343,60	642,70	244,55	362,82	88728,25	59804,33	131641,03	2092,62
2446,70	860,30	462,15	465,92	215326,28	213581,91	217084,89	2192,15
2212,30	854,60	456,45	231,52	105678,81	208345,90	53603,22	2189,54
2701,60	71,40	-326,75	720,82	-235529,70	106766,07	519586,80	1831,33
3571,80	193,70	-204,45	1591,02	-325286,02	41800,12	2531356,39	1887,27
3969,20	210,60	-187,55	1988,42	-372930,39	35175,29	3953828,78	1895,00
3271,00	115,90	-282,25	1290,22	-364166,63	79665,50	1664677,18	1851,69
3210,60	174,10	-224,05	1229,82	-275542,94	50198,75	1512466,31	1878,30
3385,00	182,90	-215,25	1404,22	-302260,23	46332,89	1971844,18	1882,33
3654,50	432,70	34,55	1673,72	57825,87	1193,65	2801351,00	1996,58
3052,70	426,10	27,95	1071,92	29959,44	781,16	1149020,40	1993,56
3123,20	411,60	13,45	1142,42	15364,72	180,88	1305131,89	1986,93
3609,00	192,10	-206,05	1628,22	-335496,74	42456,92	2651112,39	1886,54
3605,50	406,00	7,85	1624,72	12752,83	61,61	2639727,08	1984,37
2815,10	318,10	-80,05	834,32	-66788,25	6408,13	696096,02	1944,16
3142,90	362,10	-36,05	1162,12	-41895,45	1299,66	1350531,48	1964,29
4277,90	410,60	12,45	2297,12	28597,42	154,98	5276777,26	1986,47
3753,40	335,40	-62,75	1772,62	-111233,50	3937,66	3142194,75	1952,08
3505,70	136,00	-262,15	1524,92	-399759,92	68723,03	2325392,27	1860,88
3426,30	525,20	127,05	1445,52	183652,67	16141,51	2089538,75	2038,88
3206,80	518,70	120,55	1226,02	147796,21	14532,12	1503134,09	2035,91
3049,70	360,90	-37,25	1068,92	-39818,23	1387,62	1142597,86	1963,74
4348,30	433,60	35,45	2367,52	83926,89	1256,65	5605168,43	1996,99
3012,40	322,90	-75,25	1031,62	-77630,48	5662,68	1064247,44	1946,36
2976,60	247,60	-150,55	995,82	-149922,02	22665,53	991664,83	1911,92
3293,20	330,10	-68,05	1312,42	-89311,44	4630,91	1722455,95	1949,65

Appendix 11.
Regression other liabilities.

Y bar	1980,78
X bar	1169,57
$\sum(X - X\ bar)^2$	36716615,31
$\sum(X - X\ bar)(Y - Y\ bar)$	37190116,39
b_2	1,01
b_1	796,12

Y	X8	(X - X bar)	(Y - Y bar)	(X - X bar)(Y - Y bar)	$(X - X\ bar)^2$	$(Y - Y\ bar)^2$	Model
204,90	176,30	-993,27	-964,67	958179,28	986586,82	930589,69	974,70
192,20	216,40	-953,17	-977,37	931601,25	908534,52	955253,62	1015,31
228,50	229,90	-939,67	-941,07	884296,69	882981,15	885614,19	1028,99
244,70	301,70	-867,87	-924,87	802668,31	753199,67	855385,94	1101,71
331,20	312,50	-857,07	-838,37	718543,08	734570,30	702865,55	1112,65
359,30	406,80	-762,77	-810,27	618050,86	581819,25	656538,72	1208,17
370,50	435,70	-733,87	-799,07	586414,68	538566,31	638514,09	1237,44
723,20	514,60	-654,97	-446,37	292359,81	428986,71	199246,86	1317,36
980,70	621,90	-547,67	-188,87	103439,00	299943,27	35672,17	1426,04
821,90	750,60	-418,97	-347,67	145663,89	175536,51	120874,96	1556,40
1048,30	825,20	-344,37	-121,27	41762,11	118591,23	14706,60	1631,96
1127,40	985,70	-183,87	-42,17	7753,97	33808,46	1778,37	1794,53
1013,90	908,90	-260,67	-155,67	40578,82	67949,25	24233,39	1716,74
1060,80	921,00	-248,57	-108,77	27037,23	61787,43	11831,08	1729,00
983,70	990,00	-179,57	-185,87	33376,96	32245,66	34547,94	1798,89
933,50	1110,50	-59,07	-236,07	13944,88	3489,36	55729,41	1920,94
820,20	1034,10	-135,47	-349,37	47329,53	18352,33	122059,93	1843,56
1102,20	1205,60	36,03	-67,37	-2427,32	1298,11	4538,82	2017,27
941,50	1213,80	44,23	-228,07	-10087,39	1956,22	52016,28	2025,58
1258,90	1320,50	150,93	89,33	13482,39	22779,63	7979,71	2133,65
1037,00	1264,70	95,13	-132,57	-12611,36	9049,57	17575,01	2077,13
964,50	1246,20	76,63	-205,07	-15714,42	5872,04	42054,02	2058,39
1142,90	1302,60	133,03	-26,67	-3547,99	17696,78	711,33	2115,52
871,50	920,10	-249,47	-298,07	74359,94	62235,66	88846,18	1728,09
863,70	809,90	-359,67	-305,87	110012,77	129363,06	93556,93	1616,47
979,90	846,90	-322,67	-189,67	61201,21	104116,43	35975,00	1653,94
964,00	868,90	-300,67	-205,57	61809,12	90402,91	42259,34	1676,23
1445,80	1011,10	-158,47	276,23	-43774,26	25112,98	76302,59	1820,26
1396,40	997,30	-172,27	226,83	-39076,05	29677,22	51451,50	1806,28
1566,96	1015,80	-153,77	397,39	-61106,85	23645,45	157918,20	1825,02
2025,30	1049,70	-119,87	855,73	-102576,92	14369,00	732272,52	1859,36
1500,90	1131,00	-38,57	331,33	-12779,62	1487,70	109779,06	1941,71
1479,30	926,10	-243,47	309,73	-75410,01	59278,02	95932,20	1734,17
1876,70	713,30	-456,27	707,13	-322642,40	208183,01	500031,75	1518,62
2019,50	765,00	-404,57	849,93	-343856,52	163677,51	722379,70	1570,99
1904,60	809,70	-359,87	735,03	-264515,53	129506,97	540267,97	1616,26
1953,60	887,40	-282,17	784,03	-221230,13	79620,34	614701,83	1694,97
2570,60	897,40	-272,17	1401,03	-381319,20	74076,93	1962882,91	1705,10
2474,80	927,40	-242,17	1305,23	-316088,37	58646,68	1703623,34	1735,48
2343,60	1005,30	-164,27	1174,03	-192858,68	26984,89	1378344,63	1814,39
2446,70	1075,90	-93,67	1277,13	-119629,68	8774,21	1631059,07	1885,90
2212,30	-1896,60	-3066,17	1042,73	-3197185,89	9401403,19	1087284,25	-1124,94
2701,60	1020,90	-148,67	1532,03	-227767,96	22103,00	2347113,56	1830,19
3571,80	1395,00	225,43	2402,23	541532,69	50818,34	5770705,28	2209,11
3969,20	1856,80	687,23	2799,63	1923987,04	472284,02	7837923,83	2676,87
3271,00	1682,80	513,23	2101,43	1078514,91	263404,24	4416004,81	2500,62
3210,60	1760,90	591,33	2041,03	1206920,25	349670,26	4165800,32	2579,73
3385,00	1685,00	515,43	2215,43	1141896,98	265667,29	4908126,68	2502,85
3654,50	1582,20	412,63	2484,93	1025354,44	170262,88	6174873,28	2398,73
3052,70	1531,40	361,83	1883,13	681371,20	130920,39	3546175,70	2347,27
3123,20	1403,10	233,53	1953,63	456229,53	54535,90	3816667,17	2217,32
3609,00	1322,10	152,53	2439,43	372084,26	23265,17	5950814,97	2135,27
3605,50	1592,80	423,23	2435,93	1030956,45	179122,98	5933751,22	2409,46
2815,10	1489,30	319,73	1645,53	526123,80	102226,78	2707766,45	2304,63
3142,90	1578,00	408,43	1973,33	805965,34	166814,44	3894028,25	2394,47
4277,90	1875,30	705,73	3108,33	2193638,80	498053,75	9661710,61	2695,61
3753,40	1894,30	724,73	2583,83	1872576,57	525232,46	6676173,49	2714,85
3505,70	1978,70	809,13	2336,13	1890230,45	654690,11	5457499,78	2800,34
3426,30	2189,20	1019,63	2256,73	2301027,09	1039643,77	5092826,82	3013,55
3206,80	2394,40	1224,83	2037,23	2495257,91	1500206,64	4150302,94	3221,40
3049,70	1920,20	750,63	1880,13	1411279,96	563444,24	3534885,92	2741,09
4348,30	2306,00	1136,43	3178,73	3612400,81	1291471,40	10104319,52	3131,86
3012,40	2087,40	917,83	1842,83	1691402,54	842410,50	3396019,57	2910,44
2976,60	2248,10	1078,53	1807,03	1948933,85	1163225,30	3265354,64	3073,21
3293,20	4171,40	3001,83	2123,63	6374772,30	9010978,73	4509801,11	5021,32

Appendix 12.
Regression capital.

Y bar	1980,78
X bar	2216,89
∑(X - X bar)²	125373504,46
∑(X - X bar)(Y - Y bar)	90234150,49
b_2	0,72
b_1	385,23

Y	X9	(X - X bar)	(Y - Y bar)	(X - X bar)(Y - Y bar)	(X - X bar)²	(Y - Y bar)²	Model
204,90	346,80	-1870,09	-1775,88	3321051,26	3497242,36	3153736,66	634,83
192,20	370,40	-1846,49	-1788,58	3302591,02	3409531,00	3199005,21	651,81
228,50	429,60	-1787,29	-1752,28	3131828,62	3194411,04	3070472,26	694,42
244,70	482,40	-1734,49	-1736,08	3011209,67	3008460,90	3013960,95	732,42
331,20	587,20	-1629,69	-1649,58	2688300,55	2655894,51	2721101,99	807,85
359,30	673,80	-1543,09	-1621,48	2502086,37	2381131,50	2629185,42	870,18
370,50	770,00	-1446,89	-1610,28	2329895,16	2093495,12	2592989,79	939,42
723,20	896,70	-1320,19	-1257,58	1660241,60	1742905,70	1581498,17	1030,60
980,70	1168,60	-1048,29	-1000,08	1048371,53	1098915,15	1000152,62	1226,30
821,90	1271,00	-945,89	-1158,88	1096171,29	894710,80	1342994,30	1300,00
1048,30	1520,50	-696,39	-932,48	649368,61	484961,17	869512,06	1479,57
1127,40	1685,60	-531,29	-853,38	453391,61	282270,70	728251,12	1598,39
1013,90	1780,20	-436,69	-966,88	422226,70	190699,50	934849,79	1666,48
1060,80	1827,30	-389,59	-919,98	358414,99	151781,57	846356,41	1700,38
983,70	1972,80	-244,09	-997,08	243377,89	59580,68	994161,16	1805,10
933,50	1983,20	-233,69	-1047,28	244739,61	54611,74	1096787,66	1812,58
820,20	1953,90	-262,99	-1160,58	305221,75	69164,55	1346937,37	1791,50
1102,20	1912,40	-304,49	-878,58	267519,05	92715,10	771896,33	1761,63
941,50	-280,00	-2496,89	-1039,28	2594960,22	6234467,35	1080095,24	183,71
1258,90	-929,90	-3146,79	-721,88	2271594,26	9902296,99	521105,40	-284,04
1037,00	-917,00	-3133,89	-943,78	2957692,58	9821276,17	890713,72	-274,76
964,50	-394,30	-2611,19	-1016,28	2653692,10	6818321,25	1032817,53	101,44
1142,90	-305,80	-2522,69	-837,88	2113703,47	6363972,60	702036,71	165,14
871,50	1777,50	-439,39	-1109,28	487406,62	193064,92	1230493,93	1664,54
863,70	1832,50	-384,39	-1117,08	429394,68	147756,85	1247859,48	1704,12
979,90	1785,90	-430,99	-1000,88	431369,22	185753,71	1001753,38	1670,58
964,00	1948,00	-268,89	-1016,78	273402,55	72302,66	1033834,06	1787,25
1445,80	1946,40	-270,49	-534,98	144706,56	73165,67	286199,65	1786,10
1396,40	1961,40	-255,49	-584,38	149303,20	65275,93	341495,67	1796,89
1566,96	2066,40	-150,49	-413,82	62275,85	22647,70	171243,94	1872,46
2025,30	1707,80	-509,09	44,52	-22666,64	259174,19	1982,36	1614,37
1500,90	1780,00	-436,89	-479,88	209653,90	190874,22	230281,27	1666,34
1479,30	2072,00	-144,89	-501,48	72659,67	20993,56	251478,49	1876,49
1876,70	2164,40	-52,49	-104,08	5463,13	2755,36	10831,88	1943,00
2019,50	2124,60	-92,29	38,72	-3573,87	8517,73	1499,52	1914,35
1904,60	2228,10	11,21	-76,18	-853,82	125,63	5802,83	1988,84
1953,60	2355,80	138,91	-27,18	-3775,02	19295,56	738,55	2080,75
2570,60	2444,80	227,91	589,82	134425,81	51942,27	347891,99	2144,81
2474,80	2462,80	245,91	494,02	121484,61	60470,97	244059,41	2157,76
2343,60	2448,20	231,31	362,82	83924,19	53503,60	131641,03	2147,25
2446,70	2699,80	482,91	465,92	224998,49	233200,58	217084,89	2328,34
2212,30	2669,90	453,01	231,52	104882,19	205216,67	53603,22	2306,82
2701,60	2562,40	345,51	720,82	249050,68	119376,10	519586,80	2229,45
3571,80	2815,40	598,51	1591,02	952241,14	358212,38	2531356,39	2411,54
3969,20	3062,40	845,51	1988,42	1681229,06	714884,56	3953828,78	2589,31
3271,00	3074,40	857,51	1290,22	1106377,73	735320,76	1664677,18	2597,94
3210,60	3106,00	889,11	1229,82	1093446,65	790513,86	1512466,31	2620,69
3385,00	3242,40	1025,51	1404,22	1440043,28	1051667,60	1971844,18	2718,86
3654,50	3229,10	1012,21	1673,72	1694157,28	1024565,97	2801351,00	2709,29
3052,70	3308,30	1091,41	1071,92	1169906,59	1191172,43	1149020,40	2766,29
3123,20	3366,30	1149,41	1142,42	1313111,46	1321139,81	1305131,89	2808,03
3609,00	2961,30	744,41	1628,22	1212063,49	554143,96	2651112,39	2516,54
3605,50	3824,80	1607,91	1624,72	2612406,97	2585369,62	2639727,08	3138,02
2815,10	3769,58	1552,69	834,32	1295444,77	2410841,46	696096,02	3098,28
3142,90	3799,47	1582,58	1162,12	1839151,93	2504554,59	1350531,48	3119,79
4277,90	3667,10	1450,21	2297,12	3331308,22	2103104,58	5276777,26	3024,52
3753,40	3863,80	1646,91	1772,62	2919348,96	2712307,48	3142194,75	3166,09
3505,70	3872,80	1655,91	1524,92	2525134,05	2742032,83	2325392,27	3172,57
3426,30	3944,40	1727,51	1445,52	2497154,41	2984285,48	2089538,75	3224,10
3206,80	4189,10	1972,21	1226,02	2417974,30	3889606,22	1503134,09	3400,22
3049,70	4515,60	2298,71	1068,92	2457143,94	5284060,59	1142597,86	3635,21
4348,30	4585,50	2368,61	2367,52	5607736,65	5610306,04	5605168,43	3685,52
3012,40	4684,60	2467,71	1031,62	2545746,51	6089585,05	1064247,44	3756,84
2976,60	4549,60	2332,71	995,82	2322966,35	5441528,77	991664,83	3659,68
3293,20	4821,90	2605,01	1312,42	3418874,82	6786069,08	1722455,95	3855,66

Appendix 13.
Asset forecast by time series.

	Y bar	16495,48						
	X bar	9,00						
	∑(X - X bar)²	408,00						
	∑(X - X bar)(Y - Y bar)	651152,10						
	b_2	1595,96						
	b_1	2131,83						
	X	**Y**	**(X - X bar)**	**(Y - Y bar)**	**(X - X bar)(Y - Y bar)**	**(X - X bar)²**	**(Y - Y bar)²**	**Model**
Historical data	1	2687,50	-8,00	-13807,98	110463,81	64,00	190660214,21	3727,79
	2	4515,10	-7,00	-11980,38	83862,64	49,00	143529420,38	5323,75
	3	8872,00	-6,00	-7623,48	45740,86	36,00	58117393,50	6919,71
	4	11683,40	-5,00	-4812,08	24060,38	25,00	23156079,96	8515,67
	5	11899,30	-4,00	-4596,18	18384,71	16,00	21124838,15	10111,63
	6	11554,90	-3,00	-4940,58	14821,73	9,00	24409295,86	11707,59
	7	12038,10	-2,00	-4457,38	8914,75	4,00	19868205,00	13303,55
	8	12821,80	-1,00	-3673,68	3673,68	1,00	13495898,81	14899,52
	9	13870,30	0,00	-2625,18	0,00	0,00	6891551,50	16495,48
	10	15461,70	1,00	-1033,78	-1033,78	1,00	1068693,79	18091,44
	11	18239,30	2,00	1743,82	3487,65	4,00	3040920,50	19687,40
	12	23784,40	3,00	7288,92	21866,77	9,00	53128406,22	21283,36
	13	25561,20	4,00	9065,72	36262,89	16,00	82187343,11	22879,32
	14	24220,50	5,00	7725,02	38625,12	25,00	59675988,53	24475,28
	15	25241,00	6,00	8745,52	52473,14	36,00	76484181,80	26071,24
	16	26800,90	7,00	10305,42	72137,96	49,00	106201754,12	27667,20
	17	31171,70	8,00	14676,22	117409,79	64,00	215391537,09	29263,16
Forecast	**18**							**30859,12**
	19							**32455,08**
	20							**34051,04**
	21							**35647,00**
	22							**37242,96**
	23							**38838,93**
	24							**40434,89**
	25							**42030,85**
	26							**43626,81**
	27							**45222,77**

Appendix 14.
GDP forecast by time series.

		Y bar	33532,58						
		X bar	9,00						
		∑(X - X bar)²	408,00						
		∑(X - X bar)(Y - Y bar)	1703765,09						
		b_2	4175,89						
		b_1	-4050,47						
	X		**Y**	**(X - X bar)**	**(Y - Y bar)**	**(X - X bar)(Y - Y bar)**	**(X - X bar)²**	**(Y - Y bar)²**	**Model**
Historical data	1		5 870,13	-8,00	- 27 662,44	221 299,56	64,00	765210829,27	125,42
	2		7 590,59	-7,00	- 25 941,99	181 593,90	49,00	672986595,26	4301,31
	3		10 213,73	-6,00	- 23 318,85	139 913,08	36,00	543768647,96	8477,21
	4		12 849,79	-5,00	- 20 682,78	103 413,92	25,00	427777582,27	12653,10
	5		16 052,92	-4,00	- 17 479,66	69 918,64	16,00	305538495,66	16829,00
	6		17 007,65	-3,00	- 16 524,93	49 574,80	9,00	273073367,15	21004,89
	7		21 815,52	-2,00	- 11 717,06	23 434,12	4,00	137289534,50	25180,79
	8		28 243,05	-1,00	- 5 289,53	5 289,53	1,00	27979085,13	29356,68
	9		31 015,19	0,00	- 2 517,39	-	0,00	6337262,90	33532,58
	10		35 999,03	1,00	2 466,45	2 466,45	1,00	6083357,93	37708,47
	11		39 675,83	2,00	6 143,25	12 286,51	4,00	37739572,37	41884,37
	12		40 884,13	3,00	7 351,55	22 054,66	9,00	54045359,69	46060,26
	13		46 971,15	4,00	13 438,57	53 754,29	16,00	180595199,03	50236,16
	14		54 378,86	5,00	20 846,28	104 231,40	25,00	434567353,84	54412,05
	15		61 819,54	6,00	28 286,96	169 721,75	36,00	800151976,85	58587,95
	16		69 532,63	7,00	36 000,05	252 000,33	49,00	1296003442,79	62763,84
	17		70 134,10	8,00	36 601,52	292 812,17	64,00	1339671348,04	66939,74
Forecast	**18**								**71115,63**
	19								**75291,53**
	20								**79467,42**
	21								**83643,32**
	22								**87819,21**
	23								**91995,11**
	24								**96171,00**
	25								**100346,90**
	26								**104522,79**
	27								**108698,69**

Appendix 15.
Forecast of the economically employed population by time series.

	Y bar	8178,46						
	X bar	9,00						
	∑(X - X bar)²	408,00						
	∑(X - X bar)(Y - Y bar)	41095,22						
	b_2	100,72						
	b_1	7271,95						
	X	**Y**	**(X - X bar)**	**(Y - Y bar)**	**(X - X bar)(Y - Y bar)**	**(X - X bar)²**	**(Y - Y bar)²**	**Model**
Historical data	1	7 181,80	-8,00	- 996,66	7 973,29	64,00	993333,27	7372,67
	2	7 261,00	-7,00	- 917,46	6 422,23	49,00	841734,79	7473,40
	3	7 403,50	-6,00	- 774,96	4 649,77	36,00	600564,64	7574,12
	4	7 631,10	-5,00	- 547,36	2 736,81	25,00	299604,13	7674,84
	5	7 857,20	-4,00	- 321,26	1 285,04	16,00	103208,67	7775,57
	6	7 903,40	-3,00	- 275,06	825,18	9,00	75658,59	7876,29
	7	8 114,20	-2,00	- 64,26	128,52	4,00	4129,48	7977,01
	8	8 301,60	-1,00	123,14	- 123,14	1,00	15163,20	8077,74
	9	8 507,10	0,00	328,64	-	0,00	108003,55	8178,46
	10	8 570,60	1,00	392,14	392,14	1,00	153772,95	8279,18
	11	8 510,10	2,00	331,64	663,28	4,00	109984,39	8379,91
	12	8 433,32	3,00	254,85	764,56	9,00	64951,04	8480,63
	13	8 553,40	4,00	374,94	1 499,76	16,00	140579,21	8581,36
	14	8 585,20	5,00	406,74	2 033,69	25,00	165436,57	8682,08
	15	8 695,00	6,00	516,54	3 099,23	36,00	266812,48	8782,80
	16	8 780,80	7,00	602,34	4 216,37	49,00	362812,20	8883,53
	17	8 744,52	8,00	566,06	4 528,49	64,00	320424,99	8984,25
Forecast	**18**							**9084,97**
	19							**9185,70**
	20							**9286,42**
	21							**9387,14**
	22							**9487,87**
	23							**9588,59**
	24							**9689,31**
	25							**9790,04**
	26							**9890,76**
	27							**9991,49**