

## **Econometric Modeling and Forecasting of Factors Affecting the Credit Mechanism**

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### ***Abstract***

*Econometric models are widely used to solve various research problems in market economy and transition. In particular, commercial banks are effective in making rational decisions regarding the state of loans given to entities.*

*In this article, econometric modeling and forecasting of the factors affecting the credit mechanism is carried out and ways of their improvement are proposed.*

**Keywords:** *commercial bank, credit, credit mechanism, model, econometric modeling, correlation coefficient, multifactor econometric model, multifactor econometric model.*

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**Enter.**

Loans from commercial banks are an important source of financing the costs of technical and technological rearmament of enterprises of the real sector of the economy. On the other hand, increasing the level of use of loans from commercial banks by economic entities creates the need to improve the credit mechanism.

In the strategy of reforming the banking system of the Republic of Uzbekistan for 2020-2025, it is necessary to implement lending only on the basis of market conditions, to reduce the dependence of banks on state resources, to modernize the provision of banking services, to create an efficient infrastructure of banks and to automate their operations, to improve the management of credit portfolios and bank risks in the country's banking system. recognized as priority areas of reform [1].

This research consists in determining the growth rates of loans allocated to business entities by JSCB "UZPROMSTROYBANK" and the factors affecting this indicator, as well as econometric modeling and forecasting for the near future.

In this regard, it is important to create multi-factor econometric models for studying the factors affecting the volume of loans and their alternative forecasting by evaluating the loans allocated by JSCB "UZPROMSTROYBANK" to business entities. A multifactor econometric model helps to study the influence of a number of factors on the resulting factor.

**Literature analysis.**

The result of the research carried out by N. Valentseva showed that the possibility of reducing the interest rate on loans due to the interest margin is determined by the decrease in the cost of bank products. In this case, the general lower limit of the amount of the interest spread is considered a sufficient level of interest margin. An important condition for reducing costs in banks is the introduction of monitoring of the cost of banking products into banking practice [2].

In fact, reducing the interest rate of loans due to the interest margin leads to a decrease in the amount of net interest income of the commercial bank. However, the cost of credit products can be significantly reduced.

According to E.Litvinov, the use of the annuity method of collecting interest payments on retail loans by commercial banks leads to an increase in the burden of loan payments on individuals. Therefore, allowing individual borrowers to choose loan payment methods (differentiated or annuity) allows to strengthen the incentive content of interest rates [3].

The results of a study conducted by Dando and Skodberg on a sample of seven thousand companies showed that the evaluation of transition matrices between ratings (migration matrices) and extrapolations based on them allows for an accurate assessment of the transition to default status for high-rated credit portfolios, including low-default credit portfolios [4].

Wei and Yuan proposed a marginal distribution to determine the share of losses in case of loan default (Loss Given Default, LGD) [5]. However, a comparative analysis of the proposed approach with other approaches in the field has not been performed in this study.

According to the conclusion of D. Taschen, if the standard method of choosing the upper limits of the confidence interval is used to estimate the probability of default in the case of small correlation of assets (18%), then the optimal correction corresponds to the significance level of 50-75%, large correlation (R=24%) conditions - 75-90% corresponds to the level of significance

[6]. This is an important conclusion for practical modeling of LDP. This is because if LDP is a retail product (where the correlation is usually small), then a conservative level of significance is 75%. If LDP is not a retail segment product, then a conservative level of significance should be 90%.

The results of scientific research carried out by I. Alimardonov showed that:

➤ most small business entities do not have highly liquid collateral required by republican banks;

high interest rates of loans given to small business entities by the commercial banks of our republic at the expense of credit lines of foreign banks;

➤ methodical foundations of lending to small business entities by banks and non-bank credit organizations have not improved. In particular, the methodological bases of lending by banks are based on principles, their aspects that differ from the principles of lending to small business entities by non-bank credit organizations are not expressed in the current legal documents [6].

The procedure for assessing creditworthiness of borrowers is one of the main issues of credit relations between commercial banks and borrowers.

**Research methodology.** In the course of the research, econometric analysis methods, standard deviation coefficient, Jacque-Bera criterion for checking compliance with the normal distribution law and Skewness asymmetry coefficient were used.

#### **Research results and discussion.**

Based on the goals of the research, the following factors were selected for the multifactor econometric model: as a result factor - the amount of loans allocated by ADB "Sanoatkurilishbank", billion. soums (Y), and influencing factors - deposits, bln. soums, (X1), bank capital, bln. soums, (X2) and the volume of loans received from other banks, bln. sum (X3). (Data was obtained for the quarters of 2013-2021).

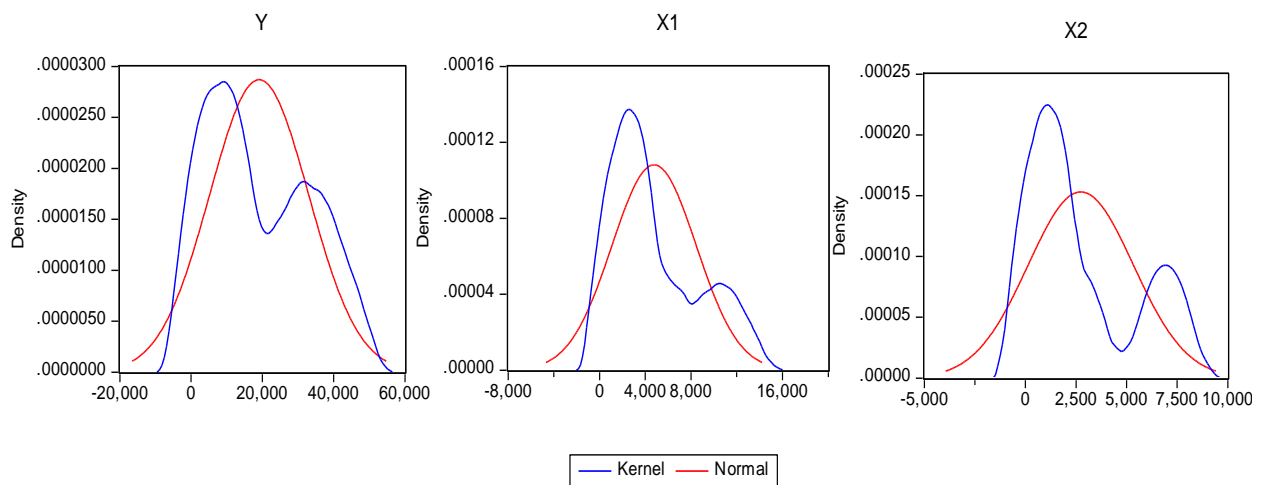
Table 1 shows the results of descriptive statistics on the factors affecting the volume of loans allocated by JSCB «UZPROMSTROYBANK».

**Table 1. Descriptive statistics on factors affecting the volume of loans allocated by JSCB «UZPROMSTROYBANK»**

|   | Y        | X1       | X2       | X3       |
|---|----------|----------|----------|----------|
| Mean (ўртача)                             | 19102.33 | 4772.778 | 2736.278 | 13316.25 |
| Median (медиана)                          | 15119.50 | 2892.500 | 1357.000 | 11596.50 |
| Maximum (максимум)                        | 43148.00 | 12607.00 | 7701.000 | 29479.00 |
| Minimum (минимум)                         | 3792.000 | 1427.000 | 359.0000 | 2472.000 |
| Std. Dev. (стандарт четланиш)             | 13903.61 | 3690.137 | 2606.779 | 9097.119 |
| Skewness (асимметрия)                     | 0.406405 | 0.913353 | 0.859095 | 0.273521 |
| Kurtosis (эксцесс)                        | 1.573346 | 2.339554 | 2.096156 | 1.463736 |
| Jarque-Bera (Жак-Бера)                    | 4.044003 | 5.659561 | 5.653665 | 3.989042 |
| Probability (эҳтимолик)                   | 0.132390 | 0.059026 | 0.059200 | 0.136079 |
| Sum (йиғинди)                             | 687684.0 | 171820.0 | 98506.00 | 479385.0 |
| SumSq. Dev. (стандарт четланиш йиғиндиси) | 6.77E+09 | 4.77E+08 | 2.38E+08 | 2.90E+09 |
| Observations (кузатувлар)                 | 36       | 36       | 36       | 36       |

The average value (mean), median (median), maximum and minimum values (maximum, minimum) of each factor can be seen from the table data. In addition, the values of the standard deviation of each factor (std. dev. (Standard Deviation) - the coefficient of standard deviation shows how much each variable deviates from the average value) are presented.

Skewness is a coefficient of asymmetry, and if it is equal to zero, it means that the distribution is normal and that the distribution is symmetrical. If this coefficient is significantly different from 0, then the distribution is asymmetric (that is, not symmetrical). If the coefficient of asymmetry is greater than 0, that is, it is positive, then the normal distribution graph for the studied factor is shifted to the right. If it is less than 0, that is, it is negative, then the normal distribution graph for the studied factor is shifted to the left. Graphs of normal distribution functions of all factors are presented in Figure 1 below.

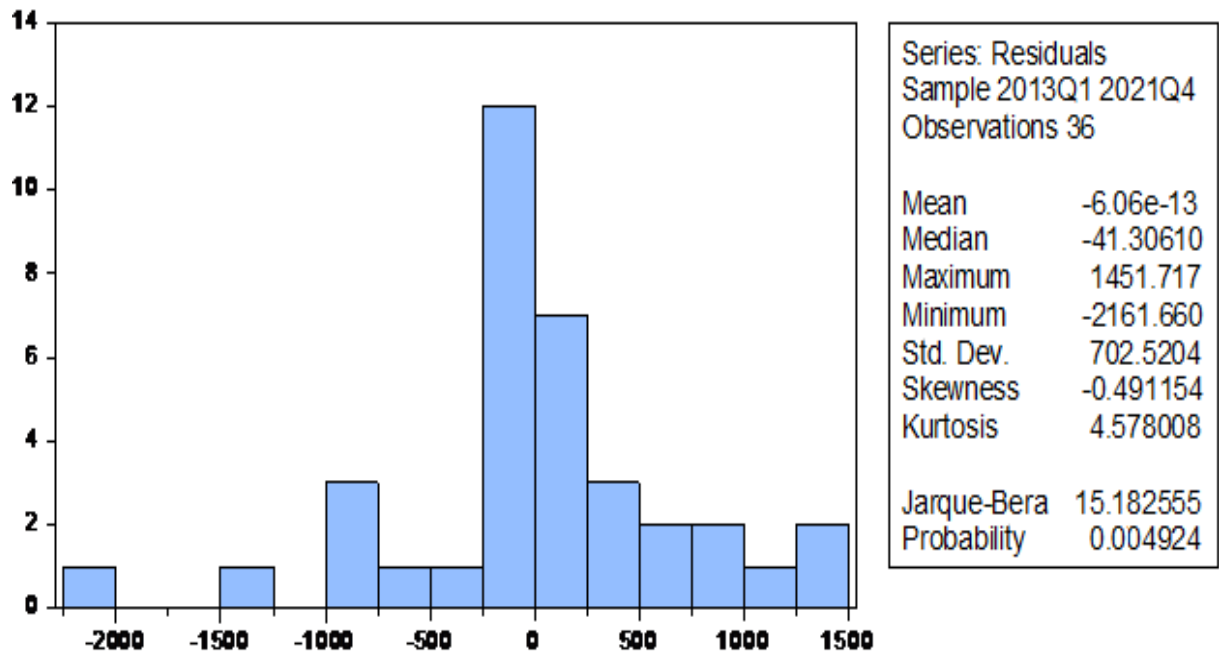


**Figure 1. Graphs of normal distribution functions of factors**

It can be seen from Figure 1 that all the factors included in the multifactor econometric model obey the normal distribution law. Since the asymmetry coefficients of all factors included in the multifactor econometric model have a positive value, the "right curve" in their graphs is longer than the "left curve", and it can be seen that the graph of the distribution function is shifted to the left.

These shifts mainly indicate changes in the dynamics of the studied factors. In some years, some factors had a sharp increase, while others did not change significantly. In general, all the studied factors obey the law of normal distribution.

A graph of the normal distribution of the resulting factor is presented in Figure 2 below.



**Figure 2. Checking whether the resulting factor obeys the normal distribution law**

The Jacques-Bera test is used to test whether the outcome factor (Y) obeys the normal distribution law. This criterion is a statistical criterion that checks the errors of the observations to the normal distribution with the moments of the third moment (asymmetry) and the fourth moment (kurtosis) and  $S = 0$  and  $K = 3$ .

From Figure 2, it can be clearly seen that the resulting factor obeys a normal distribution. This is confirmed by the calculated parameters and criteria, that is, the calculated Jacques-Bera coefficient is equal to 15.182 and its probability is less than 0.05 (prob=0.004924).

In order to select the factors for the multi-factor econometric model, which will be created according to the factors affecting the volume of loans allocated by JSCB «UZPROMSTROYBANK», it is necessary to conduct a correlation analysis between the factors. For this, special and pair correlation coefficients are calculated between the factors. The matrix of individual and pairwise correlation coefficients between the factors is presented in Table 2 below.

**Table 2. Individual and pairwise correlation coefficients between factors matrix**

|    | Y        | X1       | X2       | X3       |
|----|----------|----------|----------|----------|
| Y  | 1.000000 |          |          |          |
| X1 | 0.952710 | 1.000000 |          |          |
|    | 18.28201 | -----    |          |          |
|    | 0.0000   | -----    |          |          |
| X2 | 0.946409 | 0.584035 | 1.000000 |          |
|    | 17.08657 | 1.23953  | -----    |          |
|    | 0.0000   | 0.2010   | -----    |          |
| X3 | 0.981251 | 0.489420 | 0.437086 | 1.000000 |
|    | 29.68625 | 0.346000 | 0.613731 | -----    |
|    | 0.0000   | 0.1324   | 0.1259   | -----    |

**Covariance Analysis: Ordinary****Date: 07/22/22 Time: 10:30****Sample: 2013Q1 2021Q4****Included observations: 36****Correlation****SSCP**

Probability It can be seen from Table 2 that private correlation coefficients indicate the density of connections between the resulting factor (Y) and the factors affecting it. Therefore, private correlation coefficients show that there are various connections between the resulting factor - the amount of loans allocated by ADB "Sanoatkurilishbank" (Y) and the influencing factors.

So, the density of connection between the volume of loans (Y) and the volume of deposits (X1) of JSCB «UZPROMSTROYBANK» is equal to 0.9527. This shows that there is a strong relationship between the bank's loans and the amount of bank deposits. Similarly, there is a close connection between the amount of loans issued by JSCB «UZPROMSTROYBANK» (Y) and the amount of bank capital (X2), that is, the value of the private correlation coefficient between them is equal to 0.9464. In addition, there is a close connection between the amount of loans issued by ADB "Sanoatkurilishbank" (Y) and the amount of loans received from other banks (X3). This is because the private correlation coefficient between these two factors is equal to 0.9812.

In Table 2 above, there are also pairwise correlation coefficients, which show the correlation densities between the influencing factors (X1, X2 and X3). The most important thing here is that the influencing factors should not be closely related to each other. That is, there should be no multicollinearity between influencing factors. Multicollinearity is said to exist if the value of the pairwise correlation coefficient between two influencing factors is greater than 0.7. From the data in Table 2, it can be seen that the correlation densities between the influencing factors are not greater than 0.7, that is, the correlation between X1 and X2 is 0.5840, the correlation between X1 and X3 is 0.4894, and the correlation between X2 and X3 is 0.4371. Judging by the pairwise correlation coefficients in the correlation matrix, there is no multicollinearity between the influencing factors.

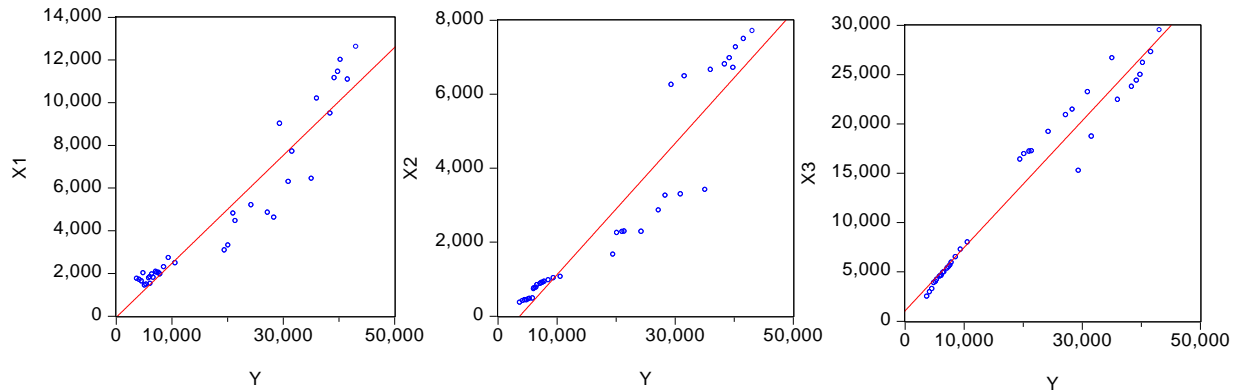
Also, in Table 2, coefficients for determining the reliability and probability of correlation coefficients were calculated (values in the rows below the calculated correlation coefficients). At the bottom of each correlation coefficient is its estimated Student's t-test value and probability. It is assumed that the calculated probability between the factors is not greater than 0.05. For example, the private correlation coefficient between the volume of loans (Y) and the volume of deposits (X1) of JSCB «UZPROMSTROYBANK» is equal to  $r_{Y,X1} = 0,9527$ ,  $t = 18,2820$  and  $prob. = 0,0000$ . This indicates that there is a strong relationship between these two factors, the private correlation coefficient is reliable, and there is a positive strong relationship between the two factors at 95 percent certainty.

Analyzing by the pair correlation coefficient, the pair correlation coefficient between the volume of bank deposits (X1) and the volume of loans received from other banks (X3) is equal to  $r_{X1,X3} = 0,4894$ ,  $t = 0,3460$  and  $prob. = 0,1324$ . This indicates that there is a weak relationship



between these two factors and that the pairwise correlation coefficient is not reliable.

In checking the above, that is, in determining the densities and forms of connections between the factors, we look at their dot graphs to determine the relationship of each factor with the resulting indicator (Y) (Figure 3).



**Figure 3. View of forms of connection between the volume of allocated loans of JSCB «UZPROMSTROYBANK» and the factors affecting it**

In the graphs of Figure 3, it can also be said visually that there are correct and tight connections between the resulting factor (Y) and the influencing (Xi) factors. Therefore, the correlation coefficients between the factors included in the multifactor econometric model for the volume of allocated loans of JSCB «UZPROMSTROYBANK» (Y) fully meet the requirements for the calculated value and probability of Student's t-criterion.

This indicates that we include all factors in the multifactor econometric model for the volume of allocated loans (Y) of JSCB «UZPROMSTROYBANK».

In general, a multifactor econometric model looks like this:

$$y = a_0 + a_1x_1 + a_2x_2 + \dots + a_nx_n + \varepsilon, \quad (1)$$

where y is the resulting factor, influencing factors, random error.

The "method of least squares" was used to determine  $a_0, a_1, a_2, \dots, a_n$  the unknown parameters in the multifactor econometric model (1).

We use the EViews program to calculate the unknown parameters of the multi-factor econometric model, which is based on the volume of allocated loans of JSCB «UZPROMSTROYBANK». The calculation results are presented in Table 3 below.

**Table 3. Parameters of the multifactor econometric model calculated on the volume of allocated loans of JSCB «UZPROMSTROYBANK» and the factors affecting it**

Dependent Variable: Y

Method: Least Squares

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Sample: 2013Q1 2021Q4

Included observations: 16

| Variable           | Coefficient | Std. Error            | t-Statistic | Prob.    |
|--------------------|-------------|-----------------------|-------------|----------|
| X1                 | 0.105395    | 0.050599              | 2.082946    | 0.0072   |
| X2                 | 1.893396    | 0.267947              | 7.066312    | 0.0000   |
| X3                 | 0.988783    | 0.029896              | 33.07458    | 0.0000   |
| C                  | 251.5659    | 266.7470              | 0.943088    | 0.3527   |
| R-squared          | 0.997447    | Mean dependent var    |             | 19102.33 |
| Adjusted R-squared | 0.997208    | S.D. dependent var    |             | 13903.61 |
| S.E. of regression | 734.7135    | Akaike info criterion |             | 16.14128 |
| Sumsquaredresid    | 17273724    | Schwarz criterion     |             | 16.31722 |
| Loglikelihood      | -286.5430   | Hannan-Quinn criter.  |             | 16.20269 |
| F-statistic        | 4167.310    | Durbin-Watson stat    |             | 1.798951 |
| Prob(F-statistic)  | 0.000000    |                       |             |          |

2.082946

Using the data of the 3rd table above, we present the multi-factor econometric model on the volume of allocated loans of JSCB «UZPROMSTROYBANK» in an analytical form:

$$\hat{Y} = 251,5659 + 0,1054X_1 + 1,8934X_2 + 0,9888X_3$$

$$(266.75) \quad (0.0505) \quad (0.2679) \quad (0.0299) \quad (2)$$

(values in parentheses indicate standard error values calculated for each factor).

The calculated multifactor econometric model shows that the volume of deposits of JSCB «UZPROMSTROYBANK» (X1) is on average one billion. increases to soums, the volume of allocated loans (Y) of JSCB «UZPROMSTROYBANK» averages 0.1054 bln. as it increases to soum. The capital size of JSCB «UZPROMSTROYBANK» (X2) is one bln. increases to soums, the volume of allocated loans of JSCB «UZPROMSTROYBANK» (Y) averages 1.8934 bln. as it increases to soum. JSCB «UZPROMSTROYBANK» loans received from other banks (X3) averaged 1 bln. increase to soums, the volume of allocated loans of JSCB «UZPROMSTROYBANK» (Y) averaged 0.9888 bln. as it increases to soum.

To check the quality of the multifactor econometric model (2) constructed on the volume of allocated loans of JSCB «UZPROMSTROYBANK», we check the coefficient of determination. The coefficient of determination shows how many percent of the resulting factor is made up of the factors included in the model. The calculated coefficient of determination (R<sup>2</sup> - R-squared (Table 3)) is equal to 0.9974. This shows that 99.74 percent (2) of the allocated loans of ADB "Sanoatkurilishbank" are made up of the factors included in the multi-factor econometric model. The remaining 0.26 percent (100.0-99.74) shows that it is the influence of factors that have not been taken into account.

The fact that the standard errors of the factors in the multi-factor econometric model (2) based on the volume of allocated loans of JSCB «UZPROMSTROYBANK» took small values also indicates that the statistical significance of the model is high.

Fisher's F-criterion is used to check the statistical significance of the multifactor econometric model (2) based on the volume of allocated loans of ATB Sanoatkurilishbank. Fisher's calculated F-criterion value is compared with its value in the table. If Fhisob>Fazdval, then the multifactor econometric model (2) is called statistically significant and it can be used to forecast the resulting indicator - the volume of allocated loans of JSCB «UZPROMSTROYBANK» (Y) for future periods.



So, we find the tabular value of the F-criterion to check the statistical significance of the multifactor econometric model (2) based on the volume of allocated loans of JSCB «UZPROMSTROYBANK». For this, we calculate the values of the degrees  $k_1 = m$   $k_2 = n - m - 1$  of freedom and  $\alpha$  the level of significance. Given the level of  $\alpha = 0,05$  significance and the degrees of freedom  $k_1 = 3$  and  $k_2 = 36 - 3 - 1 = 32$ , the table value of the F-criterion is equal to  $F_{\text{жадвал}} = 2,92$ . Based on the fact that the calculated value of the F-criterion is  $F_{\text{hisob}} = 4167.31$  and the table value is equal to  $F_{\text{jadval}} = 2.92$ , and since the condition  $F_{\text{hisob}} > F_{\text{jadval}}$  is fulfilled, the multifactor econometric model (2) can be called statistically significant and the allocated loans of JSCB «UZPROMSTROYBANK» from it can be used to forecast the volume (Y) for future periods.

The Student's t-criterion is used to check the reliability of the calculated parameters of the multifactor econometric model (2) based on the volume of allocated loans (Y) of JSCB «UZPROMSTROYBANK». By comparing the calculated (calculation) and table (table) values of Student's t-test, we accept or reject the  $H_0$  hypothesis. To do this, we find the table value of the t-criterion based on the conditions of the selected reliability probability ( $\alpha$ ) and degree of freedom (d.f. =  $n - m - 1$ ). Here  $n$  - the number of observations,  $m$  - the number of factors.

The table value of t-criterion  $t_{\text{жадвал}} = 2,03$  is equal to confidence  $\alpha = 0,05$  probability and degree d.f. =  $36 - 3 - 1 = 32$  of freedom.

It can be seen from the calculations carried out on the creation of a multifactor econometric model that the calculated values of the t-criterion for all factors included in the free extreme and multifactor  $\alpha = 0,05$  econometric model are more accurate than the table value (Table 4). This means that all factors are reliable and allows these factors to participate in a multifactor econometric model.

We use the Darbin-Watson (DW) criterion to check the presence of autocorrelation in the residuals of the resulting factor (Y) according to the multifactor econometric model (2) based on the volume of allocated loans of JSCB «UZPROMSTROYBANK».

The calculated DW value is compared with the DWL and DWU in the table. Autocorrelation is said to exist in the resulting factor residuals if  $DW_{\text{hisob}} < DWL$ . If  $DW_{\text{hisob}}$  is greater than DWU, the resulting coefficients are said to have no autocorrelation. The lower limit value of the Darbin-Watson criterion is  $DWL = 1.24$  and the upper limit value is  $DWU = 1.65$ .  $DW = 1.7989$ . Therefore, since  $DW_{\text{hisob}} > DWU$ , there is no autocorrelation in the residuals of the resulting factor (volume of allocated loans of JSCB «UZPROMSTROYBANK» (Y)).

The absence of autocorrelation in residuals of the resulting factor also indicates that the multifactor econometric model given above (2) can be used in forecasting.

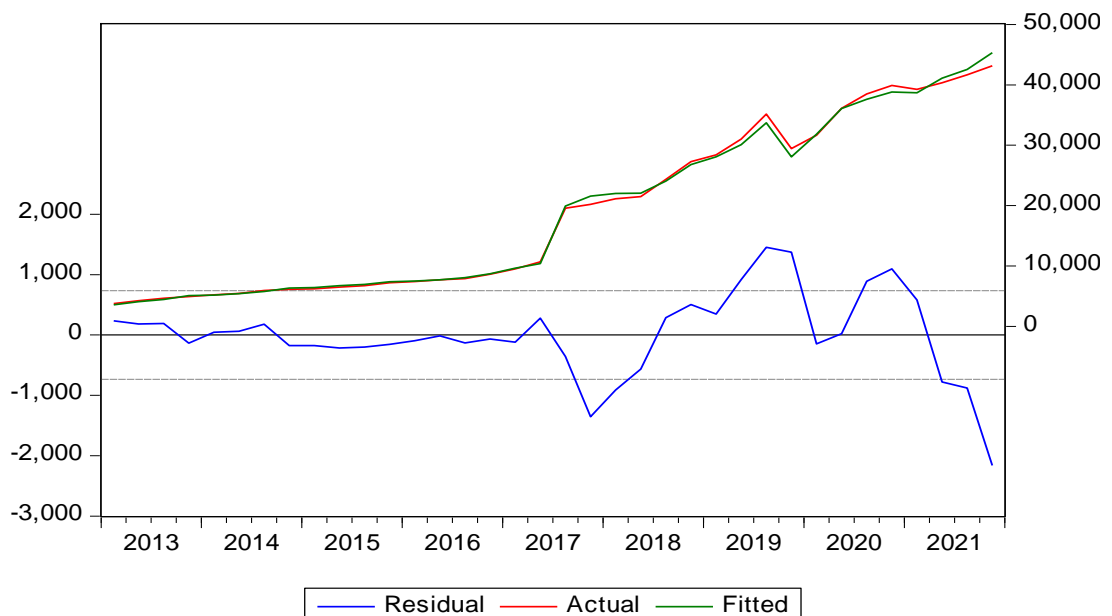
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 Sample: 2013Q1 2021Q4  
 Included observations: 36

| Autocorrelation | Partial Correlation | AC | PAC    | Q-Stat | Prob   |       |
|-----------------|---------------------|----|--------|--------|--------|-------|
|                 |                     | 1  | 0.559  | 0.559  | 12.211 | 0.000 |
|                 |                     | 2  | 0.186  | -0.184 | 13.602 | 0.001 |
|                 |                     | 3  | -0.080 | -0.151 | 13.870 | 0.003 |
|                 |                     | 4  | -0.046 | 0.162  | 13.961 | 0.007 |
|                 |                     | 5  | -0.010 | -0.045 | 13.966 | 0.016 |
|                 |                     | 6  | -0.117 | -0.229 | 14.588 | 0.024 |
|                 |                     | 7  | -0.227 | -0.072 | 17.013 | 0.017 |
|                 |                     | 8  | -0.338 | -0.185 | 22.584 | 0.004 |
|                 |                     | 9  | -0.222 | 0.045  | 25.077 | 0.003 |
|                 |                     | 10 | -0.197 | -0.192 | 27.123 | 0.002 |
|                 |                     | 11 | -0.223 | -0.210 | 29.855 | 0.002 |
|                 |                     | 12 | -0.187 | 0.051  | 31.854 | 0.001 |
|                 |                     | 13 | -0.049 | 0.034  | 31.998 | 0.002 |
|                 |                     | 14 | 0.133  | 0.003  | 33.091 | 0.003 |
|                 |                     | 15 | 0.144  | -0.081 | 34.447 | 0.003 |
|                 |                     | 16 | 0.118  | -0.004 | 35.401 | 0.004 |

**Figure 4. Testing the levels of the resulting series residuals for autocorrelation and partial autocorrelation**

From the data of Figure 4, it can be seen that multicollinearity was not detected even when each observation on the volume of allocated loans (Y) of JSCB «UZPROMSTROYBANK» and the two factors influencing it was checked for autocorrelation (AS) and partial autocorrelation (RAS).

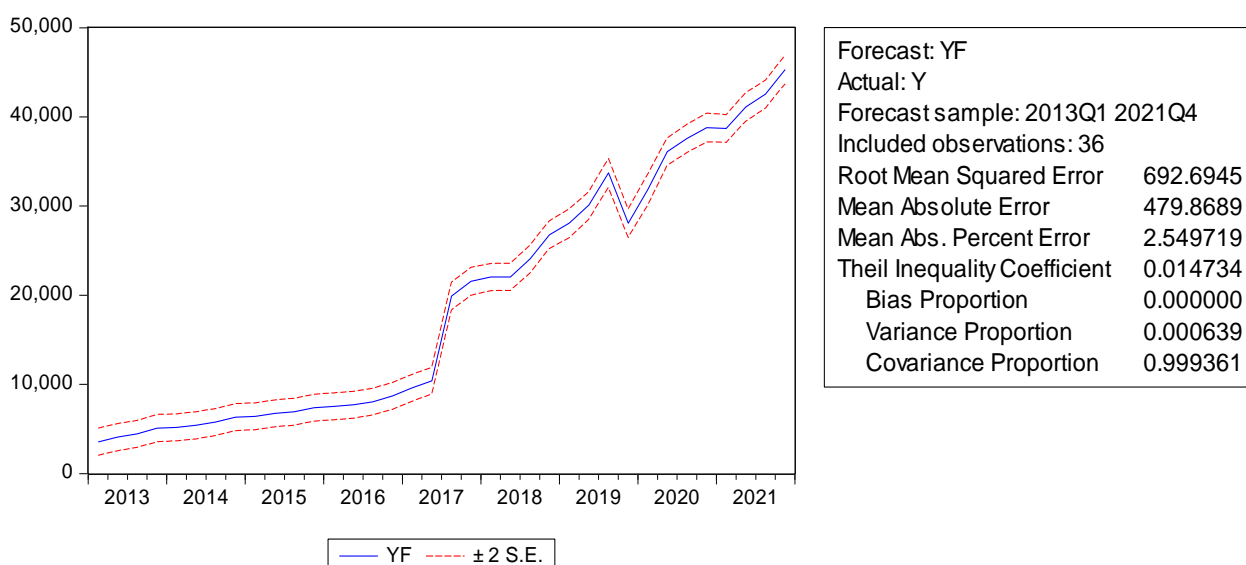
(2) the (Actual), calculated (Fitted) values of the multifactor econometric model and the differences between them (Residual) are presented in Figure 5 below.



**Figure 5. Real, calculated values of JSCB «UZPROMSTROYBANK» loans volume (Y) and differences between them (Residual) graph**

It can be seen from Figure 5 that the graph of calculated values of the volume of allocated loans of JSCB «UZPROMSTROYBANK» according to the multi-factor econometric model (2) is very close to the graph of its actual values, the differences between them are not so great. This is another proof that (2) the multifactor econometric model can be used in forecasting the volume of loans for future periods.

The coefficient of MARE (Mean absolute percent error) is calculated from the calculated (2) multifactor econometric model in forecasting the result indicator for future periods. If the calculated MARE coefficient value is less than 15.0 percent, the model can be used to predict the resulting factor, otherwise it cannot be used. The value of the MARE coefficient on the volume of allocated loans of JSCB «UZPROMSTROYBANK» is 2.5497 percent (Fig. 6).



**Figure 6. Indicators of using the calculated model in forecasting**

This is less than 15.0 percent (MAPE=2.5497), that is, it is 2.5497 percent. That is why (2) multifactor econometric model can be used in forecasting the amount of allocated loans of ADB "Sanoatkurilishbank".

Using these conditions (2) we will make forecast calculations of the volume of allocated loans of JSCB «UZPROMSTROYBANK» for future periods using a multi-factor econometric model.

For this, we will first create a trend model. A trend model is a time-dependent function of an influencing factor, and it generally looks like this:

$$X_i = \beta_0 + \beta_1 \cdot t + \varepsilon \quad (3)$$

The trend model for the volume of deposits (X1) of JSCB «UZPROMSTROYBANK» looks like this:

$$X_1 = -1121,55 + 318,61 \cdot t \quad (4)$$

$$R^2 = 0,9097, F_{\text{хисоб}} = 163,10, t_{\text{хисоб}} = 12,7713$$

The trend model for JSCB «UZPROMSTROYBANK» capital size (X2) looks like this:

$$X_2 = -1439,7673 + 225,7329 \cdot t \quad (5)$$

$$R^2 = 0,8323, F_{\text{хисоб}} = 168,7835, t_{\text{хисоб}} = 12,9917.$$

The trend model of JSCB «UZPROMSTROYBANK» loans received from other banks (X3) looks like this:

$$X_3 = -1760,98 + 814,9888 \cdot t \quad (6)$$

$$R^2 = 0,8909, F_{\text{хисоб}} = 277,5861, t_{\text{хисоб}} = 16,6609$$

The analysis of the trend models created between the influencing factors and the time factor shows that the statistical significance and reliability of all calculated coefficients in the trend models (4) - (6) were determined. So, we calculate the trend models (4) - (6) and put their calculated values into the multifactor econometric model (2), first we calculate the forecast values of the influencing factors, and then the forecast calculations of the resulting factor.

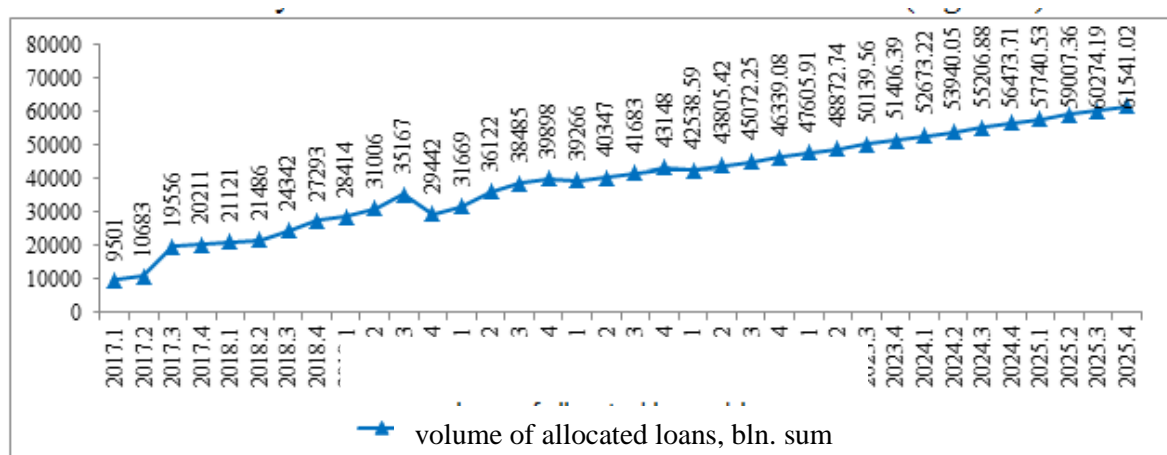
**Table 4. The volume of allocated loans of JSCB «UZPROMSTROYBANK» and the values of forecast calculations of indicators affecting it\***

| Years  | Allocated loans, bln. sums, Y | Deposits, billion sums, X1 | Capital, billion sums, X2 | Banks' credits, billion sums, X3 |
|--------|-------------------------------|----------------------------|---------------------------|----------------------------------|
| 2013.1 | 3792                          | 1742                       | 359                       | 2472                             |
| 2013.2 | 4270                          | 1692                       | 399                       | 2934                             |
| 2013.3 | 4640                          | 1623                       | 427                       | 3254                             |
| 2013.4 | 4944                          | 1993                       | 430                       | 3848                             |
| 2014.1 | 5229                          | 1427                       | 447                       | 3980                             |
| 2014.2 | 5463                          | 1460                       | 460                       | 4172                             |
| 2014.3 | 5950                          | 1761                       | 474                       | 4486                             |
| 2014.4 | 6151                          | 1815                       | 728                       | 4558                             |
| 2015.1 | 6231                          | 1494                       | 751                       | 4628                             |
| 2015.2 | 6517                          | 1943                       | 763                       | 4886                             |
| 2015.3 | 6730                          | 1790                       | 832                       | 4971                             |
| 2015.4 | 7227                          | 2071                       | 868                       | 5329                             |
| 2016.1 | 7435                          | 2018                       | 892                       | 5437                             |
| 2016.2 | 7695                          | 2024                       | 897                       | 5611                             |
| 2016.3 | 7925                          | 1948                       | 924                       | 5915                             |
| 2016.4 | 8645                          | 2286                       | 963                       | 6468                             |
| 2017.1 | 9501                          | 2714                       | 1022                      | 7230                             |
| 2017.2 | 10683                         | 2471                       | 1057                      | 7981                             |
| 2017.3 | 19556                         | 3071                       | 1657                      | 16382                            |
| 2017.4 | 20211                         | 3297                       | 2241                      | 16913                            |
| 2018.1 | 21121                         | 4788                       | 2269                      | 17171                            |
| 2018.2 | 21486                         | 4447                       | 2284                      | 17201                            |
| 2018.3 | 24342                         | 5191                       | 2278                      | 19160                            |
| 2018.4 | 27293                         | 4833                       | 2848                      | 20870                            |
| 2019.1 | 28414                         | 4601                       | 3249                      | 21419                            |
| 2019.2 | 31006                         | 6279                       | 3286                      | 23212                            |
| 2019.3 | 35167                         | 6418                       | 3404                      | 26641                            |
| 2019.4 | 29442                         | 9004                       | 6247                      | 15212                            |
| 2020.1 | 31669                         | 7704                       | 6478                      | 18696                            |

|                |                 |                 |                 |                 |
|----------------|-----------------|-----------------|-----------------|-----------------|
| 2020.2         | 36122           | 10185           | 6653            | 22431           |
| 2020.3         | 38485           | 9473            | 6802            | 23732           |
| 2020.4         | 39898           | 11437           | 6704            | 24933           |
| 2021.1         | 39266           | 11141           | 6963            | 24349           |
| 2021.2         | 40347           | 11994           | 7259            | 26159           |
| 2021.3         | 41683           | 11078           | 7490            | 27265           |
| 2021.4         | 43148           | 12607           | 7701            | 29479           |
| <b>2022.1*</b> | <b>42538.59</b> | <b>10667.13</b> | <b>6912.35</b>  | <b>28393.61</b> |
| <b>2022.2*</b> | <b>43805.42</b> | <b>10985.75</b> | <b>7138.08</b>  | <b>29208.59</b> |
| <b>2022.3*</b> | <b>45072.25</b> | <b>11304.36</b> | <b>7363.81</b>  | <b>30023.58</b> |
| <b>2022.4*</b> | <b>46339.08</b> | <b>11622.97</b> | <b>7589.55</b>  | <b>30838.57</b> |
| <b>2023.1*</b> | <b>47605.91</b> | <b>11941.59</b> | <b>7815.28</b>  | <b>31653.56</b> |
| <b>2023.2*</b> | <b>48872.74</b> | <b>12260.20</b> | <b>8041.01</b>  | <b>32468.55</b> |
| <b>2023.3*</b> | <b>50139.56</b> | <b>12578.81</b> | <b>8266.74</b>  | <b>33283.54</b> |
| <b>2023.4*</b> | <b>51406.39</b> | <b>12897.43</b> | <b>8492.48</b>  | <b>34098.53</b> |
| <b>2024.1*</b> | <b>52673.22</b> | <b>13216.04</b> | <b>8718.21</b>  | <b>34913.52</b> |
| <b>2024.2*</b> | <b>53940.05</b> | <b>13534.65</b> | <b>8943.94</b>  | <b>35728.50</b> |
| <b>2024.3*</b> | <b>55206.88</b> | <b>13853.27</b> | <b>9169.68</b>  | <b>36543.49</b> |
| <b>2024.4*</b> | <b>56473.71</b> | <b>14171.88</b> | <b>9395.41</b>  | <b>37358.48</b> |
| <b>2025.1*</b> | <b>57740.53</b> | <b>14490.49</b> | <b>9621.14</b>  | <b>38173.47</b> |
| <b>2025.2*</b> | <b>59007.36</b> | <b>14809.11</b> | <b>9846.88</b>  | <b>38988.46</b> |
| <b>2025.3*</b> | <b>60274.19</b> | <b>15127.72</b> | <b>10072.61</b> | <b>39803.45</b> |
| <b>2025.4*</b> | <b>61541.02</b> | <b>15446.33</b> | <b>10298.34</b> | <b>40618.44</b> |

Note: \* in years is the forecast period

From the data of Table 4, it can be seen that if the volume of allocated loans of JSCB «UZPROMSTROYBANK» in the period of 2013-2021 is on average 19102.0 bln. amounted to 52,039.81 billion soums during the forecast period (quarters of 2022-2025). amounting to soum. This growth is 13.52 times in 2025 compared to 2013. That is, during the forecast period, the volume of lending to business entities by ADB "Sanoatkurilishbank" will increase (Figure 7).

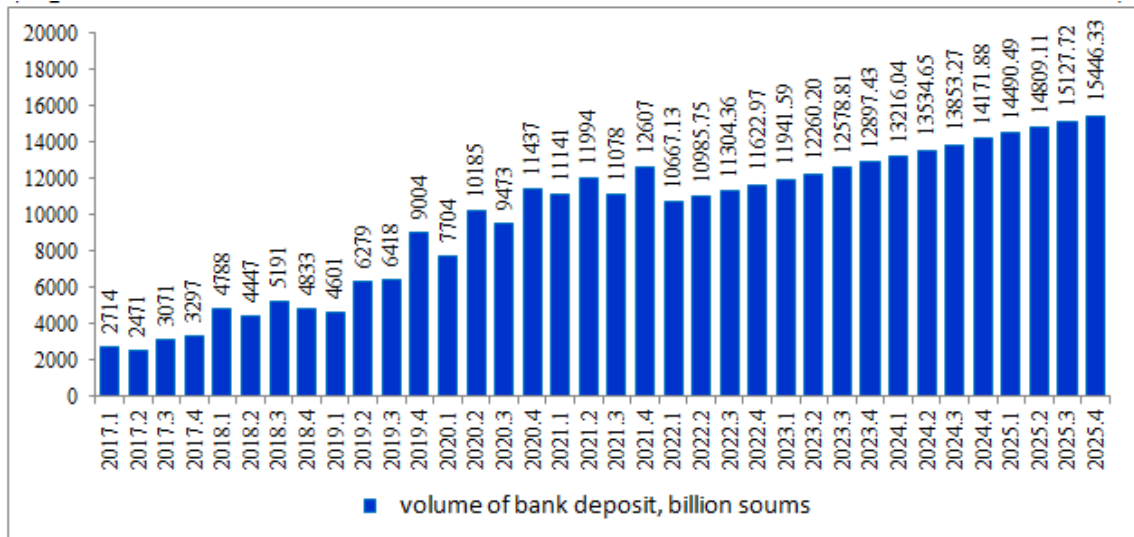


**Figure 7. Dynamics of the volume of allocated loans of JSCB «UZPROMSTROYBANK» (by quarters in 2017-2021) and forecast values by quarters in 2022-2025**

This is mainly done by increasing the number of business entities in our country and allocating loans to them for their various activities, as well as giving incentives for loans to certain categories of entrepreneurs (Fig. 7).

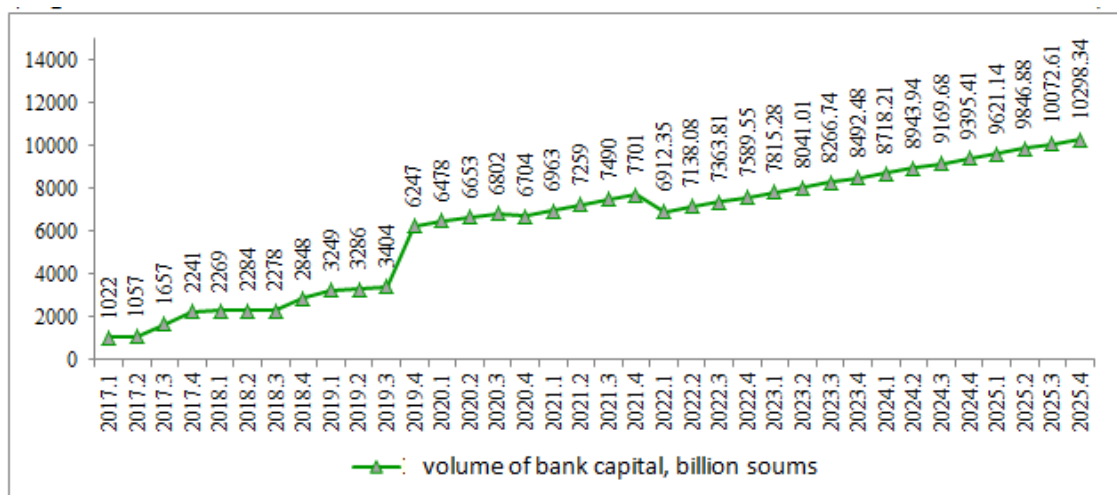


In the retrospective period (2013-2021 by quarters), the volume of deposits of JSCB «UZPROMSTROYBANK» averaged 4773.0 bln. amounted to 13,056.73 billion soums during the forecast period (2022-2025 by quarters). it is expected to reach soum. This is mainly done by attracting funds to the deposit by the bank (Fig. 8).



**Figure 8. Dynamics of JSCB «UZPROMSTROYBANK» deposits volume (by quarters in 2017-2021) and forecast values by quarters in 2022-2025**

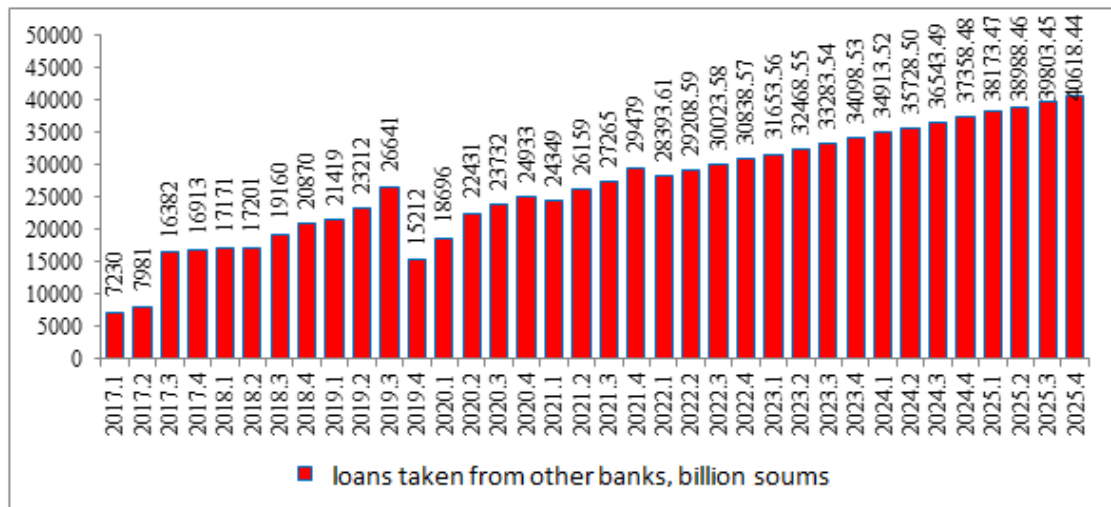
The capital size of JSCB «UZPROMSTROYBANK» is also expected to increase during the forecast period. If the volume of bank deposits in 2013-2021 averaged 2736.0 bln. amounted to 8,605.34 billion soums in the forecast period (2022-2025 by quarters) on average. it is observed that it reaches soum (Figure 9).



**Figure 9. Dynamics of the capital volume of JSCB «UZPROMSTROYBANK» (by quarters in 2017-2021) and forecast values by quarters in 2022-2025**

JSCB «UZPROMSTROYBANK» has a tendency to increase the volume of loans received from other banks. If the average volume of loans received from other banks in 2013-2021 is 13316.0 bln. amounted to 34,506.02 billion soums on average during the forecast period (2022-2025 by quarters). amounting to soum. That is, the increase is 2.6 times (Figure 10).





**Figure 10. Dynamics of loans received by JSCB «UZPROMSTROYBANK» from other banks (by quarters in 2017-2021) and forecast values by quarters in 2022-2025**

**Conclusions and suggestions.**

Based on the results of the research, we made the following conclusions:

When examining whether the resultant factor (Y) obeys the law of normal distribution, it can be clearly seen that the resultant factor obeys the normal distribution. This is confirmed by the calculated parameters and criteria, that is, the calculated Jacques-Bera coefficient is equal to 15.182 and its probability is less than 0.05 (prob=0.004924).m

Private correlation coefficients indicate the density of connections between the resulting factor (Y) and the factors affecting it, and private correlation coefficients indicate the existence of various connections between the resulting factor - the amount of loans issued by JSCB «UZPROMSTROYBANK» (Y) and the influencing factors.

Visually, it can be said that there are correct and tight connections between the resulting factor (Y) and the influencing (Xi) factors. Therefore, the correlation coefficients between the factors included in the multifactor econometric model for the volume of allocated loans of JSCB «UZPROMSTROYBANK» (Y) fully meet the requirements for the calculated value and probability of Student's t-criterion.

According to the multifactor econometric model, the graph of calculated values of the volume of allocated loans of JSCB «UZPROMSTROYBANK» is very close to the graph of its actual values, the differences between them are not so great. This is (2) the use of a multi-factor econometric model in forecasting the volume of allocated loans of ADB "Sanoatqurilishbank" for future periods.

Between 2013 and 2021, the volume of allocated loans of JSCB «UZPROMSTROYBANK» averaged 19102.0 billion. amounted to 52,039.81 billion soums during the forecast period (quarters of 2022-2025). amounting to 13.52 times in 2025 compared to 2013. That is, during the forecast period, the volume of loans to business entities by ADB "Sanoatqurilishbank" will increa

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