Evaluation of Factors Affecting Commercial Bank's Liquidity Ratio

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Abstract- **The article examines the occurrence of risks in commercial banks and their theoretical issues. The balance sheet and financial results data of JSC Turonbank for 2017-2024 were analyzed in monthly basis. Scientific approaches are systematized using methods such as linear regression and stress-testing as well as ARIMA model. The scientific conclusions of the author are formed and based on research. Proposals and recommendations are systematized based on the developed conclusions.**

***Keywords*:** Bank, bank's risk, credit risk, liquidity risk

1. INTRODUCTION

It is important to ensure liquidity in the activity of commercial banks. The execution of financial obligations by banks to their customers serves to strengthen their financial reputation. Liquidity has a significant role in determining the solvency level of banks and reflecting indicators regarding its effective management. Many researches have been carried out on bank liquidity management and its regulation. These researches analyze liquidity provision from different perspectives and emphasize that liquidity provision can be achieved by effective implementation and regulation of financial operations of banks. In our study, we carry out analysis on assessment of bank risks.

2. LITERATURE REVIEW

Before carrying out our study, we will look through the systematization of some conclusions of foreign and Uzbek scientists. In the research conducted jointly by M. Drechman, specialist of the Bank for International Settlements, and K. Nikolaou, specialist of the European Central Bank, explanations and evaluations are given for financing of liquidity risk [1]. According to them, liquidity risk financing has been substantial issue from the past. However, they note that financial sources are still abstract.

Manish Kumar and Shaheed Bhagat Singh states that liquidity risk being one of the reasons for financial distress should not be ignored. Following the Basel Committee recommendations and framing an effective liquidity risk management system is the only way to fight out its ill effects.

According to Viral V. Acharya and Stephen Schaefer a central difficulty with discussing issues relating to liquidity is the lack of consensus on what it means. Liquidity is clearly multi-faceted and perhaps also a somewhat loosely employed economic concept.

Uzbek scientists and researchers also conducted scientific researches on the liquidity problem and formulated conclusions. In particular, prof. B. Izbosarov points out that there are some complications related to ensuring liquidity in banks. Particularly, he noted that "even though commercial banks meet the requirements of the current liquidity, instant liquidity and net stable financing ratio norms on the first day of the reporting period, current account problems with cash supply occurred in commercial banks' branches in the regions on other dates of the month.".

Researcher M. Tojiev focuses on the pecular importance of the liquidity problem in bank risk management and scientific approaches to its regulation. He suggests that one should give priority to the asset diversification during the allocation of assets to the economy. He concludes that the asset concentration within a single client or sector leads to increased risks.

Researcher T. Rakhmatov gives his opinion on the classification of instruments for regulation of bank liquidity. In particular, instruments are based on internal and external factors (see Figure 1) [5].

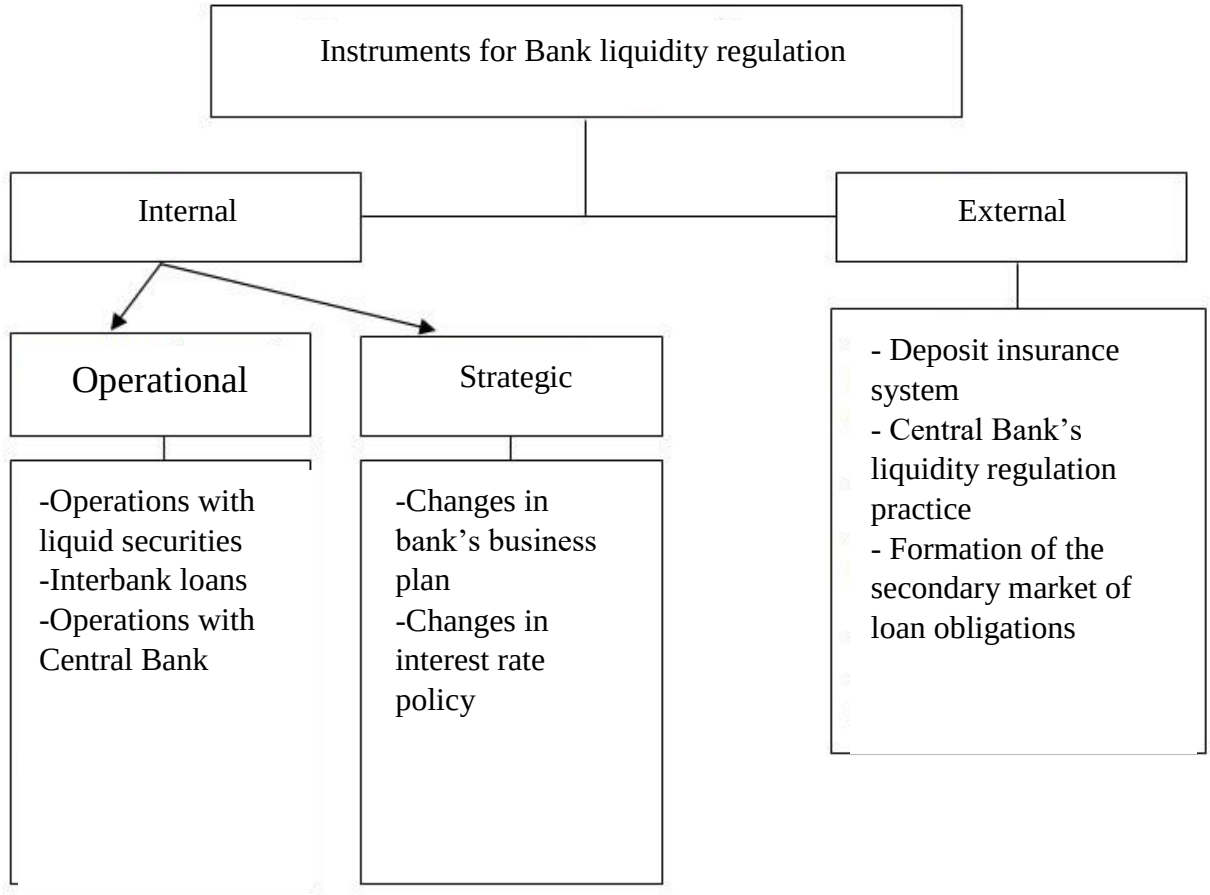

Figure 1. Classification of bank liquidity management

In this part of our study, we focus on the database analysis of balance sheet and financial performance indicators of JSC Turonbank.

The study presents asset based measures of bank liquidity which capture and quantify the dynamics of liquidity flows within JSC Turonbank between 2017 and 2024.

3. ANALYSIS AND RESULTS

Different systemized financial ratios were examined on econometric model to implement performed analysis which is resulted to forecast current liquidity ratio of JSC Turonbank.

Table 1: Illustrative statistics of selected data from balance sheet and financial performance indicators from 2017-2024 financial years

№	Variable	Obs	Mean	Std. Dev.	Min	Max
1	Current liquidity	89	.803198	.1746765	.5672047	1.52013
2.	Cash and other cash items (x_1)	89	3.31e+08	2.03e+08	3.06e+07	7.16e+08
3.	Due from Central Bank (x_2)	89	2.82e+08	1.36e+08	9.21e+07	7.23e+08
4.	Due from other banks and financial institutions, net (x_3)	89	5.53e+08	3.34e+08	4.76e+07	1.35e+09
5.	Credit and leasing operations, net (x_4)	89	5.55e+09	3.69e+09	4.87e+08	1.21e+10
6.	Customers' liabilities on derivative instruments, net (x_5)	89	5223895	1.02e+07	0	4.63e+07
7.	Demand deposits (x_6)	89	7.47e+08	2.29e+08	2.98e+08	1.34e+09
8.	Time deposits (x_7)	89	1.28e+09	9.66e+08	7.68e+07	3.88e+09

9.	Due to Central Bank (x_8)	89	4137928	1.09e+07	0	7.54e+07
10.	Due to other banks and financial institutions (x_9)	89	7.97e+08	7.15e+08	4850721	2.30e+09

Stata program software were used to carry out the analysis.

The total number of observations is 89. As can be seen from the data of Table 1, we can observe the average values of selected indicators of the balance sheet and financial performance indicators of JSC Turonbank. It is important that we pay attention to the current liquidity ratio in this table. We can observe that the average indicator is 0.8, while the minimum and maximum coefficients are 0.56 and 1.5 respectively. In general, although this coefficient does not fully reflect trends related to liquidity risk, it is the basis for forming some conclusions. Also, the average value of loan to deposit ratio is 2.44, which means that there is a concern of liquidity risk.

Central Bank settled current liquidity ratio to commercial banks and it is calculated as ratio of liquid assets to up to one month maturity liabilities. Our analysis based on liquid assets data which includes Cash and other cash items (x_1), Due from Central Bank (x_2), Due from other banks and financial institutions, net (x_3) and up to one month maturity liabilities which are Demand deposits (x_6), Time deposits (x_7), Due to Central Bank (x_8) and Due to other banks and financial institutions (x_9).

We calculate the current liquidity ratio (Lc) based on the following formula 1.

$$L_c = \frac{x_1 + x_2 + x_3}{x_6 + x_7 + x_8 + x_9} (1)$$

Setting the current liquidity ratio in Table 1 as a dependent variable, and selecting indicators from x_1 to x_9 as independent variables, we formulate the following model (see formula 2):

$$L_c = \beta_0 + x_1 + x_2 + x_3 + x_6 + x_7 + x_8 + x_9 + \varepsilon \ (2)$$

Table 2: Evaluation of factors affecting the current liquidity ratio

Source	SS	df	MS	Number of obs	89
				F(7, 81)	52.27
Model	2.1983813	7	.314054471	Prob > F	0.0000
Residual	.48666482	81	.006008208	R-squared	0.8187
Total	2.68504612	88	.030511888	Adj R-squared	0.8031
				Root MSE	.07751

Current liquidity	Coef. Std.	Err.	t	P>t	[95%Conf. Interval]
Cash and other cash items (x_1)	7.40e-10	1.28e-10	5.78	0.000	4.85e-10 9.95e-10
Due from Central Bank (x_2)	8.85e-10	8.23e-11	10.75	0.000	7.21e-10 1.05e-09
Due from other banks and financial institutions, net (x_3)	7.85e-10	7.52e-11	10.43	0.000	6.35e-10 9.35e-10
Demand deposits (x_6)	-4.42e-10	9.17e-11	-4.82	0.000	-6.25e-10 -2.60e-10
Time deposits (x_7)	3.16e-11	2.97e-11	1.06	0.290	-2.74e-11 9.06e-11
Due to Central Bank (x_8)	2.13e-09	1.07e-09	1.99	0.050	-4.22e-12 4.26e-09
Due to other banks and financial institutions (x_9)	-6.71e-10	5.25e-11	-12.77	0.000	-7.75e-10 -5.66e-10
_cons	.6897029	.0360477	19.13	0.000	.6179793 .7614265

Table 2 presents the results of model formed based on formula 2, and the calculated test results are as follows: R-squared (0.8187) means that the model fits very well, while F-statistic (52.27) and Prob > F (0.0000) indicate that the model is statistically significant. means

It can be observed that the liquidity coefficient increases with the increase of highly liquid indicators as Cash and other cash items (x_1), Due from Central Bank (x_2), Due from other banks and financial institutions, net (x_3).

Demand deposits (x_6), Time deposits (x_7), Due to Central Bank (x_8) and Due to other banks and financial institutions (x_9)are inversely proportional because they are in the denominator in calculating current liquidity ratio. The established model shows that time deposits do not affect current liquidity and we can observe that funds payable to the Central Bank have a minimum effect. In this case, we can conclude that this indicator does not in general have effect.

It should be noted that liquidity risk increases with the increase of indicators such demand deposits and Due to other banks and financial institutions. We have to note that banks should be cautious in managing demand deposits and Due to other banks and financial institutions' accounts when considering liquidity risk.

In order to test this model further, we re-build our model based on formula 2 by conducting a stress test. In this case, on the basis of the Stata computer software, we will perform an 18 percent decrease in highly liquid items and 24 percent increase in liabilities stress change of the indicators given in formula 1. For example, giving assumptions that cash and other cash items fall to 82% of their value, we will form new indicators for demand deposits equal to 124% of their value. We have chosen the percentage change contingently for the performing this stress test analysis. As a result, the average value of current liquidity based on one-sided stress test was equal to 0.37 and 0.38, respectively. In the case of a two-sided stress test, it was equal to 0.31 (see Table 3).

Below we process stress test for our model with formula 2 and see the changes in current liquidity ratio, whereas high liquid assets' indicators decreased (see Table 4) and liabilities increased (see Table 5).

Table 3: Current liquidity ratio stress test

Indicator	Obs	Mean	Std. Dev.	Min	Max
18 percent decrease in highly liquid items on one-sided stress test	89	.3679829	.107822	.2380856	.7867957
24 percent liabilities increase (one-sided stress test)	89	.3804621	.1114785	.2461596	.8134778
Two-sided test	89	.3119789	.0914124	.2018508	.6670518

Table 4: Evaluation of factors affecting the current liquidity ratio based on stress test with 18 percent decrease in highly liquid items

Source	SS	df	MS	Number of obs	89
				F(7, 81)	35.53
Model	.771725121	7	.110246446	Prob > F	0.0000
Residual	.251326073	81	.003102791	R-squared	0.7543
Total	1.02305119	88	.011625582	Adj R-squared	0.7331
				Root MSE	.0557

Current liquidity	Coef. Std.	Err.	t	P>t	[95% Conf. Interval]
Cash and other cash items (18 percent decrease)	2.07e-10	1.12e-10	1.84	0.069	-1.64e-11
Due from Central Bank (18 percent decrease)	4.93e-10	7.21e-11	6.84	0.000	3.50e-10
Due from other banks and financial institutions, net (18 percent decrease)	3.85e-10	6.59e-11	5.83	0.000	2.54e-10
Demand deposits (x_6)	-1.42e-10	6.59e-11	-2.15	0.034	-2.73e-10
Time deposits (x_7)	-7.18e-11	2.13e-11	-3.37	0.001	-1.14e-10
Due to Central Bank (x_8)	1.38e-09	7.70e-10	1.79	0.078	-1.56e-10
Due to other banks and financial institutions (x_9)	-1.94e-10	3.78e-11	-5.15	0.000	-2.70e-10
_cons	.3706086	.0259049	14.31	0.000	.319066

The model formed based on formula 2 is presented in Tables 4 and 5, and the calculated test results are as follows: R-squared (0.7543) means that the model is well conformed, whereas F-statistic (35.53) and Prob > F (0.0000) indicate that model has statistical significance.

Table 5: Evaluation of factors affecting the current liquidity ratio based on stress test with 24 percent increase in liabilities

Source	SS	df	MS	Number of obs	89
				F(7, 81)	35.53
Model	.824954619	7	.11785066	Prob > F	0.0000
Residual	.26866122	81	.003316805	R-squared	0.7543
Total	1.09361584	88	.012427453	Adj R-squared	0.7331
				Root MSE	.05759

Current liquidity	Coef. Std.	Err.	t	P>t	[95% Conf. Interval]
Cash and other cash items (x_1)	1.75e-10	9.51e-11	1.84	0.069	-1.39e-11
Due from Central Bank (x_2)	4.18e-10	6.11e-11	6.84	0.000	2.96e-10
Due from other banks and financial institutions, net (x_3)	3.26e-10	5.59e-11	5.83	0.000	2.15e-10
Demand deposits (24 percent increase)	-1.18e-10	5.50e-11	-2.15	0.034	-2.28e-10
Time deposits (24 percent increase)	-5.99e-11	1.78e-11	-3.37	0.001	-9.52e-11
Due to Central bank (24 percent increase)	1.15e-09	6.42e-10	1.79	0.078	-1.30e-10
Due to other banks and financial institutions (24 percent increase)	-1.62e-10	3.15e-11	-5.15	0.000	-2.25e-10
_cons	.3831768	.0267834	14.31	0.000	.3298863

In stress test we decreased High liquid assets by 18 percent or increased liabilities by 24 percent which indicated to statistical significance of constructed model. This shows that JSC Turonbank is resistant to the stress test and can perform stable activities in real situations. In this case, a one-sided stress test was performed. Conversely, liabilities remained unchanged when high liquid assets were decreased, and vice versa.

We will carry out double-sided stress test on the Table 6 data by reforming the model based on formula 2.

Table 6: Evaluation of factors affecting the current liquidity ratio based on two-sided stress test

Source	SS	df	MS	Number of obs	89
				F(7, 81)	35.53
Model	.554699464	7	.079242781	Prob > F	0.0000
Residual	.180647793	81	.00223022	R-squared	0.7543
Total	.735347257	88	.008356219	Adj R-squared	0.7331
				Root MSE	.04723

Current liquidity	Coef. Std.	Err.	t	P>t	[95% Conf. Interval]
Cash and other cash items (18 percent decrease)	1.75e-10	9.51e-11	1.84	0.069	-1.39e-11
Due from Central Bank (18 percent decrease)	4.18e-10	6.11e-11	6.84	0.000	2.96e-10
Due from other banks and financial institutions, net (18 percent decrease)	3.26e-10	5.59e-11	5.83	0.000	2.15e-10

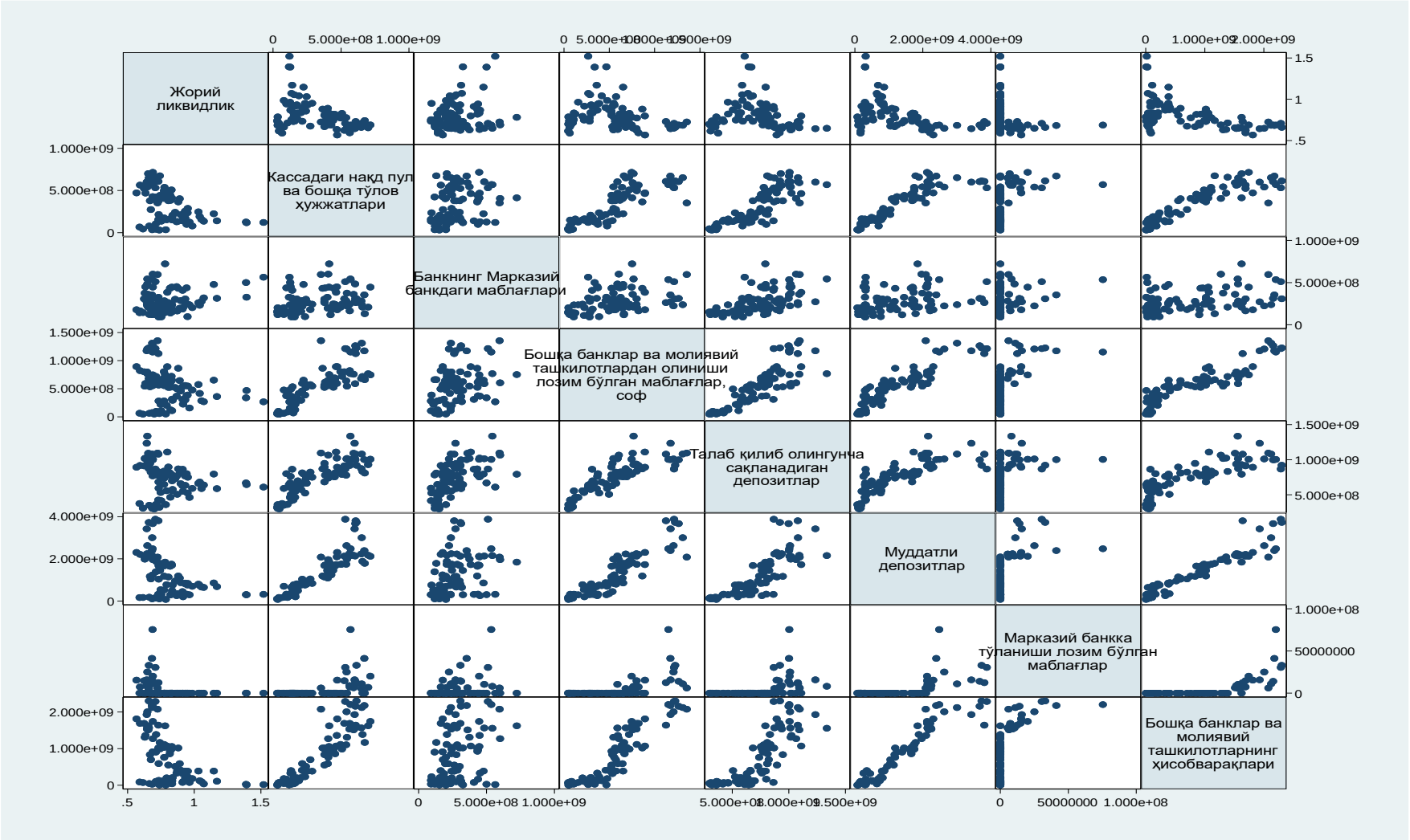

Illustration 2. Correlation matrix of Current liquidity ratio and its affecting factors

Demand deposits (24 percent increase)	-9.71e-11	4.51e-11	-2.15	0.034	-1.87e-10
Time deposits (24 percent increase)	-4.91e-11	1.46e-11	-3.37	0.001	-7.81e-11
Due to Central bank (24 percent increase)	9.41e-10	5.26e-10	1.79	0.078	-1.07e-10
Due to other banks and financial institutions (24 percent increase)	-1.33e-10	2.58e-11	-5.15	0.000	-1.84e-10
_cons	.314205	.0219624	14.31	0.000	.2705067

4. SUMMARY

We can observe that the liquidity risk does not arise sharply in the activity of JSC Turonbank even when a two-way stress test is conducted. That means the share of high liquid assets are remaining high in banks' activity. At the same time, it can be concluded as follows:

Firstly, we recommend high liquid assets to use for issuing loans and leases or investment purposes. In this, higher risk weighted assets share could be as much as 18 percent of high liquid assets.

Secondly, JSC Turonbank can attract deposits from population with interest rate up to 24%. In other words, liquidity risk will not arise even bank will increase deposit interest rate to attract more resources.

In this study we approached the influence of high liquid assets and liabilities on the liquidity ratio. During the process we formed a cross-matrix graph of the primary indicators that affect current liquidity (see Figure 2).

Figure 2 shows that Due from the Central Bank and Due to the Central bank accounts have no significant effect. In particular, it can be observed that the increase in Due to the Central Bank account does not lead to an increase either in high liquid assets nor in liabilities. It should be noted that this indicator does not indirectly affect the bank's financial activity. In general, it can be seen that the mentioned indicators have a strong influence on each other.

REFERENCES

[1]. Drehmann, M., & Nikolaou, K. (2013). Funding liquidity risk: definition and measurement. Journal of Banking & Finance, 37(7), 2173-2182.

[2]. Acharya, V. V., & Pedersen, L. H. (2005). Asset pricing with liquidity risk. Journal of financial Economics, 77(2), 375-410.

[3]. Manish Kumar and Shaheed Bhagat Singh. AIMA Journal of Management & Research, May 2013, Volume 7, Issue 2/4, ISSN 0974 – 497.

[4]. Izbosarov B. Peculiarities of the methodological and legal basis of ensuring the liquidity of commercial banks in Uzbekistan//International Journal of Finance and Digitalization. www.ijfd.uz. Vol. 1 Issue 02, 2022.

[5]. Tojiev M. M. O'. Ensuring the liquidity of commercial banks as an important factor of risk management //Economics and finance (Uzbekistan). – 2018. – no. 7. - pp. 14-17.

[6]. Rakhmatov T.S. Methods and means of managing the liquidity of commercial banks//Economics. #2 2022. https://e-journal.uz.