Econometric Analysis of Factors Affecting the Efficiency of Credit Organizations Providing Microfinancial Services in the Republic of Uzbekistan

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Abstract: This article provides an econometric analysis of factors influencing the efficiency of credit institutions providing microfinance services operating in Uzbekistan. Indicators of economic efficiency of credit institutions providing microfinance services were selected and observations were made on them.

Key words: non-bank credit organizations, profitability, econometric analysis, model, efficiency, microfinance organizations, asset, capital, liquidity.

INTRODUCTION

Non-bank credit institutions have their own unique place in every country. Their role in reducing poverty in the country and improving the social activities of the population is recognized. At the same time, non-bank credit organizations must also ensure their financial stability.

As indicators of social efficiency of credit institutions providing microfinance services, we took the size of the loan portfolio and their percentage ratio. Since in order to determine the level of financial assistance to the low-income segment of the population by credit institutions providing microfinance services, it is necessary to study the volumes of loans issued by them and their percentage ratio. The factors influencing the social efficiency of credit institutions providing microfinance services are mainly external factors. These external factors, on the one hand, affect the purchasing power of the population, and on the other hand, they affect the volumes and percentage ratio of loans of credit institutions providing microfinance services.

In our research, we conduct econometric analysis using two models. That is, to determine the strength of internal and external factors affecting the economic and social efficiency of microfinance credit organizations, we will utilize the least squares model and structural vector autoregression models.

THEMATIC LITERATURE REVIEW

Conducted numerous scientific studies in domestic and foreign literature on the role of non-bank financial organizations in the economy and on factors influencing the activities of these organizations. Let's take a closer look at some of these studies.

Scholars such as R. Mersland and R. Ström have studied the relationship between the efficiency of microfinance organizations and their corporate governance. The characteristics of the board of directors, the form of ownership, competition and methods of regulation in a microfinance organization, the work of microfinance organizations with poor customer base and its impact on efficiency have been analyzed. The analysis showed that the duties of the chairman of the board of a bank and the chairman of the board in microfinance organizations are clearly separated from each other, the presence of a woman as the chairman of the board and the competitive environment in the country have a great impact on the efficiency of microfinance organizations and the situation of the poor in the country. In particular, the number of board members of a

microfinance organization reduced the volume of lending in this organization. Also, the form of ownership of microfinance organizations, that is, whether it is a non-governmental organization or a joint-stock company, does not affect the performance indicators.[1]

B. Gutierrez-Nieto and others analyzed the efficiency of microfinance organizations. According to them, microfinance organizations are not only public organizations, but also financial organizations specializing in making a profit. The above-mentioned economists used the Data Envelopment Analysis (DEA) model for assessing the efficiency of 30 microfinance organizations located in Latin America. According to the results of the analysis, four prominent indicators influence the efficiency of microfinance organizations, including the impact of reforms carried out by the state, as well as the impact of the organizational status of microfinance organizations, such as non-governmental commercial organizations and non-governmental and non-profit organizations are high.[2]

Economists such as N. Hermes, R. Lensink and A. Meesters analyzed the relationship between the allocation of loans by microfinance organizations for poverty reduction and its effectiveness. The analysis used the stochastic frontier analysis (SFA) model using statistical data from 435 microfinance organizations for 1997-2007. Based on the analysis of more than 1,300 observations, it was found that there is an inverse proportionality between lending to low-income groups of the population and the effectiveness of microfinance organizations.[3] In fact, loans from microfinance organizations to the poor are, firstly, high cost, and secondly, they are associated with high risk. The reason is that these clients are financially unstable clients.

RESEARCH METHODOLOGY

In carrying out scientific research, such methods as induction, deduction and synthesis were used. Also, statistical data from the Central Bank of the Republic of Uzbekistan and the Statistics Committee were used to analyze the activities of microfinance organizations.

ANALYSIS AND RESULTS

Internal factors as endogenous factors influencing the economic efficiency indicators of credit institutions providing microfinance services are liquidity ($Liquidity_t$), return on assets (ROA_t) and return on equity (ROE_t), the volume of loans issued. organizations providing microfinance services ($Loan_t$), loan interest rate ($LoanRate_t$), as well as the indicative interest rate (INR_t), money supply ($M2_t$), the inflation rate in the economy (CPI_t) and the levels of devaluation of the national currency (DEV_t).

From social performance indicators selected ones were chosen such as the volume of loans of credit institutions providing microfinance services ($Loan_t$), interest on loans($LoanRate_t$) indicative interest rate as an endogenous influencing factor(INR_t), money supply in circulation($M2_t$), inflation rate in the economyCPI_t and the levels of devaluation of the national currency (DEV_t).

The statistical data of the selected indicators for the period 2017M1-2022M12 are obtained by month and in growth. All data are natural logarithms, since the analyzed statistical data differ in size. As a result, the data are leveled and come to the same unit of measurement.

[1] Mersland, R., & Strøm, R. Ø. (2009). Performance and governance in microfinance institutions. *Journal of Banking & Finance*, *33*(4), 662-669.

[2] Gutierrez-Nieto, B., Serrano-Cinca, C., & Molinero, C. M. (2007). Microfinance institutions and efficiency. *Omega, 35*(2), 131-142.

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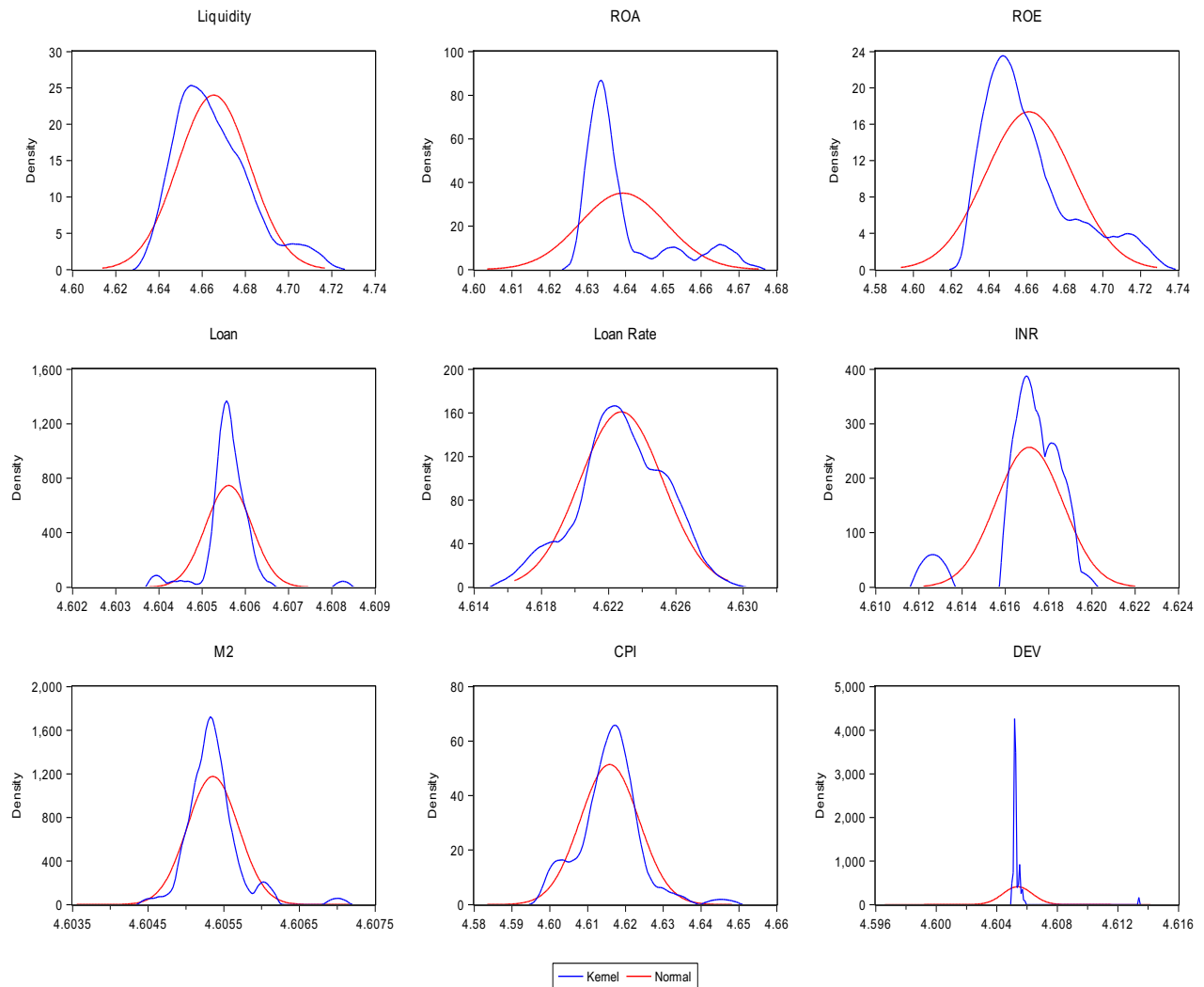
Picture 1. Normal distribution of selected indicators[4]

At the initial stage of econometric analysis, we carried out a number of statistical calculations. This is descriptive statistics of the selected data, i.e. it mainly analyzes the average, maximum and minimum values of the data, deviation from the average value (standard deviation). In our scientific work, we also analyzed the normal distribution of individual indicators.The Jarque Bera coefficient was used to check the normal distribution of data. The analysis shows that the economic efficiency indicators of credit institutions providing microfinance services, that is, all the selected indicators, except for liquidity, assets and return on capital, have a normal distribution. The reason is that the Jarque Bera coefficient calculated for all the selected indicators turned out to be reliable and their probability is less than 0.05.

Using the selected indicators, 72 observations were made. Below we analyze the descriptive statistics of the 9 selected indicators.

Table 1. Descriptive statistics of indicators[5]

	INR	M2	CPI	DEV	Loan	LoanRate	Liquidity	ROA	ROE
Mean	4.6171	4.6053	4.6157	4.6053	4.6056	4.6228	4.6654	4.6394	4.6613
Median	4.6167	4.6053	4.6161	4.6052	4.6056	4.6224	4.6611	4.6348	4.6541
Maximum	4.6192	4.6070	4.6453	4.6133	4.6082	4.6280	4.7123	4.6720	4.7228
Minimum	4.6126	4.6045	4.6001	4.6049	4.6039	4.6169	4.6418	4.6281	4.6346
Std. Dev.	0.0014	0.0003	0.0077	0.0009	0.0005	0.0024	0.0167	0.0114	0.0229

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[4]Prepared by the author based on sample statistics.

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Skewness	-1.7810	1.6639	0.5413	7.9582	0.6977	-0.2430	0.8922	1.5009	1.1271
Kurtosis	6.7229	9.6691	5.1799	66.156	12.123	2.8349	3.3518	3.9676	3.3368
Jarque-Bera	79.647	166.65	17.772	12726	255.54	0.7907	9.9257	29.841	15.585
Probability	0.0000	0.0000	0.0001	0.0000	0.0000	0.6734	0.0069	0.0000	0.0004
Sum	332.43	331.58	332.33	331.58	331.60	332.84	335.9100	334.03	335.61
Sum Sq. Dev.	0.0001	8.18E-06	0.0042	6.69E-05	2.03E-05	0.000425	0.019833	0.0092	0.0375
Observations	72	72	72	72	72	72	72	72	72

According to the monitoring results, the average liquidity indicator of credit institutions providing microfinance services, which is considered as an exogenous variable, is 4.6654 in the natural logarithm state, while this indicator was at a maximum of 4.7123 and a minimum of 4.6418 during the observation period. The standard deviation of this indicator was 0.0167. Also, the average logarithmic value of the return on assets indicators of credit institutions providing microfinance services is 4.6348, and this indicator for the observed period was a maximum of 4.6720 and a minimum of 4.6281. The standard deviation of this indicator was 0.0114.

The average return on equity of credit institutions providing microfinance services is 4.6541 in natural logarithm, with this indicator for the observed period having a maximum value of 4.7228 and a minimum value of 4.6346. The degree of deviation from the average value of this indicator was 0.0229. It has been determined that the standard deviation of the return on capital indicator of credit institutions providing microfinance services is greater than other performance indicators.

Table 2. Correlation matrix between selected indicators[6]

	INR	M2	CPI	DEV	Loan	LoanRate	Liquidity	ROA	ROE
INR	1								
M2	-0.0073	1							
CPI	0.0124	-0.0449	1						
DEV	-0.0812	0.5777	0.0742	1					
Loan	0.0376	-0.0990	0.2182	0.0578	1				
LoanRate	0.8048	-0.0993	-0.0297	-0.2299	-0.0695	1			
Liquidity	0.0114	-0.0477	-0.2346	-0.1726	-0.2423	-0.0199	1		
ROA	0.0450	-0.0415	-0.1579	-0.0912	-0.2448	0.0049	0.8605	1	
ROE	0.1170	-0.0047	-0.2172	-0.1197	-0.3103	0.07838	0.8963	0.9674	1

Above, the correlation between liquidity, creditworthiness and interest rate policy of individual commercial banks with endogenous indicators was analyzed.

The ratio of the liquidity level to the volume of loans and their percentage from the economic efficiency indicators of credit institutions providing microfinance services was -0.24 and -0.02, respectively. That is, if the increase in the volume of loans of credit institutions providing microfinance services had a negative impact on their liquidity, then the impact of the interest rate on the loan on liquidity was not felt.

The ratio of the liquidity level with the indicative interest rate from the indicators of economic efficiency of credit institutions providing microfinance services was 0.01, with the money supply in circulation - 0.05, with the inflation rate - 0.23 and with devaluation - 0.05. 0.17. That is, the influence of the liquidity of microfinance institutions on the money supply with the indicative interest rate was not felt. On the contrary, there was an inverse correlation with the levels of inflation and devaluation. The correlation of return on assets with the volume of loans and their percentage of the economic efficiency indicators of credit institutions providing microfinance services was -0.24 and -0.01, respectively. That is, if an increase in the volume of loans of credit

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[6] Prepared by the author based on sample statistics.

institutions providing microfinance services had the opposite effect on the return on their assets, then the effect of the interest rate on the loan on the return on their assets was not felt.

The ratio of the return on assets of credit institutions providing microfinance services to the indicative interest rate was 0.04, to the money supply in circulation - 0.04, to the inflation rate - 0.16 and to the devaluation - 0.09. That is, the influence of the money supply to the indicative interest rate on the return on assets of credit institutions providing microfinance services was not observed. On the contrary, the rate of return on equity, which is weakly inversely proportional to the rates of inflation and devaluation, has the same dependence as the rate of return on assets. The ratio of the volume of loans of credit institutions providing microfinance services with the indicative interest rate and the money supply from the social efficiency indicators was 0.04 and -0.10, respectively. That is, if an increase in the indicative interest rate increases the volume of loans, then, conversely, an increase in the money supply in circulation reduces the volume of loans. At the same time, the correlation of the volume of loans of credit institutions providing microfinance services with the levels of inflation and devaluation was 0.21 and 0.06, respectively. That is, the influence of the level of inflation and devaluation on the volume of loans was positive.

Another indicator of the social efficiency of credit institutions providing microfinance services is the ratio of the percentage of loans issued with the indicative interest rate and the money supply in circulation, equal to 0.80 and -0.10, respectively. That is, if an increase in the indicative interest rate had a significant impact on the percentage of loans, then, on the contrary, an increase in the money supply in circulation reduces the volume of loans, and this dependence is logically built. At the same time, the correlation of the percentage of lending of microfinance credit institutions with the level of inflation and devaluation was -0.03 and -0.23, respectively. That is, if the influence of the inflation rate on the percentage of loans was insignificant, then the influence of the devaluation of the national currency on the percentage of loans was the opposite and significant.

Table 3. Parameters of factors influencing the return on capital of credit institutions providing microfinance services, calculated using the least squares model[7]

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Dependent Variable: ROE Method: Least Squares				
LOAN	-12.61486	5.148947	-2.449989	0.0170
STLR	-1.867781	1.902436	-0.981784	0.3298
INR	4.381224	3.091854	1.417022	0.1613
M2	0.791212	9.630839	0.082154	0.9348
CPI	-0.453083	0.347308	-1.304555	0.1966
DEV	-2.867816	3.448343	-0.831651	0.4087
C	62.82094	46.99667	1.336710	0.1860
R-squared	0.155899	Mean dependent var		4.661318
Adjusted R-squared	0.077982	S.D. dependent var		0.022992
S.E. of regression	0.022078	Akaike info criterion		-4.696342
Sum squared resid	0.031682	Schwarz criterion		-4.474999
Log likelihood	176.0683	Hannan-Quinn criter.		-4.608225
F-statistic	2.000841	Durbin-Watson stat		0.295245
Prob(F-statistic)	0.078219			

According to the results of the analysis, when checking with a probability of 5%, only the volume of loans has an impact on the return on capital of credit institutions providing microfinance services. In particular, an increase in the volume of loans by one percent of the rate, increases the return on capital of credit institutions providing microfinance services by 5.15 percent. Thanks to

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[7] Prepared by the author based on sample statistics.

this model, the impact of other indicators on the profitability of microfinance credit institutions with a probability of 5% was absent.

At the next stage of our analysis, we need to choose the optimal "lag" for the SVAR model. To do this, we use the lag length criteria method. The analysis shows that the optimal number of "lags" for the SVAR model of factors affecting the economic efficiency of credit institutions providing microfinance services is 2.

Table 4. **Method of optimal "lag" choice (Lag length Criteria) for SVAR-model of factors influencing economic efficiency of credit institutions providing microfinance services [8]**

Lag	LogL	LR	FPE	AIC	SC	HQ
0	2961.033	NA	5.58e-49	-85.56617	-85.27477	-85.45056
1	3261.624	514.0549	9.79e-52	-91.93114	-89.01709	-90.77504
2	3326.214	93.60832	1.76e-51*	-91.45548*	-85.91878*	-89.25889*
3	3410.587	100.2695	2.19e-51	-91.55325	-83.39391	-88.31617

The increase in the money supply and the increase in the return on capital had a positive effect on the return on assets of credit institutions providing microfinance services. Also, the increase in the money supply and the increase in the level of liquidity have a negative effect on the return on capital of credit institutions providing microfinance services. But due to autocorrelation, the increase in the return on capital in the previous period also increases the return on capital in the next period. In the next stage of our analysis, we need to choose the optimal "lag" for the SVAR model. To do this, we use the lag length criteria method. The analysis shows that the optimal number of "lags" for the SVAR model of factors affecting the social efficiency of credit institutions providing microfinance services is 2.

The results of the model did not determine the influence of the indicative interest rate, the turnover interest rate and the inflation rate in the domestic economy among the selected indicators that affect the volume and percentage of lending, indicating the social efficiency of credit institutions providing microfinance services. On the contrary, it was found that the devaluation of the national currency has a strong impact on the efficiency of social activities of microfinance institutions.

CONCLUSIONS AND SUGGESTIONS

As a conclusion, it can be said that the ratio of assets and loans of microfinance organizations and pawnshops to the country's GDP, as well as to the assets and loans of commercial banks, does not amount to even one percent, which indicates that these non-bank credit organizations are of little importance in the economy. But the rapid development of microfinance organizations and pawnshops in the past six years leads to confidence in their future.

According to the results of the SVAR model, the indicative interest rate, the lending rate, the level of return on assets, and the level of liquidity in the previous period, taking into account autocorrelation, had a positive effect on the indicators. liquidity, indicating the economic efficiency of loans of credit institutions providing microfinance services. The increase in the money supply and the increase in the return on capital had a positive effect on the profitability of loans of credit institutions providing microfinance services. Also, the growth of money in circulation and the increase in the level of liquidity have a negative effect on the profitability of loans of microfinance credit institutions.

According to the results of the model, among the selected indicators influencing the volume and percentage of loans, indicating the social efficiency of loans of microfinance service organizations, the indicative interest rate, the interest rate in circulation and the inflation rate in the domestic economy were not identified. On the contrary, it was found that the devaluation of the national currency has a strong impact on the efficiency of the social activities of loans of these organizations.

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[8]Prepared by the author based on sample statistics.

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1. Gutierrez-Nieto, B., Serrano-Cinca, C., & Molinero, C. M. (2007). Microfinance institutions and efficiency. *Omega, 35*(2), 131-142.

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