Evaluate the Efficiency of Liquidity Management in Russian Banks

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ABSTRACT

The purpose of this study is to measure the impact of liquidity on the performance of Russian banks (2008-17) to assess the efficiency of Russian banks in liquidity management to determine whether liquidity risk is reasonably priced. This study uses multiple regression analysis and DEA analysis to assess liquidity management efficiency. The study found that the effect of liquidity on the net interest margin (NIM) and the return on assets (ROA) is greater than the impact of liquidity on the return on equity (ROE), The study concluded that Medium banks were the most effective in liquidity managing, while small banks were more efficient than large banks. The study also further concluded that the Russian banks have a surplus of untapped liquidity and the efficiency of liquidity management in Russian banks is weak, Many banks could have achieved higher returns at the same liquidity levels or could have achieved the same returns at higher liquidity levels (Less liquidity risk).

Keywords: *Liquidity, Efficiency, Liquidity risk performance, Data envelopment analysis (DEA), Multi regression, ROE, ROA, Net interest margin, Performance, Russian banks.*
JEL Classification: *G210.*

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Highlights of this paper

- The purpose of this study is to measure the impact of liquidity on the performance of Russian banks.
- This study uses multiple regression analysis and DEA analysis to assess liquidity management efficiency.
- The study concluded that Medium banks were the most effective in liquidity managing, while small banks were more efficient than large banks.

1. INTRODUCTION

Banking performance is a wide concept that encompasses many issues, such as competition, concentration, efficiency, productivity and profitability (Heffernan, 2005; Bikker and Bos, 2008). The wide range of performance issues has resulted in a wide variety of banking research. However, there is no consensus among researchers on the most appropriate way to measure banks' efficiency. The study of risk in banks and their relationship to performance is very important because of the long-term effect of risk on profit. Research on the impact of risk on the banks' performance is rapidly expanding because of its practical importance. The issue of banking risk assessment has become very important, therefore the study of risk preferences and their impact on the efficiency of banks is rapidly evolving and has become a magnet for researchers (Begumhan and Cenktan, 2008). When looking at profitability, one should also analyze the risks associated with the profitability indicators.

The purpose of this study is to measure the banks' performance relative to liquidity risk-taking preferences to evaluate whether Liquidity risk is reasonably priced, by using Data Envelopment Analysis (DEA). DEA is a mathematical technique used to measure the performance of companies compared to other companies within the frontiers of the sample. Comparing a bank's liquidity management efficiency with its competitors may provide additional insights to regulatory and supervisory authorities together with bank management.

There are many risks face banks such as market risk, credit risk, interest rate risk and operational risk. These risks are reflected in the form of liquidity risk (Brunnermeier and Motohiro, 2009). Liquidity risk affects the performance and reputation of the Bank (Jenkins and Anderson, 2003). The bank may lose customer trust if funds are not provided to them well in time. A bank may fail if it does not have the acceptable liquidity even if it has a stable asset quality, adequate capital and robust profits (Crowe, 2009). A lot of literature concluded that the liquidity crisis was the main cause of the 2009 global financial crisis. The liquidity crisis greatly affected the operational environment of banks. Because of this crisis, the Basel Committee on Banking Supervision stressed the importance of liquidity risk management. it stressed that banks should maintain strong and sufficient liquid assets to deal with crises and that these assets should be profitable to be sustainable. Most banking operations rely on deposits and if depositors begin drawing their deposits, this may result in the creation of a liquidity trap for the bank (Jeanne and Svensson, 2007). This would force the bank to borrow funds from the central bank or interbank market at a higher cost (Diamond and Rajan, 2001). On the other hand, the bank with adequate deposits would not face this crisis but may lose profitability if the liquidity gap widens. The bank may be forced to increase its cash reserves to alleviate the liquidity risk, but that may be very costly (Holmström and Tirole, 2000). Banks can avoid this crisis by focusing on ratios such as liquid liabilities to total liabilities and liquid assets to total assets (John *et al.*, 2009). Liquidity is a vital pillar of banking activities. For this reason, it is important to examine and evaluate the link between liquidity risk management and banking performance.

2. LITERATURE REVIEW

Liquidity risk is described as the risk of being unable to liquidate a position at a reasonable price in the given time (Muranaga and Ohsawa, 2002). Also, it can be defined as the Bank's inability to meet short-term financial

demands. The Basel Committee on Banking Supervision (2008) defines "liquidity" as the Bank's ability to finance the increase in assets and meet liabilities when due without causing any losses. The Committee also stated that liquidity risk in banks usually arises when the Bank converts short-term liabilities to long-term liquid assets.

To determine liquidity, three elements must be considered: cost, time and quantity. Cost means the bank's ability to convert assets into cash without losses. Time means the time the bank needs to convert assets into cash, quantity means the number of resources the bank must meet its financial obligations (Maness and Zietlow, 2005). Banks can get liquidity through asset sales, borrowing money and debt repayment from debtors.

Liquidity is considered to be an important internal determinant of bank profitability among other variables because liquidity can be a source of bank failure and therefore having a large value of liquid assets that can easily be converted into cash is wise (Said and Mohd, 2010). From a marketing viewpoint, it is essential that the bank be alert of its liquidity station because it helps to grow customer loans in case of attractive market opportunities (Falconer, 2001). The bank, which suffers from a liquidity imbalance, loses a lot of business opportunities. Also, in an emergency situation instead of relying on the help of central banks, commercial banks can manage the convertible assets in advance to avoid losses in unexpected case (Ibe, 2013).

Generally, the majority agree that there is a negative correlation between liquidity and the profitability of banks. but on the other hand, there is a need to study barter against liquidity shocks and the cost of maintaining less profitable liquid assets and how this affects the Bank's ability to exploit market opportunities (Bordeleau and Graham, 2010). There are conflicting views about liquidity risk management, while insufficient liquidity leads to additional sources of finance at high costs, which reduces profitability and may lead to bankruptcy. On the contrary, large liquidity may lead to lower returns and therefore lower profitability (Ioan and Dragos, 2006).

3. EMPIRICAL STUDIES

Most studies which examined the impact of liquidity or liquidity risk on banks' performance, found that liquidity and performance risks were related. However, these studies differ in the nature of this relationship whether it is negative or positive. Twenty-two previous empirical studies were reviewed on this subject. The results were as follows:

- (10) of studies found an inverse relationship between liquidity and performance [Cuong (2015); Marozva (2015); Tabari *et al.* (2013); Arif and Nauman (2012); Vintilă and Nenu (2016); Mamatzakis and Bermpei (2014); Bellouma (2011); Tran *et al.* (2016); Drakos (2003); Hesse (2007)].
- (10) of studies found a positive relationship between liquidity and profitability [Tufail and Bilal & Khan (2013); Bordeleau and Graham (2010); Olagunju *et al.* (2012); Kosmidou *et al.* (2005); Ibrahim (2017); Ariyadasa *et al.* (2016); Dietrich and Wanzenried (2011); Bourke (1989); Kosmidou (2008); Maudos and De Guevara (2004)].
- (2) studies found that the results are unclear and inconclusive [Ben and Kandil (2009); Demirgüç-Kunt and Huizinga (1999)].

4. METHODOLOGY

Application of Data Envelopment Analysis (DEA) is non-parametric mathematical programming, a technique used to estimate production frontiers for specific inputs and outputs and to measure the efficiency relative to these frontiers (Charnes *et al.*, 1978). Presented by Farrell (1957) and developed by Charnes *et al.* (1978); Fethi and Pasiouras (2010).

DEA assumes that if a unit can produce a certain level of output using input, another unit of the same size can do the same. The most efficient producers (composite product) can be used to calculate an effective solution for each level of input or output (as a 'virtual product) and to make comparisons.

DEA helps to identify efficient companies to build efficient production frontier. DEA models measure the relative efficiency that is the efficiency of each company relative to similar companies in the sample. Thus, applying DEA in evaluating the performance of a set of companies, it is possible to form two groups: companies that comprise an efficient frontier and inefficient companies lying below the frontier.

In DEA the model, the degree of efficiency is assessed by dividing the weighted outputs on the weighted inputs (Charnes *et al.*, 1978). Each variable is chosen by its weights for each unit analysis in order to obtain maximum efficiency. The efficiency rate per unit of the reference group of j= 1, …, n companies is evaluated relative to the other set members (Charnes *et al.*, 1978). The maximal efficiency score is equal to 1, and the lower values indicate relative inefficiency of the analyzed objects (see Equation 1):

$$\text{Maximize: } \frac{\sum_{r=1}^{s} u_r y_{rk}}{\sum_{i=1}^{m} v_i x_{ik}} \qquad (1)$$

$$\text{Subject to: } \frac{\sum_{r=1}^{s} u_r y_{rj}}{\sum_{i=1}^{m} v_i x_{ij}} \leq 1 \quad j=1\ldots, n;\ u_r, v_i > 0$$

Where: ***yrk :*** *is the quantity of output r produced by firm k.* ***xik :*** *is the quantity of input i consumed by firm k.*

ur : *is the weight of output r.* ***vi :*** *is the weight of input i.*

n: *is the number of firms to be evaluated.* ***s:*** *is the number of outputs.*

m: *is the number of inputs.*

This linear programming problem can be dealt following two different approaches:

1. The weighted sums of outputs are maximized holding inputs constant (output-oriented model).
2. The weighted sums of inputs are minimized holding outputs constant (input-oriented model).

The Original DEA model (CCR model [*]) was developed under CRS assumption (Charnes *et al.*, 1978) by which is meant that "t times increase in inputs will result in t times increase in output" (Fethi and Pasiouras, 2010). The fractional model can be transformed to a linear programming problem (see Equation 2). It should be solved n times for each company in the reference set. CRS input-oriented model Primal equation:

$$\text{Maximize: } \sum_{r=1}^{s} u_r y_{rk}$$

$$\text{Subject to: } \sum_{i=1}^{m} v_i x_{ij} - \sum_{r=1}^{s} u_r y_{rj} \geq 0 \quad j=1\ldots, n \qquad (2)$$

$$\sum_{i=1}^{m} v_i x_{ik} = 1 \qquad u_r, v_i > 0$$

Where: ***yrk :*** *is the quantity of output r produced by firm k.* ***xik :*** *is the quantity of input i consumed by firm k.*

ur : *is the weight of output r.* ***vi :*** *is the weight of input i.*

n: *is the number of firms to be evaluated.* ***s:*** *is the number of outputs.*

m: *is the number of inputs.*

Later, the model was modified to the BCC model Banker *et al.* (1984) which used the VRS assumption. VRS assumption suggests that Equiproportionate increases in factor inputs yield a greater (or less) than Equiproportionate increase in output" (Heffernan, 2005). Experts point to the fact that CRS can only be applied for the companies which operate optimally (Coelli *et al.*, 2005). However, in many industries (including banking sector) such factors, as imperfect competition or government regulations, may cause the deviation from an optimal scale (Coelli *et al.*, 2005; Beccalli *et al.*, 2006; Singh *et al.*, 2008). In addition, VRS is considered to be a more appropriate

[*]Detailed explanations of CCR model modifications and mathematical transformations are provided, for instance, by Erkoc (2012).

assumption for measuring efficiency in developed banking sector (McAllister and McManus, 1993; Wheelock and Wilson, 1995). In our study, we will use the VRS approach (input-oriented model).

5. EMPIRICAL ANALYSIS

5.1. Data and Variables

This study includes the data of 85 Russian banks. The total assets of the 85 banks selected for the study constitute 87% of the total assets of the banking sector in Russia. the study divided the banks into three equal groups based on the size of the assets. The first group consisted of 28 banks, it included the banks which have total assets between (270 billion Rubles to 23 trillion Rubles) were categorized as large banks, The second group consisted of 29 banks, and included the banks which have total assets of between (102 – 270 billion Rubles) were categorized as medium banks, and The third group consisted of 28 banks, and included the banks which have total assets of between(5 - 102 billion Rubles) were categorized as small banks. The sample panel data include the year-end data for the period 2008 - 2017. This study used financial ratios, multiple - regression and DEA. Data from Official published on the website of the Central Bank of the Russian Federation were used. The DEA performance index is represented by the weighted output ratio divided by the weighted input ratio.

The next step is to find the appropriate variables to be included in the DEA model as inputs and outputs. The discriminatory power of the DEA will be reduced when there are a large number of variables. Therefore, until this problem is overcome, the variables must be minimized using appropriate scientific methods. This issue has been widely discussed and there are many ways to choose variables Jenkins and Anderson (2003); Fanchon (2003); Ruggiero (2005); Adler and Yazhemsky (2010); Luo *et al.* (2012); Xie *et al.* (2014); Niranjan and Johnson (2011), Hiroshi and Avkiran (2009); Subramanyam (2016). Here in our study, we will select the variables by analyzing the multiple regression of the variables to find the effect of independent variables (inputs) on the dependent variables (outputs) and then we will choose the variables with statistical significance.

Table-1. Variables definition & measurement units..

Variables	Abbreviation variables	Variables definition
Dependent variables	(TL/TD)	Total Loans to Total Deposits Ratio
(Inputs)	(LA/CL)	Liquid Assets to Current Liabilities Ratio
	(LA)/(CL+TD)	Liquid Assets to Liquid Liabilities Ratio
	(LA/TA)	Liquid Assets to Total Assets Ratio
	(LA /TD)	Liquid Assets to Total Deposits Ratio
Independent variables	NIM	Net Interest Margin to Total Assets
(Outputs)	ROA	Return on Assets
	ROE	Return on Equity

5.2. The Multiple -Regression Model

The multiple regression equation assumes that liquidity (inputs) affect profitability and performance factors, therefore the general linear model of multi-regression is outlined in Equation 3:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 \quad (3)$$

Where: ***Y:*** *The dependent variables (outputs)* ***α*** *:The constant term.*

B: *The coefficient of the function.* ***X :*** *The independent factors (inputs).*

By putting the study variables in the above equation, three equations can be formed as follows:

$$NIM=\alpha+\beta1(TL/TD)+\beta2(LA/CL)+\beta3[LA/(CL+TD)]+\beta4(LA/TA)+\beta5(LA/TD) \quad (4)$$

$$ROA=\alpha+\beta1(TL/TD)+\beta2(LA/CL)+\beta3[LA/(CL+TD)]+\beta4(LA/TA)+\beta5(LA/TD) \quad (5)$$

$$ROE=\alpha+\beta1(TL/TD)+\beta2(LA/CL)+\beta3[LA/(CL+TD)]+\beta4(LA/TA)+\beta5(LA/TD) \quad (6)$$

Where: ***NIM**: Net interest margin.* ***ROA:** Return on assets.* ***ROE:** Return on equity.*
***TL:** Total loans.* ***TD:** Total deposits.* ***LA:** Liquid assets.*
***CL:** Current liabilities.*

5.2.1. The Hypotheses

The main hypotheses can be formulated as follows:

H_o: liquidity variables don't affect financial performance (expressed by NIM, ROA and ROE) of the Russian commercial banks.

H_1: liquidity variables affect financial performance (expressed by NIM, ROA, and ROE) in Russian commercial banks.

5.2.2. The Subset Hypothesis

NIM Model

H_o: (TL/TD), (LA/CL), (LA/(CL+TD)), (LA/TA) and (LA /TD) don't affect NIM in Russian banks.

H_1: At least one of (TL/TD), (LA/CL), (LA/(CL+TD)), (LA/TA) and (LA /TD) affect NIM in Russian banks.

ROA Model

H_o: (TL/TD), (LA/CL), (LA/(CL+TD)), (LA/TA) and (LA /TD) don't affect ROA in Russian banks.

H_1: At least one of the (TL/TD), (LA/CL), (LA/(CL+TD)), (LA/TA) and (LA /TD) affect ROA in Russian banks.

ROE Model

H_o: (TL/TD), (LA/CL), (LA/(CL+TD)), (LA/TA) and (LA /TD) don't affect ROE in Russian banks.

H_1: At least one of (TL/TD), (LA/CL), (LA/(CL+TD)), (LA/TA) and (LA /TD) affect ROE in Russian banks.

5.2.3. Testing (F) For the Suitability of the Research Models

To examine the suitability of the multiple regression models for analysis, by using the distribution (F-statistic) test, one of the following hypotheses will be rejected:

H_o: The model is unsuitable; when the independent variables don't affect the dependent variables.

H_1: The model is suitable; when the independent variables do affect the dependent variables.

The decision rule as follows:

Accept H_o If p-value (Sig. F) > 0.05

Accept H_1 If p-value (Sig. F) ≤ 0.05

From the analysis output in Table 2 the results as follow:

- The Models (4), (8), (11), (12), (14), (15), (16), (19) and (23): values of p-value (Sig. F) ≤ 0.05 ,So we shall refuse the null hypothesis H_o and accept the alternative hypothesis H_1 , that means At the $\alpha = 0.05$ level of significance, there is enough evidence to conclude that the predictors are useful for predicting the NIM or ROA or ROE ; therefore, the models are suitable.
- The Models (1), (2), (3) ,(5), (6), (7), (9), (10), (13), (17), (18), (20), (21), (22), (24), (25) , (26),(27) ,(28),(29) and(30): values of p-value (Sig. F) > 0.05 ,So we shall accept the null hypothesis H_o and refuse the alternative hypothesis H_1, that means At the $\alpha = 0.05$ level of significance, there isn't enough evidence to conclude that the predictors are useful for predicting the NIM or ROA or ROE ; therefore, the models are unsuitable.

Table-2. ANOVA table, f-statistic values and sig. f-statistic.

Year	Model Name	Model. No	F-statistic	Sig. F-statistic	The decision	Year	Model Name	Model. No	F-statistic	Sig. F-statistic	The decision
2008	NIM	Model (1)	1.38	0.24	Unsuitable	2013	NIM	Model (16)	4.38	0.01	Suitable
	ROA	Model (2)	1.32	0.26	Unsuitable		ROA	Model (17)	1.4	0.23	Unsuitable
	ROE	Model (3)	0.29	0.92	Unsuitable		ROE	Model (18)	1.87	0.11	Unsuitable
2009	NIM	Model (4)	3.5	0.01	Suitable	2014	NIM	Model (19)	4.45	0.02	Suitable
	ROA	Model (5)	0.51	0.77	Unsuitable		ROA	Model (20)	0.56	0.73	Unsuitable
	ROE	Model (6)	0.18	0.97	Unsuitable		ROE	Model (21)	0.29	0.92	Unsuitable
2010	NIM	Model (7)	0.95	0.45	Unsuitable	2015	NIM	Model (22)	0.56	0.73	Unsuitable
	ROA	Model (8)	15.56	0	Suitable		ROA	Model (23)	11.21	0	Suitable
	ROE	Model (9)	0.1	0.99	Unsuitable		ROE	Model (24)	0.12	0.99	Unsuitable
2011	NIM	Model (10)	1.27	0.29	Unsuitable	2016	NIM	Model (25)	1.08	0.38	Unsuitable
	ROA	Model (11)	34.99	0	Suitable		ROA	Model (26)	0.33	0.89	Unsuitable
	ROE	Model (12)	12.89	0	Suitable		ROE	Model (27)	0.33	0.89	Unsuitable
2012	NIM	Model (13)	1.74	0.15	Unsuitable	2017	NIM	Model (28)	0.76	0.58	Unsuitable
	ROA	Model (14)	38.77	0	Suitable		ROA	Model (29)	0.65	0.66	Unsuitable
	ROE	Model (15)	4.49	0.04	Suitable		ROE	Model (30)	0.22	0.96	Unsuitable

5.2.4. R-Square for The Appropriate Models

R-square measures the strength of the relationship between the model and the dependent variable. However, it is not a formal test of the relationship. The F test of general importance is to test the hypothesis of this relationship. If the F test is significant, we can conclude that R-squared is not zero and the correlation between the model and the dependent variable is statistically significant. Table 3 showing the variability percentage of independent variables. The (R square) demonstrates the relationship between dependent and independent variables whereas (R) represents the square root of (R). The value of (R) points out how independent variables are associated with NIM, ROA and ROE. Moreover, the (adjusted R square) mentions the statistical shrinkage of risks variables. Simply, (adjusted R square) refers to the compatibility of independent variables with dependent ones in order to validate the decisions based on the regression model (Cameron and Trivedi, 1998).

Table-3. The total divergence in the dependent variables.

Year	Model name	Model. No	R^2	Adjusted R^2	Sig.R	The decision
2009	NIM	Model (4)	0.15	0.11	0.39	Suitable
2010	ROA	Model (8)	0.28	0.26	0.53	Suitable
2011	ROA	Model (11)	0.56	0.55	0.75	Suitable
	ROE	Model (12)	0.32	0.3	0.57	Suitable
2012	ROA	Model (14)	0.59	0.57	0.77	Suitable
	ROE	Model (15)	0.05	0.04	0.23	Suitable
2013	NIM	Model (16)	0.14	0.11	0.37	Suitable
2014	NIM	Model (19)	0.1	0.08	0.31	Suitable
2015	ROA	Model (23)	0.12	0.11	0.35	Suitable

5.2.5. Testing (T) for the Appropriate Models

To examine the suitability of the multiple regression models for analysis, by using the distribution (T-statistic) test, one of the following hypotheses will be rejected:

H_o: The model is not suitable (when the independent variables don't affect the dependent variables).

H_1: The model is suitable (when the independent variables affect the dependent variables).

The decision rule as follows:

Accept H_o If p-value (Sig. T) > 0.05

Accept H_1 If p-value (Sig. T) ≤ 0.05

Table 4 Shows the accepted variables in the alternative hypothesis H_1 only. We avoided mentioning the accepted variables in the null hypothesis H_o because it will be excluded from the DEA analysis.

Table-4. Contains only the rejected models in the null hypothesis (Ho) or the accepted models in the alternative hypothesis (H1). accepted models in the null hypothesis were ignored.

Year	Outputs	No.Model	Inputs	B	T Statistic	Sig. Tstatistic	The Decision
2009	NIM	Model (4)	constant	0.65	8.07	0.00	Suitable
			TLTD	0.01	2.02	0.05	Suitable
			LACLTD	0.49	3.16	0.00	Suitable
			LATA	-0.40	-3.13	0.00	Suitable
			LATD	-0.13	-2.13	0.04	Suitable
2010	ROA	Model (8)	constant	0.01	3.07	0.00	Suitable
			LACLTD	0.06	5.53	0.00	Suitable
			LATA	-0.07	-2.66	0.01	Suitable
2011	ROA	Model (11)	constant	0.03	8.42	0.00	Suitable
			TLTD	0.00	9.07	0.00	Suitable
			LACLTD	0.17	9.77	0.00	Suitable
			LATA	-0.25	-10.07	0.00	Suitable
	ROE	Model (12)	constant	0.16	10.25	0.00	Suitable
			TLTD	0.01	5.18	0.00	Suitable
			LACLTD	0.48	5.53	0.00	Suitable
			LATA	-0.74	-5.93	0.00	Suitable
2012	ROA	Model (14)	constant	0.02	3.26	0.00	Suitable
			LACL	0.00	0.94	0.35	Suitable
			LACLTD	0.43	10.24	0.00	Suitable
			LATA	-0.45	-6.62	0.00	Suitable
			LATD	0.00	-3.84	0.00	Suitable
	ROE	Model (15)	constant	0.12	9.03	0.00	Suitable
			LATD	0.00	-2.11	0.04	Suitable
2013	NIM	Model (16)	constant	0.07	7.83	0.00	Suitable
			LACL	0.00	3.17	0.00	Suitable
			ALCLTD	-0.48	-3.19	0.00	Suitable
			LATA	0.32	2.14	0.04	Suitable
2014	NIM	Model (19)	constant	0.06	7.66	0.00	Suitable
			ALCLTD	-0.36	-2.81	0.01	Suitable
			LATA	0.28	2.15	0.04	Suitable
2015	ROA	Model (23)	constant	-0.01	-2.17	0.03	Suitable
			LATA	0.06	3.35	0.00	Suitable

Note: *Table 4 contains only the rejected models in the null hypothesis (Ho) or the accepted models in the alternative hypothesis (H1). accepted models in the null hypothesis were ignored.

In Table 4 all the accepted models in the alternative hypothesis H_1 because all of the p-values ≤ 0.05, so we shall refuse the null hypothesis (H_o)and accept the Alternative Hypothesis (H_1). So, At the α = 0.05 level of significance, there exists enough evidence to conclude that the slope (B) of the variables mentioned above is not zero and, hence, that variables are useful as predictors of NIM, ROA and ROE in Russian banks. It can be seen that in

2008, 2016 and 2017 liquidity indicators did not affect the performance indicators so in these years we will enter all indicators in the DEA model.

The value of slope B in the Table 4 represents the ratio of effect and the type of relationship between the independent variables and the dependent variable. In order to know the importance of risk indicators and its impact on performance indicators, it is necessary to determine its real value compared to all variables. Therefore, we multiply the value B by the mean of the dependent variables, this make us know the value of its effect as compared to other variables as is clear in the Figure 1.

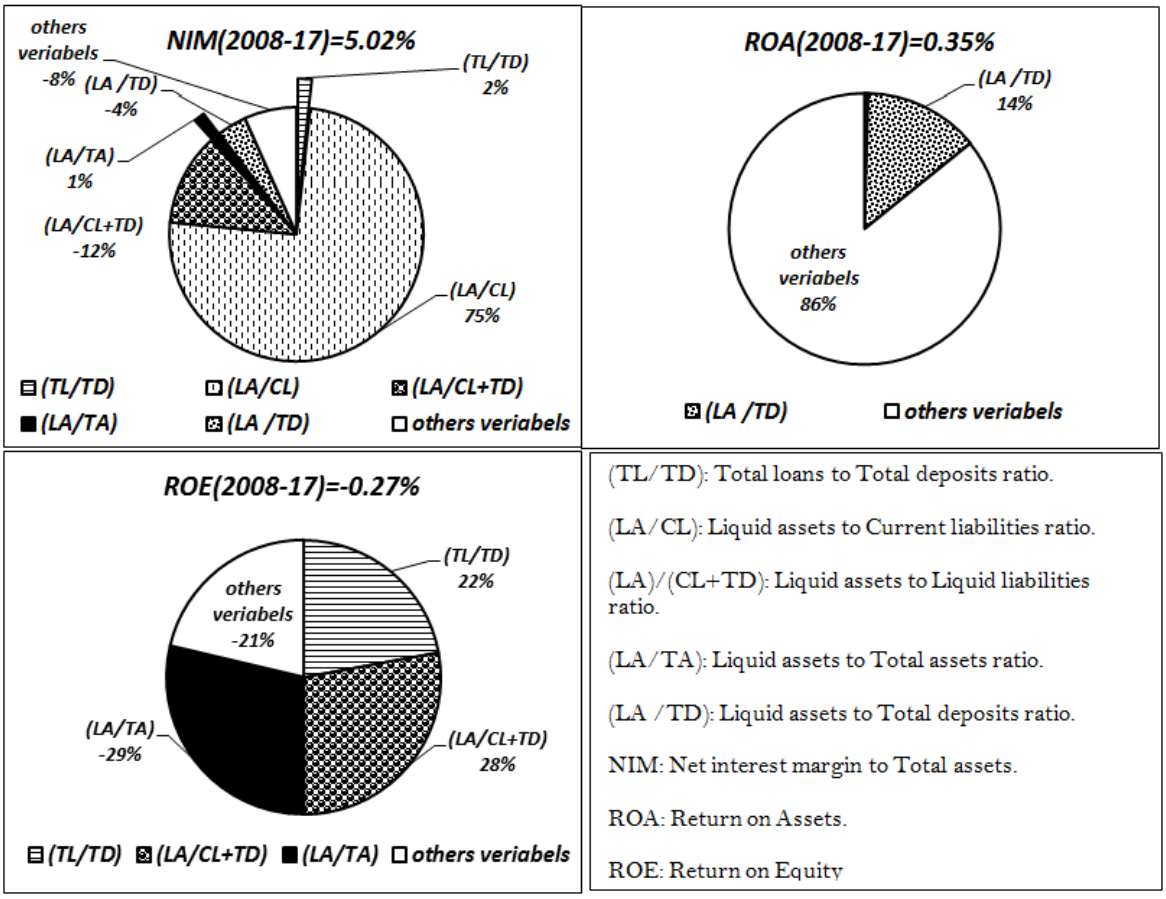

Figure-1. Ratios of the contribution of liquidity indicators in the formation of performance indicators (2008-17).

Figure 1 illustrates the contribution of liquidity indicators to the formation of performance indicators, net interest margin (NIM), Return on Assets (ROA) and Return on Equity (ROE) were 92%, 14% and 79% respectively. It can be noted that the indicators of liquidity used in the study vary from one indicator to another depending on the composition of each indicator, this is because of the nature of the complex liquidity concept. Liquidity is not only related to profitability, but it is also associated with many banking aspects that are affected it and Many banking aspects that affect them such as asset and liability portfolio management, balance in terms of investing funds and attracting funds, etc., this study examines the impact of liquidity and evaluates its management based on profitability only. Also, it can be seen that the effect of liquidity on the net interest margin(NIM) and the return on assets (ROA) is greater than the impact of liquidity on the return on equity (ROE), this is because liquidity is dynamic, this characteristic is present in the net interest margin and assets, but equity is relatively stable.

The most important results that can be read and analyzed in figure 1 above include the following:

1. There is a positive and significant impact of the liquidity index (LA / CL) on the NIM reached 75%. In other words, the higher the liquid assets than the liquid liabilities, this has a positive impact on performance indicators.
2. There is a positive impact of the liquidity index (LA / TD) on the ROA reached 14%. when the liquid assets increase more than the increase in deposits, in the sense that liquid assets were financed by equity (not from deposits or liquid liabilities) this has a positive impact on performance indicators.
3. There is a positive effect of the liquidity index (TL / TD) on ROE and NIM reaching 22% and 2% respectively. The larger the loans than the deposits reflected positively on the performance indicators i.e. the financing of loans from equity.
4. There is a positive impact of the liquidity index (LA / CL + TD) on ROA reached 28% also has a negative impact on the NIM reached -12%. When liquid liabilities and deposits are reduced, this is positively reflected in the performance indicators if liquid liabilities and deposits are used in illiquid assets (financing liquid assets from capital).
5. There is a negative impact of the liquidity index (LA / TA) on the ROE reached -29%, also has a positive impact on the NIM reached 1%. illiquid assets are reflected positively on performance indicators.
6. There is a negative impact of the liquidity index (LA / TD) on the NIM reached -4%. The more deposits, and using of these deposits in illiquid assets (loans) has a positive impact on performance indicators.

It can be concluded from the above analysis that in order to improve performance indicators in Russian banks by managing liquidity, it must:

1. Increase the sources of funds in banks. This is done in one of two ways by attracting more deposits and/or increasing capital. In the case of Russian banks that have a surplus of liquidity, they should increase the sources of funds by increasing the capital only.
2. Russian banks should reduce the sources of liquid funds (liquid liabilities).
3. Russian banks must increase illiquid assets (loans) so that loans remain larger than deposits.

All of these recommendations ultimately mean resort to the capital increase.

Based on the above, inputs and outputs will be adopted in the DEA analysis as shown in Table 5.

Table-5. Statistical inputs and outputs according to the results of the multiple regression analysis

Year	Inputs	Outputs
2008	***	***
2009	(TL/TD), LA/(CL+TD), (LA/TA), (LA/TD)	NIM
2010	LA/(CL+TD),(LA/TA)	ROA
2011	(TL/TD), LA/(CL+TD), (LA/TA)	ROA-ROE
2012	(LA/CL), LA/(CL+TD),(LA/TA),LATD	ROA-ROE
2013	(LA/CL), LA/(CL+TD),(LA/TA)	NIM
2014	LA/(CL+TD),(LA/TA)	NIM
2015	(LA/TA)	ROA
2016	***	***
2017	***	***

(TL/TD): Total loans to Total deposits.

(LA/CL): Liquid assets to Current liabilities.

(LA)/(CL+TD): Liquid assets to Liquid liabilities.

(LA/TA): Liquid assets to Total assets.

(LA /TD): Liquid assets to Total deposits.

NIM: Net interest margin to Total assets

ROA: Return on Assets.

ROE: Return on Equity.

5.3. The Efficiency of Liquidity Management

Table-6A. The technical efficiency of liquidity (DEA - VRS) for Russian banks. (2008-17).

Bank	Bank #	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Mean
Sberbank of Russia	1	1	1	0.56	1	0.99	0.89	0.77	0.48	0.88	0.78	0.83
VTB Bank	2	0.95	0.14	0.44	0.23	0.3	0.36	0.19	0.24	0.53	0.67	0.4
Gazprombank	3	0.88	0.18	0.19	1	0.95	0.49	0.37	0.1	0.57	0.31	0.5
Rosselkhozbank	4	0.92	0.19	0.03	0.04	0.21	0.68	0.53	0.05	0.32	0.2	0.32
Alfa-Bank	5	0.99	0.36	0.17	0.47	1	0.89	0.63	1	0.55	0.67	0.67
Credit Bank of Moscow	6	0.89	0.35	0.22	0.16	0.96	0.7	0.75	0.05	0.42	0.76	0.53
Bank Otkritie	7	0.91	0.42	0.31	0.44	1	0.68	0.28	0.05	0.48	0.41	0.5
Unicredit Bank	8	0.99	0.18	0.39	0.91	1	0.65	0.42	0.19	0.58	0.93	0.62
B&N Bank	9	0.85	0.29	0.03	0.11	0.24	0.87	0.56	0.19	0.16	0.4	0.37
Promsvyazbank	10	0.82	0.31	0	0.4	0.96	0.82	0.58	0.43	0.5	0.39	0.52
Rosbank	11	0.97	0.52	0	0.36	0.97	0.94	0.77	0.1	0.59	0.44	0.57
Raiffeisenbank	12	0.95	0.47	0.5	0.84	0.99	0.89	0.75	0.43	0.96	0.53	0.73
Sovcombank	13	0.97	0.72	1	0.67	0.94	0.99	0.57	0.86	1	0.95	0.87
Bank Saint-Petersburg	14	0.99	0.28	0.17	0.44	0.24	0.69	0.51	0.19	0.53	0.44	0.45
Bank Uralsib	15	0.99	0.35	0.11	0.03	0.23	0.84	0.93	0.05	0.85	0.55	0.49
Bank RRDB	16	1	0.63	0.25	0.2	0.13	0.43	0.26	0.48	0.48	0.42	0.43
Citibank	17	1	0.51	0.92	0.92	0.99	0.88	0.7	0.21	0.79	0.83	0.78
Growth Bank	18	0.95	0.22	0.14	0.18	0.34	0.64	0.81	0.1	0.76	0.1	0.42
Ak Bars Bank	19	0.74	0.16	0.03	0.22	0.3	0.32	0.14	0.81	0.74	0.3	0.37
Bm-Bank	20	1	0.27	0	0.15	0.4	0.93	0.74	0.1	1	1	0.56
NB Trust	21	0.62	0.13	0	0.23	0.32	0.95	0.45	0.86	0.38	0.13	0.41
Mosobl bank	22	1	0.24	0.9	1	0.47	0.95	0.91	0.45	1	1	0.79
Smp Bank	23	0.95	0.41	0.06	0.72	0.87	0.46	0.26	0.05	0.23	0.64	0.46
Russian Standard Bank	24	0.86	0.84	0.36	0.5	0.96	1	0.3	0.46	0.56	0.45	0.63
Bank Dom.Rf	25	0.8	0.01	0	0	0.21	0.6	0.46	0.1	0.1	0.32	0.26
Novikom bank	26	0.83	0.49	0.36	0.46	0.93	0.66	0.53	0.43	0.35	0.35	0.54
The Ural Bank	27	0.7	0.19	0.19	1	0.59	0.9	0.58	0.29	0.27	0.07	0.48
Moscow Industrial Bank	28	1	0.43	0.17	0.03	0.67	0.69	0.61	0.05	0.21	0.18	0.4
Sviaz-Bank	29	0.86	0.32	0.75	0.77	0.53	0.5	0.42	0.05	0.3	0.48	0.5
HCF Bank	30	1	0.81	0.63	1	0.94	1	0.26	0.05	0.87	1	0.75
Absolut Bank	31	1	0.32	0	1	0.96	0.75	0.56	0.1	0.33	0.29	0.53
Vozrozhdenie Bank	32	0.98	0.67	0.08	0.22	0.87	0.81	0.79	0.14	0.43	0.7	0.57
Post Bank	33	1	0.83	0.28	0.42	0.52	1	0.28	0.76	0.97	0.89	0.69
Tinkoff Bank	34	1	1	0.5	1	1	1	0.23	0.81	1	1	0.85
Orient Express Bank	35	1	0.66	0.58	0.75	0.95	0.98	0.26	0.05	0.93	0.57	0.67
Surgutneftegas bank	36	0.96	0.29	0	0.31	1	0.77	0.74	0.43	0.35	0.6	0.54
Bank Zenit	37	0.93	0.29	0.22	0.33	0.81	0.47	0.42	0.1	0.15	0.31	0.4
Trans kapital bank	38	0.91	0.5	0.36	0.15	1	0.91	0.79	0.14	0.39	0.26	0.54
Rosevro bank	39	0.84	0.61	0.19	0.59	0.98	0.84	0.91	0.56	0.94	0.81	0.73
Nordea Bank	40	1	0.45	0.53	0.35	0.86	0.62	0.39	0.14	0.94	0.59	0.59
Cb Deltacredit	41	1	1	1	1	0.88	1	0.67	0.1	0.51	0.93	0.81
Ing Bank (Eurasia)	42	1	0.46	0.89	0.78	1	0.26	0.14	0.86	0.73	0.73	0.68
Mts Bank	43	0.91	0.25	0	0	0.06	0.91	0.4	0.05	0.45	0.61	0.36
Avers	44	0.96	0.27	0.42	0.21	0.74	0.53	0.63	0.64	0.55	0.51	0.55
Renaissance Credit	45	1	0.42	0.03	0.8	1	0.95	0.31	0.24	0.93	0.9	0.66

Table-6B. The technical efficiency of liquidity (DEA - VRS) for Russian Banks. (2008-17).

	Bank #	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Mean
Invest trade bank	46	0.99	0.28	0.11	0.24	0.78	0.6	0.6	0.14	0.98	0.13	0.48
Cetelem Bank	47	0.98	0.31	0.03	0.13	1	1	0.53	0.38	0.85	0.86	0.61
Jsc "Otp Bank"	48	1	0.65	0.83	0.98	1	1	0.24	0.43	0.55	0.92	0.76
Joint Stock West Siberian C.Bank	49	1	0.38	0.08	0.5	0.95	0.84	0.98	0.29	0.33	0.52	0.59
Avangard J.Stock Bank	50	0.99	0.27	0.25	0.24	0.98	0.93	0.75	0.62	0.74	0.54	0.63
Bank Finservice	51	0.92	0.68	0.58	0.24	0.89	0.36	0.26	0.52	0.67	1	0.61
Skb-Bank	52	0.99	0.44	0.14	0.93	0.97	0.95	0.33	0.29	0.79	0.69	0.65
Rgs Bank	53	1	0.64	0.17	0.2	0.35	0.68	0.9	0.1	0.51	0.8	0.53
Rusfinance Bank	54	1	1	0.95	1	0.64	0.78	0.36	0.57	0.41	0.34	0.7
Credit Europe Bank Ltd	55	0.79	0.63	0.92	0.9	1	0.9	0.38	0.1	0.96	1	0.76
Globexbank	56	0.94	0.22	0.28	0.31	0.4	0.52	0.32	0.1	0.14	0.41	0.36
Asian-Pacific Bank	57	0.95	0.93	0.93	0.82	1	0.94	0.42	0.1	0.79	0.92	0.78
Center-Invest Bank	58	0.92	0.48	0.11	0.69	0.93	0.83	0.86	0.57	0.41	0.44	0.62
Sme Bank	59	0.59	0.22	0.17	0.09	1	0.4	0.42	0.05	0.92	1	0.49
Eximbank Of Russia	60	1	0.25	0	0.13	0.09	0.8	0.4	0.33	0.33	0.9	0.42
Kuban Credit	61	1	0.43	0.47	0.37	0.84	0.8	0.95	0.38	0.4	1	0.66
Baltinvestbank	62	0.99	0.26	0.06	0.29	0.51	0.87	0.6	0.05	1	0.17	0.48
Locko-Bank	63	0.93	0.38	0.25	0.69	0.91	0.94	0.97	0.56	0.89	0.68	0.72
Hsbc Bank (Rr)	64	0.99	0.39	0	0.63	0.5	0.29	0.11	0.5	0.57	0.45	0.44
Rn Bank	65	0.8	0.39	0.5	0	1	0.5	0.21	1	1	1	0.64
Bank Soyuz	66	0.62	0.27	0.06	1	0.13	0.87	0.7	0.1	0.43	0.37	0.45
Deutsche Bank	67	1	0.32	0.56	0.06	0.94	0.02	0.02	0.86	0.79	0.85	0.54
Metallinvestbank	68	0.96	0.25	0.19	0.36	1	0.59	0.33	0.62	0.83	0.6	0.57
Centro Credit Bank	69	0.94	0.14	0.69	0.98	0.99	0.99	0.49	0.04	0.43	0.42	0.61
Expobank	70	0.7	0.47	0	0	0.45	0.99	0.57	0.64	0.85	0.5	0.52
Sdm-Bank	71	1	0.59	0.28	0.27	0.95	0.79	0.65	0.86	0.77	0.63	0.68
Bbr Bank	72	0.92	0.67	0.36	0.11	0.64	0.84	1	0.57	0.42	0.69	0.62
Toyota Bank	73	0.66	0.36	0.17	0.76	1	0.97	1	0.64	0.94	0.92	0.74
Banca Intesa	74	0.73	0.47	0.11	0.26	0.86	0.97	0.85	0.1	0.67	0.45	0.55
Primsotsbank	75	1	0.84	0.56	0.88	1	0.84	0.71	0.67	0.92	0.88	0.83
Bcs Bank	76	0.93	0.3	0.36	0.22	0.61	0.21	0.4	0.29	0.24	0.47	0.4
Bnp Paribas Bank	77	1	0.29	0.31	0.32	0.37	0.51	0.19	0.48	0.92	0.38	0.48
Levoberezhny	78	1	0.95	0.33	0.76	1	0.9	0.57	0.76	0.8	0.99	0.81
International F.Club	79	1	0.51	0	0.14	0.66	0.87	0.67	0.1	0.58	0.54	0.51
Chelindbank	80	0.58	0.66	0.28	0.44	0.66	0.86	1	0.62	0.5	0.68	0.63
Credit Agricole Cib	81	0.96	0.5	0.25	0.39	0.71	0.04	0.33	0.01	0.24	0.47	0.39
Chelyabinvestbank	82	0.95	0.66	0.31	0.58	0.77	0.83	0.93	0.29	0.35	0.53	0.62
Commerzbank (Eurasija)	83	0.8	0.37	0.89	0.11	0.97	0.23	0.19	0.03	0.72	0.88	0.52
Sotsinvestbank	84	0.99	0.48	0.08	0.08	0.13	0.7	0.81	0.05	0.16	0.32	0.38
Mosuralbank	85	1	0.93	0	0.19	0.23	0.85	0.67	0.19	0.51	0.95	0.55
Mean		0.92	0.46	0.31	0.47	0.73	0.74	0.54	0.34	0.61	0.61	0.57

Tables 6A and 6B present the results of DEA. the study uses financial ratios and output-oriented DEA model to assess the technical efficiency of liquidity management in Russian banks. The results show that no bank achieved full efficiency and consistent liquidity management during all ten years of the study.

In 2008 twenty four banks achieved the perfect efficiency score 1.0 , namely, Banks # 1, 16, 17, 22, 28, 30, 33, 34, 35, 41, 42, 43, 45, 48, 49, 53, 54, 60, 61, 67, 77, 78, 79 and 85. while the worst bank in liquidity Management was namely, Bank # 80 with efficiency score 0.584.

In 2009 four banks achieved the perfect efficiency score 1.0, namely, Banks # 1, 34, 41 and 54. while the worst bank in liquidity Management was namely, Bank # 25 with efficiency score 0.01.

In 2010 four banks achieved the perfect efficiency score 1.0, namely, Banks # 13 and 41. while the worst banks in liquidity Management were namely, Banks # 10,11, 20, 21, 25, 31, 36, 43, 60, 64, 70, 79 and 85 with efficiency score 0.

In 2011 ten banks achieved the perfect efficiency score 1.0, namely, Banks # 1, 3, 22, 27, 30, 31, 34, 41, 54 and 66. while the worst banks in liquidity Management were namely, Banks # 25, 43,65 and 70 with efficiency score 0.

In 2012 eleven banks achieved the perfect efficiency score 1.0, namely, Banks # 34, 36, 45, 48, 55, 57, 59, 65, 68 and 73. while the worst banks in liquidity Management were namely, Bank # 43 with efficiency score 0.057.

In 2013 three banks achieved the perfect efficiency score 1.0, namely, Banks # 41, 47 and 48. while the worst banks in liquidity Management were namely, Bank # 67 with efficiency score 0.022.

In 2014 three banks achieved the perfect efficiency score 1.0, namely, Banks # 72, 73 and 80. while the worst banks in liquidity Management were namely, Bank # 67 with efficiency score 0.018.

In 2015 two banks achieved the perfect efficiency score 1.0, namely, Banks 5 and 65. while the worst bank in liquidity Management was namely, Bank # 81 with efficiency score 0.012.

In 2016 six banks achieved the perfect efficiency score 1.0, namely, Banks 13,20,22,34,62 and 65. while the worst bank in liquidity Management was namely, Bank # 25 with efficiency score 0.098.

In 2017 eight banks achieved the perfect efficiency score 1.0, namely 20,22,30,34,55,59,61 Banks and 65. while the worst bank in liquidity Management was namely, Bank # 27 with efficiency score 0.074.

The year 2008 was the best year in the efficiency of liquidity management during the study period, where the average efficiency of banks combined to score 92.2%, while in 2010 was the worst, the average efficiency of banks combined score was 31.2%. In 2009, 2011, 2012, 2013, 2014, 2015, 2016 and 2017 the measure of the liquidity efficiency for banks combined were score 45.5%, 46.6%, 73%, 74%, 54.4%, 34%, 61%, 60.8% and 57.72% respectively. The average liquidity efficiency of the combined banks from 2008-2017 indicates that Russian banks could have reduced their inputs by 7.8%, 54.5%, 68.8%, 53.4%, 27%, 26%, 45.6%, 66%, 39% and 39.2% % Respectively.

liquidity efficiency also indicates that the profitability of banks is exactly in parallel with their liquidity risk-taking preferences in one bank for six years, one bank for five years, one bank for four years, four banks for three years, seven banks for two years and twenty-five banks for a year, This means that these banks may have had good liquidity management in those years, It also means that these banks were working better than other banks in those years because their degrees of efficiency is equal to (1). On the other hand, there are 45 banks that have never achieved the full 1.0 degree of efficiency over the ten-year period. This means that the profitability of those banks did not reasonably match their liquidity levels as expected. Many banks could have achieved higher returns at the same liquidity risk levels or could have achieved the same returns at lower risk levels.

Table-7. The technical efficiency of liquidity management by size of Banks (DEA - VRS).

Year	Large banks	Medium banks	Small banks	Mean
2008	91.21%	96.15%	89.14%	92.17%
2009	36.80%	53.65%	45.78%	45.41%
2010	26.73%	40.44%	26.20%	31.12%
2011	45.39%	55.73%	38.50%	46.54%
2012	64.82%	82.93%	70.83%	72.86%
2013	74.24%	78.51%	68.93%	73.89%
2014	54.90%	49.12%	59.27%	54.43%
2015	31.23%	30.40%	40.45%	34.03%
2016	56.37%	63.70%	62.83%	60.97%
2017	50.79%	66.57%	64.78%	60.71%
Mean	53.25%	61.72%	56.67%	57.21%

Table 7 shows the average technical efficiency of liquidity management according to the size of the banks. During the ten years, the banks achieved efficiency average in liquidity management as follows: large banks (53.25%), medium banks (61.72%) and small banks (56.67%), In other words, medium banks were the most effective in liquidity managing, while small banks were more efficient than large banks. The large banks were the least efficient than other banks in liquidity efficiency, Figure 2 shows this.

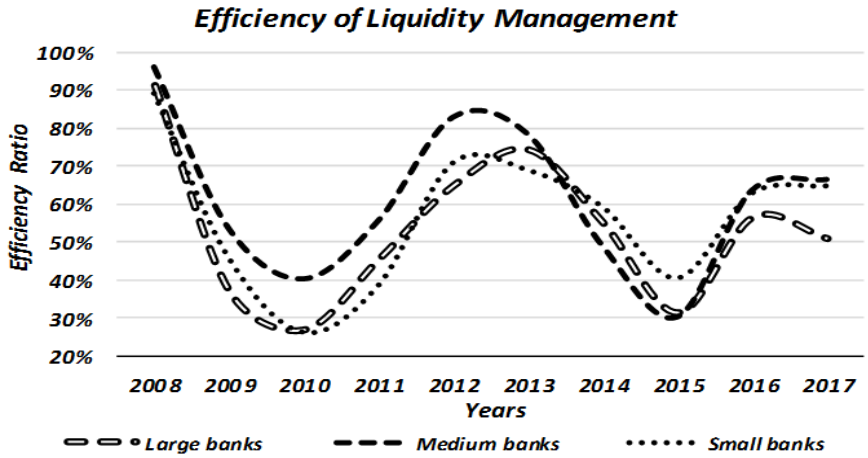

Figure-2. The technical efficiency of liquidity management by size of banks (DEA - VRS).

6. RESULTS, CONCLUSION AND RECOMMENDATIONS

This study assessed the efficiency of Russian banks in liquidity management during the period 2008-17. The purpose of this study was to measure the impact of liquidity on the performance of Russian banks and assessing the efficiency of Russian banks in managing liquidity to determine whether liquidity risk is reasonably priced. This study used multiple regression analysis to test the hypothesis of the effect of liquidity on the performance in 85 Russian banks, the study also used the results of the multiple regression analysis to determine the variables that used as inputs and outputs in the DEA model to assess liquidity management efficiency. Five indicators were selected to measure liquidity (inputs): Total loans to Total deposits ratio (TL/TD), Liquid assets to Current liabilities ratio (LA/CL), Liquid assets to Liquid liabilities ratio (LA/(CL+TD), Liquid assets to total assets ratio (LA/TA) and Liquid assets to Total deposits ratio (LA /TD). Three indicators were selected to measure profitability and performance: net interest margin (NIM), return on assets (ROA) and return on equity (ROE).

6.1. The Study Found the Following

- During the ten years of the study, the contribution of liquidity indicators to the formation of performance indicators, net interest margin (NIM), Return on Assets (ROA) and Return on Equity (ROE) were 92%, 14% and 79% respectively.
- Impact of liquidity indicators that used in the study varied from one indicator to another depending on the composition of each indicator, this is because of the nature of the complex liquidity concept, sometimes have a negative effect, sometimes have a positive effect and sometimes there is no effect.
- The effect of liquidity on the net interest margin (NIM) and the return on assets (ROA) is greater than the impact of liquidity on the return on equity (ROE).
- Liquidity management efficiency indicates that the profitability of banks is exactly in parallel with their liquidity risk-taking preferences in one bank for six years, one bank for five years, one bank for four years, four banks for three years, seven banks for two years and twenty-five banks for a year.
- During the ten years of study, the banks achieved average efficiency in liquidity management as follows: large

banks (53.25%), medium banks (61.72%) and small banks (56.67%).

- Liquidity in banks that have not achieved full efficiency is higher than in banks that have achieved full efficiency, this indicates an excess of untapped liquidity.

6.2. The Study Concluded That

- Banks that achieved full efficiency may have good liquidity management in those years, it means that these banks were working better than other banks in those years because their degrees of efficiency is equal to (1). On the other hand, there are 45 banks that have never achieved the full degree of efficiency (1) over the ten-year period.
- Medium banks were the most effective in liquidity managing, while small banks were more efficient than large banks. The large banks were the least efficient than other banks in liquidity efficiency.
- The Russian banks have a surplus of untapped liquidity and also the efficiency of liquidity managing is weak.
- The profitability of banks that have not been efficient in managing liquidity is not reasonably commensurate with their liquidity levels as expected. Many banks could have achieved higher returns at the same liquidity levels or could have achieved the same returns at higher liquidity levels (Less liquidity risk).
- Interest rate risk problem: Russia went into the crisis with foreign currencies, especially with the US dollar, which is widely used in household savings. The only effective tool used by the Bank of Russia to counter the ruble decline was open market operations whose size is determined by uncontrolled external factors (global oil prices, risk demand in global financial markets). Large-scale foreign currency purchases created a structural liquidity surplus in the domestic financial sector and caused a rise in inflation. Continued high prices in Russia compared to its major trading partners have led to a ruble decline, which has gradually eroded the competitiveness of domestic producers. To stop the decline of Ruble and combat inflation the Bank of Russia raised interest rates by 6.5 percentage points to 17% at once. This huge jump in interest rates showed that the Bank of Russia was determined to protect the ruble at any cost. A new monetary policy has been adopted for the Bank of Russia based on a gradual shift from focusing on exchange rate targeting to inflation targeting and increasing the role of interest rate instruments. This led to a gradual transition to a floating exchange rate while maintaining the ability to mitigate unwanted exchange rate fluctuations through a more flexible foreign exchange intervention mechanism, Figure 3 shows the use of the interest rate to control inflation and the ruble exchange rate. The figure 3 also shows the downward trend of interest rates in recent years, which is moving in the right direction to reduce the cost of borrowing in order to stimulate economic growth.

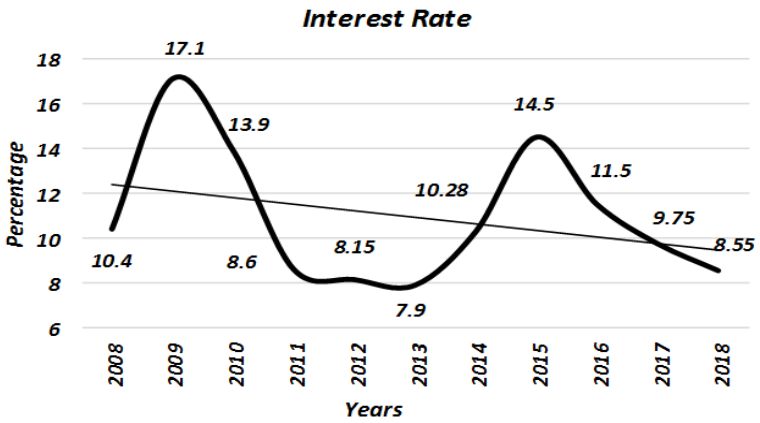

Figure-3. Interest Rate in Russia (200 8- 2019).

7. RECOMMENDATIONS

- To improve Russian banks efficiency in liquidity management, they must analyze the best practices Standard banks in liquidity management efficiency which may provide an additional approach to liquidity management.
- Russian banks should Increase the sources of funds, this is done in one of two ways by attracting more deposits and/or increasing capital. In the case of Russian banks that have a surplus of liquidity, they should increase the sources of funds by increasing the capital only.
- Russian banks should reduce the sources of liquid funds (liquid liabilities).
- Russian banks must increase illiquid assets (loans) so that loans remain larger than deposits.
- All these recommendations above ultimately mean resort to the capital increase so the Bank of Russia and Russian banks should adopt a policy that increases the capital by:
- Allocation of part of the annual profits to increase the capital.
- issuing new shares to raise capital, if possible.
- Study the merger of banks with each other, especially in small and medium-sized banks to strengthen financial positions.
- The Bank of Russia and Russian banks should adopt a long-term policy to gradually increase the minimum capital of Russian banks.
- In light of the excess liquidity found in Russian banks, in light of all the above recommendations related to increasing the sources of funds by increasing capital, reducing liquid liabilities, expanding in credit and keeping the loans larger than deposits, all of this needs an expansionary credit policy. The most important pillar in expansionary credit policy is the reduction of interest rates, so the Bank of Russia should create favorable conditions for expanding the process of credit and decreasing the surplus liquidity in banks, especially by decrease interest rates since the banking sector suffers from high-interest rates that hinder the credit expansion policy.

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