

Original Article

# The Relationship between Liquidity and Profitability in Banking Sector: A Practice in Borsa Istanbul

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**Abstract** - The banking sector plays an important role in the guidance of both national and international economic events. The banks are usually the first institutions referred by the financial sector as well as the real sector in finding sources of funds. It has become a requirement for a strong economy that banks have solid financial structures. Liquidity management has an important share in both providing continuity and increasing effectiveness in the banking sector, just like in the other sectors, and it also affects profitability. In this study, the relationship between the liquidity and profitability of 12 banks operating in Borsa İstanbul (BİST) is analyzed during the period of 2007-2017 by using panel data regression analysis. As a result of the analysis, it is seen that there is an increase in profitability when liquidity increases and vice versa.

**Keywords** - Banking sector, Liquidity, Liquidity Risk, Profitability, Panel Data Regression Analysis.

## I. INTRODUCTION

Banks are the institutions providing fund flow between the people or corporations needing funds and those having surplus funds. They collect the surplus funds as deposit money and grant a loan to those who are in need. Thus, the fund's transfer in the economy happens both in a faster and a more cost-efficient way. The income banks earn in return for the service provided during the fund's transfer constitutes a major part of their return. It is a fact that banks are also institutions, and they are required to be managed well financially, just as the other institutions. Liquidity management is of capital importance for these institutions as such in other institutions. Good management of liquidity has an important role in providing continuity, increasing effectiveness and profitability.

Risk is the possibility of deviation from the expected return. The possibility of making defective decisions while doing return planning causes failure in the plan, unprofitability or the possibility of making a loss (Bolak,2004:p.15).

Bank for International Settlements (BIS) was founded in 1930 with the studies made on the international platform in order to minimize the fluctuations and their effects happening or possibly happening in the world's financial markets. Basel Committee on Banking Supervision, founded under BIS, conducts international studies regarding risk management in banks and sets standards (BIS:2019).

As a result of the studies conducted by this Committee, the financial risks in banks are divided into three main groups Market Risk, Credit Risk and Operational Risk. Market risk consists of the risks occurring in terms of mobility in the financial prices. It is the risk of devaluation of the prices existing in the financial tables of the banks due to the prices formed in the market. Liquidity risk is also included in this group. Credit risk is the risk involving the losses that banks can encounter due to credit transactions. Operational risk, on the other hand, comprises the risks related to the other elements about the institution remaining out of the elements that can cause market and credit risk (BIS,2019).

With the studies of Basel, Capital Adequacy Ratio, stipulating the consolidation of the banks' financial structures against the risks including the liquidity risk, is constituted. The content of the ratio is developed in order to fill the deficiencies in Basel I and Basel II, and Basel III standards are set afterwards. This ratio is desired to be over 8%. In Basel III regulations, two liquidity ratios are added in addition to Basel II Capital Adequacy Ratio calculations (TBB,2013:p.12).

In 2009, banking risks were divided into four groups in more elaborate ways as financial risks, operational risks, business risks and event risks by Van Greening and Bratanovic. The liquidity risk, constituting the subject of this study, is included in the financial risks group. Liquidity risk is the misplanning of the cash inflows and outflows of the banks. These are risks emerging as a result of the non-availability of the outflow due payment amount completely and timely.

Liquidity is fulfilling banks' obligations and barter trade debts in due course of time. In this sense,



it is of prime importance, just as for the other institutions. The fact that banks don't have enough liquid assets when the time of payment is due is defined as the liquidity risk (Okay,2002:p.113).

Since the banks play a direct role within the financial system, the liquidity risk these institutions have becomes more important for them when compared to other institutions. A possible liquidity leak in a bank will rapidly cause the reaction of the market. The banks facing liquidity risk can react more slowly regarding encashing their assets compared to the other enterprises. When emergencies occur, a liquidity shortage can cause the bank not to be able to fulfil its obligations (Bolak,1998:p.48).

It is possible to divide Emergency Liquidity risk as market liquidity risk and funding risk. Market liquidity risk is the negative situation that emerges in connection with the price of the instrument in the market when the transaction of the financial investment instrument is being made. Funding risk, on the other hand, is the inapplicability of the cash flows to fulfil the obligations (Kozanoğlu,2000:p.24).

The banks have particular reasons causing liquidity risk over other institutions. Maturity mismatch in the assets and sources is the primary reason. The fact that the maturity of the granted credits is longer than the deposit money's duration is the main cause of this problem. Default of the credits granted by the banks and the spurts in the deposit money is listed among the other reasons (Diamond,1999:p.711).

Liquidity risk is one of the most important and biggest problems of banks. The bank can encounter bankruptcy when it is not managed well. Since the banks are the keystones of the financial markets, some regulations are made regarding the liquidity risk. Keeping a certain percentage of the deposit money as cash for the short-term liquidity obligations, holding a certain amount of the long-term deposit money as bonds and bills with high liquidity for long-term liquidity obligations can be given as examples to such regulations (Doğan ve Şarsel,1994:p.25).

Institutions aim at acquiring the highest return by taking the minimum risk. However, risk and return have a parallel relationship. When considered from this point of view, risk can be defined as knowing the calculation of possibilities made for the return (Ercan and Ban,2005:p.177). Managing the risk correctly will result in an increase in return, or profitability in other words.

Profitability is important in the banking sector, as in every sector, in terms of maintaining continuity or at least maintaining the current position. The return that can be achieved by the capital from different investment fields, economic developments and a profit target of the institution and profitability ratios in the sectors are the considered points for the assessment of profitability (Akgüç,1989:p.64).

It is possible to analyze the factors affecting the profitability of the banks under two titles as controllable and uncontrollable factors. Wage and commissions, business segment, deposit money and credit quality can be given as examples of the controllable factors. The overall situation of the economy, sectoral conditions and rate of interest can be given as examples of the uncontrollable factors (Altan and Çatalbaş,2003:p.3).

The active and passive structures of the banks change depending on the profit they gain from their assets. In fact, this change is mutual. Also, the balance sheet structure of the banks affects their profitability. The ratio that is mostly used while evaluating the profitability performance of the banks is the return on assets ratio. This ratio shows how efficiently the banks use their assets (Hester Zoellner, 1966:p.375).

In this study, the liquidity and profitability relationship in the banking sector in Turkey is analyzed by using Panel data regression analysis. In the next parts of the study, the first literature review and then methodology, findings and results will be addressed.

## II. LITERATURE REVIEW

In the study conducted by Bourke in 1989, a positive relationship is found between liquidity and profitability. In the study carried out by Molyneux and Thornton in 1992, a significant and negative relationship is found between liquidity and profitability. In the study made by Türker in 2002, it is identified that the return on assets of liquidity is among the main micro determinants. Athanasoglu, Delis and Staikouras made a study on the factor affecting the bank profitability and concluded that liquidity has a positive effect on profitability. Also, in 2006, Berger and Bouwman analyzed the factors identifying the liquidity risk of the American banks and concluded that the banks whose return on assets is larger are exposed to more liquidity risk. In 2010, Ismail deduced that the banks in Indonesia manage the liquidity risk successfully. In the study carried out by Akhtar, Khizer and Shama in 2011, it is inferred that the size of assets of a bank and the liquidity risk are directly proportional. In 2012, Çelik and Akarım conducted a study on the liquidity risk of the banks, and they deduced that there is a negative relationship between risky liquid assets and equity capital and liquidity. Once more, in the study carried out by Clark et al. in 2012 on the factors affecting the return on assets of 16 banks operating in the banking system in Macedonia, it is found out that solvency, liquidity risk, operational expenses management, banking sector reform index and economic growth have a significant effect on the return of the assets. In the study conducted by Yılmaz in 2013, it is seen that in the banking sector of 9 developing countries, including Turkey, liquidity, operational expenses and

capitalization, inflation and largeness have a significant effect on the return of the assets.

### III. DATA SET, PRACTICE AND FINDINGS

Performed panel data analysis comprises of 12 banks operating in BİST: Akbank T.A.Ş., Denizbank A.Ş., QNB Finansbank A.Ş., Türkiye Garanti Bankası A.Ş., Türkiye Halk Bankası A.Ş., Türkiye İş Bankası A.Ş., Şekerbank T.A.Ş., Türkiye Vakıflar Bankası T.A.O., Yapı ve Kredi Bankası A.Ş., Türkiye Kalkınma ve Yatırım Bankası A.Ş., Türkiye Sınai Kalkınma Bankası A.Ş. and ICBC Turkey Bank A.Ş. In bank selection, the banks whose data can be acquired in the time period of 2007-2017 are given priority and the data used is obtained from the system of the Banks Association of Turkey (TBB) on bank basis. Table 1 shows the variables used in the econometric study and their explanations.

**Table 1. The Variables Used in the Study and Their Resources**

Variable Name	Notation	Measurement
Panel A: Dependent and Independent Variables		
Return on Assets Ratio	ROA	Net Profit/Total Assets
Liquidity Ratio	LO	Liquid Assets/Total Assets
Panel B: Control Variables Peculiar to Banking Sector		
Capital Adequacy Ratio	SYO	Equity / ((Total Risk Weighted Assets)*100)
Inefficiency	ETK	Other Operational Expenses/TotalAssets
Bank Scale	OLC	Logarithm of Banks' Total Assets

In the study, in order to see the liquidity effect on the bank's profitability, the return on assets ratio is used as the dependent variable, while liquidity ratio is used as the independent variable in our first model (1). In the second model (2), the liquidity ratio is used as the dependent variable, while the return on assets ratio is used as the independent variable to see the effect of the profitability on the banks' liquidity ratio.

$$ROA_{it} = \beta_{0it} + \beta_{1it}LIK_{it} + \beta_{2it}SYO_{it} + \beta_{3it}OLC_{it} + \beta_{4it}ETK_{it} + \epsilon_{it}$$

$$LIK_{it} = \beta_{0it} + \beta_{1it}ROA_{it} + \beta_{2it}SYO_{it} + \beta_{3it}OLC_{it} + \beta_{4it}ETK_{it} + \epsilon_{it}$$

In the equations,  $i=1,2,3,\dots, N$  shows the total number of the individual units in the panel;  $t=1,2,3,\dots, T$  shows the total number of the observations made along the time dimension, and  $\epsilon$  shows the panel data error term.

The purpose of this study is to analyze the long-term relationship between the liquidity and profitability in the time period of 2007-2017 of 12

banks operating in İstanbul Stock Exchange (BİST) by using Fully Modified Ordinary Least Squares (FMOLS) test developed by Philips and Hansen (1999) that corrects the deviations in the standard fixed effects estimators and Dynamic Ordinary Least Squares (DOLS) method developed by Stock and Watson (1995) that can eliminate the deviation in the stationary regression by including the dynamic elements into the models.

Table 2 shows the descriptive statistics related to the dependent and independent variables used in the panel data analysis. When the table is analyzed, it is seen that the variables whose average variable values are the highest are the inefficiency (ETK) and the liquidity ratio (LO), respectively. Also, the fact that median values are close to average values indicates that the variables have a distribution close to the normal distribution.

**Table 2. Descriptive Statistics Related to the Variables**

Variable	Avg	Median	Std. Dvd.	Min	Max	Obs
ROA	1.802	1.671	0.818	0.330	5.064	132
LO	26.516	25.560	7.390	9.787	45.910	132
SYO	18.648	16.036	11.685	12.784	91.176	132
ETK	62.692	63.283	29.758	4.036	211.41	132
OLC	0.739	0.924	0.497	0.693	1.432	132

**Table 3. Correlation Matrix Values**

	ROA	LO	OLC	SYO	ETK
ROA	1.00				
LO	0.35	1.00			
OLC	0.540	0.22	1.00		
SYO	0.35	0.16	0.01	1.00	
ETK	0.41	0.55	0.55	0.05	1.00

In Table 3, Pearson Correlation Coefficients among the variables are included. According to Tabachnick and Fidell (2001), when the correlation coefficient between two variables has a value over 0.90, it creates a problem in the regression analysis. In accordance with another point of view, the correlation coefficients should be under the level of 70%. When Table 3 is analyzed, it is seen that the highest correlation among the variables used in the study is 0.59, and this value is under the level of 0.80 proposed by Gujarati (2004) for the existence of multicollinearity.

**Note:** Numbers between parentheses show the probability values. The null hypothesis of the tests is that "there is a unit root."

**Table 4. Variation Inflation Factor Values**

	Dependent Variable: ROA	Dependent Variable: LO
Variable	VIP Value	VIF Value
LO	1.470	-
ROA	-	2.162
OLC	1.298	1.141
SO	1.258	1.283
ETK	1.356	1.827

Variation Inflation Factor (VIF) results are given in Table 4. According to these results, VIF values vary in 1.47 - 1.25 for the number 1 equation. For the number 2 equation, VIF values take part in 1.14-2.16. In regard to these obtained results, it can be stated that the multicollinearity problem doesn't exist for both equations.

**IV. PANEL UNIT ROOT TEST FINDINGS AND EVALUATION**

Before the panel data regression analysis, unit root tests are applied for the variables used in the analysis. In order to prevent spurious regression problems, which is frequently encountered in regression analysis, firstly, it is tested if the used variables are stationary or not in time series methods. Levin, Li ve Chu-t test (LLC), Breitungt-test, Im, Pesaran ve Shin-W test (IPS), ADF-Dickey Fuller ve Choi Z ve Hadri-Z tests are commonly used unit root methods in panel data studies. Unit root tests belonging to the variables are seen in Table 4. According to these test results, it is identified that all of the variables' level values have a unit root, and the series is turned into the stationary state by subtracting the first difference. As stated above, I (1) stability level, in other words, first rank integration condition of all of the necessary condition variables required to apply FMOLS and DOLS models are being fulfilled.

**Table 5. Panel Unit Root Test Results**

Variables	Level		First Difference	
ETK	-0.4669	(0.3192)	-3.0307	(0.0012)
ROA	-3.8008	(0.0766)	-2.3428	(0.0096)
LO	-0.6320	(0.2637)	-4.3797	(0.0000)
OLC	0.7709	(0.7796)	-9.5310	(0.0000)
SYO	-1.1752	(0.1199)	-10.2889	(0.0000)
ETK	0.1325	(0.5527)	-3.7826	(0.0001)
ROA	0.1061	(0.5423)	-1.8325	(0.0334)
LO	0.5148	(0.6967)	-2.8285	(0.0023)
OLC	2.1515	(0.9843)	-3.3493	(0.0004)
SYO	-0.6889	(0.2454)	-5.7489	(0.0000)

**Table 6. FMOLS and DOLS Models Analysis Results**

Dependent Variable: ROA						
	FMOLS			DOLS		
	Coef	t-stat	p-value	Coef	t-stat	p-value
LO	0.024**	2.246	0.027	0.025**	2.499	0.014
OLC	0.328***	2.695	0.000	0.317**	2.085	0.039
SYO	0.021*	1.774	0.079	0.014	3.289	0.285
ETK	0.009***	3.394	0.000	0.008***	3.322	0.000

Table 6 and Table 7 show FMOLS and DOLS results for both dependent variables. According to FMOLS panel data regression results, all independent variables' elasticity coefficients are significant on different statistical levels. When the elasticity coefficients are evaluated for the FMOLS model, it is seen that an average 1% increase in Liquidity Ratio (LO), Bank Scale (OLC), Capital Adequacy Ratio (SYO) and Inefficiency (ETK) variables will also increase the profitability of the banks (ROA) in the ratios of 0.02%, 0.32%, 0.02% and 0.009% respectively.

Similarly, according to DOLS results, the elasticity coefficients of the variables except for the SYO variable are significant. When DOLS test results are evaluated throughout the study, it is seen that an average 1% increase in Liquidity Ratio (LO), Bank Scale (OLC) and Inefficiency (ETK) variables will also increase the profitability of the banks (ROA) in the ratios of 0.02%, 0.31% and 0.008% respectively. FOLS and DOLS results are seen to be approximate.

**Table 7. FMOLS and DOLS Models Analysis Results**

Dependent Variable: LO						
	FMOLS			DOLS		
	Coef	t-stat	p-value	Coef	t-stat	p-value
ROA	1.864	1.523	0.1311	2.466**	2.616	0.010
OLC	2.95***	3.598	0.000	1.013***	3.933	0.000
SYO	0.267**	2.130	0.035	0.292**	2.508	0.013
ETK	0.027	0.853	0.395	0.013	0.546	0.585

As can be seen in table 7, according to FMOLS analysis results, Bank Scale (OLC) and Capital Adequacy Ratio (SYO) are statistically significant in ratios of 1% and 5% on the Liquidity Ratio of the banks involved in BİST. When the elasticity coefficients are assessed to analyze long term relationships, it is seen that the liquidity ratio of the banks show a 2.95% increase if there is an average 1% increase in the largeness of the Scale (OLC). On the other hand, a 1% increase in Capital Adequacy Ratio (SYO) will cause a 0.26% increase in an average liquidity ratio.

On the other side, according to DOLS regression results, the variables except for the Inefficiency (ETK) variable are statistically significant. When the elasticity coefficients are evaluated, it is seen that a 1% increase in Return on Assets Ratio, scale largeness of the Banks and Capital Adequacy Ratio will increase the Liquidity Ratio in the ratios of 2.46%, 1.01% and 0.29%, respectively.

## V. CONCLUSION

Banks are the indispensable keystones of the financial system. Banks are profit-oriented institutions like other companies. The banks which will get and maintain enough profitability ratio will be permanent in the sector. Factors such as active-passive structure, the competition status in the sector, the overall situation of the economy, credit-deposit money quality are the leading factors affecting the profitability of the banks. One of the biggest risks that can be confronted while trying to maintain the continuity of the banks is the liquidity risk. Liquidity is comprised of the assets that will enable the banks to meet their obligations on time. If the banks face a liquidity shortage, it means that they have decay in their financial structures. An unfavourable situation in the financial structures of the banks will affect the market rapidly and deeply to the contrary of the other companies.

It is seen that profitability and liquidity have a strong relationship. So, in this study, the relationship between the banks' liquidity and profitability is analyzed. The data set of the study is composed of 12 banks operating in BİST from which secure data can be obtained in the time period of 2007-2017. Obtained data are analyzed by means of Panel data regression analysis. The profitability variable "Net Profit/Total Assets" ratio and liquidity variable "Liquid Assets/Total Assets" ratio are used as dependent variables. Capital Adequacy Ratio, Inefficiency and Bank Scale are used as independent variables.

When the elasticity coefficients are evaluated for the FMOLS model, it is seen that an average 1% increase in Liquidity Ratio (LO), Bank Scale (OLC), Capital Adequacy Ratio (SYO) and Inefficiency (ETK) variables will increase the profitability of the banks (ROA) in the ratios of 0.02%, 0.32%, 0.02% and 0.009% respectively. According to DOLS, an average 1% increase in Liquidity Ratio (LO), Bank Scale (OLC), and Inefficiency (ETK) variables will increase the profitability of the banks (ROA) in the ratios of 0.02%, 0.31% and 0.008% respectively. As it can be understood from the outcomes, the results of these two models are approximate.

According to FMOLS analysis outcomes, Bank Scale (OLC) and Capital Adequacy Ratio (SYO) are statistically significant in ratios of 1% and 5% on the Liquidity Ratio of the banks involved in BİST. When the elasticity coefficients are assessed to analyze long term relationships, it is seen that the liquidity ratio of the banks show a 2.95% increase if there is an average 1% increase in the largeness of the Scale (OLC). 1% increase in Capital Adequacy Ratio will cause a 0.26% increase on an average in liquidity ratio.

According to DOLS regression results, the variables except for the Inefficiency (ETK) variable are statistically significant. When the elasticity coefficients are evaluated, it is seen that a 1% increase in Return on Assets Ratio, scale largeness of the Banks and Capital Adequacy Ratio will increase the Liquidity Ratio in the ratios of 2.46%, 1.01% and 0.29%, respectively.

When both model results are analyzed, it is seen that liquidity affects profitability and vice versa.

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