



## **Capital Adequacy and Management Quality for Banking Liquidity Management Decision in Pakistan.**

**Zulqurnain Zeeshan Rafique**

MS Finance Scholar at Shaheed Zulfikar Ali Bhutto Institute of Science and Technology, Islamabad, Pakistan

**Kashif Naseer Toor**

MS Finance Scholar at Shaheed Zulfikar Ali Bhutto Institute of Science and Technology, Islamabad, Pakistan

**Zahid Bashir**

Lecturer at the Department of Commerce,  
University of Gujrat, Pakistan.

### **Abstract**

Liquidity management is a crucial decision in commercial banking operations especially when the depositors need cash daily. A sound liquidity policy may not only enhance the efficiency of a bank's operations but also may impact its customer retention. The study, therefore, is focused to investigate the capacity of bank-specific forces like capital adequacy and management quality for explaining the commercial bank's liquidity decision in Pakistan. This empirical research study uses the financial statements of 23 commercial banks with eleven years' frequency; 2008-2018. The study employs the panel-data modeling and estimation method for the analysis of relevant data. Bank's liquidity management decision was used as the outcome variable while the independent variables were capital adequacy ratio and management quality ratio. The funding cost ratio, profitability ratio, deposit ratio, and non-performing loan ratio were used as the control variable. This empirical research finds that the commercial bank's liquidity decision is strongly supported due to increments in capital adequacy ratio as well as in management quality ratio while funding cost ratio and non-performing loans significantly reduce the existing level of liquidity in commercial banks of Pakistan. The study contributes to the understanding of liquidity decisions not only in Pakistan but also in other countries in the Asian-region. The factors used for explaining liquidity decisions of the banking sector in this study are not necessarily the only factors in this domain but may include further industry-based, firm-specific based, and macro-level factors in future research. However, the policymakers in the commercial banking sector of Pakistan are recommended to consider the significant factors of this study while deciding on setting an appropriate level of liquidity in their banks for the proper functioning of their day to day operations.

**Keywords:** Bank's Liquidity, Capital Adequacy, Management Quality, Commercial Banking, Panel Data Modelling

---

The material presented by the authors does not necessarily represent the viewpoint of editor(s) and the management of the Khadim Ali Shah Bukhari Institute of Technology (KASBIT) as well as the authors' institute.

© KBJ is published by the Khadim Ali Shah Bukhari Institute of Technology (KASBIT) 84-B, S.M.C.H.S, off Sharah-e-Faisal, Karachi-74400, Pakistan.



## **Introduction**

### **Background of Research:**

Bank Liquidity refers to its ability to meet its due financial obligation without suffering the losses which are unacceptable to the bank (BIS, 2008). When the bank transforms its short-term funds into long term advances, the liquidity risk may arise. To cope with this situation, the banks must hold an ideal liquidity level to increase their profitability as well as to set off their financial liabilities. Commercial banks worldwide tried to maintain their liquidity at an adequate level to compensate for the global financial crises. As a result, they seek liquidity support from their central banks so they may be able to withstand the financial system at that time but it did not happen and as a result, a lot of banks became bankrupt during that period of global financial crises. It has awakened the policymakers in the banking system to maintain an adequate level of liquidity for proper management of risk to cope with these kinds of crises (Vodva, 2013). Three instruments as suggested by (Aspachs, Nier, & Tiesset, 2005) that can be used by commercial banks for ensuring appropriate liquidity against crises situations are as follows:

The commercial bank must hold a liquidity cushion on the balance sheet's asset side. This liquidity cushion should include assets like cash and cash equivalents, the Government's issued debt instruments, balances with other commercial banks and with the central bank of that country, and other alike instruments that may shield the bank in case of demand for liquidity. On the Balance sheet's liability size as the second strategy, the commercial banks must depend on interbank trading in the shape of borrowings from another alike commercial bank as per liquidity demand. Nevertheless, this approach is closely related to the liquidity risk of the market also. As Last Resort's lender, the central bank of the country can provide liquidity assistance in case of emergency to a bank where illiquidity has risen as a case of shortage of system-wide aggregate liquidity, this approach is highly concerned with the balance sheet's liability side. The Global Financial Crisis of 2008 was considered the worst financial crisis after the great depression of the 1930s by a large number of economists worldwide. This financial crisis has affected many sectors especially the banking sector of almost every country in the world. During global financial crises, it was found that the weak position of bank liquidity may prompt all the events to become negative. It is due to a misunderstanding on behalf of the banks regarding their liquidity risk of mismanagement of their funds (Munteanu, 2012a). Lehman Brother bankruptcy henceforth put both United States and Global Financial System into turmoil. The collapse of Lehman Brothers had a crippling effect on the global economy with a financial crisis escalating to the world. In the aftermath of this episode, financial institutions froze lending such a situation entails liquidity complications in the shadow banking financial system. Besides, during the financial crises, Lehman Brother distorted and the liquidity shudder smashed the banking system in Romania which resulted in unembellished disorders in their credit activities. As a result, the banks were unwilling to advance loans to other commercial banks and reserve liquidity as anxiety of default in the financial industry or predict a shortage of liquidity (Lovin, 2013). A lot of banks resisted for maintaining the liquidity level adequate to cope with the financial crises period so that they can withstand the financial system. Liquidity support of extraordinary level would be required from the central bank during financial crises (Černohorský, Teplý, & Vrábek 2010). A lot of commercial banks failed and merged



even with wider spread support by the central bank or needed a resolution for these kinds of financial distress (Teply, 2011). These economic and financial crises exposed the need for an adequate level of liquidity risk management as well as measurements. Normally, the commercial banks attempt to maintain a balance between their liquidity as well as their profitability (Nireesh, 2012). The establishment of an adequate level of liquidity for the bank's customer is required all the time is a crucial feature of a commercial bank. So, the commercial banks should maintain enough balance of cash and cash equivalents to ensure the customer requirement for day to day withdrawal and lending.

The banking system of Pakistan has emerged during British colonialism in the East Continent. After the country got its freedom from British Raj as a separate state from India with the name of Pakistan on the 14<sup>th</sup> of August 1947, the commercial banking scope has been enhancing and growing continuously. Reserve bank of India was the central bank at the time of independence, after a year Mr. Muhammad Ali Jinnah establish a separate central bank for Pakistan with the name of State bank of Pakistan having headquarters in Karachi. In November 1949, The National Bank of Pakistan was established by the Government to meet the financing need for exports in Pakistan at that time. Soon, the NBP became the right hand of the State bank of Pakistan due to its importance in the commercial bank's industry. After a while, many other foreign and local banks including private banks were established to meet the financing needs of a different class of customers. Currently, 26 banks are operating as commercial banks in Pakistan including Govt, Private and foreign banks. The researcher used 23 banks fulfilling the criteria of financial data availability for 11 years in the study.

### **Research Problem:**

As discussed (Hussain, 2012) under SBP act 1956 under section 36, all the commercial banks scheduled, including Islamic, conventional, microfinance, or subsidiaries of these banks are required by law to keep a certain part in the form of cash and cash equivalent on their liabilities' side of the balance sheet with State bank of Pakistan. The commercial banks have to maintain the following two requirements of cash reserve as a part of their liabilities in local currency; on daily basis, a three percent minimum is required to maintain the liabilities like time and demand depending on cash reserve ratio and on weekly basis, five percent of their liabilities like time and demand should be maintained depending on cash reserve requirements from Friday to next Thursday. Currently, on 1-year tenure, there is 0 cash reserve requirement on commercial bank's time deposits. Also, as a deposit in the shape of foreign currencies, commercial banks are required to keep five percent of cash as a reserve and fifteen percent of cash as a special reserve. Above and beyond, the commercial banks in Pakistan are also required to include funds as clearance for interbank transactions as cash reserve requirements with State Bank of Pakistan (Hussain, 2012). As this global financial crisis had a direct impact on the banking system, it had raised some questions about the management of risk relating to adequate liquidity. It has gained attention worldwide researchers, policymakers, and practitioners to consider liquidity shortage and find out the reason why it is so (Roman & Sargu, 2015). The major reason for banks becoming insolvent is the shortage of liquidity due to financial crises worldwide (Mohammad Raeisi, 2016). Bank liquidity is one of the major factors for a bank's success or failure in meeting its goals and objectives that may be damaged due to changes in liquidity which results in global financial crises and insolvency.



### **Research Significance:**

The current study concludes some factors which are identified as liquidity determinants of commercial banks of Pakistan for the period of study 2008-18. These factors indicate the management of the commercial banks in Pakistan as well as the policymaker that what action they should take while making liquidity management decisions for their banks. The current study also helps future researchers for making a starting point for their future research in this area of study. The current study can contribute to the well-being of the financial industry especially the banking sector of Pakistan and our society as a whole for guiding them regarding liquidity management. The study can help all the stakeholders of banking sectors to get a deep knowledge regarding the relationship that exists between the identified factors and liquidity management.

### **Literature Review**

#### **Bank liquidity**

Bank Liquidity refers to its ability to meet its due financial obligation without suffering the losses which are unacceptable to the bank (BIS, 2008). When the bank transforms its short-term funds into long term advances, the liquidity risk may arise. To cope with this situation, the banks must hold an ideal liquidity level to increase their profitability as well as to set off their financial liabilities. In the words of Moore (2009), a commercial bank's liquidity refers to the capacity of a financial institution with any obstacle to transforming its assets into cash. Liquidity has been defined as the unrestricted stream of financial resources between the central bank and a financial intermediary; financial markets and commercial banks with a specific concentration (Nikolaou, 2009).

#### **Driving Factors**

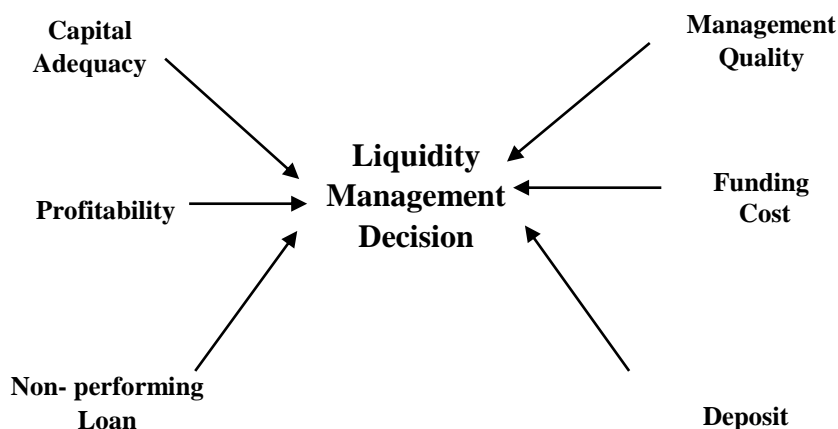
The study was conducted on bank liquidity to find determinants that may affect the liquidity of commercial banks in Romania using a multivariate linear regression model on 27 banks actively operating there. It has been found that Z-score as bank stability is an important factor that has an effect which is significant with the liquidity of banks in Romania during financial global financial crises (Munteanu, 2012a). Another study conducted by (Vodva, 2013) to identify the factors of commercial bank's liquidity in the Republic of Czech using panel regression analysis on 18 banks found that there is a positive relationship between capital adequacy ratio, rate of interest, non-performing loans ratio, interbank transaction interest rate and liquidity of commercial banks. Also, they found a negative relationship between the rate of inflation, financial crises, business cycle, and commercial bank liquidity. They also stated that the role of the size of the bank was not clear because it was not significant at all. Research conducted with a purpose of finding the determinants of bank's liquidity because liquidity as an important component of banking system found that rate of inflation, GDP growth rate, operating cost to total assets, capital to total assets and financial performance of the banks have a significant relationship with the liquidity of banks while bank size, total loan to total assets, the financial cost to total credits, total deposits to total assets have not significant relationship with the liquidity of banks (Moussa, 2015b). This study was conducted using static and dynamic panel data modeling techniques on 18 banks in Tunisia. A study regarding commercial banks to determine the bank-specific factors affecting the liquidity of banks using a panel or longitudinal

modeling techniques on 10 commercial banks in Ethiopia (Melese, 2015). They found that profitability and capital adequacy have a significant relationship with liquidity while the size of the bank has a positive significant relationship with the liquidity of the banks. Also, the ratio of non-performing loans and the growth rate of loans were not significant at all with the liquidity of banks. Study to analyze an issue that was significant to be tackled as a need for endorsing financial stability in the form of exploring the factors affecting liquidity of CEE countries' banks. They found that the loan depreciation harmed liquidity of banks (Roman & Sargu, 2015). In addition, a number of studies evidenced similar findings concerning liquidity management decision in commercial banking sectors from the different regions of the world by (Al-Homaidi, Tabash, Farhan, & Almaqtari, 2019; Ali, Shah, & Chughtai, 2019; Bibi & Mazhar, 2019; Chen, Huang, & Lin, 2018; DeYoung, Distinguin, & Tarazi, 2018; Dolgun & Ng, 2019; El-Chaarani, 2019; Mahdi & Abbes, 2018; Mahmood, Khalid, Waheed, & Arif, 2019; Pereira, 2020; Rashid, Hassan, & Shah, 2020; Said, 2018; Shah, Khan, Shah, & Tahir, 2018; Sitepu, 2020).

### **Theoretical Framework:**

The researchers have found a little number of studies available for bank liquidity determinants especially in the case of Pakistan, only one study could be found by (Rasool, 2017) with a very limited number of factors covered. So, the researcher will try to analyze the maximum factors for commercial banks in Pakistan to explore the validity of international evidence for the study. Based on the available literature studies' findings, the researchers were able to conclude that forces responsible for making liquidity decisions might be capital adequacy, management quality, funding cost ratio, profitability ratio, deposit ratio, and non-performing loan ratio. The theoretical and conceptual framework of the study based on identified factors can be depicted in the following figure.

Figure 1: Theoretical Framework



### **Hypotheses Development:**

The study develops a set of following hypotheses based on previous literature and theoretical framework.



- H<sub>1</sub>:** *A commercial bank's liquidity decision is strongly supported by an adequate level of capital ratio in the banking sector of Pakistan.*
- H<sub>2</sub>:** *The improvement of management quality in the commercial banking sector of Pakistan strongly boost the liquidity management decision.*
- H<sub>3</sub>:** *The funding cost ratio intensely negates the liquidity management decision in the commercial banking sector of Pakistan.*
- H<sub>4</sub>:** *The liquidity management decision in the commercial banking sector of Pakistan is powerfully supported by its profitability.*
- H<sub>5</sub>:** *A higher level of deposit powerfully ensures the strong liquidity management position of a commercial bank in Pakistan.*
- H<sub>6</sub>:** *A commercial bank's liquidity decision is strongly negated by the increasing level of non-performing loans in Pakistan.*

### **Methodology**

The present empirical research investigation uses the secondary data obtained from the set of financial statements of public, private, and foreign commercial banks operating in different regions of Pakistan from their income statements and balance sheet using an annual frequency between 2008-18. The population of these banks during this period indicates a total number of 26 commercial banks while the study uses the required sampled data for 23 banks meeting the criteria of providing the complete required set of financial information according to the set of variables of the study. The remaining banks were excluded due to partial or complete non-availability of the required set of information from their financial statements. The sourced data comprising the financial statement was accessed through the websites of relevant banks. The final dataset comprised a balanced panel of 23 banks for 11 years' frequency resulting in 253 firm-year observations for this study. The researcher uses the bank's liquidity for measuring the liquidity management decision as to the dependent variable of this research investigation while the independent variables include; capital adequacy and management quality ratios. Also, the funding cost ratio, profitability ratio, deposit ratio, and non-performing loan ratio were used as the control variables of this empirical research investigation. The detailed explanation of dependent, independent, and control variables of this study is stated as follows;

A commercial bank's liquidity decision may be referred to as a decision regarding current assets' management to loan requirements for the smooth conduct of banking operations. A commercial bank needs to have a sufficient amount of cash to meet its short-term obligations and customers' demands. Four different measures were used in the previous researches for measuring a commercial bank's liquidity decision like L1 which is defined as net loans to total assets, L2 which is defined as liquid assets to deposit plus short-term borrowings, L3 which is defined as liquid assets to total assets and finally L4 which is defined as loans to deposits plus short-term financing. The researcher used the average value for  $(L1+L2+L3+L4)/4$ , to see a more accurate measure. The previous researchers used the above measures of commercial bank liquidity decision as their dependent variable includes (Al-Homaidi et al., 2019; Ali et al., 2019; Bibi & Mazhar, 2019; Chen et al., 2018; DeYoung et al., 2018; Dolgun & Ng, 2019; El-Chaarani, 2019; Gautam, 2016b; Laštůvková, 2016; Mahdi & Abbes, 2018; Mahmood et al., 2019; Moussa, 2015a; Munteanu, 2012b; Patora, 2016a; Pereira, 2020; Raeisi, Haghghat, & Shirazi, 2016; Rashid et al., 2020; Roman & Sargu, 2015;



Said, 2018; Shah et al., 2018; Singh & Sharma, 2016; Sitepu, 2020; Trenca, Petria, & Corovei, 2015; P Vodová, 2011; Pavla Vodová, 2014). The term capital adequacy may be referred to as the minimum level of capital in terms of reserve that should be made available with the commercial banks all the time. It is also known as the capital adequacy ratio which enhances the stable financial condition of a commercial bank. According to the Basel III accord, commercial banks need to maintain at least eight percent of capital adequacy ratio in response to their adjusted level of assets. It is the first independent variable for the current study is the Capital Adequacy ratio which is defined as shareholder's equity to total assets. It is used as independent variables as a determining factor of bank's liquidity by previous researches like (Ahmad & Rasool, 2017; Gautam, 2016b; Moussa, 2015a; Munteanu, 2012b; Patora, 2016a; Raeisi et al., 2016; Roman & Sargu, 2015; Singh & Sharma, 2016; Trenca et al., 2015). The second determining factor as identified by previous research studies of bank's liquidity is management quality ratio which is defined as interest expense to total deposits. This ratio was used by (Roman & Sargu, 2015) as a determining factor of a bank's liquidity. The lesser the management quality ratio, the more the amount available to have for liquidity decisions. This ratio is used as a measure of management quality because the basic function of every bank is to accept the deposit for interest payment and use this fund to lend at a higher profit to receive the swap from the transaction. When the banks receive more deposit and pay a minimum level of interest to have more amount of cash for having a more liquid position, it indicates the management quality of a commercial bank.

The third determining factor as identified by the previous research studies of bank liquidity was the funding cost ratio. It is defined as total interest expense to total liabilities. Funding cost ratio was used as a determining factor of a bank's liquidity by (Munteanu, 2012a) and (Patora, 2016b). The total liabilities of a commercial bank may include the current liabilities as to the long term liabilities. The current liabilities are needed to settle on a routine basis without paying interest rather than banks receive service charges on it while the long term liabilities require a commercial bank to pay interest or sometimes profit to customers and other stakeholders but in the case of long term liabilities banks does not require to settle it on urgent basis. So, the cost payable for current as well as on long term liabilities is considered as the funding cost that may decrease the liquidity position of a bank. The more a bank pays in terms of funding cost, the lesser it has in a liquid fund. The fourth determining factor of a bank's liquidity is a profitability ratio which can be measured by either ROA or ROE. As ROA, it is defined as net income after tax to total assets. As ROE, it is defined as net income after tax to total equity. The researcher used the average value of both ratios to measure the profitability on an average basis for an effective tool. The profitability is used by previous researchers like (Moussa, 2015b), (Melese, 2015), (Roman & Sargu, 2015), and (Patora, 2016b). A profitable operation may result in a positive indication for cash available to make a positive liquidity decision. It is defined as deposits to total assets. It is the 5<sup>th</sup> determining factor used in the previous studies like (Singh & Sharma, 2016). The increasing proportion of deposit enhances a bank's ability to increase its liquidity position. The more deposit a commercial bank has, the more it has to pay for liquidity requirements. The last ratio used as a determining factor of a bank's liquidity is the non-performing loan ratio which is defined as a non-performing loan to total loans. This variable is used as a determining factor of bank's liquidity by (Ahmad & Rasool, 2017; Gautam, 2016b; Patora, 2016a; Trenca et al., 2015; Vodva, 2013). The non-performing loans may be referred to as the amount of loans the defaulter of which is unable to pay

even after 90 days passing from the actual payment date. The increasing level of non-performing loan may decrease the liquidity position of a bank.

### **Empirical Model:**

The present research investigation requires the panel data estimation technique for analyzing the objectives of this study. A panel data requires the econometric modeling for fixed effect, random effect, and pooled OLS.

The basic empirical panel model using OLS as the method of estimation is as follows:

$$(Bank\ Liquidity)_{it} = \beta_0 + \beta_1 (Capital\ Adequacy)_{it} + \beta_2 (Management\ Quality)_{it} + \beta_3 (Funding\ Cost\ Ratio)_{it} + \beta_4 (Profitability\ Ratio)_{it} + \beta_5 (Deposit\ Ratio)_{it} + \beta_6 (Non-Performing\ Loan\ Ratio)_{it} + U_{it} \quad (1)$$

The above empirical basic panel data model is transformed into the fixed effect model as follows;

$$(Bank\ Liquidity)_{it} = (\beta_0 + \mu_i) + \beta_1 (Capital\ Adequacy)_{it} + \beta_2 (Management\ Quality)_{it} + \beta_3 (Funding\ Cost\ Ratio)_{it} + \beta_4 (Profitability\ Ratio)_{it} + \beta_5 (Deposit\ Ratio)_{it} + \beta_6 (Non-Performing\ Loan\ Ratio)_{it} + v_{it} \quad (2)$$

Finally, the random effect model can be established in the following way for the present research investigation;

$$(Bank\ Liquidity)_{it} = \beta_0 + \beta_1 (Capital\ Adequacy)_{it} + \beta_2 (Management\ Quality)_{it} + \beta_3 (Funding\ Cost\ Ratio)_{it} + \beta_4 (Profitability\ Ratio)_{it} + \beta_5 (Deposit\ Ratio)_{it} + \beta_6 (Non-Performing\ Loan\ Ratio)_{it} + (\mu_i + v_{it}) \quad (3)$$

Where:  $\beta_0$  = constant,  $\beta_1 - \beta_6$  = Slops to measures the change in bank-specific factors stated above,  $U_{it}$  = Error term for the basic panel data model, while  $\mu_i$  refers to the fixed parameter in the fixed-effect model,  $v_{it}$  refers to the error term,  $\alpha_0 + \mu_i$  refers to the fixed effect and finally  $\mu_i + v_{it}$  refers to the random effect. The estimation of empirical panel requires the use of Hausman (1978) specification test for testing fixed effect, LaGrange multiplier test for testing random effect as per Breusch and Pagan (1980), and unit root test for testing stationarity. Besides, heteroscedasticity test, cross-sectional dependency test, and autocorrelation test require in case of fixed effect estimation (Das, 2019; Driscoll & Kraay, 1998; Hoechle, 2007; Torres-Reyna, 2007).

### **Estimation Results**

The estimation results report the panel descriptive statistics, Pearson correlation matrix, panel stationarity testing, panel regression estimations in the form of fixed effect, random effect, robust fixed effect, Driscoll & Kraay standard error, panel corrected standard error estimates along-with diagnostic tests like Hausman specification, cross-sectional dependency, heteroscedasticity, and serial correlation.

### **Descriptive Statistics:**

Table 1 indicates (Appendix) the summary statistics in the form of mean, standard deviation, min, and maximum. It indicates that there are 23 commercial banks (n=23) and the period indicated is 11 years, so the total number of observations in the current empirical study as shown by the above table is 253 (N=253). The Table indicates that Bank Liquidity contributes on average .18 in overall statistics in the present empirical research study with the overall deviation of .54 from its average value while the bank to bank deviation is .291 and year to year deviation is .456 respectively. The overall minimum liquidity ratio for commercial banks in Pakistan is .007 while the





maximum is 6.03 respectively. Capital adequacy contributes an overall of .139 on average with an overall standard deviation of .38 from its meanwhile bank to bank deviation is .176 and year to year deviation is .338 respectively. The overall minimum value for capital adequacy is -.025 and the maximum value is 5.60 respectively. The average value of capital adequacy is almost 5.9% above the Basel III requirement for capital adequacy which is a good indication for the commercial banking sector of Pakistan. The management quality ratio contributes an overall of .134 on average with an overall deviation from its mean as .59 while bank to bank deviation is .309 and year to year deviation is .504 respectively. The minimum value for the management quality ratio is .001 and the maximum value of it is 7.50 respectively. The Funding cost ratio, on average, subsidizes at an overall value as .194 with an overall deviation from its mean as 1.33 respectively. Profitability indicates an overall value of .019 as an average contribution in the study with an overall deviation of .57 respectively. The Deposit ratio indicates an overall average value of .775 with an overall deviation of .25 respectively. Finally, the non-performing loan ratio showing an overall average contribution of .507 in the current study with an overall deviation from its mean as .26 respectively.

### **Correlation Analysis:**

Table 2 (Appendix) indicates the Pearson correlation matrix for the variable involved in the current study with their relevant significance with each other. The correlation matrix for the variables of the study, both dependent and independent variables like Bank Liquidity, Capital adequacy, management quality along-with controlled variables like funding cost ratio, profitability ratio, deposit ratio, and non-performing loan ratio respectively. The table indicates that Capital adequacy has a weak positive and significant relationship with bank liquidity with a coefficient  $r = 0.2770$ . Management Quality also shows a significant association with bank liquidity with a strong positive coefficient of  $r = 0.8119$ . The table also indicates a weak positive association of  $r = 0.3669$  between management quality and capital adequacy which is also significant. Funding cost ratio has a weak negative association with bank liquidity which is not significant with  $r = -0.0141$  as a coefficient value but it is significant with capital adequacy with a weak positive association denoting its coefficient value as  $r = 0.3491$ . Besides, this variable has a weak and insignificant association with management quality showing a coefficient value as  $r = 0.0134$ . The variable, profitability has a weak and positive association with bank liquidity, capital adequacy, management quality, funding cost ratio which is not significant with anyone showing coefficients as the  $r = 0.0288$ ,  $r = 0.0663$ ,  $r = 0.0276$  and  $r = 0.0131$  respectively. The deposit ratio has a positive and significant association with bank liquidity and management quality showing their coefficients as the  $r = 0.4499$  and  $r = 0.2398$  respectively while having a negative and insignificant association with capital adequacy, funding cost ratio, and profitability showing their coefficients as the  $r = -0.0960$ ,  $r = -0.0570$  and  $r = -0.0501$  respectively. Finally, the variable non-performing loan ratio has insignificant association with all other variables showing positive association with capital adequacy, management quality, deposit ratio with  $r = 0.036$ ,  $r = 0.0725$  and  $r = 0.0023$  respectively and negative association with bank liquidity, funding cost ratio and profitability with  $r = -0.0123$ ,  $r = -0.1162$  and  $r = -0.0064$  respectively.



### **Panel Unit Root Testing:**

The panel unit root testing using a fisher-type augmented Dicky-fuller test at a level and first difference as well as by Levin-Lin-Chu unit root testing for panel data is indicated in tables 3 and 4 (Appendix). Table 3 above indicates the fisher type panel unit root testing using augmented Dicky Fuller. The table indicates test statistics values using inverse chi-square (P) and modified inverse chi-square (PM) at level; zero lag difference and at the first lag difference. The table indicates all variables are stationary at a level or zero lag difference rejecting the null hypothesis except non-performing loans which is not stationary at zero difference lag. At lag first difference, all the variables are stationary showing significance at 1% level and rejecting the null hypothesis except funding cost ratio and profitability ratio. Table 4 showing the Levin-Lin-Chu test for panel unit root. The results indicate a level or zero lag difference all the variables are stationary at a 1% level while the bank liquidity is stationary at a 10% level and the non-performing loan is not stationary at any level. At the first difference of lag 1, the variables like bank liquidity, capital adequacy, and deposit ratio are stationary at 1% level and profitability ratio is stationary at 5% level while again non-performing loan is not stationary at any level.

### **Panel regression estimates:**

The nature of data in the current study is a panel, so the present empirical research study applies panel data modeling and estimation method for achieving the objectives of the study. The following table 5 indicates the results of 4 types of tests that have been applied in panel data modeling of the current study; like Hausman, (1978) specification test, Cross-sectional dependence, Heteroskedastic, and serial correlation. The Significance of the Hausman specification test validates the fixed effect regression model. The significance of Cross-sectional dependence validates Driscoll-Kraay standard error estimation, the significance of heteroscedastic validate robust fixed effect estimation, and finally, the significance of serial correlation validates the panel corrected standard error (PCSE) estimation as per the guidelines provided by (Das, 2019; Driscoll & Kraay, 1998; Hoechle, 2007; Torres-Reyna, 2007). The estimated regression results are reported in Table 5 (Appendix). It indicates the number of observations as 253 with several panels or groups as 23. All the models are statistically significant at a 1% level. The capital adequacy ratio is not significant at any level in the majority of the models. The first hypothesis is accepted with an indication of a strong positive link between capital adequacy and liquidity management decision in the commercial banking sector of Pakistan. It is highly significant only in case of robust fixed effect estimation at a 1% level accepting the hypothesis. All the models showing a positive relationship between capital adequacy and the bank's liquidity. A one-unit increase in capital adequacy strongly supports the bank's liquidity decision by .0112102 using a fixed-effect model, .0643982 using the random-effect model, .0676783 using Driscoll-Kraay S.E model, .6158521 using robust fixed-effect model, and .0676783 using panel corrected standard error model. These positive relationships are consistent with the similar findings of (Munteanu, 2012a), (Vodva, 2013), (Melese, 2015), (Roman & Sargu, 2015), (Gautam, 2016a), (Mohammad Raeisi, 2016), (Singh & Sharma, 2016) and (Rasool, 2017). The *management quality ratio* is highly significant and shows a positive relationship with bank liquidity decisions. The proposed hypothesis indicating the positive link between the management quality ratio and liquidity decision in the commercial banking sector of Pakistan is accepted. If one-unit is increased in management quality, the bank liquidity is increased by .6158521 in case of fixed effect model, .6666826 in case of random effect model, .6699857 in case



of Driscoll-Kraay S.E model, .6699857 in case of panel corrected standard error model, and by .0177857 in case of the robust fixed-effect model. The result of this relationship is consistent with (Roman & Sargu, 2015).

The funding cost ratio is not significant at any level in all the models. It shows a negative relationship with bank liquidity in all the models except robust fixed effect estimation where it shows a positive relationship. The null hypothesis is rejected in all cases. A one-unit increase in funding cost ratio may decrease the bank liquidity by .0177857 in case of fixed effect model, .0138385 in case of random effect model, .013484 in case of Driscoll-Kraay S.E model, and .013484 in case panel corrected standard error model while the bank liquidity may increase by .0184908 in case of robust fixed effect estimation. The finding of a positive relationship is constant with a similar finding (Singh & Sharma, 2016). The profitability ratio is not significant at any level in all the models showing a positive relationship with bank liquidity except in the case of a robust fixed-effect model where it is significant at the 10% level. The majority of results reject the null hypothesis. A one-unit increase in profitability ratio may increase the bank liquidity by .0184908 in case of fixed effect, .0184857 in case of random effect, .0183144 in case of Driscoll-Kraay S.E estimation, .6422856 in case of robust fixed effect estimation, and .0183144 in case of panel corrected Standard effort estimation. This result is consistent with (Moussa, 2015b), (Roman & Sargu, 2015), and (Singh & Sharma, 2016). The deposit ratio is significant in all the models showing a positive relationship with bank liquidity except robust fixed effect regression where it is not significant at any level and shows a negative relationship. The null hypothesis is accepted in all other models except for the robust fixed effect. A one-unit increase in deposit ratio may increase the bank liquidity by .6422856 in case of fixed effect estimation, .6105989 in case of random effect estimation, .6077029 in case of Driscoll-Kraay S.E estimation, and .6077029 in case of panel corrected standard error model. The finding of this relationship is consistent with (Singh & Sharma, 2016). The non-performing loan ratio is significant in the majority of the models showing a negative relationship and accepts null hypothesis expect in case of Fixed effect and robust fixed effect estimation where it is not significant at any level. A one-unit increase in the non-performing loan may decrease bank liquidity by .1201894 in case of a fixed-effect model, .1458675 in case of a random effect model, .1480761 in case of Driscoll-Kraay S.E estimation, .3346376 in case of robust fixed effect and .1480761 in case of panel corrected standard error estimation. The result is consistent with (Vodva, 2013), (Melese, 2015), (Trenca et al., 2015), (Gautam, 2016a), and (Rasool, 2017).

## **Conclusion and Recommendations**

This empirical research study investigated the role of pure commercial banking specific forces like capital adequacy and management quality for the commercial bank's liquidity decision in Pakistan. This empirical research study used the financial statements as a source of collecting data from the balance sheet and income statement for 23 commercial banks with eleven years' frequency; 2008-2018. The study employed the panel-data modeling and estimation method like panel descriptive statistics, Pearson correlation matrix, panel stationarity testing, panel regression estimations in the form of fixed effect, random effect, robust fixed effect, Driscoll & Kraay standard error, panel corrected standard error estimates along-with diagnostic tests like Hausman specification, cross-sectional dependency, heteroscedasticity, and serial correlation. For the analysis of relevant data, the study uses the bank's liquidity management decision as to the outcome variable while the independent variables are



capital adequacy ratio and management quality ratio. The funding cost ratio, profitability ratio, deposit ratio, and non-performing loan ratio were used as the control variable for the study. The unit root tests indicate the stationarity of data at a level as well as at the first difference. 4 types of tests like Hausman (1978) specification test, Cross-sectional dependence, Heteroskedastic, and serial correlation were applied in the present empirical research. The Significance of the Hausman specification test validates the fixed effect regression model. The significance of Cross-sectional dependence validates Driscoll-Kraay standard error estimation, the significance of heteroscedastic validate robust fixed effect estimation, and finally, the significance of serial correlation validates the panel corrected standard error (PCSE) estimation as per the guidelines provided by (Das, 2019; Driscoll & Kraay, 1998; Hoechle, 2007; Torres-Reyna, 2007). This empirical research finds that the commercial bank's liquidity decision is strongly supported due to increments in capital adequacy ratio as well as in management quality ratio while funding cost ratio and non-performing loans significantly reduce the existing level of liquidity in commercial banks of Pakistan. Liquidity management is a crucial decision in commercial banking operations especially when the depositors need cash daily. A sound liquidity policy may not enhance the efficiency of its operation but also may impact customer retention. The study contributes to the understanding of liquidity decisions not only in Pakistan but also in other countries in the Asian-region. The factors used for explaining the liquidity decision of the banking sector in this study do not necessarily are the only factors in this domain but may include further industry-based, firm-specific based and macro-level factors in future research. However, the policymakers in the commercial banking sector of Pakistan are recommended to consider the significant factors of this study while deciding on setting an appropriate level of liquidity in their banks for the proper functioning of their day to day operations.

## References

- Ahmad, F., & Rasool, N. (2017). Determinants of Bank Liquidity: Empirical Evidence from Listed Commercial Banks with SBP. *Journal of Economics and Sustainable Development*, 8(1), 47-55.
- Al-Homaidi, E. A., Tabash, M. I., Farhan, N. H., & Almaqtari, F. A. (2019). The determinants of liquidity of Indian listed commercial banks: A panel data approach. *Cogent Economics & Finance*, 7(1), 1616521.
- Ali, S., Shah, S. Z. A., & Chughtai, S. (2019). The Role of Bank Competition in influencing Bank Liquidity Creation: Evidence from China. *Journal of Business & Economics*, 11(1), 21-34.
- Bibi, S., & Mazhar, F. (2019). Determinants of bank's profitability & liquidity and the role of BASEL III in Islamic & conventional banking sector of Pakistan: A case study of NBP. *The Economics and Finance Letters*, 6(1), 40-56.
- BIS, (2008). Principles for sound liquidity risk management and supervision. *Basel, Bank for international settlements*.
- Breusch, T. S., & Pagan, A. R. (1980). The Lagrange multiplier test and its applications to model specification in econometrics. *The review of economic studies*, 47(1), 239-253.



- Černohorský, J., Teplý, P., & Vrábel, M. (2010). LIQUIDITY MARKET SUPPORT DURING THE GLOBAL CRISIS.
- Chen, N., Huang, H.-H., & Lin, C.-H. (2018). Equator principles and bank liquidity. *International Review of Economics & Finance*, 55, 185-202.
- Das, P. (2019). *Econometrics in Theory and Practice: Analysis of Cross Section, Time Series, and Panel Data with Stata 15.1*: Springer Nature.
- DeYoung, R., Distinguin, I., & Tarazi, A. (2018). The joint regulation of bank liquidity and bank capital. *Journal of Financial Intermediation*, 34, 32-46.
- Dolgun, M. H., & Ng, A. (2019). Liquidity Risk Management in Islamic Banks: Evidence from Malaysia *Islamic Monetary Economics and Institutions* (pp. 159-179): Springer.
- Driscoll, J. C., & Kraay, A. C. (1998). Consistent covariance matrix estimation with spatially dependent panel data. *Review of economics and statistics*, 80(4), 549-560.
- El-Chaarani, H. (2019). Determinants of bank liquidity in the Middle East region. *International Review of Management and Marketing*, 9(2), 64.
- Gautam, R. (2016a). The Determinants of Banks Liquidity Empirical Evidence on Nepalese Commercial. *THE BATUK : Journal of Interdisciplinary Studies*, 2(2), 10.
- Gautam, R. (2016b). The determinants of banks liquidity: Empirical evidence on Nepalese commercial banks. *Journal of Interdisciplinary Studies*, 2(2), 69-78.
- Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica: Journal of the econometric society*, 1251-1271.
- Hoechle, D. (2007). Robust standard errors for panel regressions with cross-sectional dependence. *The state journal*, 7(3), 281-312.
- Hussain, F. (2012). Reserve Requirements: Current Practices and Potential Reforms *State Bank of Pakistan Research Bulletin*, 8(1), 8.
- Laštůvková, J. (2016). Liquidity determinants of the selected banking sectors and their size groups. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 64(3), 971-978.
- Lovin, H. (2013). Determinants of the Liquidity in Romanian Interbank Deposits Market. *Procedia Economics and Finance*, 5, 512-518. DOI: 10.1016/s2212-5671(13)00060-9



**KASBIT Business Journal, 13(1), 25-42, September 2020**

- Mahdi, I. B. S., & Abbes, M. B. (2018). Relationship between capital, risk, and liquidity: a comparative study between Islamic and conventional banks in the MENA region. *Research in International Business and Finance*, 45, 588-596.
- Mahmood, H., Khalid, S., Waheed, A., & Arif, M. (2019). Impact of Macro Specific Factor and Bank Specific Factor on Bank Liquidity using FMOLS Approach. *Emerging Science Journal*, 3(3), 168-178.
- Melese, N. a. L. (2015). Determinants of Banks Liquidity: Empirical Evidence on Ethiopian Commercial Banks. *Journal of Economics and Sustainable Development*, 6(15), 12.
- Mohammad Raeisi, D. A. H. a. D. J. K. S. (2016). Bank Liquidity and its Effective Factors in Iran. *International Journal of Educational Advancement*, 7(3), 16.
- Moore, W. (2009). How do financial crises affect commercial bank liquidity? Evidence from Latin America and the Caribbean. *Munich Personal RePEc Archive*.
- Moussa, M. A. B. (2015a). The determinants of bank liquidity: Case of Tunisia. *International Journal of Economics and Financial Issues*, 5(1), 249-259.
- Moussa, M. A. B. (2015b). The Determinants of Bank Liquidity: Case of Tunisia<1036-3237-1-PB.pdf>. *International Journal of Economics and Financial Issues*, 5(1), 11. Doi: 2015
- Munteanu, I. (2012a). Bank Liquidity and its Determinants in Romania. *Procedia Economics and Finance*, 3, 993-998. DOI: 10.1016/s2212-5671(12)00263-8
- Munteanu, I. (2012b). Bank liquidity and its determinants in Romania. *Procedia Economics and Finance*, 3(1), 993-998.
- Nikolaou, K. (2009). Liquidity (risk) concepts, definitions, and interactions. *European Central Bank Working Paper series, NO 1008*.
- Niresh, J. A. (2012). TRADE-OFF BETWEEN LIQUIDITY & PROFITABILITY: A STUDY OF SELECTED MANUFACTURING FIRMS IN SRI LANKA. *Researchers World -Journal of Arts, Science & Commerce, III(4(2))*, 7.
- Patora, K. (2016a). What drives the liquidity position of foreign-owned banks? The case of Poland. *Journal of Applied Finance and Banking*, 6(6), 1.
- Patora, K. (2016b). What drives the liquidity position of foreign-owned banks? The case of Poland. *Journal of Applied Finance & Banking*, 6(6), 22.
- Pereira, L. (2020). Determinants of Bank Liquidity Creation: Empirical Evidence from Commercial Banks in Brazil. *Journal of Finance and Accounting*, 4(1), 1-14.
- Raeisi, M., Haghghat, A., & Shirazi, J. K. (2016). Bank Liquidity and its Effective Factors in Iran. *International Journal of Educational Advancement*, 7(3), 315-300.



- Rashid, A., Hassan, M. K., & Shah, M. A. R. (2020). On the role of Islamic and conventional banks in the monetary policy transmission in Malaysia: Do size and liquidity matter? *Research in International Business and Finance, 52*, 101123.
- Rasool, F. A. a. N. (2017). Determinants of Bank Liquidity: Empirical Evidence from Listed Commercial Banks with SBP. *Journal of Economics and Sustainable Development, 8(1)*, 9.
- Roman, A., & Sargu, A. C. (2015). The impact of bank-specific factors on the commercial banks' liquidity: empirical evidence from CEE countries. *Procedia Economics and Finance, 20*, 571-579.
- Said, R. M. (2018). Basel III New Liquidity Framework and Malaysian Commercial Banks Profitability. *Jurnal Pengurusan (UKM Journal of Management), 52*.
- Shah, S. Q. A., Khan, I., Shah, S. S. A., & Tahir, M. (2018). Factors Affecting Liquidity of Banks: Empirical Evidence from the Banking Sector of Pakistan. *Colombo Business Journal, 9(1)*, 1-18.
- Singh, A., & Sharma, A. K. (2016). An empirical analysis of macroeconomic and bank-specific factors affecting the liquidity of Indian banks. *Future Business Journal, 2(1)*, 40-53.
- Sitepu, R. W. (2020). Factors Affecting Liquidity Coverage Ratio (LCR) as Implementation of BASEL III in the Banking Sector. *International Journal of Public Budgeting, Accounting, and Finance, 2(4)*, 1-15.
- Teply, P. (2011). The Future Regulatory Challenges of Liquidity Risk Management. *World Academy of Science, Engineering, and Technology International Journal of Economics and Management Engineering, 5(1)*, 5.
- Torres-Reyna, O. (2007). Panel data analysis fixed and random effects using Stata (v. 4.2). *Data & Statistical Services, Princeton University, 112*.
- Trenca, I., Petria, N., & Corovei, E. A. (2015). Impact of macroeconomic variables upon the banking system liquidity. *Procedia Economics and Finance, 32*, 1170-1177.
- Vodová, P. (2011). *Determinants of Commercial Banks' Liquidity in the Czech Republic, Recent Researches in Applied and Computational Mathematics, 92-97*. Paper presented at the Retrieved from [www.wseas.us/e-library/conferences/2011/.../MATH-13.pdf](http://www.wseas.us/e-library/conferences/2011/.../MATH-13.pdf).
- Vodová, P. (2014). Czech commercial banks: are they liquid enough to finance loan commitments? *Procedia Economics and Finance, 12*, 752-760.



Vodva, P. (2013). Determinants of Commercial Banks' Liquidity in the Czech Republic. *Recent Researches in Applied and Computational Mathematics*, 6.

## Appendix

Table 1: Panel Descriptive Statistics

Variable		Mean	S.D	Min	Max
<b>Bank Liquidity Ratio</b>	Overall	.183	.538	.007	6.03
	Between		.291	.047	1.45
	Within		.456	-1.25	4.76
<b>Capital Adequacy Ratio</b>	Overall	.139	.380	-.025	5.60
	Between		.176	.032	.911
	Within		.338	-.702	4.83
<b>Management Quality Ratio</b>	Overall	.134	.588	.001	7.50
	Between		.309	.037	1.53
	Within		.504	-1.35	6.11
<b>Funding Cost ratio</b>	Overall	.194	1.33	.001	17.86
	Between		.500	.037	2.36
	Within		1.24	-2.17	15.69
<b>Profitability Ratio</b>	Overall	.019	.568	-7.39	2.85
	Between		.215	-.844	.266
	Within		.528	-6.53	2.60
<b>Deposit Ratio</b>	Overall	.775	.246	.023	3.60
	Between		.074	.577	.927
	Within		.235	-.081	3.50
<b>Non-Performing Loan Ratio</b>	Overall	.507	.260	.002	.999
	Between		.146	.191	.760
	Within		.217	-.154	1.00

Number of Observations ( $N$ ) = 253, Number of firms ( $n$ ) = 23, Number of years ( $T$ ) = 11

Source: Researcher's self-analysis using STATA 13

Table 2: Correlation Matrix

	BLR	CAR	MQR	FCR	PR	DR	NPLR
<b>BLR</b>	1.0000						
<b>CAR</b>	0.2770 (0.0000)	1.0000					
<b>MQR</b>	0.8119 (0.0000)	0.3669 (0.0000)	1.0000				
<b>FCR</b>	-0.0141 (0.8232)	0.3491 (0.0000)	0.0134 (0.8320)	1.0000			
<b>PR</b>	0.0288 (0.6483)	0.0663 (0.2933)	0.0276 (0.6627)	0.0131 (0.8357)	1.0000		
<b>DR</b>	0.4499 (0.0000)	-0.0960 (0.1276)	0.2398 (0.0001)	-0.0570 (0.3666)	-0.0501 (0.4277)	1.0000	
<b>NPLR</b>	-0.0123 (0.8459)	0.0366 (0.5624)	0.0725 (0.2505)	-0.1162 (0.0651)	-0.0064 (0.9192)	0.0023 (0.9711)	1.0000

Where **BLR** = Bank Liquidity ratio, **CAR** = Capital adequacy ratio, **MQR** = Management quality ratio, **FCR** = Funding Cost ratio, **PR** = Profitability ratio, **DR** = Deposit ratio and **NPLR** = Non-performing loan ratio





Table 3: Fisher-type unit-root test  
Based on augmented Dickey-Fuller tests (Statistics values)

Variables	At Lag (0) difference		At Lag (1) difference	
	Inverse chi-squared (46) P	Modified inv. chi-squared Pm	Inverse chi-squared (46) P	Modified inv. chi-squared Pm
Bank Liquidity Ratio	62.52**	1.72**	102.56***	5.89***
Capital Adequacy Ratio	135.62***	9.34***	79.82***	3.53***
Management Quality Ratio	75.06***	3.03***	46.41	0.04
Funding Cost ratio	96.39***	5.25***	37.78	0.86
Profitability Ratio	310.25***	27.55***	105.57***	6.21***
Deposit Ratio	136.03***	9.39***	168.42***	12.76***
Non-Performing Loan Ratio	58.10	1.26	115.82***	7.28***

\*\*\* 1%, \*\*5%, \*1% Number of Panels = 23, Number of Periods = 11

Source: Researcher's self-analysis using STATA 13

Table 4: Levin-Lin-Chu Unit Root Testing

Variables	At Level (0 lag difference)	At first difference (1 <sup>st</sup> Lag)
	Adjusted t-values	Adjusted t-values
Bank Liquidity Ratio	-1.45*	-3.92***
Capital Adequacy Ratio	-10.38***	-6.50***
Management Quality Ratio	-2.54***	-0.23
Funding Cost ratio	-3.03***	2.16
Profitability Ratio	-44.70***	-1.76**
Deposit Ratio	-8.53***	-15.04***
Non-Performing Loan Ratio	0.88	-0.32

\*\*\* 1%, \*\*5%, \*1%, Number of Panels = 23, Number of Periods = 11

Source: Researcher's self-analysis using STATA 13

Table 5

Panel Data Regression Results Dependent Variables: BLR

Input-Variables	Coefficient's Values with Significance				
	FE	RE	DKSE	F.E (Robust)	PCSE
CAR	.011	.064	.068	.616***	.068
MQR	.616***	.67***	.67***	.0178**	.67***
<b>Control-Variables</b>					
FCR	-.018	-.014	-.013	.0185	-.013
PR	.018	.019	.018	.642*	.018
DR	.642***	.611***	.608*	-.1201	.608***
NPLR	-.120	-.146**	-.148*	-.335	-.148*
Constant	-.335***	-.312***	-.310	.0112	-.31*
<b>Model</b>	<b>Prob&gt; F =</b>	<b>Prob &gt; chi2 =</b>	<b>Prob&gt; F =</b>	<b>Prob&gt; F =</b>	<b>Prob&gt; chi2</b>
<b>Significance</b>	0.0000	0.0000	0.0000	0.0000	= 0.0000
R <sup>2</sup> (within)	0.683	0.68	-	0.68	-
R <sup>2</sup> (Between)	0.892	0.91	-	0.89	-
R <sup>2</sup> (overall)	0.731	0.74	0.74	0.73	0.74
<b>Diagnostic Tests</b>		-	-	-	-
Hausman – Test	<b>Prob &gt; chi2 =</b>	-	-	-	-
	0.0000				



**KASBIT Business Journal, 13(1), 25-42, September 2020**

<i>Cross-sectional Dependence Test</i>	-	-	<b>Pr = 0.0000</b>	-	-
<i>Heteroscedasticity Test</i>	-	-	<b>(Pesran)</b>	<b>Prob &gt; chi2 =</b>	
<i>Serial Correlation Test</i>	-	-	-	0.000	<b>Prob&gt; F =</b>
					0.0000

*Significance: 1% \*\*\*, 5% \*\*, 10% \* , Number of Observations = 253, Number of Groups = 23, Time Period = 11 years, FE = Fixed Effect, RE = Random Effect, DKSE = Driscoll & Kway standard Error, PCSE = Panel corrected standard error. Where BLR = Bank Liquidity ratio, CAR = Capital adequacy ratio, MQR = Management quality ratio, FCR = Funding Cost ratio, PR = Profitability ratio, DR = Deposit ratio and NPLR = Non-performing loan ratio*

*Source: Researcher self-analysis using Stata*