

Macro-Economic and Bank-Specific Determinants of Liquidity: Empirical Evidence of Islamic Banks in Bangladesh

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Abstract: *The objectives of this study are to explore macroeconomic and bank-specific variables that influence the liquidity positions of Islamic banks in Bangladesh. For the empirical analysis, secondary data was collected from the different banks' financial statements, World Bank and Bangladesh bank publications spanning 2009-2020. The panel data were analyzed using a random effect regression model. The study's findings showed that bank size, CAR, ROA, DEP, and INF are statistically significant drivers of Islamic banks' liquidity in Bangladesh. Among the bank-specific factors, bank size, ROA, and DEP were shown to have a substantial adverse effect on liquidity, but CAR was discovered to have a significant positive impact. Furthermore, the inflation rate is shown to have a strong negative influence on the liquidity position of Islamic banks in Bangladesh. The growth rate of GDP has an insignificant positive impact on liquidity. The study suggests that bank management be more careful when raising capital and assets in the short run to manage the excessive liquidity crisis.*

Keywords: *Liquidity, Panel data, Islamic banks, Bangladesh.*

1.0 Introduction

Liquidity refers to an institution's capacity to convert its assets into cash or cash equivalents at a reasonable price to satisfy its obligations when they become due. Banks are facilitators, allowing money to flow from surpluses to deficit units. A duration gap exists in the case of financial intermediation. A liquidity crisis can happen if a lot of people withdraw their money from a bank at the same time. Banks with significant off-balance-sheet exposures, such as those that rely heavily on significant corporate deposits, face higher liquidity risk. Liquidity risk can also be caused by factors like credit and interest rates, foreign currency, etc. Therefore, prudent liquidity management is required to prevent liquidity risk and maintain financial stability.

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Prior to the financial crisis of 2008, financial institutions gave liquidity risk a lower priority than other concerns. Since the global economic crisis, liquidity risk has become considerably more relevant. Recognizing its importance, the Basel Committee on Banking Supervision added liquidity risk to Basel III. The liquidity management of financial institutions has a significant impact on bank profitability. Several researchers have attempted to investigate the fundamental micro and macroeconomic causes of bank liquidity, given the significance of liquidity management in banking operations. Assfaw (2019) investigated the impact of internal and external variables on the liquidity situations of Ethiopian private commercial banks in this context. The research found that bank size, loan growth, and deposits are crucial factors in determining a bank's liquidity.

Furthermore, macroeconomic variables such as GDP, the purchase of national bank notes, inflation, and interest rates significantly influence Ethiopia's private commercial banks' liquidity. In addition, Al-Qudah (2020) investigated the impact of macroeconomic variables like inflation and real GDP growth and microeconomic variables like nonperforming loans, return on assets, capital adequacy, nonperforming loans, and deposit growth on the liquidity of Jordanian commercial banks. According to the results, macroeconomic factors significantly influenced bank liquidity, with inflation having a positive impact and real GDP growth having a negative effect. On the other hand, deposit growth and capital adequacy have a significant impact on bank liquidity.

Several academics in Bangladesh sought to investigate the effects of firm-specific and macroeconomic variables on bank liquidity. According to Islam and Nasreen (2018), large banks in Bangladesh keep considerably more liquid assets than small commercial banks. Banks with high-risk exposure and engagement in off-balance-sheet operations must hold less liquidity. Liquid assets are favourably influenced by a bank's profitability, deposits, and age. A greater GDP growth rate is also said to lower bank liquidity. Moreover, Ahamed (2021) investigated the influence of internal and external factors on the liquidity risk of Bangladeshi commercial banks. There is a negative relationship between the size of a bank's assets and its liquidity risk. The bank's liquidity is better, and the risk of running out of money is lower the bigger the bank is. The association between liquidity risks and return on equity and capital adequacy ratios is positive but negligible. In terms of macroeconomic issues, inflation exacerbates liquidity worries, but GDP and domestic credit positively influence it. Sunday et al.

(2021) examined the factors influencing Nigeria's liquidity management and suggested that, while establishing the appropriate liquidity management approach, bank management should consider both bank-specific (size and profitability) and macroeconomic (GDP growth and inflation rate) aspects. Even if numerous variables have a positive or negative association, the study reveals that banks must carefully analyze the elements to avoid a future liquidity crisis.

From the extensive literature, only a few studies (Al-Homanidi et al., 2019; Al-Qudah, 2020; Tasnova, 2022) empirically validate the influence of microeconomic and macroeconomic factors on bank liquidity, indicating that further study is needed. That's why researchers are fascinated with this area of study. The previous study in Bangladesh aimed to identify the critical aspects that might affect the liquidity of Bangladesh's private commercial banks. However, very few researches have been done in Bangladesh on the impact of bank-specific and macroeconomic variables on Islamic bank liquidity. Consequently, the study's key objectives are to investigate the influence of bank-specific variables and macroeconomic factors on Islamic banks' liquidity in Bangladesh. This study intends to provide significant insight to academicians and policymakers by adding empirical data on the bank-specific and macroeconomic determinants of liquidity of Islamic banks in Bangladesh. So, the Islamic banking industry will significantly be benefited from this study, which is crucial for smooth operations. The study will help the banks determine how liquidity is affected by bank size, amount of capital, deposits, GDP, and inflation. This study suggests that Islamic banks must monitor these factors carefully to avoid a liquidity crisis in the future.

2.0 Research Design

2.1 Data

Twelve years of data from seven Islamic banks in Bangladesh are used in this research (2009–2020). The data is obtained from the annual reports of these banks. The World Bank and Bangladesh Bank websites have been searched for macroeconomic data. In this investigation, both time series and cross-sectional panel data were used. This research used imbalanced panel data since one bank has eight years of data and the other banks have twelve years.

2.2 Determinants of the Liquidity of Islamic Banks

Various scholars used different parameters to scrutinize the factors affecting bank liquidity throughout the globe. The bank-specific and macroeconomic variables examined in this analysis are as follows:

2.2.1 Bank specific factors

a. Bank Size

The size of a bank is crucial in determining how much liquid assets it holds. Smaller banks keep more liquid assets than larger banks because smaller banks have restricted access to liquid asset collections (Kashyap et al., 2002). However, Aspachs et al. (2005) showed that size does not affect a bank's liquidity. On the other hand, Choon et al. (2013) exposed that a bank's size substantially influences its liquidity.

b. Capital Adequacy

Bank capital serves as a safeguard against the bank's bankruptcy. According to Berger and Bouwman (2009), banks with more capital have greater risk absorption and liquidity generation capacities. Research of European and US commercial banks undertaken by Vodova (2013) revealed that they reduced their capital ratio when banks experienced a liquidity crisis. They also observed that it strengthened its solvency guidelines when a small bank had a liquidity crisis. The study supported the execution of the lowest liquidity ratios by the Basel Committee and questioned large banks' behavior compared to small banks during a liquidity crisis.

c. Profitability

According to Lartey et al. (2013), a bank's profitability positively impacts the bank's liquidity. Choon et al. (2013) and Vodova (2013) discovered that profitability and liquidity are interrelated. In contrast, Aspachs et al. (2005) found that profitability did not impact banks' liquidity.

d. Deposit

The term "demand deposit" refers to a deposit the bank must pay at any time if the client requests it. Alger and Alger (1999) present an overview of the theoretical studies on Mexican banks' determinants of liquid assets. Contrary to the theoretical assumption, they observed that banks with a larger share of demand deposits had a smaller proportion of liquid assets. Dinger (2009) discovered that as deposit rates increase, bank liquidity decreases. In contrast,

the findings of Moussa (2015) showed that there was almost no link between deposits and bank liquidity.

2.2.2 Macroeconomic factors

a. GDP

GDP is often used as a proxy for the economic cycle. Choon et al. (2013) and Moussa (2015) found that GDP has a positive impact on bank liquidity; however, Vodova (2011) and Dinger (2009) found that it has a negative effect. According to Aspachs et al. (2005), between 1985 and 2003, UK banks seemed to maintain lower liquidity levels when GDP grew and vice versa.

b. Inflation

Moussa (2015) conducted empirical research on Tunisian banks and found that changes in the rate of inflation negatively impacted the banks' liquidity. Similarly, Bhati et al. (2015) examined Indian banks and concluded that inflation negatively impacts banks' liquidity. According to Tseganesh (2012), inflation positively affects liquidity. However, Horváth et al. (2014) conclude that it has a negligible impact on a bank's liquid assets.

2.3 The Hypotheses

The following hypothesis has been examined in this study based on previous research:

H₀=There is no association between bank-specific and macroeconomic variables with Islamic bank liquidity in Bangladesh.

H₁=There is a strong association between bank-specific and macroeconomic variables and the liquidity of Islamic banks in Bangladesh.

2.4 Model Development

The following equations were established to estimate the bank-specific and macroeconomic drivers of liquidity in Islamic banks in Bangladesh.

$$LAD_{it} = \alpha_{it} + \beta_1 SIZE_{it} + \beta_2 CAR_{it} + \beta_3 ROA_{it} + \beta_4 DEP_{it} + \beta_5 GDP_{it} + \beta_6 INF_{it} + \varepsilon_{it} \quad (1)$$

$$LTD_{\pi} = \alpha_{\pi} + \beta_1 SIZE_{\pi} + \beta_2 CAR_{\pi} + \beta_3 ROA_{\pi} + \beta_4 DEP_{\pi} + \beta_5 GDP_{\pi} + \beta_6 INF_{\pi} + \varepsilon_{\pi} \quad (2)$$

Where $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ and β_6 regression coefficients indicate how much each component contributes to the change in the dependent variable-liquidity indicators, and ε_{it} reflects the error term for the bank i in year t . The panel data

i and t represent the bank and year, respectively. LAD and LTD are the factors that determine the bank liquidity variable for bank i in year t . Liquidity has been computed as the ratio of total liquid assets to total deposits and total investments to total deposits. This study uses the bank's total assets log to determine its size. CAR is calculated by dividing total assets by risk-weighted assets, and ROA is by dividing net profit after taxes by total assets.

2.5 Data Analysis

To analyze and display the numerical data and values relevant to this study, the researchers utilized Eviews software. Different classical linear regression diagnostic tests, such as the Skewness and Kurtosis tests for normality, the Breusch-Pagan-Godfrey test of heteroskedasticity, and the Breusch-Godfrey Serial Correlation LM Test, were conducted at a 5 percent level of significance. The researchers employed the redundant fixed effect test and the Hausman test to determine the appropriate regression model. Finally, a random effect regression model was used to discover the bank-specific and macroeconomic variables influencing Islamic banks' liquidity in Bangladesh.

3.0 Results and Discussion

3.1. Diagnostic Test of the Regression Model

3.1.1 Normality (Jarque-Bera) Test

The Jarque-Bera test statistics were used to test the null hypothesis that the residuals are normally distributed or not. **Table-01** represents the results of the normality test.

Table-01: Normality of the Error Term

Test statistic value	Model 1	Model 2
Prob. Chi-Square	0.3499	0.2782

In this situation, Jarque-Bera statistics provide insignificant p values ($\text{Prob.} > \chi^2 = 0.3499$ and $\text{Prob.} > \chi^2 = 0.2782$ for M1 and M2, respectively). Consequently, the null hypothesis cannot be rejected, and the error term cannot be assumed to be normally distributed.

3.1.2. Unit Root Test

Using the unit root test, determine the stationary nature of the variables. The null hypothesis asserts that none of the model's variables is steady. The findings of the Augmented Dickey-Fuller test were as follows:

Table-02: Unit Root Test Result

Test statistic value	Model 1	Model 2
ADF Chi-Square	0.0000	0.0000

The P values of the test statistics are all less than the 0.05 significance level, as shown above. As a result, the null hypothesis was rejected, and all variables in the model were revealed to be stationary. The outcome demonstrates that the estimation model is correct.

3.1.3. Test of Heteroskedasticity

The Breusch-Pagan-Godfrey test was employed to check for heteroskedasticity. The null hypothesis in this test is that the error variances are the same, reflecting homoscedasticity. **Table-03** shows the results of the Breusch-Pagan-Godfrey test.

Table-03: Breusch-Pagan-Godfrey Heteroskedasticity Test P –value

Test statistic value	Model 1	Model 2
Prob. Chi-Square	0.8686	0.7616

As, the Prob. Chi-Square value is greater than 0.05, the result shows that the models do not have a problem with heteroskedasticity (i.e. Prob.>chi² = 0.8686 and Prob.>chi² = 0.7616 for M1 and M2 respectively).

3.1.4. Test of Autocorrelation

In this study, the autocorrelation issue is detected using the Breusch-Godfrey Serial Correlation test. The null hypothesis here is that the model has no autocorrelation problem. The outcome of the test statistic is as follows;

Table-04: Breusch-Godfrey Serial Correlation LM Test P –value

Test statistic value	Model 1	Model 2
Prob. Chi-Square	0.0730	0.0616

The test result indicated that the models are free from the problem of autocorrelation as the null hypothesis cannot be rejected at 5 percent level of significance.

3.1.5. Multicollinearity Test

Multicollinearity occurs when more than one specific linear link between the explanatory variables (Gujarati & Porter, 2009). In this study, the correlation

matrix was used to detect the problem of multicollinearity. The correlation matrix is depicted in **Table-05**.

Table-05: Correlation among independent variables

	Size	ROA	CAR	DEP	GDP	INF
SIZE	1.0000					
ROA	-0.4135	1.0000				
CAR	-0.1630	-0.1522	1.0000			
DEP	0.1799	-0.1606	-0.4679	1.0000		
GDP	0.0282	-0.0756	-0.0484	-0.0753	1.0000	
INF	-0.3094	0.3594	-0.0663	-0.0228	-0.0862	1.0000

As none of the independent variables are highly correlated to other independent variables as shown in the correlation matrix, it can be said that multicollinearity problem does not exist.

3.2 Descriptive Statistic Analysis

This section of the research detailed the number of observations made based on the data gathered and the results of descriptive statistics for the variables investigated from 2009 through 2020. **Table-06** displays the findings of a descriptive statistic for the study variables.

Table-06: Result of Descriptive Statistics

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
LAD	80	0.1651	0.0788	0.0644	0.6995
LTD	80	0.9075	0.0698	0.6008	1.0842
SIZE	80	5.3049	0.3648	4.2325	6.1513
CAR	80	0.1254	0.0300	0.0777	0.3446
ROA	80	0.0091	0.0052	0.0027	0.0307
DEP	80	0.8244	0.0499	0.7040	0.9343
GDP	80	0.0634	0.0145	0.0238	0.0815
INF	80	0.0660	0.0161	0.0542	0.1140

As shown in **Table-06**, the mean value of liquidity expressed in terms of LAD is 0.1651, which is more than the minimum average of Islamic banks' liquidity in Bangladesh, which is 0.0644 with a standard deviation of 0.0788. Similarly, LTD's liquidity index is 0.9075 on average, 0.6008 at the low end, and 1.0842 at the high end, with a standard deviation of 0.0698. The logarithm of total assets generates a mean of 5.3049, while the standard deviation is 0.3648. Additionally, CAR has a mean value of 0.1254, a standard deviation of 0.0300, a minimum value of 0.0777, and a maximum of 0.3446. As evaluated by ROA, profitability

has a mean of 0.0091, a standard deviation of 0.0307, and a range of 0.0027 to 0.0307. DEP is 0.8244 on average, with a standard deviation of 0.0499 and a range of 0.7040 to 0.9343 for the lowest and highest values.

GDP has a mean of 0.0634, a standard deviation of 0.0145, and a range of 0.0238 to 0.0815. Finally, INF has a mean value of 0.0660, a standard deviation of 0.0161, and a range of 0.0542 to 0.1140.

3.3 Model Specification Test

3.3.1 Redundant Fixed Effect Test

This study uses a redundant fixed-effects test to determine which pooled OLS and fixed-effects models give the best estimate (FEM). The null hypothesis states that the OLS model is superior to the FEM model. The summary of the redundant fixed effect test is shown in **Table 7**.

Table-07: Redundant Fixed Effect Test P –value

Test statistic value	Model 1	Model 2
Prob. Chi-Square	0.0000	0.0142

According to **Table-07**, the p-values for models 1 and 2 are 0.0000 and 0.0142, respectively, which are less than the 5% significance level. As a result of rejecting the null hypothesis, it was determined that FEM is the least suitable model for this investigation.

3.3.2 Hausman Test

The Hausman test was used to evaluate whether a fixed-effects model (FEM) or a random effect model (REM) should be used in this study. The null hypothesis is that REM is better than FEM in this test. The following illustration depicts the test result:

Table-08: Hausman Test P –value

Test statistic value	Model 1	Model 2
Prob. Chi-Square	1.0000	1.0000

The p-value of the Hausman test is more than the 5% significance level, as demonstrated by the above test statistic. Thus, there is insufficient evidence to reject the null hypothesis. As a result, the researchers determined that REM is the best appropriate model for this study.

3.4 Results of Model Estimation

The following are the estimate findings for the two models (M1 and M2) of the Islamic banks in Bangladesh's random effect regression model:

Table-09: Determinants of bank liquidity measured by M1

Dependent Variable: LAD		
Variables	Co-efficient	P-value
C	0.100015	0.5618
Size	-0.074391	0.0001
CAR	1.885068	0.0000
ROA	-0.942541	0.0330
DEP	0.227374	0.0804
GDP	0.093417	0.7822
INF	0.579240	0.0430
R-Square	0.6383	
Adjusted R-Square	0.6085	
Prob (F-statistic)	0.0000	

Table-10: Determinants of bank liquidity measured by M2

Dependent Variable: LTD		
Variables	Co-efficient	P-value
C	1.175652	0.0000
Size	-0.095667	0.0000
CAR	1.182963	0.0000
ROA	-2.906688	0.0390
DEP	-0.723972	0.0000
GDP	0.069423	0.8514
INF	-0.916187	0.0140
R-Square	0.5350	
Adjusted R-Square	0.4968	
Prob (F-statistic)	0.0000	

Tables 09 and 10 show the findings of a random effect regression for Islamic banks from 2009 to 2020, with liquidity as the dependent variable and four bank-specific and two macroeconomic factors as the independent variables. The multiple regressions are statistically significant, with M1 and M2 probability values of 0.0000, less than the 5% significance level. This suggests a substantial correlation between bank-specific and macroeconomic factors and Islamic banks' liquidity in Bangladesh. With an adjusted R-square value of 60.85 percent for model M1 and 49.68 percent for model 2, the models utilized in this study had strong predictive potential. Because both models' F-statistics are significant at the 5% significance level, the overall model is appropriate for the investigation.

According to the regression findings, bank size, CAR, ROA, DEP, and INF, all have statistically substantial effects on the liquidity of Islamic banks in Bangladesh.

4.0 Discussion of Major Findings

The researchers investigated the impact of bank-specific and macroeconomic factors on Islamic bank liquidity in Bangladesh, measured as liquid assets divided by total bank deposits. The second model investigated the effect of bank-specific and macroeconomic factors on the Islamic banks' liquidity positions in Bangladesh using the ratio of total investments to total deposits.

At a significance level of 5 %, bank size negatively influences liquidity, measured by M1 and M2. Due to this negative association, large banks hold fewer liquid assets than small commercial banks. Smaller banks have fewer opportunities to raise capital from external sources. Consequently, they are more likely to maintain a larger cash balance. In contrast, large banks are likely to have less liquidity since they have more options for cash management from money markets and other sources. This finding is in accordance with earlier research by Vodova (2012) and Tam and Tu (2017).

At the 5% significance level, the study's empirical results reveal that capital adequacy (CAR) has a statistically significant positive impact on liquidity. If CAR rises by one unit, the bank's total liquidity increases, providing all other factors remain constant. The positive relationship indicates that increased capital leads to more liquidity in the bank. This finding is consistent with the argument made by Coval and Thakor (2005).

Models M1 and M2 show that profitability, as defined by ROA, has a statistically significant negative relationship with bank liquidity, as assessed by model M1. In general, more profitable banks can raise money quickly; they keep less liquidity. This finding is consistent with the previous studies by Moussa (2015) and Sudirman (2014).

Furthermore, as indicated by model M2, the deposit substantially negatively influences liquidity. This suggests that, provided all other conditions remain constant, a rise in deposits will have a negative impact on bank liquidity. This finding is identical to the study findings of Shah and Tahir (2018) and Lastuvkova (2017).

Finally, the study's findings reveal that annual inflation has a substantial negative effect on bank liquidity as evaluated by models M1 and M2 at the 5% significance level. Both models revealed that inflation had a negative impact on bank liquidity. This implies that banks will have less money to invest if market inflation increases. Khanal (2019) also discovered a negative correlation between the inflation rate and bank liquidity in his study. It has been discovered that growth in GDP has a positive but not very substantial influence on the liquidity of Islamic banks in Bangladesh.

5.0 Conclusion and Recommendations

Bangladesh's Shariah-based Islamic banks have faced a liquidity crisis in recent years. Using panel data regression analysis, this study looked at the impact of macroeconomic and bank-specific factors on the liquidity of Islamic banks in Bangladesh from 2009 to 2020. Based on the study's empirical findings, bank management and the banking industry's governing body in Bangladesh might address the following concerns. To begin with, since bank size has a significant negative impact on liquidity, smaller bank management should maintain enough liquidity because they have fewer options for obtaining necessary money during a crisis than bigger banks. Secondly, empirical data reveals that capital adequacy improves liquidity significantly. Bank management may not contemplate expanding capital in the short run due to the current issue of excessive liquidity. Finally, it has been shown that profitability has significant negative influences on bank liquidity. Banks should adopt a liquidity management policy to balance liquidity and profitability. Fourth, it has been shown that the deposit negatively influences a bank's liquidity situation. When it comes to liquidity management, bank management may consider depositors' character. Finally, the empirical data indicates that inflation negatively impacts Islamic banks' liquidity positions in Bangladesh. The bank's capacity to make long-term investments is being harmed by inflation. Thus, management may raise short-term investments. Consequently, the study advises that Islamic banks in Bangladesh should focus on macroeconomic and internal factors when making policies and strategies to improve their liquidity position. Since the study uses a small sample size, future research should be conducted using more sophisticated research approaches and larger samples. Moreover, the Basel Committee introduced two new indicators, the liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR), to measure the liquidity position. Future studies can include these two critical ratios to investigate the impact of bank-specific and macroeconomic factors on the liquidity of Islamic banks in Bangladesh.

References

- Ahamed (2021). Determinants of Liquidity Risk in the commercial banks in Bangladesh, *European Journal of Business and Management Research*, 6(1).164-169.
- Akter, A. & Mahmud,K. (2014). Liquidity-Profitability Relationship in Bangladesh Banking Industry. *International Journal of Empirical Finance*,2(4), 143-151.
- Alger, G. & Alger, I. (1999). Liquid Assets in Banks: Theory and Practice, *Boston: College Department of Economics*.
- Al-Harbi, A. (2017). Determinants of banks liquidity: Evidence from OIC countries. *Journal of Economic and Administrative Sciences*, 33(2), 164-177.
- 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.
- Al-Qudah A. M. (2020). Macroeconomic and Bank-Specific Variables and the Liquidity of Jordanian Commercial Banks, *Journal of Asian Finance, Economics and Business*, Vol 7, No. 12, 85-93
- Aspachs, O., Nier, E. &Tieset, M. (2005). Liquidity, Banking Regulation and the Macro economy - Evidence on bank liquidity holdings from a panel of UK resident banks, Bank of England Working Paper.
- Assfaw A. M. (2019). Firm-Specific and Macroeconomic Determinants of Banks Liquidity: Empirical Investigation from Ethiopian Private Commercial Banks, *Journal of Accounting, Finance and Auditing Studies*, 5(2), 123-145
- Bangladesh Bank (2018). Bank and Financial Institutions. [ONLINE] Available at: <https://www.bb.org.bd/fnansys/bankfi.php>. [Accessed 2 June 2018].
- Bank for International Settlements (2010). Basel III: International framework for liquidity risk measurement, standard and monitoring, *Basel Committee on Banking Supervision*.
- Berger, A. N. & Bouwman, C. H. (2009). Bank liquidity creation, *Review of Financial Studies*, 22(9), 3779-3837.
- Bhati, S. S. & De Zoysa, A. (2012). An examination of factors affecting liquidity management in Indian financial system, *Sixth Annual International Conference on Business and Society in a Global Economy*, p. 21.
- Choon, L. K., Hooi, L. Y., Murthi, L. Yi, T. S. & Shven, T. Y. (2013). The determinants influencing liquidity of Malaysia commercial banks, and its implication for relevant bodies: Evidence from 15 Malaysian commercial banks,
- Coval J. D. & Thakor A. V. (2005), Financial intermediation as a beleifg-bridge between optimists and pessimists, *Journal of Financial Economics*, 75(3), 535-569
- Dinger, V. (2009). Do foreign-owned banks affect banking system liquidity risk?, *Journal of Comparative Economics*, 37(4), 647-657.
- Edem, D. B. (2017). Liquidity Management and Performance of Deposit Money Banks in Nigeria (1986 – 2011): An Investigation. *International Journal of Economics, Finance and Management Sciences*, 5(3), 146–161.
- Financial Structure and Bank Profitability. Policy Research Working Paper Series 2430.
- Gujarati, D. N., & Porter, D. C. (2009), basic Econometrics (5th ed.). New York, NY: McGraw-Hill Publishing Company
- Horváth, R., Seidler, J. & Weill, L. (2014). Bank Capital and Liquidity Creation: Granger-Causality Evidence, *Journal of Financial Services Research*, 45(3), 341-361.

- Islam M. A. and Nasreen F. (2018), Macroeconomic and Bank Specific Determinants of Liquidity of Commercial banks in Bangladesh, *Journal of Banking & Financial Services*, Volume 10, No. pp. 1-25
- Kashyap, A. K., Rajan, R. & Stein, J. C. (2002). Banks as liquidity providers: An explanation for the coexistence of lending and deposit-taking, *The Journal of Finance*, 57(1), 33-73.
- Khanal S. (2019). Determinants of liquidity in commercial banks of Nepal, *International Journal of Economics and Management Studies*, 6(8).
- Lartey, V. C., Antwi, S., & Boadi, E. K. (2013). The relationship between liquidity and profitability of listed banks in Ghana. *International Journal of Business and Social Science*, 4(3).
- Laštůvkova, J. (2017). Dimensions of liquidity and their factors in the Slovenian banking sector. *E a M: Ekonomie a Management*, 20(2), 163–174.
- Laurine, C. (2013). Zimbabwean Commercial Banks Liquidity Risk Determinants after Dollarisation. *Journal of Applied Finance & Banking*, 3(6), 97–114.
- Moussa M. A. B. (2015). The determinants of bank liquidity: Case of Tunisia, *International Journal of Economics and Financial Issues*, 5(1), 249.
- Saha et. Al. (2019). Determinants of Liquidity of Commercial Banks in Bangladesh: A Panel Cointegration Approach. *The Jahangirnagar Journal of Business Studies*, Vol. 8, No. 1, June 2019, 137-149
- 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.
- Sunday, K., Wasilu, S., Abdul-Azeez, A., & Ayorinde, B. (2021). Determinants of liquidity management: evidence from Nigerian banking sector, 23(3), 96-111.
- Sudirman I. M. S. N. (2014), Determinants of bank liquidity in Indonesia: Dynamic panel data analysis, *In Conference Paper, 11th International Annual Symposium on Maanagement*, The Singhasari Resort, Batu, Malang, Indonesia.
- Tam, L., & Tu, N. A. (2017). The Determinants of Banks' Liquidity in Vietnam. *VNU Journal of Science: Policy and Management Studies*, 33(2).
- Tasnova, N. (2022). Impact of Bank Specific and Macroeconomic Determinants on Banks Liquidity: An Empirical Study on Listed Commercial Banks in Bangladesh. *Finance & Economics Review*, 4(1), 11-24.
- Tseganesh.(2012), Determinants of banks liquidity and their impact on financial performance: Empirical study on commercial banks in Ethiopia Unpublished (Ph.D. Dissertation). Addis Abida: Addis Abada University.
- Valla, N., Saes-Escorbiac, B., & Tiesset, M. (2006). Bank liquidity and financial stability. *Banque de France Financial Stability Review*, 9(1), 89-104.
- Vodova, P. (2011). Liquidity of Czech commercial banks and its determinants, *International Journal of Mathematical Models and Methods in Applied Sciences*, 5(6), 1060-1067.
- Vodova, P. (2012). Determinants of commercial banks' liquidity in Poland. *Proceedings of 30th International Conference Mathematical Methods in Economics*, 962–967.
- Vodová, P. (2013). Determinants of commercial bank liquidity in Hungary, *Finansowy Kwartalnik Internetowy e-Finance*, 9(4), 64-71.

Appendix

Year	Bank Name	LAD	LTD	SIZE	ROA	CAR	DEP	GDP	INF
2009	SJIBL	0.1309	0.9262	4.7703	0.0182	0.1398	0.8055	0.0601	0.0542
2010	SJIBL	0.1327	0.9758	4.8965	0.0263	0.1008	0.7990	0.0557	0.0813
2011	SJIBL	0.1312	0.9669	5.0303	0.0109	0.1140	0.7773	0.0646	0.114
2012	SJIBL	0.1382	0.9414	5.1233	0.0130	0.1231	0.7693	0.0652	0.0622
2013	SJIBL	0.1423	0.8883	5.1091	0.0102	0.1256	0.7505	0.0601	0.0753
2014	SJIBL	0.1634	0.8525	5.1030	0.0059	0.1361	0.7779	0.0606	0.0699
2015	SJIBL	0.0983	0.8863	5.1395	0.0094	0.1352	0.7925	0.0655	0.0619
2016	SJIBL	0.0964	0.9887	5.2234	0.0093	0.1154	0.7439	0.0711	0.0551
2017	SJIBL	0.0970	1.0842	5.3178	0.0058	0.1219	0.7040	0.0728	0.057
2018	SJIBL	0.0866	1.0522	5.3868	0.0060	0.1450	0.7259	0.0786	0.0554
2019	SJIBL	0.0990	0.9705	5.4249	0.0065	0.1558	0.7642	0.0815	0.0559
2020	SJIBL	0.1048	0.8996	5.4676	0.0065	0.1419	0.7442	0.0238	0.0569
2009	SIBL	0.2972	0.8415	4.6019	0.0108	0.1497	0.7901	0.0601	0.0542
2010	SIBL	0.2587	0.8178	4.7417	0.0117	0.0933	0.8130	0.0557	0.0813
2011	SIBL	0.2552	0.8064	4.9264	0.0128	0.1317	0.7920	0.0646	0.114
2012	SIBL	0.2533	0.8123	5.0613	0.0125	0.1152	0.8127	0.0652	0.0622
2013	SIBL	0.2058	0.8415	5.1025	0.0096	0.1164	0.8064	0.0601	0.0753
2014	SIBL	0.1962	0.8664	5.1868	0.0124	0.1136	0.8101	0.0606	0.0699
2015	SIBL	0.1672	0.8955	5.2555	0.0115	0.1233	0.8316	0.0655	0.0619
2016	SIBL	0.1377	0.9141	5.3574	0.0101	0.1155	0.8369	0.0711	0.0551
2017	SIBL	0.1550	0.9181	5.4415	0.0053	0.1157	0.8279	0.0728	0.057
2018	SIBL	0.1348	0.9611	5.4876	0.0052	0.1427	0.8081	0.0786	0.0554
2019	SIBL	0.1462	0.9178	5.5855	0.0040	0.1500	0.7479	0.0815	0.0559
2020	SIBL	0.1367	0.9325	5.5379	0.0045	0.1240	0.9343	0.0238	0.0569
2009	Al-Arafa	0.1599	0.9421	4.6859	0.0177	0.1011	0.7906	0.0601	0.0542
2010	Al-Arafa	0.1326	1.0075	4.8772	0.0236	0.1449	0.7056	0.0557	0.0813
2011	Al-Arafa	0.1403	0.8907	5.0150	0.0171	0.1140	0.7964	0.0646	0.114
2012	Al-Arafa	0.1608	0.8508	5.1653	0.0131	0.1093	0.8158	0.0652	0.0622
2013	Al-Arafa	0.1959	0.8560	5.2328	0.0120	0.1352	0.8290	0.0601	0.0753
2014	Al-Arafa	0.1909	0.8458	5.3150	0.0103	0.1353	0.8088	0.0606	0.0699
2015	Al-Arafa	0.2313	0.9210	5.3511	0.0099	0.1655	0.7569	0.0655	0.0619
2016	Al-Arafa	0.2454	0.9472	5.4271	0.0114	0.1548	0.7470	0.0711	0.0551
2017	Al-Arafa	0.2406	0.9470	5.4978	0.0098	0.1228	0.7808	0.0728	0.057

2018	Al-Arafa	0.1765	0.9653	5.5228	0.0072	0.1438	0.7992	0.0786	0.0554
2019	Al-Arafa	0.1913	0.9705	5.5810	0.0064	0.1467	0.7801	0.0815	0.0559
2020	Al-Arafa	0.2076	0.9466	5.6215	0.0061	0.1622	0.7794	0.0238	0.0569
2009	Exim	0.1455	0.9292	4.9208	0.0203	0.1118	0.8861	0.0601	0.0542
2010	Exim	0.1210	0.9826	5.0534	0.0307	0.0980	0.8397	0.0557	0.0813
2011	Exim	0.1871	0.9242	5.1135	0.0155	0.1088	0.8307	0.0646	0.114
2012	Exim	0.2497	0.8422	5.2229	0.0129	0.1094	0.8403	0.0652	0.0622
2013	Exim	0.2051	0.8685	5.2910	0.0098	0.1330	0.8479	0.0601	0.0753
2014	Exim	0.1600	0.8884	5.3663	0.0107	0.1180	0.8618	0.0606	0.0699
2015	Exim	0.1838	0.8722	5.4227	0.0083	0.1215	0.8504	0.0655	0.0619
2016	Exim	0.1426	0.8938	5.4641	0.0101	0.1183	0.8537	0.0711	0.0551
2017	Exim	0.1383	0.8936	5.5236	0.0096	0.1211	0.8506	0.0728	0.057
2018	Exim	0.1104	1.0141	5.5694	0.0062	0.1090	0.8108	0.0786	0.0554
2019	Exim	0.1025	0.9687	5.6365	0.0055	0.1255	0.8214	0.0815	0.0559
2020	Exim	0.1060	0.9993	5.6856	0.0058	0.1327	0.8136	0.0238	0.0569
2009	FSIBL	0.1328	0.8918	4.6811	0.0068	0.1086	0.9050	0.0601	0.0542
2010	FSIBL	0.1046	0.9251	4.8036	0.0086	0.0777	0.8856	0.0557	0.0813
2011	FSIBL	0.1640	0.8634	4.9588	0.0064	0.0901	0.8591	0.0646	0.114
2012	FSIBL	0.1939	0.8762	5.1131	0.0059	0.1020	0.8472	0.0652	0.0622
2013	FSIBL	0.1858	0.8214	5.2090	0.0048	0.1033	0.8622	0.0601	0.0753
2014	FSIBL	0.1697	0.8372	5.3107	0.0032	0.1192	0.8924	0.0606	0.0699
2015	FSIBL	0.1836	0.8115	5.4074	0.0031	0.1042	0.9053	0.0655	0.0619
2016	FSIBL	0.1726	0.8243	5.4789	0.0047	0.1073	0.9104	0.0711	0.0551
2017	FSIBL	0.0863	0.9147	5.5282	0.0039	0.1221	0.8864	0.0728	0.057
2018	FSIBL	0.0644	0.9739	5.5698	0.0043	0.1013	0.8618	0.0786	0.0554
2019	FSIBL	0.0837	0.9678	5.6407	0.0047	0.1141	0.8615	0.0815	0.0559
2020	FSIBL	0.0816	0.9688	5.6959	0.0056	0.1212	0.8636	0.0238	0.0569
2009	IBBL	0.1849	0.8785	5.4445	0.0122	0.1165	0.8778	0.0601	0.0542
2010	IBBL	0.1567	0.9017	5.5193	0.0135	0.1106	0.8831	0.0557	0.0813
2011	IBBL	0.1644	0.8947	5.5902	0.0124	0.1309	0.8784	0.0646	0.114
2012	IBBL	0.1551	0.8925	5.6835	0.0114	0.1350	0.8659	0.0652	0.0622
2013	IBBL	0.1197	0.8522	5.7382	0.0090	0.1423	0.8646	0.0601	0.0753
2014	IBBL	0.1185	0.8266	5.8145	0.0061	0.1282	0.8594	0.0606	0.0699
2015	IBBL	0.1219	0.8616	5.8608	0.0045	0.1157	0.8478	0.0655	0.0619
2016	IBBL	0.1459	0.9047	5.9018	0.0056	0.1082	0.8541	0.0711	0.0551
2017	IBBL	0.1715	0.9413	5.9542	0.0052	0.1130	0.8390	0.0728	0.057

2018	IBBL	0.1524	0.9796	5.9989	0.0061	0.1197	0.8247	0.0786	0.0554
2019	IBBL	0.1712	1.0073	6.0575	0.0047	0.1295	0.8289	0.0815	0.0559
2020	IBBL	0.2333	0.9406	6.1513	0.0032	0.1355	0.8325	0.0238	0.0569
2009	UNION							0.0601	0.0542
2010	UNION							0.0557	0.0813
2011	UNION							0.0646	0.114
2012	UNION							0.0652	0.0622
2013	UNION	0.6995	0.6008	4.2325	0.0051	0.3446	0.7122	0.0601	0.0753
2014	UNION	0.2798	0.8134	4.6123	0.0027	0.1431	0.8490	0.0606	0.0699
2015	UNION	0.2055	0.8207	4.7997	0.0077	0.1325	0.8811	0.0655	0.0619
2016	UNION	0.1274	0.9044	4.9238	0.0101	0.1162	0.8848	0.0711	0.0551
2017	UNION	0.1821	0.8834	5.1195	0.0068	0.1172	0.8661	0.0728	0.057
2018	UNION	0.1248	0.9602	5.1720	0.0064	0.1024	0.8406	0.0786	0.0554
2019	UNION	0.1023	0.9750	5.2555	0.0033	0.1224	0.8341	0.0815	0.0559
2020	UNION	0.0761	0.9631	5.3223	0.0047	0.1121	0.8223	0.0238	0.0569