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Liquidity in State-owned Banks: what matters the most

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Abstract

This study inspects the factors affecting liquidity of the state-owned banks in Bangladesh from 2013 to 2022, concentrating on the impact of bank size, non-performing loans, capital adequacy ratio, cost-to-income ratio, return on equity, and cash reserve ratio. We have constructed panel data and conducted linear regression where non-performing banks' liquid assets (lnLIQ) are the dependent variable. To check the robustness of the study, we used another liquidity proxy, the current ratio (CRO). The results propose a positive relationship between bank size and liquidity, indicating that larger banks are inclined to hold more liquidity, potentially due to their capacity to access various funding sources. Non-performing loans (NPL) negatively impact liquidity, as banks with higher NPLs face increased credit risk, which compels them to allocate more resources to cover loan losses, reducing liquidity. The capital adequacy ratio (CAR) is positively related to liquidity with statistical significance, whereas the cost-to-income ratio (CIR) has a negative relationship. The outcomes indicate that higher capital reserves create liquidity buffers to manage financial risks, while higher operational costs reduce liquidity. The study provides insight into how to deal with operational efficiency and manage liquidity in state-owned banks in Bangladesh. This may help policymakers make prudent decisions on regulations and implement them successfully in the state-owned banks of Bangladesh.

JEL classification numbers: G21, C33, E44.
Keywords: Bank liquidity, Efficiency, Non-performing loans, State-owned, Current ratio.

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1. Introduction

A crucial component of Bangladesh's financial environment, bank liquidity is essential to the stability and resiliency of the nation's banking industry. The global financial crisis of 2007–2009 brought to light the significance of managing liquidity risk in the banking industry, as evidenced by the challenges faced by several banks due to their inadequate liquidity management (Canina & Carvell, 2008). Since then, the Bank for International Settlements has created global minimum liquidity criteria, which have been put into effect in a number of nations. One such country is the United States, where the liquidity coverage ratio is in place (Ihrig et al., 2021).

The study of bank liquidity has attracted much attention in Bangladesh's changing financial environment since it is essential to the stability and resilience of the banking industry. The research currently in publication identifies several variables that might affect the liquidity situation of commercial banks, such as regulatory frameworks, macroeconomic conditions, and bank-specific traits (Berger & Bouwman, 2008; Herman et al., 2017). With the critical role that liquidity management plays in the general well-being and performance of the banking sector, it has become more and more vital to comprehend these factors influencing bank liquidity in Bangladesh.

Bank-specific variables are important liquidity factors at the institutional level. The capacity of a bank to satisfy short-term commitments and maintain a strong liquidity position can be greatly impacted by a number of factors, including the composition and growth of the deposit base, the bank's capital adequacy ratio, and its overall size and asset structure (Roy et al., 2019). A strong deposit base offers a dependable source of money for lending operations and other investments; therefore, the ratio of steady, low-cost deposits to more volatile financing sources can be a significant factor (Ruozi & Ferrari, 2012).

In addition to considerations unique to individual banks, the macroeconomic landscape in Bangladesh is a significant determinant of the liquidity dynamics within the banking industry. The demand for credit, the availability of loanable funds, and general risk perceptions are all influenced by indicators like GDP growth, inflation, and the overall monetary and fiscal policy environment (Berger & Bouwman, 2008; Herman et al., 2017). These factors might affect bank liquidity. Furthermore, reserve requirements, liquidity ratios, and other prudential standards, as well as other regulatory frameworks governing the banking sector, can significantly influence commercial banks' liquidity management strategies (Gorton & Winton, 2000).

A panel data analysis using sophisticated econometric approaches and a solid dataset would be a welcome addition to the body of knowledge in order to thoroughly investigate the factors influencing bank liquidity in Bangladesh. The relative significance of different factors in influencing the liquidity dynamics of the banking sector in Bangladesh would be clarified by such an empirical study, which would then help formulate policies and make strategic decisions to improve the industry's overall resilience and financial stability (Rahman et al., 2015; Rana-Al-Mosharrafa & Islam, 2021; Bista & Basnet, 2020; Roy et al., 2019).

2. Literature Review

The current research has thoroughly examined various variables that may impact bank liquidity. For example, Sathyamoorthi et al. (2020) specified that the existence of commercial banks primarily depends on the amount of liquidity, and its degradation might lead to a loss of public trust. Similarly, during the most recent global financial crisis, large government guarantees and resource injections were given to European and US banks, supporting the claim made by Krishnamurthy, Bai, and Weymuller that bank liquidity is crucial during financial crises (Cardoso et al., 2019). These results highlight how crucial it is to comprehend the various factors that influence bank liquidity to maintain the financial system's stability.

Several research works have inspected the particular macroeconomic and bank-level variables that might impact a bank's liquidity status. It has been revealed that key variables influencing liquidity at the bank level include size, profitability, asset quality, and regulatory capital (Roy et al., 2019; Bonner et al., 2014). Profitable institutions could have greater internal liquidity sources, while larger banks might have better access to capital sources and diversification options. Furthermore, a bank's capacity to swiftly sell assets in order to satisfy short-term commitments may be impacted by the quality of its assets, as shown by the percentage of non-performing loans. Passmore & Temesvary (2020) developed a model of a bank's optimal funding option, where the bank deals with both prudent short-term bondholders and risk-taking long-term bondholders. Ahamed (2021) identified that higher liquidity and low liquidity risk have a relationship with higher bank sizes. Also, liquidity has a positive relationship with return on equity and capital adequacy ratio. In macroeconomic determinants, domestic credit and GDP positively impact liquidity risks, whereas inflation has a negative connection. Public and private sector credit increases investments, which support GDP growth. High domestic lending reduces liquidity and increases the risk of insolvency. The Liquidity risk is positively correlated with the loan-to-asset ratio. Mateev et al. (2023) identified the effect of bank regulation and ownership on the risk-taking attitude of financial institutions in the MENA region. Using panel data from 2014 to 2018, Incekara & Cetinkaya (2019) investigated liquidity risk management in Turkish Islamic and Conventional banks. They used multiple regression analysis of secondary data to determine the effect of bank-specific factors on liquidity risk (LR), using GDP and inflation (INF) as external variables. The financial performance and liquidity risk of manufacturing businesses listed between 2016 and 2020 on the Nairobi Securities Exchange were evaluated by Kinyua & Fredrick (2022). Financial performance was the dependent variable in the study, while the independent factors were tangibility, capital adequacy, inflation rate, and financial leverage. The study employed a sample of all manufacturing enterprises. Research designs that were both descriptive and inferential were used, and secondary data were used for analysis. The research inspected the impact of these variables on financial performance over the five-year period. Dzingirai (2014) also used panal data from 2009 to 2012 to find out the determinants of bank failures in Zimbabwe. Liquidity, profitability, and

capitalization are found as salient determinants among the bank fundamentals. Rezina (2020) contrasted the severity of the effect of operational modes between Conventional and Islamic banking system in Bangladesh. Dolgun & Mirakhor (2020) investigated the impacts of liquidity regulations on Islamic banking system of Turkey. They found that Islamic banks grip more cash than they should.

According to empirical data from nearby nations like Nepal, remittances, capital adequacy, deposit growth, and bank size are significant factors affecting bank liquidity (Bista & Basnet, 2020). Studies have also shown the possible effects of variables, including ineffective cost control, liquidity position, bank size, capital sufficiency, non-performing loan status, and macroeconomic conditions in Bangladesh. Increased deposit levels can progress a bank's liquidity by fortifying its capacity to fulfill its short-term obligations (Agarwal, 2019). Additionally, the makeup of the deposit base, such as the proportion of steady deposits versus volatile deposits, can significantly affect a bank's liquidity situation (Al-Khouri, 2012). Macroeconomic factors, including GDP growth, inflation, and the overall monetary and fiscal policy landscape, can also impact bank liquidity. Increased credit demand could pressure bank liquidity if the economy grows more quickly, and high inflation could decrease the real value of bank deposits and, thus, the amount of loanable funds available (Imhof et al., 2018). Moreover, bank liquidity may be significantly impacted by regulatory frameworks, such as reserve requirements and liquidity ratios (Polizzi et al., 2020). Global bank liquidity management has been impacted by a major regulatory change brought about by the Basel III Accord. To meet their short- and long-term liquidity demands, banks now have to maintain a sufficient quantity of high-quality liquid assets and stable funding sources thanks to the implementation of the liquidity coverage ratio and the net stable funding ratio (Roy et al., 2019; DeYoung et al., 2017). Golubeva et al. (2019) also examined the effects of liquidity risk on bank profitability after the introduction of Basel III regulations. According to Bonner et al. (2014), these restrictions have had a major impact on banks' liquidity management procedures and how they handle their assets and liabilities. Goldberg (2023) showed that the scope of responses to global conditions such as risk sentiment relies on the features and vulnerabilities of the financing institutions.

In the end, institutional, macroeconomic, and regulatory variables interact intricately to determine bank liquidity in Bangladesh. By integrating these diverse factors, policymakers and financial regulators can create comprehensive frameworks to support sustainable liquidity management practices within the Bangladeshi banking sector (Hossain & Ahamed, 2021). For the nation's banking sector to remain healthy and competitive over the long run, these forces must be understood.

3. Definition of variables, data, and methods

3.1 The Data

Data for this research has been collected from annual reports of government banks and Bangladesh Bank, the central bank of Bangladesh. We have collected data for ten years, from 2013 to 2022, to construct panel data to determine the factors that impact bank risk in state-owned banks in Bangladesh. A total of 60 observations being put into STATA 17. Natural logarithms were used to get customarily distributed data for LIQ and total asset variables. Other variables, i.e., non-performing loans (NPL), total asset (TA), Capital Adequacy Ratio (CAR), Cost to income ratio (CIR), Return on Equity (ROE), Cash Reserve Ratio (CRR) etc., are all in percentile form.

3.2 Definition of Variable

Table 1: Definition of variable

Variable	Definition	Expected Sign	Justification	References
lnLIQ (Liquidity Ratio)	Natural logarithm of Total Liquid Assets: This represents the total liquid assets available to a bank, adjusted using the natural logarithm for normalization. A higher value indicates better liquidity, allowing the bank to meet short-term obligations and unexpected demands.	Indistinct (±): The liquidity ratio's effect can vary; while higher liquidity is generally positive, extreme caution or excess liquidity may indicate inefficiency in asset utilization.	Higher liquid assets are expected to improve a bank's liquidity position, indicating better financial health (Molyneux & Thornton, 1992).	Molyneux & Thornton (1992)
lnNPL (Bank Risk)	Natural logarithm of Total Non-performing Loans: This represents the natural logarithm of the total number of loans that are defaulted or close to being defaulted. It measures the risk profile of a bank's loan portfolio. A higher value indicates a greater proportion of risky loans, suggesting potential financial instability.	Negative (-): An increase in non-performing loans indicates higher risk and potential losses for the bank, negatively affecting its liquidity. As non-performing loans rise, the bank's ability to meet its short-term obligations may be impaired.	An increase in non-performing loans indicates higher risk and potential losses, negatively affecting liquidity (Chiaramonte & Casu, 2017).	Chiaramonte & Casu (2017)
lnTA (Bank Size)	Natural logarithm of total assets: This represents the total assets held by a bank, expressed in logarithmic form. It is used to gauge the size of the bank. A larger bank typically has better access to resources and liquidity, enhancing its risk management ability.	Positive (+): A larger bank typically has more resources, improving its liquidity position and allowing it to handle larger financial obligations.	Larger banks typically have more liquid assets, enhancing their liquidity position (Distinguin, I., Roulet, C., & Tarazi, A. (2013).	Distinguin, I., Roulet, C., & Tarazi, A. (2013)
CIR (Efficiency)	Operating expenses divided by operating income: This efficiency ratio measures a bank's operating expenses relative to its operating income. A lower CIR indicates higher efficiency, which usually translates into better liquidity management, as more income can be used to support liquid assets.	Indistinct (±): The impact of the Cost-Income Ratio can be mixed; while higher efficiency usually supports liquidity, it may also suggest tight margins that could strain liquidity in adverse conditions.	Higher operational efficiency (lower CIR) generally leads to improved liquidity management (Bourke, 1989).	Bourke (1989)

CAR (Capital Adequacy Ratio)	The ratio of a bank's capital to its risk-weighted assets: This capital adequacy ratio measures a bank's financial strength. A higher ratio suggests that a bank has a solid capital base to absorb potential losses, positively impacting its liquidity and overall stability.	Positive (+): A higher capital adequacy ratio suggests that a bank can absorb more losses, positively impacting its liquidity and overall financial stability.	A higher capital adequacy ratio suggests that a bank can absorb more losses, positively impacting its liquidity (Athanasoglou et al., 2008).	Athanasoglou et al., (2008)
ROE (Loans to Total Assets)	The ratio of net interest income to Equity Capital assesses how well a bank generates returns from its equity capital through interest income. Higher ROE typically indicates effective profit generation and better liquidity management.	Positive (+): Higher returns on equity indicate effective profit generation, which supports liquidity and enhances the bank's capacity to meet financial obligations.	Higher returns on equity indicate effective profit generation, which supports liquidity (Friedman, 2018).	Friedman (2018)
CRR (Cash Reserve Ratio)	The ratio of total debt to total equity: This ratio, also known as the debt-to-equity ratio, measures a bank's financial leverage. It indicates the proportion of debt financing relative to equity financing. A higher ratio suggests that a bank is relying more on debt to finance its operations, which can be a risk factor for liquidity.	Indistinct (±): The effect of the Cash Reserve Ratio (CRR) on liquidity can vary. While a higher CRR may indicate that a bank has more cash set aside, which could be seen as a positive sign for liquidity, it also means that more resources are tied up and not available for lending or investment, which can negatively impact liquidity.	Higher total debt (and therefore a higher CRR) can reduce liquidity, as more capital is committed to debt servicing (Diamond, 1984).	Diamond (1984)

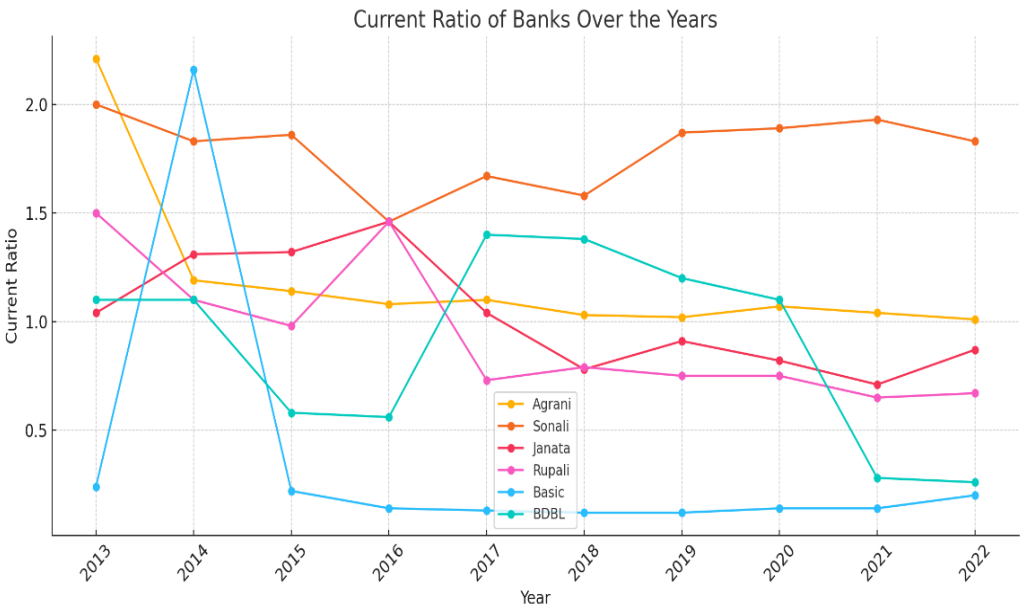

Figure 1: Current ratio (CRO) of state-owned banks

(source: Bangladesh Bank)

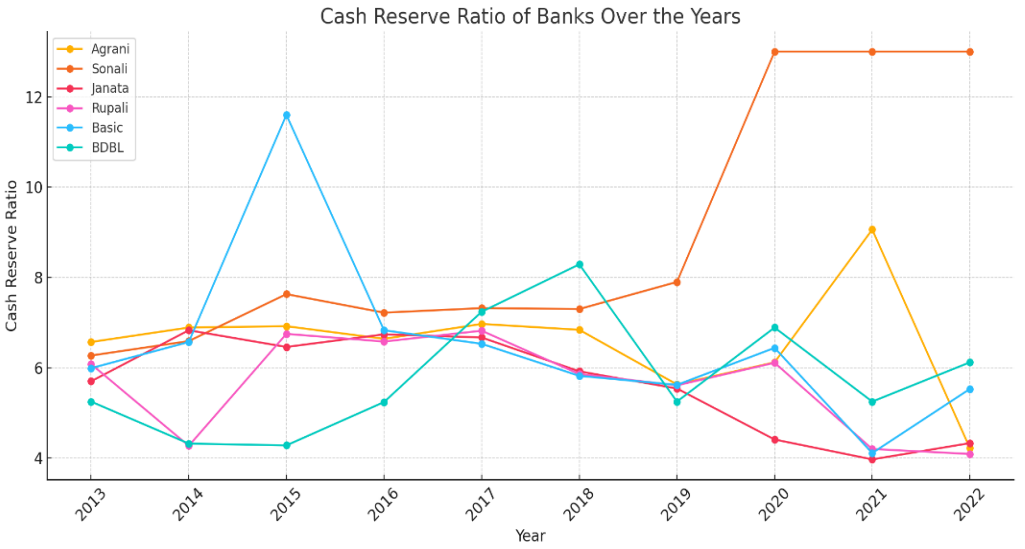

Figure 2: Cash reserve ratio (CRR) of state-owned banks

(source: Bangladesh Bank)

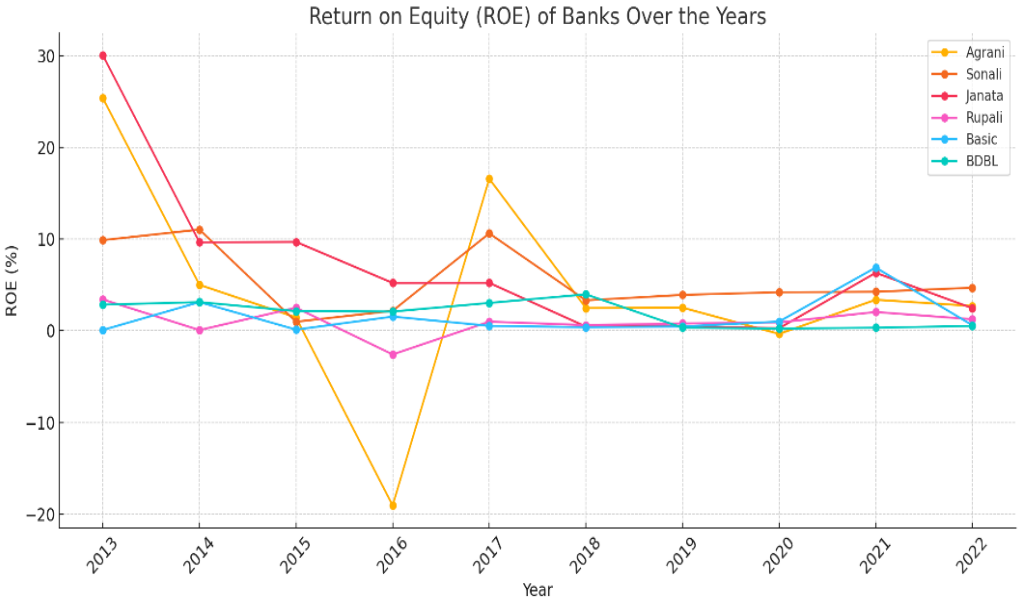

Figure 3: Return on Equity (ROE) of state-owned banks

(source: Bangladesh Bank)

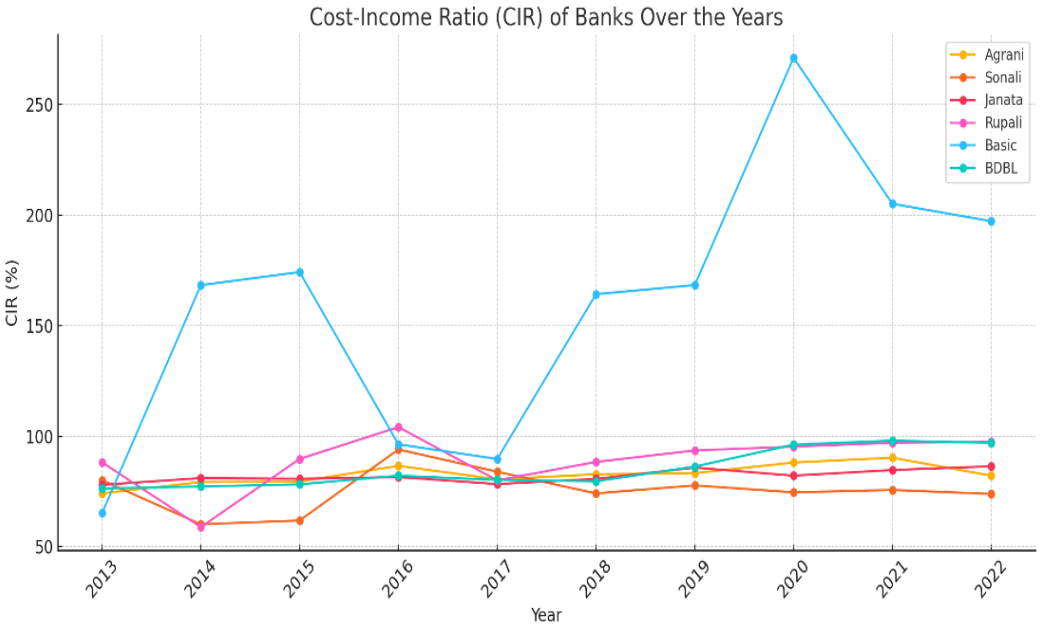

Figure 4: Cost to Income ratio (CIR) of state-owned banks

(source: Bangladesh Bank)

4. Methodology

4.1 Ordinary Least Squares

We have applied ordinary least square (OLS) to estimate the relationship the dependent and independent variables. The econometric model is demonstrated below:

$$Liquidity_{it} = \beta_0 + \beta_1 * Bank\ Risk_{it} + \beta_2 * SIZE_{it} + \beta_3 * Efficiency_{it} + \beta_4 * + \beta_5 * Capital\ Adequacy_{it} + \beta_6 * Profitability_{it} + \beta_7 * Cash\ Reserve\ Ratio_{it} + \epsilon_{it}$$

$$lnLIQ_{it} = \beta_0 + \beta_1 * lnNPL_{it} + \beta_2 * lnTA_{it} + \beta_3 * CIR_{it} + \beta_4 * CAR_{it} + \beta_5 * ROE_{it} + \beta_6 * CRR_{it} + \epsilon_{it} \quad \textbf{(1)}$$

4.2 Econometric Model for Robustness

$$Current\ Ratio_{it} = \beta_0 + \beta_1 * Bank\ Risk_{it} + \beta_2 * SIZE_{it} + \beta_3 * Efficiency_{it} + \beta_4 * + \beta_5 * Capital\ Adequacy_{it} + \beta_6 * Profitability_{it} + \beta_7 * Cash\ Reserve\ Ratio_{it} + \epsilon_{it}$$

$$CRO_{it} = \beta_0 + \beta_1 * lnNPL_{it} + \beta_2 * lnTA_{it} + \beta_3 * CIR_{it} + \beta_4 * CAR_{it} + \beta_5 * ROE_{it} + \beta_6 * CRR_{it} + \epsilon_{it} \quad \textbf{(2)}$$

where ϵ_{it} is the error term, i represents the bank, and t represents time.

5. Estimation Method

5.1 Summary Statistics

The summary statistics show that **lnLIQ** (liquidity) has an average of 24.57 with a relatively small standard deviation, indicating limited variation in liquidity among the banks. **lnTA** (bank size) has a mean of 26.66, while **lnNPL** (non-performing loans) averages 24.37, with low variation across the sample. **CAR** (capital adequacy ratio) and **CIR** (cost-to-income ratio) exhibit wider variability, with CAR ranging from -7.00 to 9.15 and CIR having a high maximum value of 167.85, indicating significant differences in capital management and operational efficiency among the banks. **ROE** (return on equity) has a small mean (0.035) and low variation, while **CRR** (cash reserve ratio) averages 6.52 with a moderate spread, reflecting the central bank's regulatory requirements.

Table 2: Summary statistics

Variable	Obs	Mean	Std. dev.	Min	Max
lnLIQ	58	24.568	0.946	23.008	26.141
lnTA	58	26.660	1.111	24.570	28.213
lnNPL	58	24.373	1.022	22.253	25.742
CAR	60	0.316	2.159	(7.000)	9.150
CIR	58	3.770	22.044	(2.714)	1.970
ROE	60	0.035	0.063	(0.191)	0.301
CRR	60	6.520	1.995	3.970	13.000

5.2 Pairwise correlations

Table 3: Pairwise correlations

Variables	(lnLIQ)	(lnTA)	(lnNPL)	(CAR)	(CIR)	(ROE)	(CRR)
lnLIQ	1.000						
lnTA	0.923***	1.000					
lnNPL	0.704***	0.855***	1.000				
CAR	-0.038	-0.223*	-0.417***	1.000			
CIR	-0.184	-0.087	-0.071	-0.121	1.000		
ROE	0.126	0.151	-0.023	-0.003	-0.069	1.000	
CRR	0.302**	0.294**	0.236*	-0.100	-0.025	0.036	1.000
**** p<0.01, ** p<0.05, * p<0.1*							

The correlation matrix reveals significant relationships between key variables influencing liquidity (lnLIQ) in state-owned banks. Bank size (lnTA) shows a strong positive correlation with liquidity, indicating that larger banks tend to hold more liquidity. Non-performing loans (lnNPL) are also positively correlated with liquidity, suggesting that banks may maintain higher liquidity to cover potential losses as loan performance declines.

However, the capital adequacy ratio (CAR) is inversely related to lnNPL and lnTA, meaning banks with higher capital reserves can have lower loan-related risks. The cash reserve ratio (CRR) positively correlates with liquidity and bank size, identifying that banks with larger asset bases and higher liquidity are likely to keep higher reserves. The cost-to-income ratio (CIR) and return on equity (ROE) indicate marginal correlations with liquidity, tell-tale a limited direct influence of these aspects on the liquidity of state-owned banks in Bangladesh.

6. Results & Discussions

Between 2013 and 2022, six state-owned banks in Bangladesh underwent regression analysis of liquidity (lnLIQ) to identify the major and non-significant elements affecting liquidity management. With an R-squared value of 0.90, the model has a good level of explanatory power, as the included variables account for 90% of the variance in liquidity. Liquidity and bank size (lnTA) correlate positively and significantly, indicating that larger banks often keep more liquidity. This suggests that larger banks have more advanced liquidity management systems and better access to various funding sources. And hence, these banks can maintain larger liquidity buffers (Berger & Bouwman, 2009). Non-performing loans (lnNPL) indicates an adverse relationship with liquidity (lnLIQ) in the studty which suggests that higher NPLs can reduce banks' capacity to generate profit and thereby compelling resources allocation to make up potential losses resulting reduction in liquidity. This findings of the study are similar with few earlier studies like (Ahmed, 2020) which NPLs decrease banks' liquid assets and financial stability.

Table 4: Regression analysis of liquidity

Source	SS	df	MS	Number of obs	=	58.00
				F(6, 51)	=	79.63
Model	51.50	6.00	8.58	Prob > F	=	-
Residual	5.50	51.00	0.11	R-squared	=	0.90
				Adj R-squared	=	0.89
Total	57.00	57.00	0.99	Root MSE	=	0.33

Table 5: Elements affecting liquidity management

lnLIQ	Coefficient	Std. err.	t	P>t	[95% conf.	interval]
lnTA	1.1656	0.0951	12.2600	0.000	0.9747	1.3565
lnNPL	(0.2659)	0.0995	(2.6700)	0.0100	(0.4658)	(0.0661)
CAR	0.1010	0.0502	2.0100	0.0500	0.0002	0.2017
CIR	(0.0928)	0.0443	(2.0900)	0.0410	(0.1819)	(0.0038)
ROE	(0.0639)	0.0468	(1.3700)	0.1780	(0.1578)	0.0300
CRR	0.0315	0.0448	0.7000	0.4860	(0.0585)	0.1215
_cons	(0.0026)	0.0431	(0.0600)	0.9510	(0.0893)	0.0840

In this study, bank liquidity is found to have a positive relationship with capital adequacy ratio (CAR). This signifies that well-capitalized banks maintain higher liquid assets to deal with financial instability and as a precautionary measurement against economic downturns (Bourke, 1989). The Cost to income ratio (CIR) negatively influences liquidity with statistical significance. This indicates that higher operational Costs can inversely impact liquidity; that is, higher spending in banks can lead to lower holding of liquid assets. Prior studies by Bourke (1989) and Molyneux & Thornton (1992) have also established the importance of operational efficiency in upholding liquidity, stressing that enlarged operating expenses normally result in bank liquidity limitations.

Return on Equity (ROE) and cash reserve ratio (CRR) have negative and positive relationships with liquidity with no statistical significance. However, return on equity has an inverse relation, describes that profitability, as expressed by ROE in this study, is not impacted by liquidity like commercial banks as immediately as it increases due to the continuous efforts of state-owned banks priority to make the banks stable rather than going for profit maximization. This study is results align with (Athanasoglou et al., 2008) who also identified that increased liquidity may not always be the straight cause of profitability. Again, state-owned banks are more concerned about reinvesting their profits into expansion and other riskier projects rather than retaining higher liquidity levels. This may happen as government assistance or other funding sources are commonly available to state-owned banks, which reduces the binding nature of the CRR as a liquidity restriction (Barth et al., 2006). Therefore, even though CRR is a key regulatory instrument, it might not be necessary to outline liquidity edges in banks that receive government support.

The findings suggest that policymakers should concentrate on managing non-performing loans and improving operational efficiency to strengthen liquidity in state-owned banks. Liquidity levels get boosted with enriched risk management frameworks to reduce NPLs, and dropping operational costs could improve liquidity positions. Moreover, while retaining capital adequacy is crucial for liquidity, liquidity management strategies for state-owned banks should go beyond regulatory reserves. These strategies should consider state-owned banks' unique operational and risk profiles, ensuring adequate liquidity buffers are preserved to improve financial steadiness (Rajan & Dhal, 2003).

7. Multicollinearity Test

The Variance Inflation Factor (VIF) test suggests that multicollinearity is not a significant issue in the regression model. The VIF value is below the critical threshold of 10. However, lnNPL (VIF = 5.24) and lnTA (VIF = 4.78) show moderate multicollinearity and some correlation between NPL and SIZE. The mean VIF of 2.45 suggests multicollinearity is generally low across the model. Although moderate multicollinearity exists, it is unlikely to distort the results significantly (O'Brien, 2007).

Table 6: Multicollinearity test

Variable	VIF	1/VIF
lnNPL	5.24	0.190827
lnTA	4.78	0.209095
CAR	1.38	0.725265
ROE	1.15	0.87285
CRR	1.1	0.909162
CIR	1.04	0.96157
Mean VIF	**2.45**	

8. Heteroskedasticity Test

8.1 White's test for heteroskedasticity

White's test for heteroskedasticity was conducted to assess whether the residuals have constant variance (homoskedasticity). The null hypothesis (H_0) of homoskedasticity could not be rejected, as the chi-squared value was 31.49 with a p-value of 0.2515, indicating no significant evidence of heteroskedasticity. Cameron and Trivedi's IM-test confirmed this, with non-significant results for heteroskedasticity, skewness (chi-squared = 10.40, p = 0.1089), and kurtosis (chi-squared = 1.50, p = 0.2213). The overall test statistic was 43.38 with a p-value of 0.1300, suggesting no major specification issues.

Table 7: White's test for heteroskedasticity

Source	Chi-squared	Degrees of Freedom	p-value
White's test	31.49	27	0.2515

Table 8: Cameron and Trivedi's IM-test

Heteroskedasticity 31.49	27 0.2515
Skewness 10.40	6 0.1089
Kurtosis 1.50	1 0.2213
Total 43.38	34 0.1300

8.2 Breusch–Pagan/Cook–Weisberg test for heteroskedasticity Test

The Breusch–Pagan/Cook–Weisberg test for heteroskedasticity was conducted to test whether the variance of the residuals is constant (homoskedasticity) in the model. The test yielded a chi-squared value of 0.25 with a p-value of 0.6169. Since the p-value is greater than the typical significance threshold of 0.05, we fail to reject the null hypothesis of constant variance. This indicates no significant evidence of heteroskedasticity, and the assumption of homoskedasticity holds in the model. Therefore, no adjustments for heteroskedasticity are necessary.

Table 9: The Breusch–Pagan/Cook–Weisberg test for heteroskedasticity

Test	Variable	H_0	$chi^2(1)$	Prob > chi^2
Breusch-Pagan/Cook-Weisberg	Fitted values of LNLIQ	Constant variance	0.25	0.6169

The White's heteroskedasticity test and Cameron and Trivedi's decomposition suggest no significant evidence of heteroskedasticity (p = 0.2515). Similarly, tests for skewness and kurtosis indicate no major issues with residual asymmetry or tail deviations. The Breusch–Pagan/Cook–Weisberg test also supports this, showing no evidence of non-constant variance (p = 0.6169), confirming that the assumption of homoskedasticity holds, and no adjustments are required.

9. Robustness

The robustness check involves changing the dependent variable from **lnLIQ** (liquidity) to **CRO** (Current Ratio) and comparing the results with the original regression model. In both models, **lnTA** (bank size) remains positively significant, strongly influencing both liquidity and the current ratio. This consistency suggests that larger banks maintain higher liquidity and have stronger overall financial health, reflected in their current ratio. Similarly, **lnNPL** (non-performing loans) has a consistently negative impact in both models, indicating that higher loan defaults erode liquidity and reduce the current ratio, further affirming the detrimental effect of credit risk on a bank's financial stability.

However, some differences emerge between the models. **CAR** (capital adequacy) is significant in the liquidity model but becomes non-significant when the dependent variable is CRO, suggesting that capital reserves have a more direct impact on liquidity than on short-term solvency. **CRR** (cash reserve ratio) is non-significant in the original model but becomes highly significant in the current ratio model, reflecting its greater relevance to meeting short-term obligations. **CIR** (cost-to-income ratio) retains its negative impact across both models but is more significant in the liquidity model, indicating that operational efficiency has a stronger influence on liquidity than on the current ratio. Overall, the robustness check confirms that key relationships hold, while highlighting the differing roles of certain variables depending on the dependent financial metric.

Table 10: The robustness check by changing the dependent variable

Source	SS	df	MS	Number of obs	=	58.00
				F(6, 51)	=	8.46
Model	8.61	6.00	1.43	Prob > F	=	0
Residual	8.65	51.00	0.17	R-squared	=	0.50
				Adj R-squared	=	0.44
Total	17.26	57.00	0.30	Root MSE	=	0.41

Table 11: Differences emerged between the models

CRO	Coefficient	Std. err.	t	P>t	[95% conf.	interval]
lnTA	0.467	0.119	3.910	0.000	0.227	0.706
lnNPL	(0.373)	0.125	(2.990)	0.004	(0.624)	(0.122)
CAR	0.064	0.063	1.010	0.317	(0.063)	0.190
CIR	(0.094)	0.056	(1.690)	0.097	(0.206)	0.018
ROE	0.058	0.059	0.980	0.331	(0.060)	0.175
CRR	0.188	0.056	3.350	0.002	0.075	0.301
_cons	1.000	0.054	18.470	0.000	0.891	1.108

10. Conclusion

This study inspects the association between liquidity and key financial variables for six government banks from 2013 to 2022. The outcomes specify that bank size, measured by total assets, positively affects liquidity, implying that larger government banks retain higher liquidity levels. Non-performing loans negatively impact liquidity, reflecting the strain that poor asset quality places on liquidity reserves. The capital adequacy ratio positively correlates with liquidity, suggesting that more substantial capital positions enhance liquidity, while operational inefficiency, represented by the cost-to-income ratio, reduces liquidity. The return on equity or cash reserve ratio does not significantly affect liquidity. There are quite a few limitations to this research. The analysis is done on government banks only, which may not represent the scenario of the total banking sector of Bangladesh. Again, several external aspects, such as macroeconomic conditions, government policies, or technological changes, have not been considered, along with the financial variables in the study. The reasonably small sample size limits the generalizability of the findings. Future research can cover this analysis by including more banks, primarily private and international institutions, to understand the broader liquidity dynamics.

Including macroeconomic variables, such as interest rates, inflation, and regulatory changes, would provide a more inclusive understanding of aspects impelling liquidity. Exploring the impact of digital transformation and fintech innovations on liquidity management in government banks could also propose valuable insights into future banking trends. From a policy perspective, the results advise that regulators should emphasize improving asset quality in government banks by dropping non-performing loans and safeguarding adequate capital reserves. Enhancing operational efficiency, predominantly in reducing the cost-to-income ratio, is crucial for upholding liquidity. Policymakers should also consider solidifying capital adequacy requirements, which positively impacts liquidity. Continuous monitoring of liquidity risks and applying policies to safeguard government banks and maintain strong liquidity positions will contribute to the overall stability of the banking sector.

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