The liquidity paradox in Nepalese banks

Dipendra Karki
Lecturer, Nepal Commerce Campus, Faculty of Management, Tribhuvan University
Email: dipendra.karki@ncc.tu.edu.np
https://orcid.org/0000-0001-9045-7423

Cite this paper

Karki, D. (2021). The liquidity paradox in Nepalese banks. *NCC Journal, 6*(1), 57-69.
https://doi.org/10.3126/nccj.v6i1.57817

Abstract

This study analyzes the influence of bank-specific and macroeconomic variables on liquidity in commercial banks in Nepal. Using pooled cross-sectional data from ten sample banks for the period 2011/12 to 2016/17, with sixty observations, the study employs a causal-comparative and descriptive research design as its methodology. The study concludes that bank-specific and macroeconomic variables significantly affect the liquidity in Nepalese banks, with different effects observed for public sector banks, joint ventures, and domestic private banks. This study finds that the capital adequacy ratio, bank size, and return on assets are the key determinants of bank liquidity. The findings suggest that the capital adequacy ratio positively impacts the liquidity of all types of banks in Nepal. However, the liquidity of all banks is adversely affected by the return on assets. Additionally, bank size negatively affects the liquid assets to total assets ratios of all types of banks, indicating that larger banks have lower liquidity ratios. The liquid assets to deposits ratio has a positive impact on public banks' liquidity but a negative effect on joint venture and private banks' liquidity in Nepal. These findings have significant implications for policymakers, regulators, and bank managers in Nepal to ensure effective liquidity management.

Keywords: Capital adequacy ratio, Liquidity, Bank size, Return on assets, Commercial banks

Introduction

Liquidity is a bank's ability to meet its upcoming commitments and finance transactions efficiently. It is the ability to buy or sell an asset or security quickly without impacting its price. Bank liquidity is the ability to pay short-term creditors and depositors (Eljelly, 2004). Banking sector liquidity is crucial to a healthy financial system. To meet depositors' liquidity needs, the bank swaps less liquid assets for more liquid ones. Liquidity will assist a firm avoid liquidation, which involves selling assets at distressed prices and paying lawyers, trustees in bankruptcy, and liquidators extra fees. Diamond and Dybvig (1983) suggested that improper liquidity generation might lead to insolvency (low liquidity) and low profitability (excessive liquidity). Liquidity risk results if a bank cannot maintain equilibrium. After the 2008 global financial crisis, banks and financial institutions worry about liquidity. There is consensus that insufficient liquidity buffers caused chaos and continued disruptions in the entire economy, making liquidity risk analysis and supervision a critical issue for the coming year (Bonner, 2013).

Liquidity risk threatens financial institutions and system stability. Acharya and Naqvi (2012) provided theoretical support for the idea that managers may take on more risk when banks have a lot of liquidity by sharply lowering the loan rates to increase lending volume and boost remuneration. These behaviors and financial market pressures have revealed major liquidity risk management inadequacies in several institutions. Past studies have shown that several macroeconomic and bank-specific factors have an impact on bank liquidity. Overviewing these factors, banks need efficient liquidity management to maximize earnings and stay liquid. However, gaining one usually means losing the other (Osuji & Agbada, 2013). In the Nepalese context, Baral (2005) stated that commercial bank depositors withdrawing money create the initial liquidity risk. Additionally, Kumar and Yadav (2013) mention that if liabilities exceed assets, the bank will fail. The financial sector's role is critical. Financial

assistance to business entities in the form of credit facilities is crucial to the growth of the small business sector (Karki et al. 2021). The biggest barriers to the growth of small enterprises in Nepal are acquiring initial finance and overreliance on credit, both of which are impacted by the banking industry's liquidity issue. This means that banks in Nepal need to ensure that they have sufficient liquidity to meet their financial obligations, and failure to do so can have serious consequences.

Literature review

Liquidity is one of the crucial indicators of a bank's financial health, as it represents a bank's capacity to fulfill its financial commitments. A strong liquidity position can have a positive effect on a bank's earnings and overall financial performance, which could, in turn, positively affect its stock price in the market (Karki, 2018). Hence, the importance of understanding the determinants of liquidity and how it affects a bank's profitability and economic growth cannot be overstated. This literature review seeks to provide an overview of recent studies on liquidity drivers in commercial banks from different countries.

Liquidity Drivers in Central American, Ethiopian, and Polish Commercial Banks: Vtyurina et al. (2012) conducted a study on 100 Central American commercial banks and found that capital adequacy, bank size, and fiscal growth positively influence profitability and liquidity. However, the loan loss provision negatively impacts liquidity. Similarly, Tseganesh (2012) evaluated Ethiopian commercial banks' financial performance and liquidity and documented that capital adequacy, bank size, and the fraction of nonperforming loans positively affect liquidity, while loan growth has no significant effect. Vodova's (2011) analysis of Polish commercial banks between 2001 and 2010 revealed that financial crises, economic downturns, and unemployment decrease bank liquidity, while profitability, inflation, nonperforming loans, capital adequacy, and loan rates increase it.

Liquidity Risk Management in Pakistani Banks and Nigerian Commercial Banks: Abdullah and Khan (2012) studied liquidity risk management in Pakistani local and foreign banks using 2001–2010 secondary data. They found that bank size and liquidity risk negatively and significantly affect domestic banks but negatively and insignificantly affect foreign banks. In contrast, debt-to-equity ratios increase liquidity risk for both local and international banks. On the other hand, Olagunju et al. (2011) found a link between liquidity and profitability in Nigerian banks. The research showed that illiquidity and excess liquidity are "financial diseases" that can undermine a bank's profit foundation.

Liquidity Drivers in Indonesian and Russian Commercial Banks: Sudirman (2014) examined Indonesian commercial banks' liquidity using a survey of 20 banks between 2004 and 2011. According to the study, bank liquidity is influenced by the prior year's liquidity, asset quality, capital, and profitability. However, funding and substitutes of Tier 1 capital had a negative impact. Interest rates, inflation, and capital market development also impact bank liquidity positively. Fidrmuc's (2015) study on Russian commercial banks between 2004 and 2012 found that bank liquidity creation boosts economic growth positively. Liquidity generation positively affects growth but only when computed by maturity categorization.

Liquidity Drivers in Indian and Nepalese Commercial Banks: Singh and Sharma (2016) evaluated bank-specific and macroeconomic factors affecting Indian bank liquidity between 2000 and 2013. The research documented that bank size, profitability, capital sufficiency, and deposits significantly affect Indian bank liquidity. Moreover, inflation and GDP have a substantial influence on macroeconomics. Joshi's (2016) study on Nepalese commercial bank liquidity determinants documented that profitability, interest margin, loan growth, Treasury bill rate, and bank size decrease liquidity, which boosts GDP. Subedi and Neupane (2013) examined macroeconomic and idiosyncratic liquidity drivers in Nepalese banks between 2007 and 2013. The findings of the study indicated that idiosyncratic factors like asset size, capital adequacy, and loan-to-deposit ratios significantly influence the liquidity position of Nepalese banks. The research discovered that larger banks tend to have better liquidity positions, while banks with higher ratios of credit to deposit and lower ratios of capital adequacy tend to have

lower liquidity positions. Bhandari et al. (2021) found that private banks in Nepal outperform public banks in management practices like liquidity sufficiency and service quality, which boosts customer satisfaction.

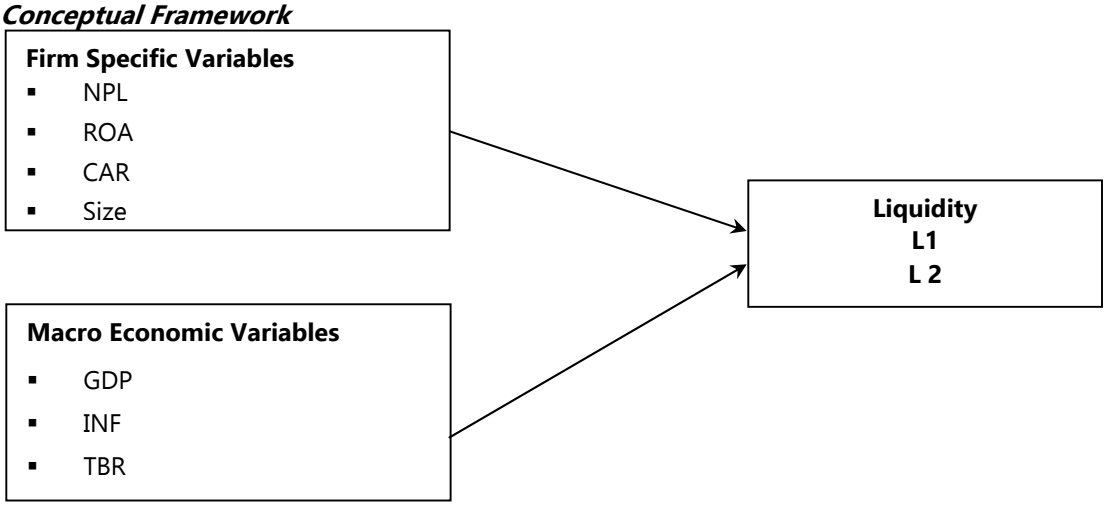
From the review of studies on liquidity drivers in commercial banks across different countries, it is evident that bank size, capital adequacy, nonperforming loans, profitability, and inflation are crucial determinants of bank liquidity.

Conceptual framework

The conceptual framework of this study is comprised of bank-specific and macroeconomic factors of liquidity, as determined by a review of the relevant literature. This study consists of two dependent variables and one independent variable that were evaluated using a variety of statistical methods. To determine the overall liquidity of the bank, the liquid assets to total assets ratio is included in the first model of dependent variable L_1. Numerous researchers, including Vodova (2011), Malik and Rafique (2013), and many others, have utilized an identical approach in order to determine a suitable association. Liquid assets relative to total deposits are the components of the second dependent variable model, L2.

Figure 1

Conceptual Framework



The relationship between dependent and independent variables is depicted in Figure 1, where independent variables include nonperforming loans (NPL), return on assets (ROA), capital adequacy ratio (CAR), bank size (SIZE), inflation (INF), gross domestic product (GDP), and Treasury bill rate (TBs).

Methodology

This study employs a research design that combines descriptive and causal-comparative methods in order to address key liquidity-related issues in the banking industry of Nepal. The descriptive research design is used to provide a detailed description of the current state of liquidity in the banks, while the causal-comparative approach is employed to evaluate the association between independent variables and liquidity. This study design allows for a comprehensive analysis of the variables that influence liquidity in commercial banks of Nepal.

Population and sampling

This research examines the impacts of bank-specific and macroeconomic factors on liquidity with a focus on commercial banks in Nepal, particularly "A" level financial institutions. The World Bank and Nepal Rastra Bank websites, among other sources, were used to compile the statistics. The study, which uses secondary sources of data, examines 10 commercial banks, consisting of 1 government bank, 4 joint ventures, and 5 private sector banks. Using a convenience sampling approach, the sample banks were selected based on their oldest age and availability of data.

Table 1
Sample Banks, Data Period, and Number of Observations

S.N.	Banks	Data period	Observations
	Panel A: Government banks		
1	Nepal Bank Ltd.	2011/12-2016/17	6
	Panel B: Joint venture banks		
2	Nabil Bank Ltd.	2011/12-2016/17	6
3	Himalayan Bank Ltd.	2011/12-2016/17	6
4	Standard Chartered Bank Ltd.	2011/12-2016/17	6
5	Nepal SBI Bank Ltd.	2011/12-2016/17	6
	Panel C: Private banks		
6	Nepal Investment Bank Ltd.	2011/12-2016/17	6
7	Siddhartha Bank Ltd.	2011/12-2016/17	6
8	Laxmi Bank Ltd.	2011/12-2016/17	6
9	Bank of Kathmandu Ltd.	2011/12-2016/17	6
10	Kumari Bank Ltd.	2011/12-2016/17	6
		Total observations 60	

Data analysis plan

The study employed SPSS 20, a statistical software, to analyze the collected data. Various analytical approaches were utilized, including descriptive statistics, correlation analysis, and regression analysis. The characteristics of the sample banks between 2011/12 and 2016/17 were summarized using descriptive statistics, like minimum values, maximum values, mean, and standard deviations. The direction and magnitude of the association between the endogenous and exogenous factors were determined using correlation analysis. Their influence, both independently and in combination with other variables, was also investigated using regression analysis. A regression equation was used to express the link between the exogenous variable (liquidity) and the endogenous factors (macroeconomic & bank-specific variables). In other words, the model presupposed that both bank-specific and macroeconomic factors affect liquidity. i.e.

Liquidity = f (macroeconomic and bank-specific factors)

Having defined the relevant components, model (1) could be expressed as

Liquidity = f (NPL, CAR, ROA, BS, GDP, INF, TB)

Model 1: $L_1it = \beta_1 + \beta_2 NPL_{it} + \beta_3 ROA_{it} + \beta_4 CAR_{it} + \beta_5 lnBS_{it} + \beta_6 GDP_t + \beta_7 INF_t + \beta_8 TB_t + e_{it}$

Model 2: $L_2it = \beta_1 + \beta_2 NPL_{it} + \beta_3 ROA_{it} + \beta_4 CAR_{it} + \beta_5 lnBS_{it} + \beta_6 GDP_t + \beta_7 INF_t + \beta_8 TB_t + e_{it}$

Where,

L_1it = liquid assets to total assets ratio

L_2it = liquid assets to total deposit ratio

NPL_{it} = Non-performing loan; *non-performing loan to total loan ratio*

ROA_{it} = Return on assets*; net income to total assets, in percentage*

CAR_{it} = Capital adequacy ratio*; given by the sum of tier I & II capital to risk-weighted assets*

BS_{it} = Log of total assets

GDP_t = Gross domestic profit; *the annual growth rate of domestic products*

INF_t = Inflation rate*; percentage increase in the general price level of goods & services*

TB_t = Treasury bill rate; *91 days Treasury bill*

Table 2
Description of the Variables

Variable	Measure	Notation
	Dependent variables	
Liquidity 1 ratio	Total liquid assets/total assets	L1
Liquidity 2 ratio	Total liquid assets/total deposits	L2
	Independent variables	
Bank-specific		
Nonperforming loan	Nonperforming loans to total loan	NPL
Return on assets	Net income to total assets	ROA
Capital adequacy ratio	(Tier I + Tier II) capital to total risk-weighted assets	CAR
Bank Size	Natural logarithm of banks' total assets	BS
Macroeconomic		
GDP	Annual growth rate	GDP
Inflation	Annual inflation rate	INF
Short-term interest rate	91-days treasury bills	TB

The variables used in the model included nonperforming loans (NPL), return on assets (ROA), bank size (BS), capital adequacy ratio (CAR), inflation rate (INF), gross domestic product (GDP), and trade balance (TB). The regression equations were computed using the statistical package for social science (SPSS 20).

Table 3
Structure and Pattern of Liquidity Ratio (L_1) of Sample Banks.

Banks	2012	2013	2014	2015	2016	2017	Mean	S.D
				Panel A: Government Bank				
NBL	0.41	0.36	0.47	0.43	0.27	0.25	0.37	0.09
				Panel B: Joint Venture Banks				
NABIL	0.21	0.21	0.22	0.23	0.19	0.18	0.21	0.05
HBL	0.29	0.26	0.24	0.23	0.19	0.16	0.23	0.03
SCBL	0.39	0.31	0.37	0.31	0.27	0.33	0.33	0.04
NSBL	0.18	0.18	0.21	0.19	0.21	0.21	0.20	0.02
Mean	0.27	0.24	0.26	0.24	0.22	0.22		
S.D	0.09	0.06	0.07	0.05	0.04	0.08		
				Panel C: Private Banks				
NIBL	0.28	0.27	0.26	0.22	0.18	0.20	0.24	0.04
SBL	0.26	0.24	0.26	0.20	0.30	0.21	0.25	0.04
LBL	0.27	0.27	0.27	0.21	0.18	0.16	0.23	0.05
BOK	0.31	0.27	0.24	0.25	0.22	0.23	0.25	0.03
KBL	0.26	0.27	0.26	0.25	0.23	0.25	0.25	0.01
Mean	0.35	0.33	0.32	0.28	0.28	0.26		
S.D	0.02	0.01	0.01	0.02	0.05	0.03		

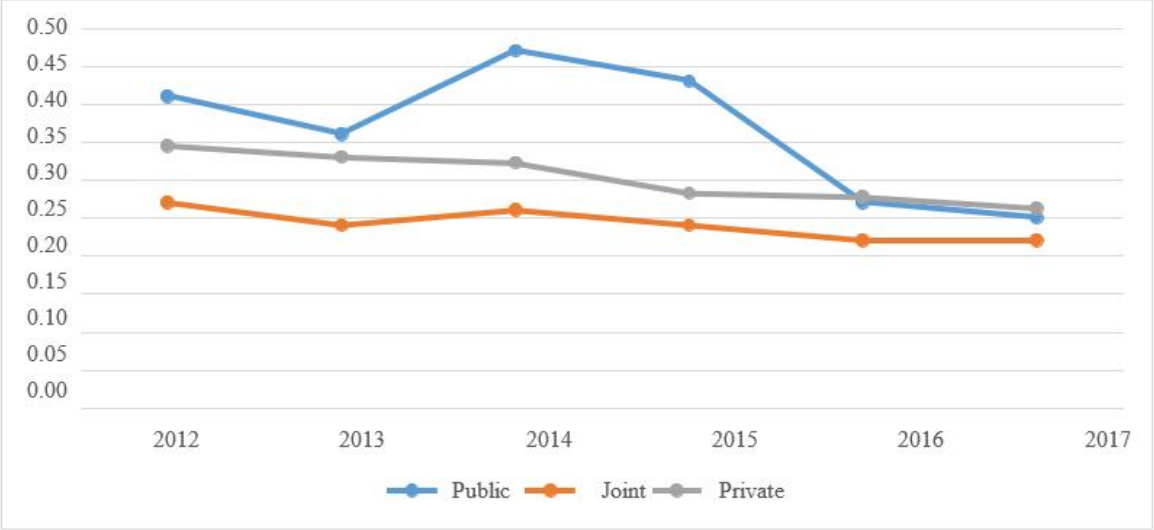
Source: Bank & NRB's Statistics.

Table 3 presents the average ratio of liquid assets to total assets (L_1) for Nepalese banks from 2012 to 2017. The highest average ratio of L_1 was observed for the NBL bank at 0.37 times, followed by SCBL at 0.33 times. However, the ratio L_1 varied widely among individual banks. For instance, the ratio declined from 0.41 times in 2012 to 0.25 times in 2017 for NBL and from 0.21 times to 0.18 times for NABIL. The highest mean ratio of L_1 for NBL bank was observed in the years 2012 to 2015 at 0.41 times to 0.43 times. Moreover, the average ratio of private banks' liquid

assets to total assets dropped from 0.35 times in 2012 to 0.26 times in 2017. Among the banks, KBL had the lowest variation in L_1 as indicated by the standard deviation (0.01), followed by NSBL (0.02).

Figure 2

Comparative Pattern of Liquidity Ratio (L_1) of Sample Banks



The year is shown by the x-axis, and the liquidity ratio (L1) is represented by the y-axis in Figure 2. The x-axis represents the year and the y-axis represents liquidity ratio (L_1). The figure indicates the fluctuations of (L_1) for different types of banks. The graphs show an upward trend beginning in 2013, though in 2016 the liquidity has shrunk for all types of banks.

Table 4

Structure and Pattern of Liquid Assets/Total Deposit (L_2) in Sample Banks

Banks	2012	2013	2014	2015	2016	2017	Mean	S.D
Panel A: Government Banks								
NBL	0.43	0.40	0.53	0.49	0.31	0.30	0.41	0.09
Panel B: Joint Ventures Banks								
NABIL	0.24	0.24	0.25	0.25	0.22	0.21	0.24	0.02
HBL	0.33	0.29	0.28	0.26	0.21	0.18	0.26	0.05
SCBL	0.45	0.36	0.42	0.35	0.31	0.34	0.37	0.05
NSBI	0.19	0.2	0.23	0.21	0.25	0.26	0.22	
Mean	0.30	0.27	0.30	0.27	0.25	0.25		
S.D	0.10	0.06	0.08	0.06	0.05	0.06		
Panel C: Private Banks								
NIBL	0.32	0.31	0.31	0.26	0.21	0.24	0.28	0.05
SBL	0.29	0.28	0.3	0.23	0.24	0.25	0.27	0.03
LBL	0.31	0.31	0.31	0.24	0.2	0.19	0.20	0.06
BOK	0.36	0.32	0.28	0.28	0.26	0.26	0.29	0.04
KBL	0.30	0.31	0.29	0.28	0.26	0..29	0.24	0.02
Mean	0.40	0.38	0.37	0.32	0.29	0.24		
S.D	0.02	0.01	0.03	0.03	0.03	0.03		

Source: Bank/NRB's Statistics.

Table 4 displays the average liquidity ratio (L_2) for different banks from 2012 to 2017. NBL has the highest average ratio (0.41 times) followed by SCBL (0.37 times). However, there is significant variation in this ratio within each bank. For instance, over the same time period, NSBI's ratio increased from 0.19 times to 0.26 times, whereas NBL's ratio declined from 0.43 times in 2012 to 0.30 times in 2017. The average ratio for public banks dropped from 0.43 times in 2012 to 0.30 times in 2017, while it dropped from 0.30 times to 0.25 times for joint venture banks. The average

ratio for private banks fell from 0.40 times in 2012 to 0.24 times in 2017. NABIL, KBL, and SBL had the lowest standard deviations for the ratio of liquid assets to total assets (0.02, 0.02 & 0.03 respectively).

Table 5

Descriptive Statistics for Joint Venture and Private Banks

The table below provides data on joint venture and private banks' variables from 2011/12–2016/17. Both (L1) and (L2) ratios are dependent variables, whereas the independent variables include NPL, CAR, ROA, log(BS), INF, GDP, and TB.

	Joint Venture Banks				Private Banks			
Variables	**Minimum**	**Maximum**	**Mean**	**S.D**	**Minimum**	**Maximum**	**Mean**	**S.D**
L1	0.16	0.39	0.24	0.07	0.16	0.31	0.24	0.07
L2	0.18	0.36	0.27	0.09	0.19	0.36	0.26	0.1
NPL	0.1	4.22	1.22	3.15	0.62	4.03	1.8	1.19
ROA	0.7	3.25	1.97	1.35	0.65	2.6	1.5	0.75
CAR	10.81	16.5	12.73	1.19	10.81	16.65	12.11	7.48
BS	41.68	140.33	75.9	22.17	25.13	150.82	57.21	16.13
GDP	0.57	6.9	4.1	1.04	0.57	6.9	4.1	1.04
INF	4.48	9.93	8.14	0.95	4.48	9.93	8.14	0.95
TB	0.02	1.19	0.55	0.6	0.02	1.19	0.55	0.6

In the case of joint venture banks: Data from several factors utilized in this analysis are summarized in Table 5. Non-performing loans (NPL) account for an average of 1.22 percent but can be as high as 4.22 percent. Comparatively, the return on assets (ROA) varies from 0.1% to 3.25%, averaging 1.97%. The average capital adequacy ratio (CAR) is 12.73 percent, with a range of 10.81 percent to 16.5 percent. The average size of a bank is 75.9 billion dollars, with the range being from 41.68 billion to 140.33 billion. The GDP ranges from a low of 0.57% to a high of 6.9%, with a mean GDP of 4.1%. Inflation is reported to be 8.14% on average, with a range from 4.48% to 9.99%. Finally, the range of possible interest rates on 91-day treasury bills is from 0.02 percent up to 1.19%, with a mean rate of 0.55%.

In the case of private banks: Banks in the study have non-performing loan (NPL) rates of 1.80%, with a range of 0.62% to 4.03%. The average ROA is 1.50 percent with a range of 0.65-2.60 percent on the asset side. The capital adequacy ratio (CAR) varies between 10.81% and 16.65%, averaging 12.119%. The size of the banks varies from $25.13 billion to $150.82 billion, with $57.21 billion as the mean. And variations in macroeconomic factors are the same with JV banks.

Table 6

Pearson Correlation Matrix for Joint Venture and Private Banks

Table 4.12 depicts the bi-variate correlation coefficients among different variables of private and joint venture banks from 2011/12 to 2016/17. The lower panel is for joint venture banks and the upper panel is for private banks. The exogenous variables are liquidity ratios; L1 and L2 and the endogenous variables are NPL, CAR, ROA, BS, INF, GDP, and TB(91 days treasury bill).

	L1	**L2**	**NPL**	**ROA**	**CAR**	**BS**	**GDP**	**INF**	**TB**
L1	1	0.977**	-0.053*	-0.047	0.525**	-0.156*	-0.148	0.088*	-0.006
L2	0.992**	1	-0.126	-0.046	0.587**	-0.193*	-0.136*	-0.125*	-0.071
NPL	-0.138	-0.171	1	-0.011	-0.262*	0.012	0.036	-0.036	-0.205
ROA	-0.375*	-0.406*	-0.317	1	-0.035	0.183	-0.029	0.169	0.225*
CAR	0.291**	0.274**	-0.377*	0.243	1	-0.219*	0.042	0.146	0.256*
BS	-0.387**	-0.405**	-0.333*	-0.279	0.022	1	-0.168	-0.341**	-0.378**

	L1	L2	NPL	ROA	CAR	BS	GDP	INF	TB
GDP	0.101	0.089	-0.031	0.121	-0.175	-0.221	1	0.446**	-0.032
INF	0.231	-0.023	0.136	0.108	-0.215	-0.436**	0.446**	1	0.548**
TB	-0.054	-0.058	0.251	0.017	-0.174	-0.486**	-0.031	0.548**	1

** The level of significance is 0.01 (two-tailed).

* The level of significance is 0.05 (two-tailed).

In the case of joint venture banks: The correlation test results for joint venture banks are shown in the lower panel of Table 6. The results indicate that the CAR, GDP, and INF are positively correlated with L1 (type of liquidity). This suggests that the ratio L1 (liquid assets /total assets) would be greater with a higher capital adequacy ratio. Additionally, as GDP increases, L1 increases. Similarly, the results indicate that L1 would increase as inflation rose. In contrast, L_1 has negative relationships with nonperforming loans, returns on assets, bank size, and the 91-day Treasury bill rate. This implies that the L1 ratio would be lower the greater the nonperforming loan ratio. It also suggests that the L1 ratio would be lower the greater the returns on assets. Similarly, the L1 would be lower the larger the bank. Furthermore, the results indicate that the L1 ratio would be lower the higher the GDP and 91-day Treasury bill rate.

Additionally, the findings demonstrate a positive relationship between the CAR and GDP with L2. This indicates that L2 (liquid assets /total deposits) will be higher the higher the capital adequacy ratio. Similarly, as GDP increases, L2 increases. However, the results indicate a negative correlation between non-performing loans, returns on assets, bank size, inflation, and the yield on 91-day Treasury bills, with L2 (liquid assets/total deposits). This indicates that the L_2 ratio would decrease as nonperforming loans rose. It also suggests that the L2 ratio (liquid assets to total deposits) would be lower the greater the return on assets and the scale of the bank. In addition, the results indicate that L2 (liquid assets to total deposits) would be lower as inflation, GDP, and 91-day Treasury bill rates increased.

In the case of private banks: The upper panel of Table 6 illustrates the outcomes of the correlation test for private banks. The findings indicate a positive correlation between the INF and CAR with both L1 and L2 ratios. This suggests that greater capital adequacy ratios are associated with higher levels of liquid assets governing a higher level of liquidity. Moreover, the results also show a negative correlation between non-performing loans, bank size, returns on assets, gross domestic product, and 91 days Treasury bill rate with both L1 and L2. This implies that higher nonperforming loans, larger bank sizes, higher GDP, and higher 91 days Treasury bill rates are linked with lower levels of liquid assets relative to total assets and deposits. Additionally, the results reveal that higher return on assets is negatively correlated with both L1 and L2, indicating that banks with better performance tend to hold lower levels of liquid assets.

Table 7

Estimated Regression Results of Liquid Ratio (L_1) on Study Variables for Joint Venture Banks

The linear regression results are based on panel data from four joint venture banks with 24 observations from 2011/12 to 2016/17. The model is, $L_{1it} = \beta_1 + \beta_2 NPL_{it} + \beta_3 ROA_{it} + \beta_4 CAR_{it} + \beta_5 lnBS_{it} + \beta_6 GDP_t + \beta_7 INF_t + \beta_8 TB_t + e_{it}$.

Models	Intercept	Regression coefficients of L1 and Joint Venture banks							Adj. R^2	S.E.	F
		NPL	ROA	CAR	BS	GDP	INF	TB			
1	0.26 (18.23)	-0.03 (-0.81)							0.12	0.72	3.24
2	0.22 (10.38)		-0.02 (-2.35*)						0.18	0.68	4.97
3	0.13 (3.02)			0.01 (3.04**)					0.20	0.69	5.50

Models	Intercept	Regression coefficients of L1 and Joint Venture banks							Adj. R^2	S.E.	F
		NPL	ROA	CAR	BS	GDP	INF	TB			
4	1.92 (3.41)				-0.06 (-3.94**)				0.20	0.65	6.64
5	0.22 (3.22)					0.01 (0.68)			0.13	0.07	1.46
6	0.26 (2.27)						7.51 (0.66)		0.10	0.07	1.02
7	0.27 (16.67)							-0.01 (-1.31)	0.15	0.62	2.42

Notes: T-values are represented by figures in parentheses. The asterisk (**) and (*) signs indicate that the results have 0.01 and 0.05 significance levels, respectively.

The findings of the regression analysis for joint venture banks are shown in Table 7. The connection between the endogenous factors and the exogenous variable L1 is measured using the beta coefficient. The findings reveal that for the CAR, GDP, and INF with L_1, the coefficient of beta is positively significant at a 1% level. This shows that the L_1 ratio rises when the capital adequacy ratio, GDP, and inflation rise. These findings are consistent with previous studies such as Repullo (2004), Moussa (2015), and Tseganesh (2012). However, the coefficient of beta is negatively and statistically significant with non-performing loans, return on assets, bank size, and 91 days Treasury bill rate with L1. This implies that as nonperforming loans, bank size, return on assets, and Treasury bill rate increase, the liquid assets to total assets decrease. These findings are also consistent with previous studies such as Umar and Sun (2016), Tesfaye (2012), and Benbouziane and Benamar (2008). The coefficient of beta for ROA is statistically significant at the 5% level, whereas for capital adequacy ratio and bank size, the beta coefficients have a 1% level of significance.

The results suggest that several factors such as NPL, CAR, GDP, inflation, returns on assets, bank size, and 91 days Treasury bill rate are significant determinants of L1 (liquid assets/total assets) for joint venture banks.

Table 8

Estimated Regression Results of Liquid Ratio (L_2) on Study Variables for Joint Venture Banks

The linear regression results are based on panel data from four joint venture banks with 24 observations from 2011/12 to 2016/17. The model is,, $L_{2it} = \beta_1 + \beta_2 NPL_{it} + \beta_3 ROA_{it} + \beta_4 CAR_{it} + \beta_5 lnBS_{it} + \beta_6 GDP_t + \beta_7 INF_t + \beta_8 TB_t + e_{it}$.

Models	Intercept	Regression coefficients of L2 and Joint venture banks							Adj. R^2	S.E.	F
		NPL	ROA	CAR	BS	GDP	INF	TB			
1	0.30 (16.89)	-0.05 (-1.05)							0.19	0.90	3.02
2	0.25 (9.47)		-0.27 (-2.48*)						0.22	0.08	4.72
3	0.15 (1.79)			0.13 (3.93**)					0.42	0.08	7.37
4	2.53 (3.67)				-0.09 (-3.22**)				0.30	0.08	5.37
5	0.26 (3.05)					0.01 (0.67)			0.19	0.09	3.27
6	0.29 (1.97)						-0.02 (-0.13)		0.13	0.09	1.82

Models	Intercept	Regression coefficients of L2 and Joint venture banks							Adj. R^2	S.E.	F
		NPL	ROA	CAR	BS	GDP	INF	TB			
7	0.31 (15.52)							-0.01 (-0.34)	0.10	0.09	1.16

Notes: T-values are represented by figures in parentheses. The asterisk (**) and (*) signs indicate that the results have 0.01 and 0.05 significance levels, respectively.

The regression findings for the association between L2 (liquid assets by total deposit) and several independent variables are shown in Table 8. The association between the CAR and GDP is statistically significant at the 1% level because the beta coefficients for both variables are positive, showing that the greater the capital adequacy ratio and GDP, the larger the L2 ratio. The conclusions of Malik and Rafique (2013) and Choon et al. (2013), respectively, are supported by these results. The study discovers a negative beta coefficient for L2 when it comes to non-performing loans, ROA, bank size, inflation, and the rate of treasury bills. This shows that the L2 ratio decreases as non-performing loans, ROA, bank size, inflation, and treasury bill rates increase. There are two levels of significance for this relationship: 1 percent and 5 percent. These results agree with those from Dinger (2009), Ghafoor (2009), Nishanthini and Meerajancy (2015), Aymen et al. (2016), and Joshi (2016), in that order.

The results reveal that greater nonperforming loans, return on assets, bank size, inflation, and treasury bill rate lead to lower liquid assets to total deposit for banks, while higher CAR and GDP lead to higher liquid assets to total deposit. These findings are consistent with earlier studies on the subject.

Table 9

Estimated Regression Results of Liquid Ratio (L_1) on Study Variables for Private Banks

The linear regression results are based on panel data from 5 private banks with 30 observations from 2011/12 to 2016/17. The model is, $L_{1it} = \beta_1 + \beta_2 NPL_{it} + \beta_3 ROA_{it} + \beta_4 CAR_{it} + \beta_5 lnBS_{it} + \beta_6 GDP_t + \beta_7 INF_t + \beta_8 TB_t + e_{it}$.

Models	Intercept	Regression coefficients of L1 and Private banks							Adj. R^2	S.E.	F
		NPL	ROA	CAR	BS	GDP	INF	TB			
1	5.88 (7.89)	-0.03 (-2.43*)							0.22	0.07	4.01
2	2.64 (15.22)		-0.05 (-1.52)						0.13	0.08	3.03
3	1.81 (11.86)			0.05 (5.59**)					0.29	0.06	31.02
4	0.27 (16.17)				-0.24 (-2.43*)				0.23	0.07	4.03
5	0.21 (6.34)					-0.11 (-1.35)			0.12	0.10	2.86
6	0.19 (0.16)						0.07 (2.24*)		0.20	0.06	4.04
7	0.25 (23.50)							-0.04 (-1.05)	0.17	0.70	2.02

Notes: T-values are represented by figures in parentheses. The asterisk (**) and (*) signs indicate that the results have 0.01 and 0.05 significance levels, respectively.

Table 9 presents the regression results for the relationship between various independent variables and L1, which refers to liquid assets by total assets. Positive beta coefficients for the CAR and INF show that these variables

increase the proportion of liquid assets in total assets. This finding agrees with studies conducted by Iqbal (2012) and Tseganesh (2012), respectively. The beta coefficients for NPL, ROA, bank size, GDP, and Treasury bill rate, on the other hand, are negative, showing that higher levels of these variables result in lower levels of liquid assets as a proportion of total assets. In particular, the research of Muriithi (2010) discovered that the L1 ratio decreased as nonperforming loans increased. According to Bourke (1989), the L1 ratio decreases as the return on assets increases. According to Dinger's 2009 research, the L1 ratio decreases as bank size increases. The findings of Ongore and Kusa (2013) are supported by the negative beta coefficient for GDP, which shows that higher GDP is associated with lower levels of liquid assets as a percentage of total assets. Last but not least, Joshi (2016)'s conclusions are supported by the fact that the liquid assets to total assets ratio decreases as the Treasury bill rate rises.

The regression results reveal that nonperforming loans, bank size, return on assets, GDP, and Treasury bills rates have a negative impact on the amount of liquid assets maintained by banks, but inflation and the capital adequacy ratio of banks play critical roles in determining the level of liquid assets retained by banks.

Table 10. *Estimated Regression Results of Liquid Ratio (L_2) on Study Variables for Private Banks*
The linear regression results are based on panel data from 5 private banks with 30 observations from 2011/12 to 2016/17. The model is, $L_{2it} = \beta_1 + \beta_2 NPL_{it} + \beta_3 ROA_{it} + \beta_4 CAR_{it} + \beta_5 lnBS_{it} + \beta_6 GDP_t + \beta_7 INF_t + \beta_8 TB_t + e_{it}$.

Models	Intercept	Regression coefficients of L2 and Private banks							Adj. R^2	S.E.	F
		NPL	ROA	CAR	BS	GDP	INF	TB			
1	3.16	-0.01							0.16	0.09	2.34
	(18.64)	(-1.14)									
2	3.09		-0.06						0.10	0.09	1.78
	(14.24)		(-1.22)								
3	0.19			0.07					0.40	0.06	43.02
	(10.70)			(6.55**)							
4	0.33				-0.01				0.26	0 .07	4.18
	(15.59)				(-2.93*)						
5	0.25					-0.12			0.27	0.08	4.54
	(5.94)					(-2.24*)					
6	0.18						0.12		0.23	0.07	4.30
	(3.92)						(2.14*)				
7	0.29							-0.02	0.10	0.09	.415
	(21.59)							(-0.64)			

Notes: T-values are represented by figures in parentheses. The asterisk (**) and (*) signs indicate that the results have 0.01 and 0.05 significance levels, respectively.

Table 10 illustrates the outcomes of a regression analysis examining the association between different independent variables and the L2 (liquid assets to total deposits) ratio in a bank. The beta coefficients for each variable indicate the direction and strength of their association with L2. The findings imply that the beta coefficient is positively significant for the CAR and INF, indicating that a rise in these variables leads to a higher L2 ratio. This finding is consistent with previous research conducted by Repullo (2004) and Singh and Sharma (2016), respectively. Further, the study finds a statistically significant negative relationship between L2 and nonperforming loans, bank size, return on assets, GDP, and Treasury bill rates. This implies that increasing these variables leads to a decreased L2 ratio. The findings align with previous research conducted by Umar and Sun (2016) for non-performing loans, Margolis and Walsh (2003) for return on assets, Abdullah and Khan (2012) for bank size, Ongore and Kusa (2013) for GDP, and Moore (2009) for treasury bill rate.

The regression results of Table 10 suggest that banks can increase their liquid assets to total deposits ratio by maintaining a higher capital adequacy ratio and being cautious of inflation. They should also closely monitor

nonperforming loans, bank size, return on assets, GDP, and treasury bill rates, as an increase in any of these variables could lead to a lower ratio of liquid assets to total deposits.

Conclusion

In this study, secondary data from 10 banks covering the period between 2011–12 and 2016–17 was used to assess the effects of bank-specific and macroeconomic variables on liquidity in Nepalese commercial banks. This study discovered that while nonperforming loans, bank size, return on assets, inflation, and Treasury bill rates had negative effects on these measures of liquidity, capital adequacy ratio, inflation, and gross domestic product had positive effects on L1 (liquid assets/total assets) and L2 (liquid assets/total deposits). These findings were consistent with other studies in the past. The study recommends that banks should maintain an adequate level of capital to ensure liquidity, carefully manage their loan portfolio to minimize non-performing loans, and consider macroeconomic factors when making decisions related to liquidity. The findings of this study can help Nepalese commercial banks in enhancing their liquidity management practices and contribute to the stability of Nepal's financial system as a whole.

Acknowledgement

This research was funded by the University Grants Commission with UGC Award Number: PhD-77/78-Mgmt-01; therefore, I would like to thank the University Grants Commission, Sanothimi, Bhaktapur.

References

Abdullah, A., & Khan, A. Q. (2012). Liquidity risk management: A comparative study between domestic and foreign banks in Pakistan. *Journal of Managerial Sciences, 6*(1), 61-72.

Acharya, V., & Naqvi, H. (2012). The seed of a crisis: A theory of bank liquidity risk. *Journal of Financial Economics, 106*(1), 349-366.

Aymen, M., Moussa, B., & Chedia, H. (2016). Determinants of bank lending: Case of Tunisia. *International Journal of Finance and Accounting, 5*(1), 26-37.

Baral, K. J. (2005). Health check-up of commercial bank in the framework of CAMEL: A case study of joint venture banks in Nepal. *Journal of Nepalese Business Studies, 2*(1), 41-55.

Benbouziane, M., & Benamar, A. (2008). On the liquidity effect in Algeria and Morocco. *European Journal of Business and Management,* 5(2), 232-240.

Bhandari, U., Yadav, S., Devkota, N., Paudel, U.R., Rajbhandari, S., & Karki, D. (2021). Private and public bank consumers' preference in Kathmandu Valley: Evidence from customers' satisfaction index. *International Research Journal of Science, Technology, Education, and Management*, *1*(1), 67-78. https://doi.org/10.5281/zenodo.5195755

Bonner, T. (2013). *Bank's liquidity buffer and the role of liquidity regulation*. DE Nederlandsche Bank.

Diamond, R., & Rajan, J. (2008). The procyclical effects of Bael II. *Centre for Economic Policy Research Discus*, 6862-6866.

Dinger, V. (2009). Do foreign-owned banks affect banking system liquidity risk? *Journal of Comparative Economics, 37*(6), 647-657.

Eljelly, A. M. (2004). Liquidity - Profitability trade-off: An empirical investigation in an emerging market. *International Journal of Commerce and Management, 14*(2), 48-61.

Fidrmuc, J. (2015). Does bank liquidity creation contribute to economic growth? Evidence from Russia. *BOFIT Discussion Papers*. 4-26.

Ghafoor, A. (2009). Comparison of Islamic and conventional banking in Pakistan. *Journal of Asia business studies, 23*(6), 1-36.

Iqbal, A. (2012). Liquidity risk management: A comparative study between conventional and Islamic of Pakistan. *Global Journal of Management and Business Research, 12*(5), 54-64.

Joshi, A. (2016). Idiosyncratic and macroeconomic determinants of liquidity: A case of Nepalese commercial bank. *Nepalese Journal of Business, 3*(3), 103-115.

Karki, D. (2018). Fundamentals of common stock pricing: evidence from commercial banks of Nepal. *SAARJ Journal on Banking & Insurance Research*, *7*(1), 4-32.

Karki, D., Upreti, S., Bhandari, U., Rajbhandari, S., Devkota, N., Parajuli, S., & Paudel, U. R. (2021). Does the formal financial sector enhance small business employment generation in Nepal: Evidence from cross-sectional data. *Journal of Social Economics Research, Conscientia Beam*, *8*(2), 155-164.

Kumar, M., & Yadav, G. C. (2013). Liquidity risk management in bank: A conceptual framework. *AIMA Journal of Management and Research, 7*(2), 2-12.

Malik, M. F., & Rafique, A. (2013). Commercial bank liquidity in Pakistan: Firm-specific and macroeconomic factors. *The Romanian Economic Journal, 35*(1), 139-154.

Moussa, M. A. (2015). The determinants of bank liquidity: Case of Tunisia. *International Journal of Economics and Financial Issues, 5*(1), 249-259.

Muriithi, J. W. (2010). The effect of non-performing loans on liquidity risk of commercial banks in Kenya. *Journal of Multinational Financial Management*, 12 (1), 159-169.

Nishanthini, A., & Meerajancy, J. (2015). Trade-Off between liquidity and profitability: A Comparative study between state bank and private banks in Sri Lanka. *Research Journal of Finance and Accounting, 5*(1), 20-35.

Olagunju, A., Adeyanju, O. D., & Olabode, O. S. (2011). Liquidity management and commercial bank' profitability in Nigeria. *Research Journal of Finance and Accounting, 2*(7), 2222-2847.

Ongore, V. O., & Kusa, G. B. (2013). Determinants of financial performance of commercial bank in Kenya. *International Journal of Economics and Financial Issues, 3*(1), 237-252.

Osuji, C. C., & Agbada, A. O. (2013). The efficacy of liquidity management and banking. *International Review of Management and Business Research, 2*(1), 01-11.

Repullo, R. (2004). Capital requirement, market power, and risk-taking in banking. *Journal of Financial Intermediation, 13*(1), 156-182.

Singh, A., & Sharma, A. K. (2016). An empirical analysis of macroeconomic and bank-specific factor affecting liquidity of Indian Bank. *Future Business Journal, 1*(1), 40-53.

Subedi, S., & Neupane, B. (2013). Determinants of bank liquidity and their impact on financial performance in Nepalese commercial bank.

Sudirman, S. N. (2014). Determinants of bank liquidity in Indonesia. *International Annual Symposium on Management*. 1-16.

Tesfaye, T. (2012). Determinants of Banks Liquidity and their Impact on Financial Performance: Empirical Study on Commercial Banks in Ethiopia. *The Department of Accounting and Finance*, 1-122.

Tseganesh, T. (2012). Determinants of bank liquidity and their impact on financial performance. *Journal of Finance, 58*(1), 33-73.

Umar, M., & Sun, G. (2016). Non-performing loans (NPLs), liquidity creation, and moral hazard: Case of Chinese banks. Journal of Economics and Finance, 3 (1), 258-277.

Vodova, P. (2011). Liquidity of Czech commercial bank and its determinants. *International Journal of Mathematical Models and Methods in Applied Sciences, 6*(3), 1060-1067.

Vtyurina, R, Bonner, C., & Lely, P. (2012). Determinants of Banks Liquidity Buffers in Central America; *working Paper*, available at: http://www.managementparadise.com/