Vietnam Journal of Agricultural Sciences

ISSN 2588-1299

VJAS 2024; 7(1): 2076-2084
https://doi.org/10.31817/vjas.2024.7.1.06

Determinants of Liquidity Risk in Vietnamese Commercial Banks

Nguyen Thi Huong* **& Dang Thi Hai Yen**

Faculty of Accounting and Business Management, Vietnam National University of Agriculture, Hanoi 131000, Vietnam

Abstract

Liquidity risk, which tends to compound other risks such as credit and market risks, has become one of the principal risks in banks. Thus, this study examined the determinants of liquidity risk measured by the loan deposit ratio (LDR). The sample included 30 commercial banks in Vietnam based on secondary data coverage from 2017-2021. Descriptive statistics were used to determine the general situation of the banks' assets, liabilities, and business performance. The random effects model (REM) was chosen to determine factors affecting liquidity risk. The results show the huge gap in the business performance of the four state-owned banks and the rest of the joint-stock commercial banks, and the state-owned banks always accounted for over 50% of the total credit, assets, and deposits of the whole banking system. The average banks' credit and profit growth rates were around 17% and 30%, respectively, and the bad debt ratio was about 2%. Increasing a bank's credit growth rate and profitability would push up its liquidity risk. On the other hand, holding several liquid securities that banks could sell immediately to meet solvency requirements and maintaining a high capital adequacy ratio (CAR) would reduce their liquidity risk. These findings are valuable to the banks in understanding how to minimize liquidity risk, such as controlling the credit growth rate and CAR, setting appropriate profit targets, and investing in liquid securities. Additionally, by conducting monetary policies, the State Bank should regulate market liquidity and bank liquidity for the safe operation of the financial system.

Keywords

Liquidity risk, credit, CAR, commercial banks, LDR

Introduction

Commercial banks are financial institutions that provide services such as loans, certificates of deposits, savings bank accounts, and bank overdrafts to their customers in which they use the deposits as capital for providing loans. As can be seen, the amount of deposits can change and sometimes be unpredictable; consequently, any change that affects the stability of deposits can directly impact a

Received: May 24, 2023
Accepted: March 15, 2024

Correspondence to
huongnt.vnua@gmail.com

bank's liquidity, which is the ability to pay bills and meet financial obligations when they come due. Liquidity is principal to banks because it ensures expected and unexpected fluctuations in their financial position while providing funds for their growth. A bank might lose liquidity if it experiences sudden unexpected cash outflows by way of large deposit withdrawals, large credit disbursements, unexpected market movements, or crystallization of contingent obligations. Other causes may be because of some outside event causing counterparties to avoid trading with or lending to the bank. A bank is also in a weak liquidity position if the markets on which it depends are subject to loss of liquidity. Liquidity risk occurs when a bank is unable to meet its financial obligations when they come due or is unable to do so at a reasonable cost. Liquidity risk causes banks to lose investment opportunities and affects their business performance, and also tends to compound other risks, such as credit risk and market risk. According to Zheng *et al.* (2016) and Fredrick *et al.* (2018), there are positive and significant relationships between liquidity risk and bank failure.

Previous studies have focused on the characteristics of banks and analyzed the factors affecting a bank's liquidity risk. For example, Nikolaou (2009), Bonfim & Kim (2012), and Alzoubi (2017) showed that more profitable banks tend to show higher liquidity risk. Majid (2003) discussed the importance of liquidity risk management as a key tool in protecting banks from failure and ensuring the stability of the financial system. The study also highlighted the importance of regulatory coordination between central banks and financial markets. Chen *et al.* (2010) showed that liquidity risk depends on current assets and external financing, and liquidity risk can reduce bank profitability. Iqbal (2012) pointed out that bad debts have a negative relationship with liquidity risk, while the capital adequacy ratio, profitability ratio on assets, return on equity, and size of the bank have a positive relationship with liquidity risk. In Vietnam, the study of the liquidity risk of banks was first conducted by Truong Quang Thong (2013) and then by Vu Thi Hong (2015), Nguyen Thi Tuyet Nga (2019), Phan Thi My Hanh & Tong Lam Vy (2019), and Nguyen Thi Bich Thuan & Pham Thi Anh Tuyet (2021), and most recently by Nguyen (2022). In these studies, the authors measured liquidity risk by the liquid assets to total assets ratio, liquid assets to deposits and short-term financing ratio, debt to total assets ratio, and loan to deposit ratio; and identified the factors affecting liquidity risk by the capital adequacy ratio (CAR), bank size, bad debt ratio, credit growth rate, profitability, equity ratio, foreign owner rate, inflation rate, gross domestic product (GDP), unemployment rate, and interbank market interest rate. However, the data used in these studies were from the past and did not cover the period of the COVID-19 pandemic when the economy and financial system were seriously affected.

Therefore, this study was conducted to determine the factors affecting the liquidity risk of commercial banks in Vietnam during the time frame of the COVID-19 pandemic. The research results will provide the scientific basis for commercial banks and the State Bank to propose appropriate policies to improve the efficiency and safety of the banking system.

Methodology

Data collection

Data were collected for the research period of 2017-2021, which included the time frame leading up to and including the COVID-19 pandemic. The data used in the study were secondary data from annual audited financial statements published on commercial banks' official websites, and regulations and guiding circulars of the State Bank on the capital adequacy ratio (CAR) and liquidity risk management in the banking system. Thirty commercial banks that were operating normally during the time frame were selected for the study.

Data analysis

Descriptive statistics were used to determine the general situation of the banks' assets, liabilities, and business performance. The data collected from the 30 commercial banks in the

period from 2017 to 2021 were panel data in which the behaviors of the entities (i) were observed across time (t): (X_{it}, Y_{it}), i=1,...,n; t=1,...T (Stock & Watson, 2007). To analyze panel data, one of the following three models is typically used: pooled ordinary least squares (OLS), fixed effects model (FEM), and random effects model (REM).

Pooled OLS is used for panel data to estimate the relationship between a dependent variable and one or more independent variables and assumes that such a relationship is the same for all individuals or entities in the panel. The regression model is: $Y_{it} = \alpha + \beta X_{it} + \mu it$; where, Y_{it} is the dependent variable of bank i in year t, X_{it} are the explanatory variables, β are the coefficients for X_{it}, and μit is the error term.

However, panel data deals with omitted variable bias due to heterogeneity in the data. It does this by controlling for variables that we cannot observe, are not available, and/or cannot be measured but are correlated with the dependent variables. Thus, it's reasonable to use the FEM or REM rather than pooled OLS. FEM assumes a correlation between the entity's error term and predictor variables, and an entity's fixed effects cannot be correlated with another entity's. Unlike FEM, REM assumes that the variation across entities is random and uncorrelated with the predictor or independent variables, which allows for time-invariant variables to play a role as explanatory variables. To determine the appropriate model for this research, three tests were conducted. First, to choose between pooled OLS or FEM, an F-Test was conducted. If Prob < 0.05, then FEM is more appropriate than OLS. Second, to choose between pooled OLS or REM, the Breusch-Pagan test was conducted. If Prob < 0.05, then REM is more appropriate than pooled OLS. Finally, to choose between pooled OLS or FEM, the Hausman test was conducted. If Prob < 0.05, then FEM is more appropriate than pooled OLS.

Liquidity risk

This study chose the loan to deposit ratio (LDR) to measure liquidity risk based on previous research by Bonfim & Kim (2012), Fredrick *et al.* (2018), and Circular 22/2019/TT-NHNN, which stipulates the limits and ratios to ensure safety in the operations of banks and foreign bank branches. Accordingly:

LDR ratio = Loans to customers / Total mobilized capital (including customer deposits + valuable papers - Deposits - Specialized capital deposits)

Typically, the higher the LDR, the greater the bank's profitability, but the trade-off is also a higher liquidity risk because credit is considered a minor liquid asset among the bank's profitable assets but is the main profitable asset.

There are many factors that can affect the liquidity risk of commercial banks. These factors affecting bank liquidity have been identified in previous studies by Bonfim & Kim (2012), Cucinelli (2013), Fatimah (2016), and Alzoubi (2017), and domestic studies by Truong Quang Thong (2013), Vu Thi Hong (2015), Nguyen Thi Tuyet Nga (2019), Phan Thi My Hanh & Tong Lam Vy (2019), Nguyen Thi Bich Thuan & Pham Thi Anh Tuyet (2021), and Nguyen (2022) are given in **Table 1**.

According to the above studies, several factors may impact the liquidity risk of commercial banks in Vietnam, including COVID-19, the bank's credit growth rate, return on assets (ROA) (%), CAR, bad debt ratio (%), profit after tax, the ratio of equity to total assets (%), the ratio of liquid securities to total assets, and the ratio of cash and cash equivalents to total assets.

Results and Discussion

General business performances of the commercial banks

During the COVID-19 pandemic, Vietnam faced significant slow economic growth, in which the GDP growth rates decreased from 7.4% in 2019 to 2.9% in 2020 and to 2.6% in 2021 (World Bank, 2022). Some industries were frozen, such as aviation and tourism, but others had great development opportunities, such as e-commerce. As such, the impact of the pandemic on bank performance, which is linked with all industries in the economy, was more unpredictable. Bank performance needed to be assessed based on some basic indicators, such as assets, deposits, credit, profit, bad debt, and CAR.

Table 1. Summary of previous studies on factors affecting bank liquidity

Factors affecting bank liquidity	Alzoubi (2017)	Fatimah (2016)	Cucinelli (2013)	Bonfim & Kim (2012)	Nguyen (2022)	Nguyen Thi Bich Thuan & Pham Thi Anh Tuyet (2021)	Phan Thi My Hanh & Tong Lam Vy (2019	Nguyen Thi Tuyet Nga (2019)	Vu Thi Hong (2015)	Truong Quang Thong (2013)
Cash ratio	-									
Security ratio	-					-	-			
Bank size	+/-	+	-	-	-	-	+	-		+
ROA/ROE	+	+		+	-		-	-	+	
Equity ratio	-								+	
Bad debt	+								-	
Cost to income			+	+/-						
Capital			-	+/-						
CAR		-								
GDP		-			+			-		+
Inflation		+			+					+
Financial crisis			+							
Credit growth rate	+				+	+				+

Note: (+): positive impact; (-): Negative impact; (+/-): Maybe positive/ negative impact. 0: No significant impact.

As of September 30, 2022, there were 35 commercial banks in Vietnam, of which 30 domestic banks were operating normally. Of the five banks not operating normally, the State Bank took special control over two of them, while it owned three commercial banks for restructuring purposes. Among the 30 domestic banks, four were State-owned commercial banks, which included one State-owned commercial bank, namely Agribank, and three joint-stock commercial banks in which state-owned accounts accounted for more than 70%, namely BIDV, Vietinbank, and Vietcombank. There were significant gaps in assets, customer deposits, and credit between State-owned banks and other joint stock banks. On average, the commercial banks' assets grew at a rate of approximately 12%, customer deposits grew at 22%, and the average credit growth rate was 16.63%. The general information of the banks is shown in **Table 2**.

For instance, **Figure 1** shows the banks assets in 2021, the total assets of the 30 commercial banks reached VND 12,869 trillion, of which, the total assets of the four state-owned banks reached VND 6.4 trillion, accounting for nearly 50% of the total assets of the 30 banks. The four state-owned banks had a significant impact on the financial system and the economy compared to the other banks. At the end of 2021, BIDV was the largest bank, with total assets of VND 1,761 trillion; meanwhile, the smallest bank was SGB, with total assets of VND 24.6 trillion, only 1.39% of the largest bank.

Deposits were more affected by the pandemic in 2020. Table 2 shows that the number of deposits in 2020 sharply decreased compared to the other years in the study. The reason for this observation could be due to the interest rate decreasing in 2020, leading customers to invest in the securities market and real estate market to find higher profitability instead of depositing their money in banks.

Credit growth is significant for bank development. Prior to the pandemic, the credit

Table 2. General information on banks

Unit: Billion VND

Year	2017	2018	2019	2020	2021
Assets					
Total assets of 30 banks	8,068,163	8,889,602	10,073,361	11,192,741	12,869,459
Four state-owned banks	4,485,542	4,833,947	5,405,863	5,752,479	6,403,888
Average	268,938	296,320	335,778	373,091	428,981
Max	1,202,283	1,313,037	1,489,957	1,568,126	1,761,695
Min	21,319	20,373	22,812	23,942	24,608
Deposits					
Total deposits of 30 banks	5,766,238	6,449,522	7,368,363	4,696,642	9,218,226
Average	192,207	214,984,	245,612	173,949	307,274
Max	1,007,694	1,103,606	1,269,373	990,331	1,542,504
Min	14,849	14,678	22,812	18,223	18,105
Credit					
Total credit of 30 banks	5,199,233	5,963,374	6,863,076	7,718,278	8,787,785
Average	173,307	198,845	228,769	257,275	292,926
Max	876,237	1,004,571	1,121,900	1,214,295	1,354,632
Min	14,105	13,671	14,556	15,447	16,502

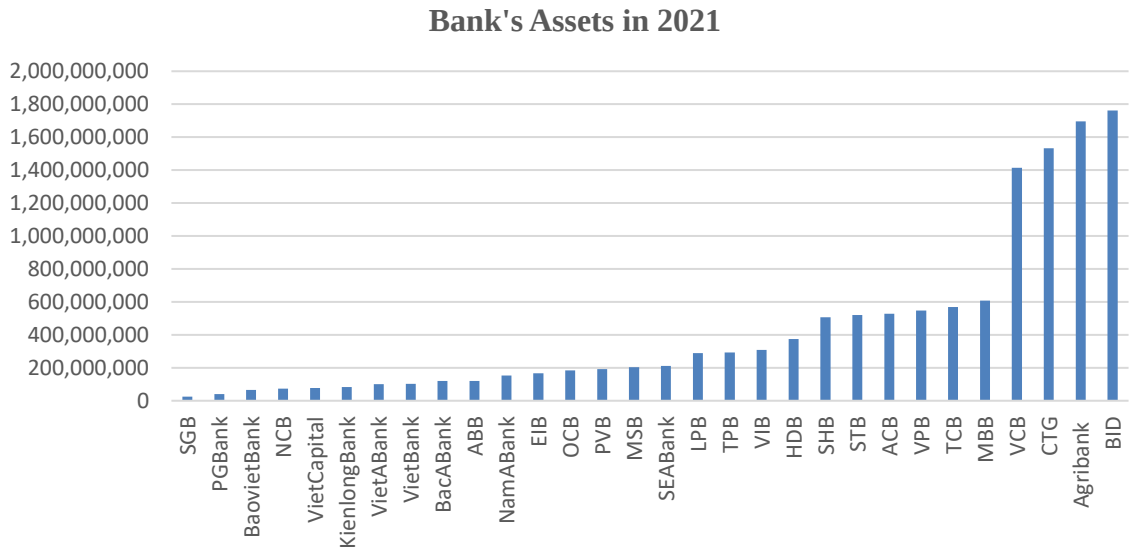

Figure 1. Assets of commercial banks in 2021

growth rate was at an average of 16.63% per year, with NamABank having the highest rate at 53% in 2017. However, in 2020-2021, anti-epidemic policies such as social distancing and lockdowns affected not only the economy but also the psychology of enterprises and households. Many enterprises suffered losses, suspended operations, or closed, and laborers and households lost jobs and income, which led to the decrease in the credit growth rate in such years.

Besides credit growth, banks must pay attention to controlling bad debt because it has negative consequences such as reducing capital, losing profitable opportunities, and pushing the

bank into a bankrupt situation. From 2017-2021, the bad debt rate was controlled at 2%, and only STB had a high bad debt rate of 13.23% in 2018.

The profit of banks in 2021 can be seen in **Figure 2**. The profits of banks increased sharply with the average profits increasing by 30% per year. In 2021, some banks had huge profits of over VND 10 trillion, namely Vietcombank- VCB (VND 21 trillion), BIDV- BID (VND 10 trillion), Vietinbank- CTG (VND 14 trillion), Techcombank- TCB (VND 18 trillion), Agribank (VND 12 trillion), and VPBank- VPB (VND 11 trillion). The bad debt rate was controlled at an average of 2%.

To protect depositors as well as the safety of the financial system, the State Bank is responsible for monitoring the CAR, which is essential for controlling the financial position and reliability of a bank. The average CAR was at 10.94%, higher than the required CAR of 8%, and SGB had the highest CAR in the system with a value of 17.34% in 2021.

Factors affecting the liquidity risk of commercial banks in Vietnam

Numerous variables can impact the liquidity risk of a commercial bank, including both internal factors such as business performance, investments, reserves, and bad debt, as well as macro factors like inflation, the GDP, and exchange rates. Based on previous research outlined in the methods section, the chosen factors for analysis in the regression model are presented in **Table 3**. The correlation matrix test showed that there was no multicollinearity among variables. **Table 4** gives the results of the pooled OLS, fixed effects model, and random effects model regression analyses.

According to the results of the F-test, Breusch-Pagan test, and Hausman test, the REM was sufficient to explain the factors affecting the liquidity risk of commercial banks in Vietnam.

The bad debt rate has a positive and significant impact on liquidity risk. When customers fail to pay their debts, the bank can fail to collect debts in time to pay for large deposit withdrawals and financial obligations with due dates, consequently increasing the bank's liquidity risk. Alzoubi (2017) also indicated that bad debt not only eroded capital and reduced profits, but also reduced the financial capacity of banks. In contrast, Vu Thi Hong (2015) showed that if a bank's bad debt increased, the bank's liquidity also increased and the liquidity risk decreased. She explained that if bad debt increased, banks tended to raise more liquid assets to meet short-term payment demands.

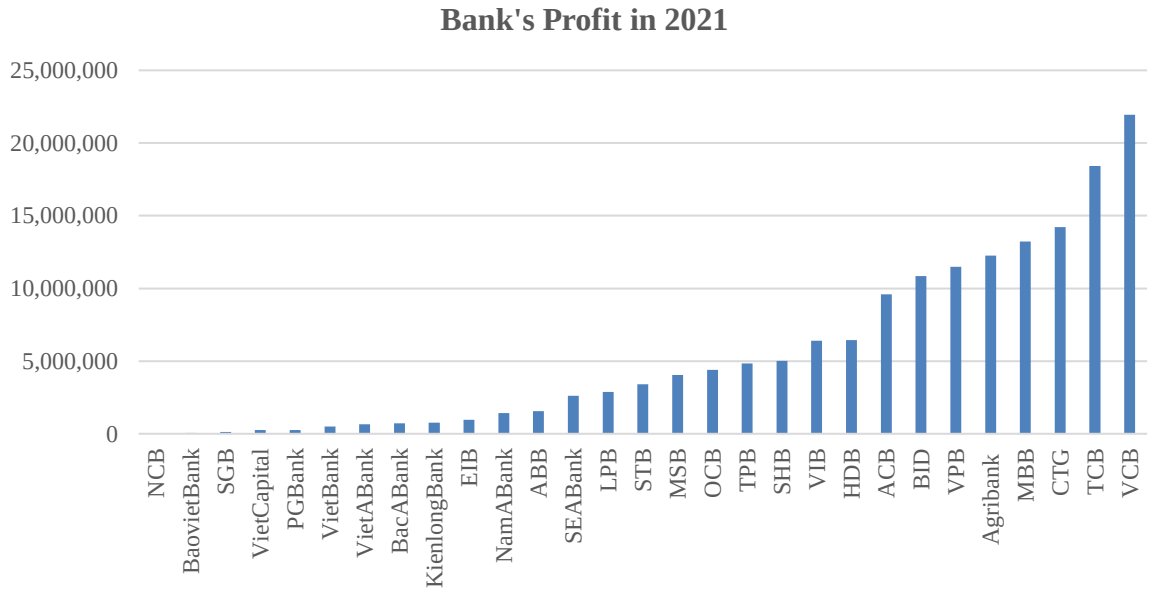

Figure 2. Profits of commercial banks in 2021

Table 3. Description of variables

Variables	Description	Variable type	Unit	Average	Min	Max
Dependent variable						
LDR	Liquidity ratio	continuous	%	0.92	0.56	1.47
Independent variables						
Covid	Year of Covid-19 pandemic	Dummy; 0: no covid 1: have covid			0	1
Loan_rate	Credit growth rate	continuous	%	16.63	-11.02	53.68
ROA	Profitability of assets	continuous	%	0.89	0.00	3.23
CAR	Capital adequacy ratio	continuous	%	10.94	8.39	17.34
Bad_rate	Bad credit rate	continuous	%	2.10	0.03	13.23
Profit	Profit after tax	continuous	trillion VND	3,489.72	90.71	21,939.04
Equity_ratio	Ratio of equity/ total assets	continuous	(%)	0.08	0.04	0.17
Sec_ratio	Ratio of liquid securities/ total assets	continuous	(%)	0.13	0.00	0.33
Cash_ratio	Ratio of cash/ total assets	continuous	(%)	0.01	0.02	0.07

Table 4. Results of the pooled OLS, FEM, and REM analyses

Variables	Pooled OLS	FEM	REM
Covid	-0.001	-0.012	-0.008
Loan_rate	0.003***	0.002***	0.003***
ROA	0.109***	0.096***	0.100***
CAR	0.000	-0.001**	-0.001**
Bad_rate	0.003	1.730***	1.308**
Profit	0.000	0.000	0.000
Equity_ratio	0.037	-0.004	-0.003
Sec_ratio	-0.300**	-0.640**	-0.462**
Cash_ratio	-1.680	-1.180	-1.404
_cons	0.797	0.770	0.778

*Note: *** and ** denote significance at the 1% and 5% confidence levels, respectively.*

Banks tended to focus on handling bad debt through debt recovery, mortgage assets, and setting up risk provisions rather than increasing liquid assets.

Credit is the main priority in banks and most of a bank's profits come from lending out money to their clients. The main source of credit comes from savings deposits that can change and lead to uncertainty. By extending credit, banks risk having uncontrollable credit quality and massive deposit withdrawals. Thus, the bank's liquidity risk would be pushed up. These results are consistent with previous studies by Truong Quang Thong (2013), Alzoubi (2017), Nguyen Thi Bich Thuan & Pham Thi Anh Tuyet (2021), and Nguyen (2022).

The ratio of securities has a strong and negative impact on liquidity risk, meaning that holding many liquid securities reduces liquidity risk. Securities include stocks, bonds, treasury bills, and valuable papers that could be converted into cash quickly without losing a substantial amount of their value. They can be bought and sold instantly to meet financial obligations or used as pledged assets to borrow additional capital from the State bank. This was reported by

Alzoubi (2017), Phan Thi My Hanh & Tong Lam Vy (2019), and Nguyen Thi Bich Thuan & Pham Thi Anh Tuyet (2021).

Additionally, the CAR reveals a negative impact on liquidity risk, meaning that an increase in a bank's CAR is associated with a decrease in its liquidity risk. The CAR is one of the important criteria when assessing a bank's operations and risk management. The CAR reflects the bank's ability to meet term liabilities and other risks such as its liquidity risk, credit risk, market risk, and operational risk. Therefore, in many countries, the Central Bank always determines and requires banks to maintain a minimum CAR. In Vietnam, the CAR is calculated according to the Basel II international standards and is set at a minimum of 8%. Fatimah (2016) and the conclusions of the Reserve Bank of New Zealand (2007) also pointed out that the higher CAR a bank had, the smaller liquidity risk could be observed.

Bank profitability (ROA) is one of the important indicators to evaluate a bank's operations. Pursuing profit also means facing different kinds of risks. Many previous studies have found that increasing profitability can reduce liquidity risk (Phan Thi My Hanh & Tong Lam Vy, 2019; Nguyen Thi Tuyet Nga, 2019; Nguyen, 2022). However, this study found the opposite result in which higher profitability led to higher liquidity risk. This can be explained in that as a bank's profitable asset portfolio expanded, the more liquid but low-return assets shrank, and thus more profits were earned but the liquidity risk increased. This result is also consistent with those of Demirgüç-Kunt & Huizinga (2010), Bonfim & Kim (2012), Vu Thi Hong (2015), and Alzoubi (2017). Research by the European Central Bank also suggests that in banks, the higher the profitability, the greater the liquidity risk (Nikolaou, 2009).

Recommendations and Policy Implications

All financial decisions of commercial banks must balance between risks and benefits. To avoid bank liquidity stress, some recommendations and policy implications can be made based on the results of this research.

Commercial banks recommendations

Managing bad debt and increasing the quality of credit is essential to ensure the safety of banking operations. Banks must coordinate with borrowers to restructure debt; extend the debt repayment time; strengthen provisioning and debt recovery according to regulations; compile regulations on lending and credit limits; and compile and improve credit appraisal quality not only at the loan appraisal and approval stages, but also in the credit granting process.

Securities investment and trading activities play an important role for banks to support their liquidity position, diversify their investment portfolios, and improve their profits. Thus, is necessary for banks to improve their efficiency of security management to achieve their set objectives.

The CAR ensures efficiency and stability by reducing the risk of bank insolvency. In general, a bank with a high CAR is considered safer and more capable of meeting its financial obligations. Thus, calculating and maintaining sufficient CAR is mandatory and essential to banks.

There is a tradeoff between risk and return, and to pursue profits, the bank must maintain a balance between the required liquidity and the desire for profitability. This means banks should diversify their investment portfolio to earn profits and at the same time hold onto liquid assets to ensure solvency.

Policy implications

The State Bank plays a crucial role in ensuring economic and financial stability. Along with supporting liquidity in critical financial markets and maintaining credit flow, the State Bank must control the credit growth rate in each period and ensure the banks' CAR following regulations. Also, the State Bank must closely monitor bank operations to ensure the entire financial system is operating efficiently.

Conclusions

In general, from 2017 to 2021, banks had an average assets growth rate of about 12%, the customer deposit growth rate was 22%, the credit growth rate was an average of 16.63% per year,

the average annual growth rate of profits was 30% was year, the bad debt rate was controlled at 2%, and the average CAR was 10.94%.

Based on the results of the REM model, five factors were found to have a significant impact on liquidity risk in Vietnamese commercial banks, namely: (i) when a bank fails to collect debts in time to pay for large deposit withdrawals and due-date financial obligations it results in increasing its liquidity risk; (ii) lending out to clients is important to get more profit but extending credit pushes up the liquidity risk; (iii) holding more securities that could be bought and sold instantly to meet financial obligations reduces the liquidity risk; (iv) maintaining the minimum CAR is a mandatory requirement as increasing the CAR is linked with a lower liquidity risk; and (v) profitability is important and necessary to maintain the existence and development of banks, but by raising profitability, banks could face a higher liquidity risk.

References

Alzoubi T. (2017). Determinants of liquidity risk in Islamic banks. Banks and Bank Systems. 12(3). DOI: 10.21511/bbs.12(3).2017.10.

Bonfim D. & Kim M. (2012). Liquidity risk in banking: is there herding? Retrieved from https://www.eba.europa.eu/sites/default/documents/files/documents/10180/598223/94d7a979-4a5c-4e51-a85a-70a79b948c8b/Bonfim-and-Kim.pdf?retry=1 on December 10, 2022.

Chen Y., Shen C., Kao L. & Yeh C. (2010). Bank liquidity risk and performance Review of Pacific Basin Financial Markets and Policies 21(1):1850007(40). DOI: 10.1142/S0219091518500078.

Cucinelli D. (2013). The Determinants of Bank Liquidity Risk within the Context of Euro Area. Interdisciplinary Journal of Research in Business. 2(10): 51-64.

Demirgüç-Kunt A. & Huizinga H. (2010). Bank activity and funding strategies: The impact on risk and returns. Journal of Financial Economics. 98: 626-650.

Fatimah S. (2016). The Determinants of Liquidity Risk: A Panel Study of Islamic Banks in Malaysia. Journal of Contemporary Issues and Thought. 6: 73-82.

Fredrick O., Jeremiah O. & Onsomu Z. (2018). The Relationship between Liquidity Risk and Failure of Commercial Banks in Kenya. Universal Journal of Accounting and Finance. 6(1): 7-13.

Stock J. H. & Watson M. W. (2007). Introduction to econometrics (2nd ed.) Boston: Pearson Addison Wesley.

Majid A. (2003). Development of Liquidity Management Instruments: Challenges and Opportunities. Proceedings from International Conference on Islamic Banking: Risk Management, Regulation and Supervision. Jakarta, Indonesia. Retrieved from https://www.sbp.org.pk/departments/ibd/Lecture_6_LIQUIDITY_MANAGEMENT.pdf on December 10, 2022.

Nikolaou K. (2009). Liquidity risk concepts definitions and interactions. Working paper series No. 1008. European Central Bank. Retrieved from https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1008.pdf on December 10, 2022.

Nguyen H. C. (2022). Factors Affecting Liquidity Risks of Joint Stock Commercial Banks in Vietnam, The Journal of Asian Finance, Economics and Business. 9(4): 197-212.

Nguyen Thi Bich Thuan & Pham Thi Anh Tuyet (2021). Factors affecting liquidity risk at Vietnamese commercial banks. Retrieved from https://tapchitaichinh.vn/nhan-to-anh-huong-den-rui-ro-thanh-khoan-tai-cac-ngan-hang-thuong-mai-viet-nam.html on December 10, 2022 (in Vietnamese).

Nguyen Thi Tuyet Nga (2019). Factors affecting liquidity at Vietnamese commercial banks. Financial Journal. 1. Retrieved from https://tapchitaichinh.vn/nhung-yeu-to-tac-dong-den-thanh-khoan-tai-cac-ngan-hang-thuong-mai-viet-nam.html on August 22, 2023 (in Vietnamese).

Phan Thi My Hanh & Tong Lam Vy (2019). Factors affecting liquidity risk of Vietnam's commercial banking system. Financial Research Journal - Marketing. 51. Retrieved from https://jfm.ufm.edu.vn/index.php/jfm/article/view/116/74 on August 22, 2023. (in Vietnamese).

Reserve Bank of New Zealand (2007). Capital adequacy ratios for banks - simplified explanation and example of calculation. Retrieved from http://people.stern.nyu.edu/igiddy/articles/capital_adequacy_calculation.pdf on September 3, 2023.

Truong Quang Thong (2013). Factors affecting liquidity risk of Vietnam's commercial banking system. Economic Development Journal. 276: 50-62 (in Vietnamese).

Vu Thi Hong (2015). Factors affecting the liquidity of Vietnamese commercial banks. Journal of Development and Integration. 23(33): 32-49 (in Vietnamese).

Zheng C., Cheung A. & Cronje T. (2016). Bank Liquidity, Bank Failure Risk, and Bank Size. Retrieved from https://acfr.aut.ac.nz/__data/assets/pdf_file/0019/57115/Chen-Zheng-Curtin-University.pdf on December 14, 2022.

World Bank (2022). GDP Growth (annual %) - Vietnam. Retrieved from https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=VN on August 22, 2023.