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Factors Affecting Liquidity Risk of Vietnamese Commercial Banks

MSc. Hoang Anh Thu, PhD. Nguyen Thi Thu Trang, Nguyen Phung Quoc Dung, Nguyen Vu Duc Huy, Mai Quoc Thinh, Van Hai Nam, Huynh Ky
Ho Chi Minh City University of Banking

Abstract: This study analyzes the factors affecting the liquidity risk of commercial banks in Vietnam during the period 2015-2024. Multiple regression models were used to analyze the impact of these factors. Stata software was used to measure the models using three main estimation methods: ordinary least squares (OLS), fixed effects model (FEM), and random effects model (REM). The research results indicate that factors including capital structure (ETA), loan-to-asset ratio (TLA), inflation (INF), and return on equity (ROE) positively influence the liquidity risk of 28 commercial banks during the study period. Based on the research results, the author also proposes several policy implications to mitigate the liquidity risk of commercial banks in Vietnam.

Keywords: Liquidity, liquidity risk, commercial banks, funding gap, Vietnamese commercial banks.

1. Introduction

Liquidity risk is the most dangerous type of risk for banks, threatening the safety of both the bank and the entire system. Despite abundant liquidity, the entire commercial banking sector was characterized by significant instability in 2017. However, this phenomenon mainly occurred in large banking institutions with the capacity to repurchase capital. Notably, following the amendment to the Law on Credit Institutions allowing for insolvency, consumers tended to deposit money in state-owned commercial banks or reputable joint-stock banks.

Liquidity risk is widely recognized as a fundamental risk, possessing the potential to spread and instigate systemic crises. Despite numerous international studies, the unique context, operational characteristics, and structure of Vietnamese banks differ significantly, thus making the application of foreign models or research findings less applicable.

In Vietnam, most modern research tends to remain at the descriptive or qualitative testing level, with a notable scarcity of comprehensive quantitative analyses related to liquidity risk determinants, especially within the framework of the developing banking system adapting to Basel III standards.

Previous academic investigations have primarily focused on credit risk, operational risk, or market risk, while liquidity risk, characterized by its profound spillover effects throughout the financial system, has remained largely unexamined. This lack of oversight creates a significant gap in the field of banking risk management in Vietnam.

In the context of the State Bank of Vietnam's strict enforcement of regulations related to liquidity adequacy ratios and its gradual alignment with the Basel III framework, a thorough examination of the determinants affecting liquidity risk is not only of significant practical relevance but also makes notable academic contributions to enhancing, scrutinizing, and adjusting existing theoretical models accordingly.

2. Theoretical Basis and Research Overview

2.1 Theory risk ro bar amount

Liquidity risk is the inability of a financial institution to meet its obligations to customers, or due to other subjective factors leading to adverse consequences, ultimately resulting in a prolonged state of reduced liquidity for the institution. As Rudolf Duttweiler clearly stated, liquidity relates to the ability of banks to meet their payment obligations when they mature; failure to meet those obligations constitutes the fundamental cause of liquidity shortages. Liquidity includes the institution's ability to efficiently and promptly settle its financial obligations arising in the course of conducting business, including disbursing deposits, making loans, payments, and other financial transactions.

According to the Basel Committee on Banking Supervision (1997), RRTK represents the risk that occurs when a financial institution is unable to increase its asset reserves or meet its debt obligations at minimum cost.

The importance of liquidity extends beyond individual financial institutions, as a lack of liquidity in banks can have consequences affecting the entire financial system (CBK, 2009). It is argued that when financial institutions maintain high levels of liquidity, they forgo the potential opportunity costs associated with specific investments that could yield significant returns (Kamau, 2009). This is a trade-off between profit and liquidity risk. Banks lend long-term at higher interest rates, but the money is tied up for a long time and difficult to

withdraw immediately. Holding short-term assets is easier to liquidate, but yields lower returns. Levine (1998) also asserts that, "although more liquid assets enhance the ability to generate cash in the short term, they simultaneously impair management's ability to remain committed to an investment strategy that protects investors," ultimately, this can culminate in a reduction of the company's "ability to raise external capital" in certain circumstances (Uzhegova, 2010).

Ndung'u and Ngugi (2000), as cited by Kamau (2009), argue that the liquidity challenges encountered are due to restrictions imposed on commercial banks within the discount window, combined with the limited capacity of the interbank market, high reserve requirements, and a clear preference for government securities.

2.2 Overview of the study

Nguyen Thanh Dat's study, "The Influence of Factors on Liquidity Risk of Vietnamese Commercial Banks," presents an empirical study indicating that an increase in total asset size correlates with a decrease in liquidity risk, while the return on equity (ROI) and TLA (Total Liquidity Risk) have an inverse relationship with the liquidity risk of banks.

The study "Factors Affecting Liquidity Risk of the Vietnamese Commercial Banking System" by Phan Thi My Hanh and Tong Lam Vy (2019) found that bank size has an inverse relationship with liquidity risk; as size increases, liquidity risk decreases. Conversely, an increase in factors related to the equity-to-total capital ratio, TLA, and return on equity ratio correlates with an increase in liquidity risk. Furthermore, reliance on external financing exacerbates liquidity risk. The investigation also highlighted macroeconomic determinants, such as the rate of economic expansion and the occurrence of financial crises, which have a favorable impact on liquidity risk.

The study by Nguyen Kim Chi et al. (2023) "The Impact of Credit Growth Rate on Liquidity Risk: The Case of Vietnamese Commercial Banks" analyzed empirical data obtained from the annual reports and financial disclosures of 27 commercial banks in Vietnam from 2010 to 2021. The results indicate that credit growth rate uniformly impacts the liquidity risk faced by Vietnamese commercial banks. Control variables, including return on equity and equity ratio, also have a similar influence on liquidity risk. In addition, certain variables, such as bank size and profit relative to total assets, clearly have a negative impact on liquidity risk.

Moussa, Mohamed Aymen Ben (2015) conducted a study titled "Determinants of Bank Liquidity: The Case of Tunisia." The study results indicated that the efficiency of financial capital variables relative to total assets, operating expenditures relative to total assets, GDP growth rate, inflation rate, and liquidity stress affect the liquidity of banking institutions. The study showed no statistically significant impact of size, total loan balances relative to total assets, financial costs relative to total credit, and deposits relative to total assets on bank liquidity.

3. Research Model

The study collected data from the financial reports of 28 banks and gathered data on GDP growth and inflation rates from word banks for the period 2015-2024. This resulted in 280 observed samples with balanced table data.

A comprehensive analysis of customs clearance data was conducted using Stata 17 software. Three main estimation methods were used: OLS (Ordinary Least Squares), FEM (Fixed Effects Model), and REM (Random Effects Model). Necessary tests were performed to determine the most suitable model among the three, and potential variance and autocorrelation issues were investigated and addressed by applying the generalized least squares (GLS) model where applicable.

Based on the above theoretical foundations, the authors propose the following model of factors influencing the risk-reward ratio of Vietnamese commercial banks:

$$FGAP_{it} = \beta_0 + \beta_1 * ETA_{it} + \beta_2 * TLA_{it} + \beta_3 * INF_t + \beta_4 * GDPG_t + \beta_5 * ROE_{it} + \beta_6 * SIZE_{it} + \mu_{it}$$

In there:

Dependent variable: FGAP is the funding gap representing liquidity risk, measured by the following formula:

$$FGAP = \frac{(\text{Loan} - \text{Deposit})}{\text{Total asset}}$$

The independent variables include: ETA, which is capital structure, measured by the following formula:

$$ETA = \frac{\text{Equity}}{\text{Total asset}}$$

TLA is the loan-to-asset ratio, measured using the following formula:

$$TLA = \frac{\text{Loans}}{\text{Total asset}}$$

INF is the inflation rate, measured by the Consumer Price Index (CPI) using the following formula:

$$INF = \frac{\text{CPIi}}{CPI0} * 100$$

GDPG is the GDP growth rate, measured as follows:

$$GDPG = \frac{(\text{CGDP i} - \text{GDP 0})}{\text{GDP 0}} * 100$$

ROE is the return on equity, measured by the following formula:

$$ROE = \frac{\text{Net income}}{\text{Equity}}$$

SIZE indicates the scale of the bank:

$$SIZE = \text{Ln}(\text{Total asset})$$

With i and t representing commercial banks and a 1-year randomized survey, β0 is the intercept coefficient, β1–6 βare the slope coefficients of the independent factors, and μit is the residual of the statistical data.

Research hypothesis

ETA is determined by the ratio of a financial institution's own capital to its total capital. A higher ETA indicates increased solvency for the bank, thus minimizing associated liquidity risk. According to Vodová (2013a), ETA has an inverse relationship with liquidity risk.
H1: Expect an inverse relationship between ETA and liquidity risk.

The total loan-to-asset ratio (TLA) is the ratio of loans to total assets held by a financial institution. A high TLA indicates decreased liquidity in the bank, thereby escalating the liquidity risk (RRTK) that the institution faces. Research conducted by Vodová (2011) suggests that the correlation between TLA and liquidity risk is characterized by an inverse relationship.
H2: Expect an inverse relationship between TLA and liquidity risk.

Perry's (1992) investigation highlighted the link between liquidity and bank performance depending on prevailing expectations of inflation. In scenarios where inflation is predicted with certainty, financial institutions are likely to revise interest rates, thus increasing revenue at a rate exceeding the rate of increase in costs. Furthermore, banks can increase their lending, however, existing competitive pressures in the market may lead to a contraction in fundraising efforts, thus increasing liquidity risk. The study by Truong Quang Thong and Pham Minh Tien (2014) found a positive correlation between inflation and liquidity risk.
H3: Expect a positive correlation between inflation and liquidity risk.

Forward-looking studies, such as those conducted by Choon et al. (2013), Sudirman (2015), Moussa (2015), and Vodova (2013), have demonstrated that during periods of economic expansion, financial institutions often underestimate the inherent risks in their economic choices. They tend to engage in riskier behaviors such as loosening lending criteria, expanding asset portfolios in pursuit of higher returns, leading to a reduction in liquidity reserves and an escalation of risky liquidity.
H4: Expect a positive correlation between economic growth rate and liquidity risk.

Banks often tend to increase lending activities to boost profits, which also means facing more liquidity risks. Anjum Iqbal's (2012) study of banks in Pakistan from 2007 to 2010 found a positive correlation between ROE and bank liquidity risk.
H5: Expect a positive correlation between ROE and liquidity risk.

The size of a banking institution is denoted as a ratio representing the gross load of a commercial bank in its first year. The quantification of bank size is derived from the natural logarithm of total assets. Investigations conducted by Lucchetta (2007) and Belaid et al. (2016) have identified a negative relationship between cargo handling bank size and liquidity, implying that significant cargo expansion in ports may act as a deterrent to the utilization of expanded port facilities.
H6: Expect an inverse relationship between bank size and liquidity risk.

Table 1: Description of variables and expectations

Variable	Variable name	Describe	Previous studies	Expected
Dependent variable	FGAP	Funding gap	Phan Thi My Hanh and Tong Lam Vy (2019).	
Independent variable	ETA	Capital structure	Tran Thi Thanh Nga and Tram Thi Xuan Huong (2018).	But
	TLA	Loan-to-total assets ratio	Nguyen Thanh Dat (2019).	But
	ROE	Return on equity		+
	INF	Inflation rate	Phan Thi My Hanh and Tong Lam Vy (2019).	+
	GDPG	Economic growth rate		+
	SIZE	Bank size		But

Source: Compiled by the authors

4. Research results

Description of research data

This study utilizes secondary datasets collected from 28 commercial banks over a 10-year period from 2015 to 2024. The panel data includes 280 observations with 7 variables in the model.

Table 2: Descriptive Statistics

Planet	Obs	Mean	Std. dev.	Min	Max
FGAP	280	-0.08275	0.110381	-0.38567	0.192565
ETA	280	0.085239	0.030929	0.040618	0.220297
TLA	280	0.591293	0.101722	0.220052	0.78806
INF	280	2.82413	0.890209	0.631201	3,621093
GDPG	280	6,155448	1,908482	2,553729	8.5375
ROE	280	10.87943	8.052431	-12.33	30,33
SIZE	280	18.91291	1,115081	16,577	21,55655

Source: Compiled results from Stata 17 software

FGAP represents the RRTK of commercial banks, with a mean of -0.08275, a highest value of 0.192565, and a lowest value of -0.38567. The standard deviation is 0.110381, indicating that the FGAP variable has small variability.

The independent variables have the smallest standard deviation of 0.030929 for ETA and the largest of 8.052431 for ROE. The highest standard deviation of ROE at 8.052431 indicates significant variability. GDPG and SIZE also have relatively high standard deviations of 1.908482 and 1.115081 respectively, suggesting significant variability for these two variables. The independent variables ETA, TLA, and INF have small standard deviations of 0.030929, 0.101722, and 0.890209 respectively, indicating minimal variability for these three variables.

Analyzing the correlation matrix between variables

Table 3: Correlation matrix results

	FGAP	ETA	TLA	INF	GDPG	ROE	SIZE
FGAP	1						
ETA	0.2129	1					
TLA	0.5505	0.0172	1				
INF	0.2596	-0.0802	0.252	1			
GDPG	-0.0748	0.0333	-0.1217	0.1695	1		
ROE	0.5482	-0.0052	0.3649	0.1446	-0.1073	1	
SIZE	0.2824	-0.2895	0.3641	0.1755	-0.0682	0.6287	

Source: Compiled results from Stata 17 software

Table 3 shows that all factors have a positive correlation with the dependent variable FGAP, TLA has the strongest correlation with FGAP, and ETA has the weakest correlation.

Check for multicollinearity issues – VIF

Table 4: Multicollinearity test results

Planet	VIF	1/VIF
SIZE	2	0.49893
ROE	1.81	0.552085
TLA	1.28	0.778339
ETA	1.18	0.849741
INF	1.13	0.881319
GDPG	1.07	0.932722
Mean VIF	1.41	

Source: Compiled results from Stata 17 software

The study examined multicollinearity through the Variance Inflation Factor (VIF). The results in the table show that the VIF coefficient ranges from 1.07 to 2, so there is no multicollinearity between the independent variables in the regression model.

Regression results according to Ols, Fem, Rem models

Table 5: Modeling results of the models

	OLS	**FEM**	**REM**	**GLS**
ETA	0.661***	0.883***	0.943***	0.533**
	-4.02	-5.07	-5.65	-2.7
TLA	0.420***	0.623***	0.575***	0.411***
	-8.03	-8.75	-8.75	-8.01
INF	0.0166**	0.00213	0.00796	0.00883***
	-2.96	-0.48	-1.85	-3.35
GDPG	-0.000878	0.00228	0.000961	0.000774
	(-0.35)	-1.27	-0.54	-0.79
ROE	0.00634***	0.00332***	0.00415***	0.00435***
	-8.1	-4.22	-5.47	-6.62
SIZE	-0.0119*	0.0428***	0.0206*	0.00987
	(-2.00)	-4.06	-2.41	-1.51
_CONS	-0.273*	-1,392***	-0.965***	-0.626***
	(-2.44)	(-7.37)	(-6.25)	(-5.08)
N	280	280	280	280
White test	0.0355			
F test	0.0000			
Hausman inspection	0.0000			

WOOLDRIDGE testing	0.0000
Wood testing	0.0000

Source: Compiled results from Stata 17 software

The study performed OLS regression followed by the White test, which yielded a p-value <0.05, indicating that the Rem model was a better fit than OLS. The Hausman test showed that the Fem model was also a better fit than Rem. However, the Wooldridge and Wald tests, with p-values <0.05, revealed heteroskedasticity and autocorrelation in the Fem model, suggesting the use of GLS to address these issues.

The GLS model shows that capital structure (ETA), loan-to-asset ratio (TLA), inflation rate (INF), and return on equity (ROE) have a significant positive impact on RRTK.

The positive impact of capital structure on liquidity risk is shown with an impact coefficient of 0.533 greater than 0 and P-value = 0.007 < 0.05. The larger the capital structure, the higher the liquidity risk, a result consistent with the research of Nguyen Kim Chi et al. (2023).

=> The sign of the result is opposite to the sign of hypothesis H1, therefore hypothesis H1 is rejected.

TLA has a positive impact on RRTK of commercial banks with an impact coefficient of 0.411 > 0 and P-value = 0.000 < 0.05. The results are similar to the study by Phan Thi My Hanh and Tong Lam Vy (2019). However, it differs from the results of Nguyen Thanh Dat (2015), who argued that TLA has an inverse relationship with RRTK.

=> The sign of the result is the opposite of the sign of hypothesis H2, therefore hypothesis H2 is rejected.

Inflation also has a positive impact on the RRTK of commercial banks with an impact coefficient of 0.009 > 0 and P-value = 0.001 < 0.05. Higher inflation will cause the RRTK of banks to increase, a result similar to the study by Phan Thi My Hanh and Tong Lam Vy (2019).

=> Hypothesis H3 is accepted.

ROE also has a positive impact on RRTK of commercial banks with an impact coefficient of 0.004 > 0 and P-value = 0.000 < 0.05. Unlike the results of Nguyen Thanh Dat (2015), he argued that ROE has an inverse relationship with RRTK. The research results show that the higher the return on equity, the higher the liquidity risk, a result similar to that of Nguyen Kim Chi et al. (2023) and Phan Thi My Hanh and Tong Lam Vy (2019).

=> Hypothesis H5 is accepted.

GDP growth rate (GDPG) has a positive impact on RRTK with an impact coefficient of 0.0007 > 0 and a P-value of 0.428 > 0.05. Contrary to the expectation formulated in hypothesis H4, the results did not find a positive correlation between GDPG and RRTK.

Hypothesis H4 is rejected.

Bank size (SIZE) has an impact coefficient of 0.009 > 0 and a P-value of 0.131 > 0.05. The larger the bank size, the lower the liquidity risk (Nguyen Thanh Dat, 2015; Nguyen Kim Chi et al., 2023). However, this data did not yet find a statistically significant relationship between bank size and liquidity risk.

Hypothesis H6 is rejected.

5. Policy Implications

With the aim of minimizing RRTK and ensuring stability in the operations of commercial banks in Vietnam, the research results propose the following policy implications:

Firstly, commercial banks in Vietnam need to improve the quality of their own capital.

The rapid increase in capital related to commercial bank shares within a short timeframe has established a distinct ownership structure, ownership differential, and multilateral relationships between financial institutions and businesses, as well as among the financial institutions themselves. This phenomenon can lead to the emergence of non-performing loans and systemic vulnerabilities. This necessitates that financial institutions develop capital recovery strategies aimed at minimizing exposure to high-risk capital sources, thereby promoting more sustainable capital expansion.

Secondly, financial institutions must exercise strict oversight over lending practices.

The study's findings indicate that escalating liquidity risk correlates with the ratio of loans to total assets of banks; therefore, financial institutions are compelled to maintain and adjust their credit allocations. An overemphasis on pursuing sales can lead to lower interest rates, while loosening lending criteria increases exposure to credit risk. There is a clear emphasis on strengthening credit relationships with clients who have strong business fundamentals and sound financial stability.

Third, financial institutions must establish a strong capital base, thereby minimizing their dependence on external funding sources.

To avoid the risk of adopting a passive stance when asked to disburse funds to clients, it is imperative to limit the use of short-term financing for long-term loans. Furthermore, there is a strong emphasis on developing

a team of skilled analysts specializing in valuing and forecasting the organization's liquidity, in exchange for addressing client withdrawal requests, with the ultimate goal of enhancing the organization's proactive approach to addressing liquidity challenges.

6. Research Conclusion

Increasing a bank's equity capital can incentivize financial institutions to allocate resources to high-risk assets in order to achieve high returns to offset the high cost of capital associated with increasing equity. This disproportionate escalation of equity capital in non-state-owned commercial banks will lead to numerous risks, including liquidity risk.

When traditional monetary institutions expand their lending activities in an unharmonized manner, liquidity risk becomes more likely. Therefore, banks are compelled to readjust their operations to avoid an overemphasis on lending activities and loans characterized by low liquidity.

Furthermore, inflation significantly impacts liquidity risk. As inflation escalates, the value of the currency can deteriorate over time, hindering banks from using cash to fulfill their financial transaction obligations, leading to a rapid increase in liquidity risk.

The return on equity (ROE) of banking institutions has a cumulative and statistically significant impact on the liquidity risk associated with commercial banks. Financial institutions are forced to navigate a delicate balance between pursuing profitability and the imperative to ensure liquidity safety.

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