BASEL III STANDARDS AND LIQUIDITY DETERMINANTS IN VIETNAMESE COMMERCIAL BANKS

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ABSTRACT

This study aims to ascertain the determinants affecting the liquidity of Vietnamese Commercial Banks by their bank ownership structures, CEO characteristics, and bank-specific variables. Using panel data consisting of 29 Vietnamese commercial banks, we measure liquidity using the most up-to-date method – the Net Stable Funding Difference (NSFD), according to Basel III standards. Correlating to the relationship between CEOs' characteristics and bank liquidity, we found that CEOs with longer tenure will control liquidity better due to their higher managerial power and entrenchment. Moreover, the findings of the present study show that local market power, bank age, bank size, and loan loss provision positively impact bank liquidity. In contrast, further investigation reveals the adverse impact of state ownership on bank liquidity. This study provides insights into the prudential supervision of Vietnamese commercial banks, which has implications for policymakers, by applying the latest liquidity measurement method and new findings on liquidity determinants.

Keywords: Net stable funding ratio Basel III; Bank's liquidity; State ownership; Z-score

DOI: http://dx.doi.org/10.15549/jeecar.v10i3.1176

INTRODUCTION

According to Koch and MacDonald (2014), there are six categories of bank risk that occur mainly from a bank's activities: credit risk, liquidity risk, market risk, operational risk, nominal risk, and legal risk. These risks may lead to negative impacts on the bank's market value, liabilities, equity, and profitability. Lacking bank liquidity is the first signal of a banking crisis and has become the main trigger for the adverse events of the 2007-2009 financial crisis, wherein many profitable banks struggled to maintain adequate liquidity. Central banks demanded unprecedented levels of liquidity support to maintain liquidity stability; however, an unexpected increase in liquidity demand forced banks to sell their illiquid assets at lower prices, leading to losses and increased risk (Allen and Santomero 2001; Allen and Gale 2004). As such, liquidity risk is one of the most critical bank concerns.

A bank's liquidity is the ability of a bank to meet its financial obligations as they become due. It can come from direct cash holdings in currency, or on account at the Federal Reserve or other central banks. It often comes from

acquisitions that can be sold quickly with minimal loss. This generally implies highly creditworthy securities, including government bills, which have short-term maturities. In reality, many banks frequently face imbalances in assets and capital on their balance sheet, so they need to manage them properly. Otherwise, they may suffer financial loss and inability to pay their short-term obligations. The liquidity of a commercial bank is essential because it is related to most of its operational aspects. Specifically, liquidity directly affects the credit intermediary function, capital mobilization, and lending; it also helps complete the transaction between the buyer and the seller promptly and conveniently.

Many empirical studies used simple measurements to calculate liquidity (Abdullah & Khan 2012; Mohamad et al. 2013; Ramzan & Zafar 2014; etc.). The dynamic structure and complex nature of the market environment in which banks operate, however, makes for different liquidity measures. Additionally, these measurements are becoming obsolete as they do not apply stricter standards in measuring liquidity. To enhance the liquidity management of the banking system, the Basel Standard was established to become a reliable standard for the banking system, which not only improved the regulatory perspective, but also its performance. The Basel Standards included three versions: Basel I mainly concentrated on credit risk and appropriate risk-weighted measurements of assets; Basel II revealed the three pillars concept of minimum capital requirements, supervisory review, and market discipline; and the latest version, Basel III aimed to strengthen the requirements on banks' minimum capital ratios following the Basel II standard. In addition, the Basel III standard introduces new requirements for holding liquid assets and stabilizing capital to reduce the risks to the banking system. Recently, researchers have been interested in using the Basel III Standard to measure liquidity, but the number of studies that have actually used it is still limited. Although comprehensive studies have investigated factors that impact banks' liquidity in different countries, there is little empirical evidence from emerging and developing countries, such as Vietnam. (Chen et al 2015; Ly et al 2017; Võ & Mai 2017; etc).

Using a dataset of 29 commercial banks in Vietnam from 2012 to 2021, this paper adds to the growing literature on bank liquidity determinants in Vietnam. This study aims to achieve three main objectives:

First, Basel III, an up-to-date method to measure bank liquidity, is applied. This study is one of the first studies in Vietnam applying the liquidity calculation according to Basel III standards. Currently, most commercial banks in Vietnam apply Basel I and II standards for controlling their liquidity (X. T. T. Pham et al., 2022). However, in developed countries worldwide, Basel III has been used consistently. Compared to previous liquidity measurements, it has become one of the most reliable standards available today. Second, bank liquidity factors were divided into financial and non-financial factors. Finally, liquidity between state-owned commercial banks and private bank groups were compared.

The remainder of this paper is organized as follows: Section 2 presents the literature review, followed by data and methodology. Section 4 describes the empirical results, and the last section covers the conclusion.

LITERATURE REVIEW

Regarding liquidity measurements, simple measures have been used in previous studies to analyze the impact of different factors on bank liquidity, such as the ratio of total deposits to total assets (Mohamad et al. 2013; Abdul-Rahman et al. 2018), the ratio of cash to total assets (Akhtar et al. 2011; Abdullah & Khan 2012; Ramzan & Zafar 2014; Abdul-Rahman et al. 2017), the liquidity asset to total asset ratio (Aspachs et al. 2005; Praet & Herzberg 2008; Rychtárik 2009). On the regulatory side, Horrath et al. (2012), Cucinelli (2013), Ramzan & Zafar (2014), and Brůna & Blahová (2016) applied the up-to-date Basel III standard measures, such as the net stability fund ratio (NSFR) or liquidity coverage ratio (LCR) to measure short-term and long-term liquidity, respectively.

There are two branches of empirical studies related to a bank's liquidity.

First, many previous researchers in different countries reported the factors that impacted bank liquidity, such as Munteanu (2012) in Romania and Abdullah & Khan (2012) in Pakistan. Almumani (2013) conducted a study about liquidity for Saudi and Jordanian banks, while Singh & Sharma (2016) and Sopan & Dutta (2018) reported liquidity factors in India.

The findings of Abdullah & Khan (2012) highlight that bank size is found to have a significantly negative relationship with liquidity risk in domestic banks, while there is either a negative or no relationship with liquidity risk in foreign banks. The result shows that the debt-to-equity ratio is significantly negative, with liquidity risk in both domestic and foreign banks. Using the dataset from 2008 to 2010 in Romania, Munteanu (2012) also found that the Z-score, an essential indicator for bank stability, significantly influences bank liquidity. Moreover, using the dataset of Saudi and Jordanian banks from 2007 to 2011, Almumani (2013) proposed that the debt-to-equity ratio and capital-to-total assets ratio were found to have a positive impact, while the size and loan-to-deposit ratio show a negative effect on liquidity risk in Saudi banks. Meanwhile, the author conducted the study with a sample of Jordanian banks and showed that the capital-to-asset ratio, debt-to-equity ratio, and ROA are positively related to liquidity risk. In contrast, the investment-to-asset ratio, loan-to-deposit ratios, and ROE are found to have a negative correlation with liquidity risk.

Singh & Sharma (2016) examined macroeconomic variables that affect the liquidity of Indian banks. Their results stated that GDP has a negative effect on bank liquidity. On the other hand, deposits, profitability, capital adequacy, and inflation positively affected bank liquidity. The cost of funding, as well as unemployment, showed an insignificant effect on bank liquidity. In more recent evidence, Sopan & Dutta (2018) discovered that among bank-specific determinants, the profitability, bank size, funding costs, and the quality of assets negatively affect the liquidity risk of Indian banks. Among the macroeconomic determinants, inflation and GDP growth rates are positively and negatively related to bank liquidity.

Second, previous researchers compared bank liquidity among various banks in the same region. For example, Aspachs et al. (2005) and Valla et al. (2006) investigated bank liquidity in the UK; Roman & Sargu (2015) focused on CEE countries; and Trenca et al. (2015) studied six countries in the EU. In addition, Roman & Sargu (2015) investigated the determinants of bank liquidity by using a sample of banks operating in a series of CEE countries (Bulgaria, the Czech Republic, Hungary, Latvia, Lithuania, Poland, and Romania). Their findings highlight that the depreciation of banks' loans portfolios harmed the overall liquidity of the analyzed banks.

In terms of applying Basel III to the measurement of bank liquidity, Chen et al. (2015) researched the effect of excess lending on the liquidity of Chinese banks from 2006 to 2012. This article classified how to measure liquidity using the net stable funding difference (NSFD) under Basel III. The result showed that excessive lending did not necessarily affect bank liquidity. Liquidity creation and the net stable funding ratio have been used jointly and separately to measure bank liquidity in recent literature, as seen in King (2013) and Ly et al. (2017). King (2013) examined different strategies to meet the net stable funding ratio (NSFR) and estimate the impact of these changes on bank net interest margins (NIMs). Moreover, Ly et al. (2017) also investigated the effect of net stable funding ratio (NSFR) adjustment speeds on systemic risk. They found that banks with an immediate trading equilibrium tended to adjust the NSFR quickly in response to the Basel III liquidity requirement, thereby reducing systemic risk.

In Vietnam, research related to a bank's liquidity is limited. The paper of Võ & Mai (2017) is one of the few studies that examined the effect of foreign ownership on the liquidity risk of 35 Joint–Stock Commercial Banks in Vietnam from 2009 to 2015. Their analysis demonstrated that the higher the foreign-owned ratio, the lower the liquidity risk of commercial banks and vice versa. The findings of Võ & Mai's (2017) study provide important empirical evidence proving the role of foreign ownership in the liquidity of Vietnamese commercial banks. Overall, studies on bank liquidity are still scarce in Vietnam. Most previous researchers applied simple ratios in examining various factors on liquidity. Nevertheless, this paper uses the latest liquidity indicators proposed by Basel III, namely the Net Stable Funding Difference (NSFD). Additionally, this study differs from considerable previous research in that it explores factors of bank liquidity in the context of Vietnam. Specifically, this research comprehensively considers all independent variables, comprising both financial variables that have been utilized in previous studies, as well as non-financial variables, such as CEO characteristic variables and bank-specific variables. Moreover, liquidity between state–owned banks is compared with private banks in the Vietnamese banking system.

DATA AND METHODOLOGY

Data

The dataset was collected from the financial statements and annual reports of 29 Vietnamese commercial banks, other data sources from the State Bank of Vietnam's website, and the Vietnam Banks Association from 2012 to 2021. Of note, the last sample excluded banks that the State Bank of Vietnam had acquired, as well as banks that had merged and consolidated in the study period. Data is organized to unbalanced panel data with 290 observations, due to a lack of ceratin observations in several years.

Variables definitions

Dependent variable

In this study, we apply Basel III standards to measure the liquidity of Vietnamese joint-stock commercial banks. Basel III mentions two new liquidity standards: the liquidity coverage ratio (LCR) and NSFD. The former standard requires banks to hold sufficient high-quality assets to cover their net cash outflows over 30 days, and the latter ratio requires that the amount of available stable funding is greater than the amount of needed stable funding. In this paper, we only use the NSFD for two reasons. First, detailed information about LCR is available for internal use only in Vietnam. Most empirical articles can only estimate the NSFD (King 2013). Secondly, the yearly dataset is employed in this study, while the LCR requires monthly data (Distinguin et al. 2013). According to Basel III, banks with a higher NSFD have adequate liquidity without borrowing money or selling their assets at a loss and hold stable funding within the banks as a buffer to limit funding risk.

Table 1. The Net Stable Funding Difference (NSFD) Measurement

NSFD = Available Stable Funding – Required Stable Funding			
Required Stable Funding		**Available Stable Funding**	
Terms	*Weight*	*Terms*	*Weight*
Cash and Funds Deposited in the Central Bank	0%	Deposits from Interbank and Financial Institutions	100%
Deposits in other Banks		Borrowings from the Central Bank	
Trading Financial Assets		Trading Financial Liabilities	
Accrued Interest Receivable		Expected Liabilities	
Lending Funds		Funds Borrowed from Interbank Lendings	
Precious Metals	50%	Total Shareholders' Equity	
Capital in Vicarious Business		Deposits	80%
Long-term Equity Investment		Liabilities from Vicarious Business	0%
Held–to–maturity Investment		Financial Assets Sold under Repurchase Agreement	
Securities Purchased Under Resale Agreement	65%	Bonds Payable	
Available for Sale Financial Assets		Remuneration Payable	
Loans and Advances		Taxes Payable	
Receivables Investment	100%	Accrued Interest Payable	
Other Assets		Other Liabilities	
Goodwill		Deferred Income Tax Liabilities	
Fixed Assets		Derivative Financial Liabilities	
Intangible Assets			
Deferred Income Tax Assets			
Investment Real Estate			
Derivative Financial Assets			

In this study, NSFD is used as the dependent variable. According to the Basel III Standard, the net stable funding difference (NSFD) is calculated as the difference between the amount of available stable funding (ASF) and the amount of required stable funding (RSF) over a one-year horizon. Table 1 shows the weights of assets and liabilities for calculating the required and

available stable funding. The ASF is a source of funds that is expected to be stable for a certain period, usually one year. To identify ASF, banks must arrange the book value of all types of capital and liabilities into one of five groups according to maturity and withdrawal ability. RSF depends on the portion of assets held by the bank and off-balance sheet exposures over the same horizon. Details of the calculation of the NSFD are shown in Table 1. The NSFD identification technique indicates that when ensuring this net stable fund difference, commercial banks will limit excessive dependence on short-term capital from the main mobilization channels and also help banks to accurately assess the liquidity of the on- and off-balance sheet items.

Independent variables

To investigate the liquidity of Vietnamese commercial banks and its factors, particularly the net stable funding difference (NSFD), 15 independent variables are used. These are classified into three categories: financial variables, CEOs' characteristic variables, and bank-specific variables, as follows:

Table 2. The Definition of Independent Variables

Variable name	Notation	Measured by	Expected sign
Financial Variables			
Total Liabilities to total assets	TLTA	Total Liabilities / Total assets	+/–
Cash flow from operating activities to Total Liabilities	FUTL	Cash flow from operating activities / Total Liabilities	+
The difference in net income	CHIN	$\frac{(\text{Net Income}_{(t)} - \text{Net Income}_{(t-1)})}{(\lvert \text{Net Income}_{(t)} + \text{Net Income}_{(t-1)} \rvert)}$	+
Capital adequacy ratio	CAR	Collected from Annual Report of banks	+
Variables related to CEO's characteristics			
CEOage	CEO_age	CEO's age in years	+
CEOgender	CEO_gender	A dummy variable that equals one if CEO's gender is female, and zero otherwise.	+
CEOtenure	CEO_tenure	The length of time between the date that the person became the CEO and the current year	+
Bank-specific variables			
State ownership	STATE	The proportion of state – ownership in shareholders.	–
Bank's age	BANKAGE	Current year – Year of establishment	+
Bank size	BANKSIZE	The logarithm of total assets (log)	+
Ratio predicts the change of business going bankrupt	Z-score	(ROA + CAR) / 6_{ROA}	–
Income Diversification	Income Diversification	1 – [[(Net interest income / Total operation income)^2 + (Non-interest income / Total operation income)^2]	+
Local market power	Market power	Customer deposits of each bank / Total customer deposits of all commercial banks	+
Loan loss provision	Loan provision	Collected from Financial reports of banks	+
COVID-19 pandemic	COVID	A dummy variable that equals 1 if the current year is 2020 or 2021, and zero otherwise.	-

Notes: This table introduces all the variables used in the above model and their definition descriptions.

Table 3. Descriptive Statistics

Variable	Mean	Std. dev.	Min	Max
NSFD	60.03	82.88	-128.06	418.58
CEO_age	47.44	6.91	31	65
CEO_gender	0.14	0.35	0	1
CEO_tenure	3.63	2.51	1	10
TLTA	0.938	0.489	0.094	0.917
FUTL	-77.97	2829.89	-43316.82	20779.70
CHIN	0.00	0.22	-1.72	0.93
CAR	0.14	0.06	0.08	0.42
STATE	88.08	12.55	64.46	100.00
BANKAGE	23.81	11.35	0	64
BANKSIZE	18.74	1.21	15.45	21.29
Z-SCORE	74.78	118.02	3.05	838.65
Income Diversification	0.30	0.12	0.01	0.50
Market power	0.03	0.04	0.00	0.20
Loan provision	0.27	0.48	0.11	3.40
COVID	0.20	0.40	0	1

Notes: This table reports the result of the descriptive statistics; all variables are provided in Table 2. Source: Authors' calculation.

Methodology

The research model is formulated from related empirical research. The model includes groups of variables: non-financial variables (CEOs' characteristics: age, gender, tenure), financial variables (TLTA, FUTL, CHIN, CAR), bank-specific variables (state ownership, bank age, bank size, income diversification, local market power, Z-score), and a macroeconomic variable (COVID), all of which affect bank liquidity. To explore bank liquidity and its determinants, the following models were used:

$NSFD_{it} = \beta_0 + \beta_1 CEO\_characteristics_{it} + \beta_2 Bankage_{it} + \beta_3 Banksize_{it} + \beta_4 TLTA_{it} + \beta_5 FUTL_{it} + \beta_6 CHIN_{it} + \beta_7 CAR_{it} + \beta_8 Zscore_{it} + \beta_9 Income\ diversification_{it} + \beta_{10} Loanprovision_{it} + \beta_{11} Localmarket\ power_{it} + \beta_{12} State_{it} + \beta_{13} COVID_t + \varepsilon_{it.}$

Where:

- Dependent variable: The net stable funding difference of the bank (i) at the time (t)
- Independent variables:
  - $CEO\_characteristics_{it}$: CEO's characteristics of the bank (i) at the time (t) including CEO's age, gender, and tenure;
  - $TLTA_{it}$: Total Liabilities to total assets of the Bank (i) at the time (t);
  - $FUTL_{it}$: Cashflow from operating activities to Total Liabilities of the Bank (i) at the time (t);
  - $CHIN_{it}$: The difference in net income between year (t) and year (t-1) of the bank (i);
  - CAR_{it}: Capital adequacy ratio of the bank (i) at the time (t);
  - $Z\text{-}score_{it}$: Ratio predicts the change of business going bankrupt of the bank (i) at the time (t);
  - $Income\ Diversification_{it}$: Diversification of services of the bank (i) at the time (t);
  - $Market\ power_{it}$: Market power of the bank (i) at the time (t);
  - $State\ ownership_{it}$: State ownership of the bank (i) at the time (t);
  - $COVID_t$: A dummy variable to define the post-COVID-19 pandemic period when an observation appears after 2019.
  - $\varepsilon_{it.}$ Error term.

For the panel data model, the regression methods are the pooled ordinary least square (POLS) regression model, fixed effect model

(FEM), and random effect model (REM). A Hausman test will be performed to find an appropriate model between FEM and REM. Next, tests of autocorrelation and heteroskedasticity will be performed to assess the reliability of the model. In case the selected model satisfies the tests, it will be included in the analysis of the final results. Conversely, when the model has autocorrelation or heteroskedasticity, it will be corrected through generalized least squares (GLS) models.

EMPIRICAL RESULTS

First, models were compared and chosen based on which model would be appropriate: POLS, FEM or REM. To examine and select the appropriate model among the three regression methods above, both the F-test and the Hausman test were used. With the F-test, Prob> F = 0.000 <α = 5%, meaning that, with a statistical significance level of 1%, H_0 was rejected. That is, with the data collected, the method of running the FEM model was shown to be appropriate and POLS was inappropriate because fixed effects existed in each bank over time. After selecting the FEM model instead of the POLS model, FEM and REM were taken into account. Based on the results of conducting the FEM and REM, the Hausman test results were presented in Table 4, showing that Prob> chi2 = 0.000, and P_value = 0.000 <α = 1%. Therefore, there had a sound basis to reject the assumption H_0, proving the FEM to be more appropriate than the REM. Through testing methods of running models, FEM is the best-selected model. Before conducting a detailed analysis of the influencing factors on liquidity risk, however, the author proceeded to test variance change and autocorrelation, then carried out necessary corrections to overcome the limitations of the model.

First, the Wooldridge test method was used to test whether there existed autocorrelation or not for regression models. The following hypothesis was assumed – H_0: the autocorrelation phenomenon was negative; H_1: the autocorrelation phenomenon was positive. If the test results indicated P_value = 0.0000 <α = 5%, then assumption H_0 would be rejected, i.e there would be a phenomenon of autocorrelation.

Next, to test whether variance change existed in the model, the authors used Breusch and Pagan test, with the assumption H_0: variance change phenomenon was negative and H_1: the variance change phenomenon was positive. As the test results for the P-value were small (less than 0.05 default), the assumption H_0 would be rejected and the H_1 hypothesis would be accepted. Based on the results stated in Table 4, the coefficient P_value <α = 0.05. Therefore, assumption H_0 was rejected. The test results of the model indicated that the obtained P-values were all equal to 0.000 <α (5%), which implied that the assumption H_0, in which the variance change phenomenon in the models was negative, was rejected with the significance level of 1%. Thus, the authors proceeded to overcome the defects of the regression model using the GLS regression method. After performing the regression and testing, as well as selecting the appropriate model of FEM, the authors proceeded to overcome the defects of the model detected by the GLS method. The results presented in Table 4 were the outcomes that have overcome the defects of the model.

This research examines the impact of a group of financial variables, variables related to CEO characteristics, and bank-specific variables on bank liquidity (NSFD). After conducting the regression model and solving the heteroskedasticity problem, the estimated coefficients that fit best for the entire period 2012-2021 are presented in Table 4.

Table 4. The regression results - Bank liquidity and its determinants

NSFD	GLS Coefficient (.Std err)
TLTA	3.264*
	(1.983)
FUTL	-0.00006
	(0.002)
CHIN	7.385
	(5.284)
CAR	22.760
	(16.350)
CEO_age	-0.105
	(0.152)
CEO_gender	0.753
	(2.286)
CEO_tenure	0.900*
	(0.531)
STATE	-0.243**
	(0.117)
BANKAGE	0.309*

Table 4. Continued

NSFD	GLS Coefficient (.Std err)
	(0.183)
BANKSIZE	5.722***
	(1.543)
Z-SCORE	0.003
	(0.006)
Income diversification	7.904
	(8.302)
Market power	588.800***
	(107.500)
Loan provision	66.290***
	(9.850)
COVID	-0.864**
	(2.793)
Intercept	-82.110**
	(34.470)
Number of observations	287

Note: Significance levels of 10%, 5%, and 1% are denoted by **, and ***, respectively. Source: Authors' calculation.

Through the regression results, only the CEO_tenure variable is positively correlated to liquidity for Vietnamese commercial banks for variables related to CEO characteristics. In the literature, most previous studies examine the relationship between CEO tenure and a firm's risk-taking. The evidence showed that longer tenure may increase managerial power (Chidambaran & Prabhala, 2003; Ryan Jr & Wiggins III, 2004), and the experiences of a manager may also accumulate with the increase of tenure (Simsek, 2007). Therefore, the longer tenure of the CEO suggests greater managerial power as well as entrenchment. Entrenched managers may also enjoy larger private benefits from control, which may motivate them to conduct low-risk projects. The empirical results found that managerial entrenchment is correlated with more conservative corporate policies (Bertrand & Schoar, 2003; Laeven & Levine, 2009; Pathan, 2009). This analysis suggests that CEO tenure should be negatively associated with risk-taking. Our results are in line with the prior authors that with a longer CEO tenure, the bank's liquidity control is better.

Next, for bank-specific variables, the group of variables including local market power, TLTA, and loan loss provision is statistically significant. Loan loss provisions for credit losses are estimates for potential losses that may occur in credit activities of financial institutions, thereby helping them to more accurately assess the quality of their credit portfolio as well as their asset position. Since the provision for credit losses is accounted for as an increase in operating expenses, it has the effect of reducing the current income tax expenses of credit institutions. Although provision for credit risks reduces the after-tax profit of credit institutions because it is a non-cash expense, it has the effect of helping credit institutions save current income tax expenses, thereby having the effect of increasing cash flow from operations for credit institutions. Table 4 shows that loan provision is positively correlated with bank liquidity at a 1% significant level. H. N. Pham & Pham (2021) found similar results when they conduct their study on a sample of 30 commercial banks for the period 2007 to 2018 in Vietnam.

Moreover, the local market power variable positively impacts bank liquidity with a significant level of 1%. Local market power is considered the market share of deposits in the industry. When compared with prior empirical research, this result coincides with the finding of previous authors (Suarez 1994; Berger & Bouwman 2013). The larger the size of bank deposits, the better their liquidity will be.

Bank age and bank size are positively correlated with liquidity at a significant level of 1%. In other words, the greater the bank size and bank age, the higher the liquidity they hold. This finding is consistent with Singh & Sharma (2016), supporting the positive relationship between bank size and liquidity. The explanation behind this may be that large banks are often reputable banks with a long history of establishment in the industry. According to Distinguin et al., (2013), large banks are in a condition to create more liquidity as compared to smaller banks because they have easier access to the lender of last resort, and also because they would be the first to benefit from the safety net. It can be said that CEOs of small banks are always in conditions to maintain high levels of liquidity because they know that they cannot access financing sources as easily as large banks if the demand for funds increases.

The present research highlights the negative impact of state ownership on bank liquidity with a significant level of 5%. The results revealed that the state-owned banks would be less liquid than

other commercial banks. This finding is not consistent with the results of Yeddou & Pourroy (2020). That study used a sample of commercial banks from 17 western European countries from 2004 to 2018, finding that state-owned banks tend to create more liquidity than private banks. Kusi et al. (2021) found similar results, whererin privately owned banks are less likely to create more liquidity compared to their state-owned bank because policymakers may push liquidity creation through state-owned banks. The finding of this study is similar to the results found in Chen et al. (2015) 's study of state ownership, wherein the author found that state ownership was an essential determinant of liquidity. As mentioned above, in the context of Vietnam, state-owned banks are large banks that have more advantages to access the lender of last resort and benefit from the safety net. Thus, CEOs in state-owned banks tend to take more risks, which is the reason why the liquidity risk of this bank group will be higher than in private banks.

Related to macroeconomic variables, this study explores the impact of the COVID-19 pandemic on bank liquidity which is different from most of the previous studies that examined the impact of GDP growth or inflation. Indeed, bank liquidity can be seriously impacted by a financial crisis. Many studies found a negative correlation between the financial crisis and bank liquidity (Vodová, 2011; Karim et al., 2021). A financial crisis may lead to a decline in bank liquidity for many reasons. First, the volatility of vital macroeconomic variables could lead to an unfavorable business environment for banks. Second, the instability of the business environment might influence a firm's liquidity as well as the financial health of their borrowers, thus affecting their ability to repay debts, ultimately leading to a decline in bank liquidity. The results of this study also highlight the negative impact of the COVID-19 pandemic on Vietnamese commercial banks' liquidity. The severe negative impact of the COVID-19 pandemic means that firms have been struggling with, the effects of which have differentiated across sectors, financial markets, and economies (Ratnasingam et al., 2020). These deteriorated economic outlooks have caused controversial difficulties concerning the liquidity, solvency, and continuous operations of firms.

CONCLUSION AND RECOMMENDATION

In this study, the most up-to-date method of the Basel III standard is applied to measure and evaluate the liquidity of Vietnamese commercial banks. After that, the determinants of bank liquidity, including the financial and non-financial factors, are investigated. Finally, the liquidity between state-owned commercial banks and private banks are compared.

Within the framework of this study, a new method to measure bank liquidity that has not been applied in the Vietnamese banking system is used. As such, some recommendations for both regulatory perspectives and commercial banks to improve liquidity management are suggested. From a regulatory perspective, the state-owned banks have a significant role in establishing a legal system appropriate to the banking industry, mainly that state-owned banks should aim to frame an index system that reflects the liquidity of the whole industry. Under the condition that commercial banks depend primarily on financial market characteristics, general market indicators will positively impact alerts for the state banks, given that they, the state banks, can make appropriate policies for each specific situation, such as Basel regulations and quantitative models.

Regarding the bank-specific and financial variables group, bank age, bank size, TLTA, local market power, and loan loss provision were variables found to be positively correlated to bank liquidity. In contrast, state ownership has a negative impact on bank liquidity. This study has insight implications for bankers, policymakers, and consumers. Liquidity trends show that there is a negative impact of ownership on bank liquidity in that state-owned banks held less liquidity in the Vietnamese banking system compared to private banks. Additionally, when investigating the CEOs' characteristics, there was an expected relationship between bank liquidity and these CEO factors. This study found that the longer the CEO's tenure, the better bank's liquidity control. This finding adds substantially to the general understanding of bank liquidity. From the perspective of an individual bank, maintaining sufficient liquidity is necessary to insure against liquidity risk, so they must comply with regulations on ensuring safety in liquidity and comply with regulations on business activities. This result will help commercial banks have more opportunities to avoid risks from

abnormal business factors by promptly detecting errors and making adjustments.

Few studies in the Vietnamese context, however, examine these variables concerning liquidity, particularly while considering state ownership. This highlights the contribution of the present study to the existing body of literature, especially since an attempt to study bank liquidity along with CEO characteristics and bank-specific and macro-economic variables such as the COVID-19 pandemic in the context of Vietman has not been made before. Due to the lack of available information after COVID-19, the bank liquidity of Vietnamese commercial banks pre and post-COVID-19 cannot adequately be compared. In terms of ownership structure, this study only takes state ownership into account, but it is recommended that future research should investigate how bank size affects bank liquidity with different ownership structures such as public, private, and foreign ownership.

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