



Impact of Liquidity and Basel III Regulation on Bank Profitability

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Abstract

This study examines the relationship between liquidity on bank profitability in the context of Vietnamese commercial banks, focusing on the moderating effect of Basel III regulations. Using data from 26 commercial banks listed on Vietnam's stock exchanges between 2012 and 2023, the research employs multiple econometric models, including OLS, FEM, REM, and Generalized Method of Moments (GMM), to explore the effects of liquidity measures such as liquid assets to total assets (LATA) and the liquidity transformation gap (TLGAP) on key profitability indicators; Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM). The findings suggest a negative relationship between liquidity and profitability of commercial banks in Vietnam, with higher liquidity levels constraining profit generation. Additionally, the study reveals that adopting Basel III regulatory standards, particularly its liquidity and capital requirements, mitigates the negative effects of liquidity on the profitability of commercial banks in Vietnam. The results highlight the trade-off commercial banks face between maintaining sufficient liquidity for financial stability and optimising profitability. This research contributes to the understanding of liquidity management in emerging markets, emphasising the role of Basel III in balancing regulatory compliance with financial performance.

Keywords:

Liquidity;
Basel III;
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1- Introduction

Banks are financial institutions that play a crucial role in the financial system and the overall economy, serving as an essential condition for long-term economic growth. During the global financial crisis of 2007–2008, numerous banks faced difficulties due to poor liquidity management. Thus, the financial crisis reaffirmed the vital importance of sustaining sufficient liquidity to uphold the stability and seamless operation of financial and banking activities. In the pre-crisis period, financial intermediaries operated in a landscape characterized by abundant and easily accessible funding, predominantly short-term and at low interest rates. However, the sudden shift in financial markets revealed just how rapidly liquidity can evaporate. When this happens, banks and investment firms may be forced to sell their holdings far below their real value, just to raise money quickly. Alternatively, they might have to borrow at extremely high interest rates, which can wipe out their profits [1].

The financial crisis also prompted the Basel Committee on Banking Supervision (BCBS) to develop new rules on equity capital and bank liquidity. It will take a long time and involve numerous obstacles for banks in developing nations like Vietnam to implement Basel II, let alone Basel III. While Basel II provides general guidelines for liquidity risk management, but lacks specific quantitative requirements; this limitation became evident during recent liquidity crises in several Vietnamese banks, which have raised concerns among policymakers, bank managers, and the public. Recognizing these shortcomings, Basel III introduced stricter liquidity regulations, including the Liquidity Coverage Ratio (LCR) $\geq 100\%$, requiring banks to hold enough high-quality liquid assets (HQLA) to cover net cash outflows for 30 days in a stress scenario, and the Net Stable Funding Ratio (NSFR) $\geq 100\%$, ensuring that banks maintain a stable funding structure to support their assets over a one-year horizon.

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The influence of liquidity on bank profitability has been extensively explored in various countries, as evidenced by a series of studies analyzed in this review. While some studies [2-4] highlight a positive relationship between liquidity and profitability, suggesting that higher liquidity enhances efficiency and enables greater credit expansion, other authors, including [5-7], argue that excess liquidity is costly and reduces returns. Additionally, studies on liquidity risk show conflicting results. It is found that banks holding illiquid assets generate higher net interest margins (NIMs) but face higher funding costs, thereby negatively affecting ROA and ROE [8]. Similarly, Abbas et al. [9] reported that liquidity positively affects profitability in some economies but negatively affects it in others. Meanwhile, research by Naceur & Goaid [10] and Demircuc-Kunt & Huizinga [11] suggests that liquidity has no significant effect on bank performance. Moreover, by maintaining higher Basel III requirements, banks are compelled to adjust their balance sheet structures, which subsequently affects net interest margins [12], bank resilience [13], bank performance [14], and bank profitability [15, 16]. In developing nations with bank-dominated financial systems like Vietnam, shifts in liquidity management may influence capital availability for enterprises and the credit risk profiles of commercial banks, ultimately impacting the broader economy. Many Vietnamese banks are still in the early stages of implementing these liquidity standards. As a result, liquidity management has become a primary concern for the banking industry in Vietnam.

This study makes three key contributions to the literature. Firstly, while numerous studies have examined the relationship between liquidity and bank profitability, most existing research has primarily focused on developed economies or specific banking sectors, such as European, North American, or African commercial banks. There remains a limited body of literature analyzing this relationship in the context of Vietnamese commercial banks. Given the structural differences in financial systems, regulatory environments, and economic conditions, it is essential to investigate whether findings from other economies hold in Vietnam. This study aims to address this gap by providing empirical evidence on the impact of liquidity on bank profitability within Vietnamese commercial banks, offering valuable insights into an emerging market context. Secondly, existing research predominantly explores liquidity as a standalone determinant of bank profitability, often neglecting the influence of regulatory frameworks such as Basel III. While some studies acknowledge the importance of liquidity in meeting regulatory requirements, they fail to comprehensively examine how compliance with Basel III standards moderates the relationship between liquidity and bank profitability. By incorporating an interaction term between liquidity and a Basel III compliance dummy variable, this study seeks to bridge this gap by assessing whether regulatory adherence amplifies or mitigates liquidity's effect on profitability. Thirdly, while prior literature has largely focused on conventional profitability indicators such as return on assets (ROA) and return on equity (ROE), the role of net interest margin (NIM) in the liquidity-profitability nexus has been relatively underexplored. Given that NIM serves as a crucial indicator of a bank's core revenue generation capability, this study expands the scope of profitability measurement by incorporating NIM alongside ROA and ROE, thereby providing a more comprehensive assessment of the impact of liquidity on bank profitability.

The structure of this study is as follows: Section 2 reviews the relevant literature, Section 3 outlines the methodology and data utilized, Section 4 presents the empirical results, and Section 5 offers the conclusion.

2- Literature Review

2-1- Liquidity and Bank Performance

According to the BCBS (2010) [17], bank liquidity is the ability to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses. The BCBS definition combined funding liquidity and liquidity risk because the primary role of banks as financial intermediaries inherently exposes them to liquidity risk. Thus, liquidity refers to funding liquidity, which is the ability of banks to be prompt and consistent in discharging their obligations as a financial intermediary.

Bank profitability is a fundamental factor in strengthening business operations, ensuring financial stability, and promoting economic growth within the banking sector. Previous empirical studies in banking research have utilized various indicators to measure profitability, including return on equity (ROE), return on assets (ROA), non-interest income, earnings per share, and net interest margin (NIM) [18-21]. The study suggests that a bank's performance is defined by its capacity to generate stable income over time, with core performance dimensions including profitability, operational efficiency, risk appetite, and leverage. This implies that profitability represents only one dimension of overall bank performance, and the profitability dimension, in particular, is measured using indicators such as Return on Assets (ROA), Return on Equity (ROE), Cost-to-Income Ratio, and Net Interest Margin (NIM).

In accessible financial markets, liquidity allows banks to operate seamlessly; however, during crises, a lack of liquidity may force them to sell holdings at prices far below their real value to raise cash. Therefore, to guarantee liquidity, the framework emphasizes the accumulation of high-quality liquid assets (HQLA)—such as cash, gold, and government bonds—which can cover net cash outflows during stress scenarios. This approach aligns with the trade-off theory, which asserts that while holding these reliable, transferable assets ensures stability, they often constrain profitability because they yield lower returns than loans [22]. Previous research has examined the relationship between liquidity and bank profitability, with some studies finding a positive association. For instance, Lall [23] examined the

impact of both bank-specific factors and external influences on the profitability of U.S. banks during the 2007–2013 financial crisis. Using GLS regression, the study found that liquidity is positively associated with both return on assets (ROA) and return on equity (ROE). Similarly, Nkegbe & Ustarz [24] examined the profitability drivers of banks in Ghana over the period 2000 to 2010, employing panel data estimation methods. Their findings indicated that liquidity positively affects ROA, ROE, and net interest margin (NIM). In a broader context, Petria et al. [25] assessed the key determinants of profitability for 27 European Union banks during 2004–2011, revealing that liquidity has a favorable impact on both return on average assets (ROAA) and return on average equity (ROAE). Kamande [26] investigated profitability determinants for 11 listed commercial banks in Kenya over the same period, concluding that liquidity contributes positively to ROA. Expanding the scope, Kohlscheen et al. [27] analyzed 534 banks from 19 emerging market economies and found consistent evidence that liquidity positively influences ROA. Kajola et al. [28] also pointed out that banks with higher liquidity generate higher income because excess liquidity enables them to expand credit activities, thereby increasing profitability.

In contrast, several studies have identified a negative relationship between liquidity and bank profitability. Arif & Nauman Anees [5] and Siddik et al. [7] identified a negative relationship between liquidity and banking performance in their research on developing economies from 2004 to 2014, indicating that maintaining excess liquidity is costly and inefficient. Nuriyeva [29] examined the internal and external factors affecting the profitability of Azerbaijani banks between 2006 and 2012, using secondary data collected from banks' financial reports. The study also found that liquidity negatively affected ROA, ROE, and NIM. Similarly, Cekrezi [30] investigated the determinants of profitability in 16 domestic and foreign commercial banks in Albania from 2010 to 2013. The findings indicated an inverse relationship between liquidity and ROA. In the Kenyan context, Onyango & Olando [31] assessed the influence of bank-specific factors on the profitability of 43 commercial banks over the period 2012–2016. Based on financial statement data, their study concluded that liquidity negatively affected ROA.

Empirical evidence on the relationship between liquidity and bank performance remains inconclusive. Several studies have identified inconsistent associations between liquidity and profitability measures. Specifically, Ben Naceur & Goaid [10] examined intermediation costs under capital regulation and reported that liquidity had no statistically significant influence on banks' return on assets (ROA) and return on equity (ROE). Bourke [2] argued that in a market-based financial system, liquidity risk is positively associated with net interest margin (NIM), implying that banks holding more illiquid assets generate higher interest income. However, their findings also indicate a negative relationship between liquidity risk and return on average assets (ROA) and return on average equity (ROE), as banks with illiquid assets incur higher funding costs to meet liquidity demands. Furthermore, in bank-based financial systems, where banks play a dominant role in financial intermediation, the relationship between liquidity risk and bank performance is statistically insignificant. Similarly, Abbas et al. [9] in their study on the impact of bank capital, liquidity, and credit risk on commercial bank profitability during the post-crisis period (2011–2017), found that liquidity had a negative effect on profitability for large commercial banks in the United States, whereas it exhibited a positive influence on banks in developed Asian economies. More recently, Haris et al. [32] investigated how the impacts of liquidity risk and credit risk on bank profitability differed during the COVID-19 period (Q1 2020 to Q4 2021) compared to the pre-pandemic period (Q1 2018 to Q4 2019). Their findings indicate that liquidity risk has a positive and significant effect on return on assets (ROA) and return on equity (ROE), but shows no significant relationship with net interest margin (NIM).

2-2-Basel III Regulation and Bank Performance

The Basel III regulatory framework, introduced by the Basel Committee on Banking Supervision (BCBS) in response to the global financial crisis of 2007–2008, aims to strengthen the resilience of the banking sector by enhancing capital adequacy, stress testing, and liquidity management. While much has been written about the impact of Basel III on the banking sector's stability, the relationship between Basel III compliance and bank profitability remains an area of considerable debate. Basel III regulations introduce stricter requirements on capital reserves, liquidity, and leverage ratios. These reforms were designed to enhance banks' ability to absorb shocks arising from financial stress and improve the overall stability of the financial system. However, implementing these regulations has implications for banks' operational efficiency and profitability.

Higher capital buffers are expected to reduce the risk of insolvency and enhance financial stability, but they also impose costs. Increased capital requirements may lead to lower leverage and reduced profitability in the short term, as banks may be forced to hold more liquid, less profitable assets to meet regulatory requirements. Conversely, well-capitalized banks are likely to face lower costs of funding and benefit from enhanced market confidence over the long term [33]. In addition, the liquidity requirements under Basel III are intended to ensure that banks can meet their short-term obligations even during periods of financial stress. However, maintaining high levels of liquid assets may result in lower returns, as banks are forced to hold lower-yielding assets, such as government bonds. This trade-off between maintaining liquidity and achieving higher profitability can influence a bank's overall return on assets (ROA) and return on equity (ROE) [34].

Numerous empirical studies have explored the relationship between Basel III compliance and bank profitability, often with mixed findings. A significant body of literature suggests that Basel III regulations may negatively affect bank profitability, particularly in the short term. For instance, studies by Stephen Kingu et al. [35] argue that increased capital requirements reduce banks' ability to generate high returns on equity, particularly when they are more reliant on short-term funding. Similarly, Flannery [36] finds that stricter capital and liquidity requirements lead to reduced profitability for banks, as they are forced to restructure their portfolios by holding less risky, but lower-yielding, assets. On the other hand, some studies suggest that Basel III may have a neutral or even positive long-term effect on bank profitability. Berrospide & Edge [37] argue that while the immediate impact of Basel III on profitability might be negative due to higher capital and liquidity requirements, the long-term benefits of greater financial stability and reduced systemic risk could improve profitability by lowering the cost of capital and increasing investor confidence. Moreover, Čihák & Hesse [38] conclude that banks that fully comply with Basel III standards are more resilient to economic shocks, potentially allowing them to capitalize on periods of financial stability. Research also highlights that the impact of Basel III on profitability may vary across different banking systems.

3- Methodology and Data

3-1- Methodology

This study investigates the impact of liquidity on bank profitability using panel data from Vietnamese commercial banks, analyzed in Stata 17. To ensure the robustness and reliability of the empirical findings, a series of preliminary diagnostic tests was conducted prior to model estimation. These include correlation analysis to explore the relationships among variables; the multicollinearity test (using Variance Inflation Factor – VIF) to detect potential collinearity issues among explanatory variables; the heteroskedasticity test to examine whether the error variances are constant across observations; and the endogeneity test to identify any bias due to omitted variables or simultaneity.

Following these diagnostics, the study proceeds to estimate the relationship between liquidity and bank profitability using three fundamental econometric models: Ordinary Least Squares (OLS), Fixed Effects Model (FEM), and Random Effects Model (REM). Moreover, given the dynamic nature of bank profitability and the potential for endogeneity, this research also utilizes the Generalized Method of Moments (GMM) estimator. GMM is particularly well-suited for panel data with potential endogeneity and autocorrelation, as it allows for the inclusion of lagged dependent variables and provides consistent estimates even when some regressors are endogenous. This methodological approach not only strengthens the credibility of the results but also enhances the robustness of the conclusions drawn from the analysis, as follows the guidelines of Blundell & Bond [39] to determine the instrument and lag structure.

Figure 1 shows the flowchart of the research methodology through which the objectives of this study were achieved.

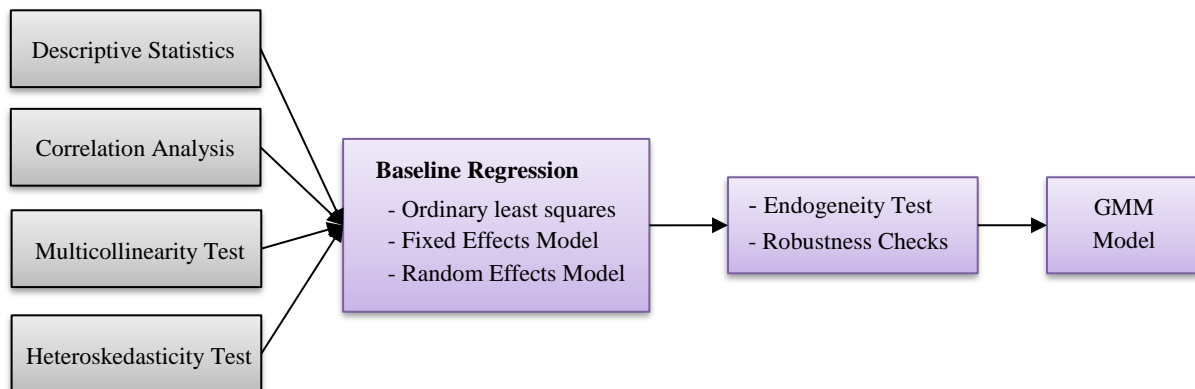


Figure 1. Research methodology

3-2- Research Model

To explore the impact of liquidity on bank profitability, incorporating both bank liquidity indicators and other control factors, and examine whether the impact is influenced by the adoption of Basel III standards, the author proposes the following research model for Vietnamese banks:

$$Y_{i,t} = \beta_0 + \beta_1.X_{i,t} + \beta_2.Z_{i,t} + \beta_3.LATA \times bs_{i,t} + \varepsilon_{i,t} \quad (1)$$

where, $Y_{i,t}$ represents the bank profitability indicators (ROA, ROE, and NIM) for bank i at time t ; $X_{i,t}$ denotes key independent variables measuring liquidity: $LATA_{i,t}$ and $TLGAP_{i,t}$; $Z_{i,t}$ denotes a set of control variables, including non-performing loans (NPL), bank size (SIZE), bank age (AGE), GDP growth rate (GDPGR), inflation rate (INF); $\beta_1, \beta_2, \beta_3$ are the coefficients of explanatory variables and control variables; ε is the error term; bs is a dummy variable equal to 1 for banks that have adopted Basel III and 0 otherwise.

The interaction term helps evaluate whether liquidity's impact on bank profitability is influenced by the adoption of Basel III standards. A dummy variable, *bs*, is created, taking the value of 1 for banks that have adopted Basel III and 0 for those that have not.

Banking profitability is measured using three proxies that are widely employed in the empirical banking literature. The first proxy is Return on Assets (ROA), which reflects the efficiency with which assets are utilized to generate profits. Consistent with previous studies [4, 36], ROA is used as an indicator of banking profitability. The second proxy is Return on Equity (ROE), which captures the effectiveness of capital utilization in generating profits. Following the approach adopted in prior research [7, 40–43], ROE is employed to assess managerial efficiency in the use of shareholders' equity. The third measure is the Net Interest Margin (NIM), defined as the difference between interest income and interest expenses divided by total assets. NIM reflects the profitability of a bank's interest-generating activities and is widely used as an indicator of earnings derived from intermediation functions [10, 44–46].

Liquid assets include cash and equivalents, cash reserves at the central bank, and cash and gold kept at or loaned to other credit institutions [47, 48]. To measure liquidity for research purposes, many authors have used the formula for liquidity by dividing liquid assets by total assets (LATA) [1, 49-51]. Deep & Schaefer [52] used the liquidity transformation gap to measure and assess the liquidity of each bank. Accordingly, the liquidity transformation gap is calculated based on the balance sheet: On the asset side (Assets - A), there are high-liquidity assets (L) and illiquid assets (I), so $A = L + I$. The liquidity transformation gap (TLGAP) is determined by the discrepancy between the bank's owned assets and its liabilities. Many Vietnamese banks are still in the early stages of implementing Basel III and the liquidity ratios such as LCR and NSFR, meaning consistent, quantitative data for LCR and NSFR is not available across all 26 banks for the full 11-year period.

For control variables, non-performing loans (NPLs) are also known as non-performing assets (NPAs). This kind of loan refers to those that were unable to be repaid, and its balance remains the same for a long period. Typically, a payment that is late for 90 days is classified as non-performing. NPLs reflect some aspect of the bank's profitability. The level of NPLs can be considered the best indicator of the banking industry's health [51]. The effect of non-performing loans on profitability was the topic that has attracted significant interest from researchers [12, 53, 54]. Bank Size (SIZE) is an important bank-specific determinant of bank profitability. In this investigation, bank size is measured by the logarithm of total assets. In general, large companies that have larger total assets are able to generate large profits. Larger banks measure assets more favorably than banks with small asset sizes because larger bank sizes have a higher level of efficiency [3, 55]. Many studies often use the age of the bank (AGE) as an additional explanatory variable [46, 56, 57]. A dummy variable, *bs*, is created, taking the value of 1 for banks that have adopted Basel III and 0 for those that have not. However, in order to capture whether Basel III modifies the effect of liquidity (LATA) on profitability, which is crucial given this research focus, the interaction term *LATA_bs* will be applied when conducting the model. The proposed research model is shown in Figure 2.

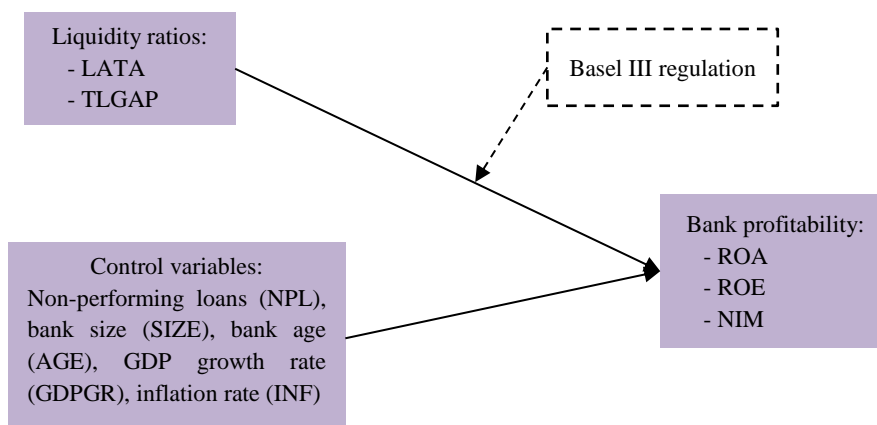


Figure 2. Research Model

3-3-Data

The sample for this study consists of 26 commercial banks listed on the Ho Chi Minh City Stock Exchange (HOSE), the Hanoi Stock Exchange (HNX), and the Unlisted Public Company Market (UPCOM). The selection criteria deliberately exclude banks operating in the over-the-counter (OTC) market and financial companies, thereby focusing on publicly traded banks with transparent financial reporting. This approach enhances the reliability and consistency of the data, which is crucial for robust empirical analysis. While the sample is limited to 26 listed commercial banks, these institutions collectively represent approximately 90% of the total assets in the Vietnamese banking system; therefore, despite the exclusion of smaller, non-listed, or OTC banks, the findings offer a highly representative overview of the

sector's overall health. Macroeconomic indicators, such as GDP, were sourced from the World Bank database, aligning with the temporal scope of bank-level data, which was obtained from external databases. The dataset frequency employed in this study was annual, encompassing both macroeconomic and micro-level variables. For the BASEL variable, the authors constructed a dummy variable based on the banks' public announcements and reports regarding their compliance progress. This binary indicator is assigned a value of 1 for banks that have officially adopted the Basel III framework and 0 for those that have not.

The study spans the period from 2012 to 2023, a significant time frame in Vietnam's banking sector, marked by structural reforms and economic fluctuations. Notably, this period includes the 2012 collapse of Habubank, a pivotal event that reshaped Vietnam's banking landscape. The downfall of Habubank was primarily attributed to its exposure to high-risk loans, particularly to Vinashin, a state-owned shipbuilding company that faced a severe financial crisis. Consequently, on August 28, 2012, Habubank was officially merged with Saigon-Hanoi Commercial Joint Stock Bank (SHB), leading to the disappearance of the Habubank brand from the market.

Table 1 presents the definitions, measurement methods, and expected relationships of the dependent, independent, and control variables used in the empirical analysis.

Table 1. Description, Measurement, and Hypothesized Effects of the Variables on Bank Profitability

Variables	Description & Measurement	Hypothesized relationship with profitability	References
<i>Dependent variables: Bank profitability</i>			
ROA	Net Income/Total Assets		[7, 16, 40, 43, 58]
ROE	Net Income/Total Equity		[7, 16, 40, 43, 58]
NIM	(Interest income-Interest expense)/ Total Assets		[46, 59]
<i>Independent variables: Bank liquidity</i>			
LATA	Liquid Assets/Total Assets	-	[47, 48]
TLGAP	(Deposits-Liquid Assets)/ Total Assets	-	[52]
<i>Independent variables: Control variables</i>			
NPL	Non-performing loans/Total loans	-	[60]
SIZE	Ln (total assets)	+	[7, 25, 53, 61]
AGE	-	+	-
BASEL	A dummy variable that takes a value of 1 for banks applied BASEL III and 0 otherwise	+	The author's calculation
GDPGR	GDP growth rate	+	[43, 54]
INF	Inflation rate	-	[43, 54]

4- Findings and Discussion

4-1-Descriptive Statistics

The descriptive statistics table provides key information about the dataset, including the number of observations, mean values, standard deviations, and the range (minimum and maximum values) for each variable. Together, these statistics form the foundation for preliminary data analysis, guiding subsequent econometric modeling and hypothesis testing while ensuring the robustness of empirical findings.

The bank profitability indicators (ROA, ROE, and NIM) have positive mean values of 0.0098, 0.1154, and 0.0294, respectively. These variables exhibit considerable variation, with ROA ranging from -0.0069 to 0.0554, ROE from -0.1314 to 0.7869, and NIM from 0.0038 to 0.1099. The wide range in profitability metrics (ROA, ROE, NIM) across Vietnamese commercial banks (comprising both state-owned and private banks) suggests substantial profitability disparities within the sector. This heterogeneity reflects the dynamic yet uneven nature of Vietnam's banking sector, where competitive pressures coexist with structural inefficiencies.

The variable LATA has a mean value of approximately 0.169, suggesting that on average, about 16.9% of total assets are held in liquid form. The standard deviation of 0.073 indicates a moderate level of variation in liquidity holdings across banks. The minimum and maximum values range from 0.045 to 0.521, reflecting a substantial disparity in liquidity levels among institutions, with some banks maintaining very high liquidity buffers while others operate with relatively low liquid asset ratios. Meanwhile, TLGAP has a higher mean of approximately 0.655, indicating that, on average, around 65.5% of total assets are funded by deposits that are not backed by liquid assets. The standard deviation is 0.088, showing less dispersion than LATA but still reflecting some variability in deposit-liquidity structures across banks. The range of TLGAP spans from 0.316 to 0.861, suggesting significant differences in the extent to which banks rely on relatively illiquid sources of funding compared to their asset base.

Among the control variables, SIZE has a relatively high mean of 11.91 with a moderate standard deviation, indicating that bank size varies but remains within a defined range. AGE exhibits notable variability, with a mean of 24.54 years and a maximum value of 66, reflecting a mix of both newly established and long-standing banks. The non-performing loan ratio (NPL) has a low mean of 0.0224 but varies up to 0.298, suggesting that while most banks maintain low NPL levels, some experience significantly higher credit risk. Macroeconomic factors such as GDP growth (GDPGR) and inflation (INF) have mean values of 0.0596 and 0.0369, respectively, with relatively low standard deviations. This indicates a stable macroeconomic environment over the observed period. These factors may play a role in shaping bank profitability, but their relatively low variability suggests limited extreme fluctuations in economic conditions (see Table 2).

Table 1. Descriptive statistics for variables

Variable	Obs	Mean	Std. dev.	Min	Max
ROA	312	0.0098384	0.0086646	-0.0069565	0.0553941
ROE	312	0.1155356	0.1084756	-0.1314236	0.7869024
NIM	312	0.0294307	0.0158763	0.0037702	0.1099118
LATA	312	0.1691202	0.0733438	0.0450184	0.5209638
TLGAP	312	0.6549798	0.0882086	0.3158428	0.8609023
NPL	312	0.0224006	0.0215303	0.005	0.298
SIZE	312	11.90848	1.163818	9.594564	14.6488
AGE	312	24.54167	11.87819	0	66
BASEL	312	0.4615385	0.4993193	0	1
GDPGR	312	0.0595925	0.0168726	0.0255373	0.0812351
INF	312	0.0369935	0.0210853	0.006312	0.090947

4-2- Correlation Analysis

The correlation matrix indicates that there are strong positive correlations among bank profitability measures (ROA, ROE, and NIM) suggesting that banks performing well in one profitability metric tend to perform well in the others. For instance, a bank with a high NIM, reflecting effective interest-based earnings, is likely to also exhibit strong ROA, as efficient asset utilization contributes to overall profitability. Similarly, elevated ROA often translates into higher ROE, assuming the bank maintains a stable capital structure without excessive leverage.

The correlation matrix indicates that most independent variables have significant correlation values below 5%, suggesting a relationship with the dependent variable (ROA, ROE, NIM). Additionally, some independent variables exhibit correlations with each other, which will be addressed in the regression analysis to mitigate potential multicollinearity issues. Starting with LATA (liquid assets to total assets), the negative correlations with ROA (-0.1325, $p=0.019$) and ROE (-0.1467, $p=0.010$) suggest that higher liquidity holdings are associated with lower profitability. Similarly, TLGAP shows a negative relationship with ROA (-0.1983, $p=0.000$), indicating that banks with larger gaps between deposits and liquid assets tend to be less profitable. The negative correlation between LATA and TLGAP aligns with the trade-off theory of liquidity management: while higher liquidity enhances stability, it may constrain profitability by limiting income-generating opportunities. The most pronounced negative impact comes from non-performing loans (NPL), which correlate strongly with both ROA (-0.2160, $p=0.000$) and ROE (-0.2674, $p=0.000$).

This underscores the adverse effect of poor asset quality on profitability, as NPLs erode interest income, increase provisioning costs, and tie up capital. SIZE exhibits a strong positive correlation with both ROA (0.3572, $p=0.000$) and ROE (0.4365, $p=0.000$), indicating that larger banks tend to achieve higher profitability. However, the weaker correlation with NIM (0.1706, $p=0.003$) suggests that size advantages may stem from non-interest income (e.g., fees, trading) or operational efficiencies rather than interest margin expansion. The Basel III adoption (BASEL) variable also shows positive correlations with profitability: ROA (0.3207, $p=0.000$), ROE (0.2801, $p=0.000$), and NIM (0.3335, $p=0.000$). This implies that banks complying with Basel III standards (which enforce stricter capital adequacy, liquidity, and risk management) tend to be more profitable (see Table 3).

To ensure a comprehensive assessment of these relationships, more detailed analyses will be conducted in subsequent regression models, employing robust econometric frameworks to rigorously evaluate the effect of bank-specific factors, macroeconomic conditions on profitability metrics.

Table 2. Pearson's correlation test-Source

	ROA	ROE	NIM	LATA	TLGAP	NPL	SIZE	AGE	bs	GDPGR	INF
ROA	1.0000										
ROE	0.8981	1.0000									
	0.0000										
NIM	0.8392	0.7756	1.0000								
	0.0000	0.0000									
LATA	-0.1325	-0.1467	-0.2571	1.0000							
	0.0192	0.0095	0.0000								
TLGAP	-0.1983	-0.0708	-0.0763	-0.7305	1.0000						
	0.0004	0.2124	0.1791	0.0000							
NPL	-0.2160	-0.2674	-0.1092	-0.0189	0.0343	1.0000					
	0.0001	0.0000	0.0540	0.7394	0.5466						
SIZE	0.3572	0.4365	0.1706	-0.1783	0.0072	-0.1827	1.0000				
	0.0000	0.0000	0.0025	0.0016	0.8998	0.0012					
AGE	0.0146	0.0658	-0.0864	-0.0660	-0.0534	-0.0656	0.6322	1.0000			
	0.7977	0.2463	0.1277	0.2454	0.3472	0.2480	0.0000				
BASEL	0.3207	0.2801	0.3335	-0.1224	-0.0245	-0.0322	0.0877	-0.1854	1.0000		
	0.0000	0.0000	0.0000	0.0307	0.6665	0.5708	0.1221	0.0010			
GDPGR	-0.0876	-0.0642	-0.0162	-0.0961	0.1296	0.0038	-0.0811	-0.0565	0.0000	1.0000	
	0.1224	0.2580	0.7761	0.0902	0.0220	0.9473	0.1529	0.3197	1.0000		
INF	-0.0424	-0.1092	0.0270	0.2566	-0.3568	0.1606	-0.2400	-0.1622	0.0000	-0.0464	1.0000
	0.4552	0.0540	0.6352	0.0000	0.0000	0.0045	0.0000	0.0041	1.0000	0.4141	

4-3- Multicollinearity Test and Heteroskedasticity Test

Table 4 presents the results of the Variance Inflation Factor (VIF) test, which assesses multicollinearity among the independent variables in the model. A VIF value greater than 10 indicates a high correlation among variables, which may lead to multicollinearity issues. Conversely, a VIF value below 10 suggests that multicollinearity is not a concern. The results show that all variables have VIF values well below the threshold of 10, with the highest value being 2.55 for TLGAP. The mean VIF is 1.66, further confirming the absence of multicollinearity. These findings indicate that the independent variables do not exhibit strong correlations with one another, ensuring the reliability of the regression analysis. Therefore, the model can be effectively utilised for further empirical investigation. However, heteroskedasticity is detected across all models for each dependent variable, indicating that variance is not constant across observations and justifying the application of robust estimation techniques in subsequent regressions.

Table 3. Multicollinearity Test

Variable	VIF	1/VIF
TLGAP	2.55	0.392410
LATA	2.40	0.416318
SIZE	1.96	0.509755
AGE	1.88	0.532232
INF	1.26	0.792036
bs	1.17	0.858269
NPL	1.07	0.938417
GDPGR	1.03	0.975107
Mean VIF	1.66	

4-4- Baseline Regression Results

The regression results across all three models (OLS, Fixed Effects Model (FEM), and Random Effects Model (REM)) consistently reveal that bank liquidity significantly influences bank profitability (Table 5). Both liquidity indicators,

LATA and TLGAP, exhibit statistically significant negative relationships with profitability measures (ROA, ROE, and NIM). This suggests that holding higher levels of liquid assets or maintaining greater liquidity mismatches is generally associated with lower bank profitability, potentially due to opportunity costs or inefficiencies in asset allocation.

Among control variables, non-performing loans (NPL) consistently exert a negative and significant effect across all dependent variables, reaffirming that higher credit risk undermines profitability. Bank size (SIZE) has a positive effect, supporting the notion that larger banks benefit from economies of scale. The square root of bank age (sqrt_AGE) shows mixed results: its impact is model-dependent and generally insignificant, indicating that bank maturity alone may not be a strong determinant of profitability.

Regarding macroeconomic factors, lagged GDP growth (L1_GDPGR) has a negative and significant influence in most models, highlighting the delayed and potentially adverse effect of economic changes on banking profitability. Inflation (INF) yields inconsistent results, being significant only in selected models (notably FEM), suggesting that its impact is context-specific and sensitive to model specification.

A key insight from the analysis lies in the role of regulatory frameworks, particularly Basel III adoption. The interaction term LATA_bs—capturing the moderating effect of Basel III on the liquidity-profitability relationship—is positive and statistically significant in most ROA and NIM models, indicating that Basel III adoption mitigates the negative impact of liquidity on bank profitability.

Table 4. Baseline regression results

	OLS	FEM	REM	OLS	FEM	REM	OLS	FEM	REM
	ROA	ROA	ROA	ROE	ROE	ROE	NIM	NIM	NIM
LATA	-0.0708*** [-8.04]	-0.0590*** [-7.75]	-0.0579*** [-7.80]	-0.534*** [-4.50]	-0.381*** [-4.36]	-0.387*** [-4.49]	-0.167*** [-9.93]	-0.102*** [-8.55]	-0.104*** [-8.97]
TLGAP	-0.0652*** [-8.49]	-0.0450*** [-7.22]	-0.0489*** [-7.85]	-0.435*** [-4.20]	-0.294*** [-4.10]	-0.313*** [-4.36]	-0.119*** [-8.10]	-0.0557*** [-5.72]	-0.0594*** [-6.17]
NPL	-0.0646*** [-3.46]	-0.0438*** [-3.46]	-0.0409*** [-3.18]	-1.005*** [-3.99]	-0.691*** [-4.75]	-0.671*** [-4.55]	-0.0644* [-1.81]	-0.0541*** [-2.74]	-0.0521*** [-2.64]
SIZE	0.00289*** [6.33]	0.00266** [2.42]	0.00398*** [4.95]	0.0476*** [7.73]	0.0263** [2.08]	0.0459*** [4.50]	0.00227*** [2.59]	0.00224 [1.31]	0.00321** [2.32]
sqrt_AGE	-0.00209*** [-4.88]	0.00364*** [2.63]	0.000428 [0.46]	-0.0279*** [-4.83]	0.0509*** [3.19]	0.0156 [1.28]	-0.00337*** [-4.12]	0.00177 [0.82]	-0.000255 [-0.15]
LATA_bs	0.0121** [2.51]	0.0287*** [2.93]	0.0215*** [2.61]	0.130** [2.00]	0.0984 [0.87]	0.0914 [0.91]	0.0152* [1.66]	0.0306** [1.99]	0.0277** [2.04]
L1_GDPGR	-0.0440* [-1.91]	-0.0405*** [-2.95]	-0.0413*** [-2.92]	-0.331 [-1.07]	-0.283* [-1.79]	-0.289* [-1.79]	-0.0301 [-0.68]	-0.0393* [-1.83]	-0.0392* [-1.82]
INF	-0.00488 [-0.17]	0.0424** [2.23]	0.0249 [1.31]	-0.109 [-0.28]	0.360 [1.65]	0.223 [1.02]	-0.0188 [-0.34]	0.0221 [0.75]	0.0127 [0.43]
_cons	0.0437*** [4.84]	-0.0000618 [-0.01]	0.00318 [0.32]	0.0963 [0.79]	-0.173 [-1.36]	-0.218* [-1.82]	0.127*** [7.39]	0.0480*** [2.78]	0.0495*** [3.07]
N	286	286	286	286	286	286	286	286	286
R ²	0.447	0.533		0.368	0.461		0.357	0.341	

t statistics in brackets; * p<0.1, ** p<0.05, *** p<0.01

4-5- Endogeneity Test and Robustness Checks

Table 6 shows that the endogeneity test is conducted using the Durbin and Wu-Hausman tests to determine whether any independent variables in the regression model are endogenous, which could lead to biased and inconsistent estimations. A p-value below 0.05 indicates the presence of endogeneity, suggesting the need for instrumental variable estimation, while a p-value above 0.05 suggests exogeneity.

Table 5. Endogeneity Test with ROA, ROE and NIM

	LATA	TLGAP	NPL	SIZE	AGE
<i>Endogeneity Test with ROA</i>					
Durbin test (p-value)	0.2535	0.9980	0.0118	0.4940	0.5941
Wu-Hausman test (p-value)	0.2668	0.9981	0.0131	0.5026	0.6015
<i>Endogeneity Test with ROE</i>					
Durbin test (p-value)	0.2561	0.2844	0.0130	0.2561	0.6532
Wu-Hausman test (p-value)	0.2694	0.2939	0.0144	0.2653	0.6598
<i>Endogeneity Test with NIM</i>					
Durbin test (p-value)	0.9900	0.1507	0.2553	0.3473	0.3960
Wu-Hausman test (p-value)	0.9904	0.1584	0.2645	0.3568	0.4053

For the model with ROA as the dependent variable, the results indicate that the p-values for NPL in both the Durbin and Wu-Hausman tests are below 0.05 (0.0118 and 0.0131, respectively), suggesting the presence of endogeneity in this variable. Meanwhile, all other variables, including LATA, TLGAP, SIZE, and AGE, have p-values above 0.05, indicating that they are exogenous. For the model with ROE as the dependent variable, the endogeneity test results are consistent with those of ROA. The p-values for NPL in the Durbin and Wu-Hausman tests are 0.0130 and 0.0144, respectively, which are below the 0.05 threshold, confirming endogeneity in NPL. The remaining variables - LATA, TLGAP, SIZE, and AGE - exhibit p-values above 0.05, implying exogeneity. For the model with NIM as the dependent variable, all variables, including LATA, TLGAP, NPL, SIZE, and AGE, show p-values above 0.05 in both tests. This suggests that there is no evidence of endogeneity in this model, meaning OLS estimation remains appropriate for these variables.

The Durbin-Wu-Hausman test results indicate that the variable non-performing loans (NPL) is endogenous in the models with ROA and ROE as dependent variables. This implies that the inclusion of NPL in these models using standard estimation techniques such as OLS, FEM, or REM could lead to biased and inconsistent estimates. In contrast, the NIM model shows no evidence of endogeneity among the regressors, suggesting that conventional estimators may still yield consistent results in this case.

Given the presence of endogeneity in the ROA and ROE models, it is essential to adopt an estimation approach that addresses this issue. Therefore, the Generalized Method of Moments (GMM) is employed in the subsequent section. GMM not only accounts for potential endogeneity or multicollinearity but also leverages the dynamic nature of panel data, thereby enhancing the robustness and reliability of the empirical findings.

4-6- GMM Results

The Generalized Method of Moments (GMM) model, selected as the preferred estimation approach for its ability to address endogeneity and heteroskedasticity, yields robust insights into the impact of liquidity and bank profitability in Vietnam (Table 7). Across all three specifications (with ROA, ROE, and NIM as dependent variables), liquidity, measured by LATA, consistently demonstrates a negative and statistically significant impact on bank profitability. This reinforces the trade-off between maintaining liquidity buffers and achieving profitability. The liquidity gap (TLGAP) also negatively affects ROA and NIM, suggesting that mismatches between deposits and liquid assets erode both asset returns and interest margins, although its impact on ROE is insignificant, highlighting that equity profitability may be less sensitive to liquidity mismatches.

The lagged dependent variables (ROA L1, ROE L1, and NIM L1) are all positive and highly significant, indicating strong persistence in profitability, equity returns, and interest margins—an expected dynamic in bank profitability due to regulatory constraints and strategic continuity.

Non-performing loans (NPL) emerge as a consistently negative and highly significant factor across all models, with the most severe effect on ROE. This result underscores the critical role of credit risk in undermining bank earnings and shareholder value. Meanwhile, bank size (SIZE) has either marginal or insignificant effects, implying that scale alone is not a reliable predictor of superior profitability in the Vietnamese banking sector. The square root of bank age (sqrt_AGE) remains largely insignificant, challenging the assumption that institutional maturity inherently confers competitive advantage. This suggests that newer banks can perform comparably to older institutions when equipped with sound strategies and governance.

Importantly, the interaction term between liquidity and Basel III adoption (LATA_bs) is positive and significant in all models; most robustly for ROA and ROE, and marginally for NIM. This finding suggests that Basel III compliance helps mitigate the negative profitability impact of high liquidity, potentially due to enhanced risk management and incentives for more efficient asset allocation under stricter regulatory standards.

Table 6. GMM regression results

	ROA	ROE	NIM
ROA L1.	.7532157*** (.0496172)		
ROE L1.		.8158432*** (.0738815)	
NIM L1.			.4898681*** (.0578687)
LATA	-.0229481*** (.0026904)	-.1061784*** (.0270167)	-.0734015*** (.0093406)
TLGAP	-.0136398*** (.0023887)	-.0102437 (.0237825)	-.0492106*** (.0096858)
NPL	-.0261536*** (.0031789)	-.5230468*** (.0397254)	-.229983** (.0718916)
SIZE	.0006671* (.0003475)	.0083326* (.0043862)	.000731 (.0004726)
sqrt_AGE	-.0001957 (.0003576)	-.004995 (.0033836)	-.0012725** (.0004198)
LATA*BASEL	.0074192*** (.0011744)	.0625516** (.0180136)	.0064849* (.0037578)
L1_GDPGR	-.0451003*** (.0038082)	-.4441461*** (.0856379)	-.03171** (.0094433)
INF	-.0057687 (.0063972)	.0309112 (.0660831)	-.0276815* (.0166834)
_cons	.0112912 (.0020878)	.0073969 (.0296062)	.0642061*** (.0106463)
AR(1) (p-value)	0.010	0.009	0.080
AR(2) (p-value)	0.853	0.315	0.879
Sargan (p-value)	0.000	0.003	0.000
Hansen (p-value)	0.272	0.249	0.338

On the macroeconomic front, lagged GDP growth (L1_GDPGR) has a strong negative effect on all profitability measures, particularly ROE. This suggests that periods of economic expansion may introduce competitive or policy-related pressures that compress margins and reduce profitability. Inflation, by contrast, is insignificant in the ROA and ROE models, and only marginally significant in the NIM model, indicating a limited and inconsistent role in explaining bank profitability during the study period.

The empirical findings from this comprehensive analysis of Vietnamese bank profitability metrics (ROA, ROE, and NIM) reveal several critical insights into the banking sector in Vietnam's context. The results collectively paint a picture of a banking system in which profitability is shaped by internal management practices, regulatory frameworks, and macroeconomic conditions; each factor exerting varying degrees of influence across different profitability measures.

A striking pattern across all models is the significant persistence of bank profitability, particularly for ROE (0.816) compared to ROA (0.753) and NIM (0.490). This finding strongly suggests that Vietnamese banks exhibit path dependence in their profitability, with past profitability being a remarkably strong predictor of current results. In the Vietnamese context, where state-owned commercial banks dominate the sector alongside emerging private players, this persistence likely reflects structural factors such as established customer relationships, brand reputation, and in some cases, implicit government support.

The consistently negative relationship between liquidity measures (LATA and TLGAP) and all three profitability metrics deserves particular attention, especially given Vietnam's regulatory environment.

First, LATA's negative impact suggests a trade-off between liquidity and profitability. Firms and financial institutions must strike a balance, ensuring enough liquidity for stability without sacrificing too much potential profit. In Vietnam, holding high liquidity (cash, government bonds) is expensive because these assets yield low returns compared to commercial lending. The negative LATA coefficient confirms the "efficiency" theory: banks that hoard cash to be safe are strictly less profitable. In Vietnam's current banking landscape, this liquidity-profitability dynamic manifests in several ways. State-owned commercial banks and larger institutions generally maintain higher LATA ratios as part of their conservative risk management strategies and to meet stringent regulatory requirements. However, this prudent approach comes at the cost of reduced earnings potential, particularly in the current low-interest-rate environment where yields on liquid assets remain minimal. Meanwhile, some smaller and more aggressive private banks operate with lower liquidity buffers to maximize lending activities and boost profits, though this strategy exposes them to greater liquidity

risks during economic downturns or periods of financial stress. Second, TLGAP's negative effect indicates that banks with large liquidity gaps face increased funding costs, as they often need to rely on more expensive wholesale funding or interbank markets to cover the shortfall. This directly pressures their net interest margins and, consequently, their Return on Assets (ROA). Recent trends show that many Vietnamese banks are operating with substantial liquidity gaps, reflecting a growing mismatch between their deposit bases and liquid asset holdings. It implies that Vietnamese banks often fund long-term assets with short-term deposits. When this gap widens, banks are forced to borrow from the interbank market or issue bonds to cover the shortfall. These wholesale funding sources are more expensive than customer deposits, directly eroding the Net Interest Margin (NIM) and ROA. This situation stems from the rapid credit growth in recent years, driven by the SBV's tight monetary policy or to support businesses recovering after COVID-19 and especially recent policies promoting green credit. So, the findings align with the conclusions of [5, 6, 48, 52, 56], where studies reported a negative impact of liquidity on bank profitability.

Besides, the strong significance of lagged profitability suggests high persistence and ensures that past performance remains a powerful predictor of future results, as state-owned commercial banks leverage these entrenched positions to maintain strategic continuity, distinguishing their stable, conservative operational models from the more volatile strategies of smaller private banks. About other control variables, non-performing loans also exhibit a strong negative effect on bank profitability. This result is critical for Vietnamese banks, where high NPL ratios have historically been a concern, particularly in periods of economic stress. The post-pandemic recovery, while strong, has exposed vulnerabilities, as some businesses still struggle with cash flow problems, leading to new NPLs.

The positive moderating effect of Basel III adoption (LATA_bs) across models, though varying in significance, implies that banks that have adopted Basel III are not just blindly hoarding cash; they are managing risk systematically. Compliance signals "financial health" to the market, likely lowering the bank's cost of capital (investors demand lower returns from safer banks). This finding provides empirical support for the regulator's push toward international standards, suggesting these reforms help banks better manage the profitability-stability tradeoff. Vietnam's banking sector has been gradually adopting Basel III standards, with the SBV implementing key measures such as the Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) to enhance financial stability.

The macroeconomic results present intriguing contradictions that speak to Vietnam's unique economic trajectory. The consistently negative coefficients for lagged GDP growth across all models run counter to conventional wisdom but may reflect specific characteristics of Vietnam's growth pattern. Rapid GDP expansion periods in Vietnam have often been credit-fueled, potentially leading to margin compression from heightened competition or subsequent asset quality deterioration. In the context of Vietnam's recent economic profitability, this relationship takes on particular relevance. Following strong post-pandemic GDP growth in 2022, Vietnamese banks have indeed faced some profitability pressures in 2023, consistent with the observed lagged effect. The credit expansion that accompanied the economic recovery has led to emerging asset-quality concerns, particularly in sectors like real estate that benefited most from the growth surge. The negative lagged GDP variable captures the delayed cost of aggressive credit expansion, where the immediate boost in economic activity is followed by a period of digesting bad debts and compressed margins.

5- Conclusion

This study aimed to examine the impact of liquidity on bank profitability within Vietnam's banking sector, utilizing a comprehensive dataset spanning from 2012 to 2023 across 26 commercial banks. Through multiple econometric approaches, including OLS, FEM, REM, and GMM models applied to three key profitability indicators (ROA, ROE, and NIM), the research provides robust empirical evidence about the liquidity-profitability relationship in Vietnam's unique banking context.

The key findings reveal several important insights. First, liquidity measures (LATA and TLGAP) consistently demonstrate negative relationships with bank profitability across all econometric models (Pooled OLS, FEM, REM, and GMM), though the magnitude varies by profitability metric. This suggests that, on average, higher liquidity levels (whether measured by excess liquid assets or liquidity mismatch) tend to constrain the profit-generating capacity of Vietnamese commercial banks. The variation in magnitude across different profitability measures (ROA, ROE, NIM) indicates that liquidity affects banks through multiple channels. Second, Basel III implementation appears to mitigate some of liquidity's negative effects, particularly for ROA and NIM. In other words, regulatory adherence may allow banks to manage liquidity more efficiently without excessively sacrificing profitability, indicating a trade-off between prudential regulation and financial performance that can be balanced through sound implementation.

For Vietnamese commercial banks, the findings underscore the importance of optimizing liquidity management while strengthening Basel III compliance, credit risk management, and operational efficiency. For regulators, accelerating Basel III implementation and enhancing supervisory mechanisms for liquidity risk monitoring are critical, while policymakers should develop balanced regulations that consider both financial stability and bank profitability, supported by macroeconomic policies fostering sustainable growth and stable interest rates. A coordinated approach among all stakeholders will be essential for building a more resilient and profitable banking sector in Vietnam.

While this study provides valuable insights into the impact of liquidity on the profitability of Vietnamese commercial banks, it is not without limitations. These limitations should be acknowledged and can serve as opportunities for future research. First, the study primarily relies on bank-level panel data from Vietnamese commercial banks and does not account for the potential differences across bank ownership types (e.g., state-owned vs. private vs. foreign banks). Future studies could explore how liquidity-profitability relationships vary across different bank classifications to offer more nuanced policy insights. Likewise, differences in bank size and age may lead to heterogeneous responses to liquidity conditions. Future studies could employ interaction terms or subgroup analysis to better capture these potential disparities. Second, this study focuses exclusively on the Vietnamese banking sector. Expanding the analysis to a comparative regional or international context could help validate the findings and highlight country-specific versus generalizable patterns in the liquidity-profitability nexus. Third, although the study includes an interaction term (LATA_bs) to capture the moderating role of Basel III implementation, the binary nature of the bs variable may not fully reflect the degree or timing of Basel III compliance across banks. Future research could explore a more granular approach to better measure regulatory heterogeneity.

By addressing these limitations, future research can contribute to a deeper and more comprehensive understanding of how liquidity management affects banking profitability, particularly in emerging markets undergoing regulatory and digital transformations. For example, future research could extend the analysis to a regional or cross-country comparison, especially among ASEAN countries or other emerging economies, to assess whether the liquidity-profitability nexus observed in Vietnam is generalizable across different regulatory and financial environments. Furthermore, future research could explore the role of Basel III implementation in shaping the relationship between liquidity and bank profitability in greater detail. While this study uses a binary proxy (bs dummy) to indicate whether a bank adopts Basel III or not, this approach may not adequately capture the depth, quality, and timing of compliance across institutions.

6- Declarations

6-1-Author Contributions

Conceptualization, D.T.N. and O.T.K.N.; methodology, T.T.T.N. and O.T.K.N.; software, O.T.K.N.; validation, D.T.N., T.T.T.N., and O.T.K.N.; formal analysis, D.T.N. and T.T.T.N.; investigation, D.T.N. and T.T.T.N.; resources, D.T.N. and T.T.T.N.; data curation, O.T.K.N. and T.T.T.N.; writing—original draft preparation, D.T.N. and O.T.K.N.; writing—review and editing, D.T.N., T.T.T.N., and O.T.K.N.; supervision, D.T.N.; project administration, T.T.T.N.; funding acquisition, T.T.T.N. All authors have read and agreed to the published version of the manuscript.

6-2-Data Availability Statement

The data presented in this study are available on request from the corresponding author.

6-3-Funding and Acknowledgments

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6-4-Institutional Review Board Statement

Not applicable.

6-5-Informed Consent Statement

Not applicable.

6-6-Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

7- References

- [1] Marozva, G. (2015). Liquidity and Bank Performance. *International Business & Economics Research Journal (IBER)*, 14(3), 453. doi:10.19030/iber.v14i3.9218.
- [2] Bourke, P. (1989). Concentration and other determinants of bank profitability in Europe, North America and Australia. *Journal of Banking and Finance*, 13(1), 65–79. doi:10.1016/0378-4266(89)90020-4.
- [3] Kosmidou, K., Tanna, S., & Pasiouras, F. (2005). Determinants of profitability of domestic UK commercial banks: panel evidence from the period 1995-2002. *Money Macro and Finance (MMF) Research Group Conference*, Rethymno, Greece.
- [4] Ben Abdallah, M., & Bahloul, S. (2025). The influence of solvency and liquidity ratios on profitability of Tunisian banks: the moderating effect of asset quality. *African Journal of Economic and Management Studies*, 16(2), 255–270. doi:10.1108/AJEMS-02-2024-0136.

- [5] Arif, A., & Nauman Anees, A. (2012). Liquidity risk and performance of banking system. *Journal of Financial Regulation and Compliance*, 20(2), 182–195. doi:10.1108/13581981211218342.
- [6] Molyneux, P., & Thornton, J. (1992). Determinants of European bank profitability: A note. *Journal of Banking & Finance*, 16(6), 1173–1178. doi:10.1016/0378-4266(92)90065-8.
- [7] Siddik, M. N. A., Kabiraj, S., & Joghee, S. (2017). Impacts of capital structure on performance of banks in a developing economy: Evidence from bangladesh. *International Journal of Financial Studies*, 5(2), 13. doi:10.3390/ijfs5020013.
- [8] Chen, Y. K., Shen, C. H., Kao, L., & Yeh, C. Y. (2018). Bank Liquidity Risk and Performance. *Review of Pacific Basin Financial Markets and Policies*, 21(1), 1850007. doi:10.1142/S0219091518500078.
- [9] Abbas, F., Iqbal, S., & Aziz, B. (2019). The impact of bank capital, bank liquidity and credit risk on profitability in postcrisis period: A comparative study of US and Asia. *Cogent Economics & Finance*, 7(1), 1605683. doi:10.1080/23322039.2019.1605683.
- [10] Ben Naceur, S., & Goaid, M. (2008). The determinants of commercial bank interest margin and profitability: evidence from Tunisia. *Frontiers in Finance and Economics*, 5(1), 106-130. doi:10.2139/ssrn.856365.
- [11] Demirguc-Kunt, A., & Huizinga, H. (1999). Determinants of Commercial Bank Interest Margins and Profitability: Some International Evidence. *The World Bank Economic Review*, 13(2), 379–408. doi:10.1093/wber/13.2.379.
- [12] King, M. R. (2013). The Basel III Net Stable Funding Ratio and bank net interest margins. *Journal of Banking and Finance*, 37(11), 4144–4156. doi:10.1016/j.jbankfin.2013.07.017.
- [13] Hayati, R., Rachmawati, E. N., & Suriyanti, L. H. (2026). Basel III compliance and bank resilience: An analysis of the effects of macroeconomic factors and profitability on the performance of Indonesian banks. *Journal of Accounting and Investment*, 27(1), 73–92. doi:10.18196/jai.v27i1.26636.
- [14] Yamin, N., Asif, M., Hasnat, M. A., Islam, M. M., Nasiruddin, M., Khandakar, H., & Rahman, M. A. (2025). The Impact of Basel Iii Implementation on the Financial Performance of the Banking Industry in Bangladesh. *Banks and Bank Systems*, 20(1), 98–108. doi:10.21511/bbs.20(1).2025.09.
- [15] Amuah, D., Amadi, C., Telford, B., & Ode-Ichakpa, I. (2026). Capital, liquidity, and bank performance after the global financial crisis: evidence from the ‘big four’ retail banks in the UK. *Journal of Banking Regulation*, 27(1), 11. doi:10.1057/s41261-026-00308-2.
- [16] Mdandalaza, Z., & Jeke, L. (2025). Basel Iii Capital Regulation and Bank Profitability in the Emerging Market. *Risk Governance and Control: Financial Markets and Institutions*, 15(1), 150–162. doi:10.22495/rgcv15i1sip1.
- [17] BCBS. (2010). Basel III: International framework for liquidity risk measurement, standards and monitoring. Basel Committee on Banking Supervision (BCBS), Bank for International Settlements, Basel, Switzerland.
- [18] Kostyrin, E., & Drynkin, S. (2025). Innovative Approach to the Optimal Distribution of Citizens’ Pension Savings to Non-State Pension Funds. *Emerging Science Journal*, 9(1), 504–523. doi:10.28991/ESJ-2025-09-01-028.
- [19] Amponsah Tuffour, S., Appiah, A., Bashiru, S., & Bunyaminu, A. (2022). Claim Management of Non-Life Insurance Companies in Ghana: Does It Impact on Profitability? *Journal of Applied Economic Sciences (JAES)*, 17(16), 97. doi:10.57017/jaes.v17.2(76).02.
- [20] Lee, C. C., & Hsieh, M. F. (2013). The impact of bank capital on profitability and risk in Asian banking. *Journal of International Money and Finance*, 32(1), 251–281. doi:10.1016/j.jimonfin.2012.04.013.
- [21] Ozili, P. K., & Uadiale, O. (2017). Ownership concentration and bank profitability. *Future Business Journal*, 3(2), 159–171. doi:10.1016/j.fbj.2017.07.001.
- [22] Fritsch, N., & Siedlarek, J.-P. (2022). How Do Banks Respond to Capital Regulation? — The Impact of the Basel III Reforms in the United States. *SSRN Electronic Journal*. doi:10.2139/ssrn.4088845.
- [23] Lall, P. (2014). Factors affecting US banking performance: evidence from the 2007-2013 financial crisis. *International Journal*, 3(6), 282-295.
- [24] Nkegbe, P. K., & Ustarz, Y. (2015). Banks Performance in Ghana: Trends and Determinants. *Ghana Journal of Development Studies*, 12(1–2), 33. doi:10.4314/gjds.v12i1-2.3.
- [25] Petria, N., Capraru, B., & Ihnatov, I. (2015). Determinants of Banks’ Profitability: Evidence from EU 27 Banking Systems. *Procedia Economics and Finance*, 20, 518–524. doi:10.1016/s2212-5671(15)00104-5.
- [26] Kamande, E. G. (2019). The Effect of Bank Specific Factors on Financial Performance of Commercial Banks in Kenya. *Research Journal of Finance and Accounting*. doi:10.7176/rjfa/10-20-14.
- [27] Kohlscheen, E., Murcia Pabón, A., & Contreras, J. (2018). Determinants of bank profitability in emerging markets. *BIS Working Paper No. 686*, 1-36.

- [28] Kajola, S. O., Sanyaolu, W. A., Alao, A., & Ojunrongbe, O. J. (2019). Liquidity and profitability dynamics: evidence from the Nigerian banking sector. *Accounting and Taxation Review*, 3(2), 1-12.
- [29] Nuriyeva, Z. (2014). Factors affecting the profitability of Azerbaijan banking system. Master Thesis, Eastern Mediterranean University, Gazimağusa, North Cyprus.
- [30] Cekrezi, A. (2015). Factors affecting performance of commercial banks in Albania. *The European Proceedings of Social and Behavioral Sciences*, 4–13. doi:10.15405/epsbs.2015.05.3.
- [31] Onyango, W. A., & Olando, C. O. (2020). Analysis on Influence of Bank Specific Factors on Non-Performing Loans among Commercial Banks in Kenya. *Advances in Economics and Business*, 8(3), 105–121. doi:10.13189/aeb.2020.080301.
- [32] Haris, M., Yao, H. X., & Fatima, H. (2024). The impact of liquidity risk and credit risk on bank profitability during COVID-19. *Plos One*, 19(9), 308356. doi:10.1371/journal.pone.0308356.
- [33] Kashyap, A. K., Rajan, R., & Stein, J. C. (2002). Banks as liquidity providers: An explanation for the coexistence of lending and deposit-taking. *Journal of Finance*, 57(1), 33–73. doi:10.1111/1540-6261.00415.
- [34] Bholat, D., Lastra, R. M., Markose, S. M., Miglionico, A., & Sen, K. (2018). Non-performing loans at the dawn of IFRS 9: Regulatory and accounting treatment of asset quality. *Journal of Banking Regulation*, 19(1), 33–54. doi:10.1057/s41261-017-0058-8.
- [35] Stephen Kingu, P., Macha, D. S., & Gwahula, D. R. (2018). Impact of Non-Performing Loans on Bank's Profitability: Empirical Evidence from Commercial Banks in Tanzania. *International Journal of Scientific Research and Management*, 6(01), 71–79. doi:10.18535/ijrm/v6i1.em11.
- [36] Flannery, M. J. (2017). Stabilizing large financial institutions with contingent capital certificates. *The Most Important Concepts in Finance*, 277–300. doi:10.4337/9781786431134.00020.
- [37] Berrospide, J. M., & Edge, R. M. (2010). The Effects of Bank Capital on Lending: What Do We Know, and What Does It Mean?. *International Journal of Central Banking*, 6(34), 1-50.
- [38] Čihák, M., & Hesse, H. (2010). Islamic Banks and Financial Stability: An Empirical Analysis. *Journal of Financial Services Research*, 38(2), 95–113. doi:10.1007/s10693-010-0089-0.
- [39] Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115–143. doi:10.1016/S0304-4076(98)00009-8.
- [40] Almaqtari, F. A., Al-Homaidi, E. A., Tabash, M. I., & Farhan, N. H. (2019). The determinants of profitability of Indian commercial banks: A panel data approach. *International Journal of Finance and Economics*, 24(1), 168–185. doi:10.1002/ijfe.1655.
- [41] Menicucci, E., & Paolucci, G. (2016). The determinants of bank profitability: empirical evidence from European banking sector. *Journal of Financial Reporting and Accounting*, 14(1), 86–115. doi:10.1108/jfra-05-2015-0060.
- [42] Sivalingam, L., & Kengatharan, L. (2018). Capital structure and financial performance: A study on commercial banks in Sri Lanka. *Asian Economic and Financial Review*, 8(5), 586–598. doi:10.18488/journal.aefr.2018.85.586.598.
- [43] Yahya, A. T., Akhtar, A., & Tabash, M. I. (2017). The impact of political instability, macroeconomic and bank-specific factors on the profitability of Islamic banks: An empirical evidence. *Investment Management and Financial Innovations*, 14(4), 30–39. doi:10.21511/imfi.14(4).2017.04.
- [44] Barajas, A., Steiner, R., & Salazar, N. (1999). Interest spreads in banking in Colombia, 1974-96. *IMF Staff Papers*, 46(2), 196–224. doi:10.2307/3867667.
- [45] Berger, A. N. (1995). The Relationship between Capital and Earnings in Banking. *Journal of Money, Credit and Banking*, 27(2), 432. doi:10.2307/2077877.
- [46] Dietrich, A., & Wanzenried, G. (2011). Determinants of bank profitability before and during the crisis: Evidence from Switzerland. *Journal of International Financial Markets, Institutions and Money*, 21(3), 307–327. doi:10.1016/j.intfin.2010.11.002.
- [47] Bordeleau, É., & Graham, C. (2010). The impact of liquidity on bank profitability (No. 2010-38). Bank of Canada, Ottawa, Canada.
- [48] Rasul, L. M. (2013). Impact of liquidity on Islamic banks' profitability: evidence from Bangladesh. *Acta Universitatis Danubius. (Economica)*, 9(2), 23-36.
- [49] Hirindu Kawshala, K. (2017). The factors effecting on bank profitability. *International Journal of Scientific and Research Publications*, 7(2), 212-216.
- [50] Moussa, M. A. B. (2015). The determinants of bank liquidity: Case of Tunisia. *International journal of economics and financial issues*, 5(1), 249-259.

- [51] Ruziqa, A. (2013). The impact of credit and liquidity risk on bank financial performance: The case of Indonesian conventional bank with total asset above 10 trillion rupiah. *International Journal of Economic Policy in Emerging Economies*, 6(2), 93–106. doi:10.1504/IJEPEE.2013.055791.
- [52] Deep, A., & Schaefer, G. (2004). Are Banks Liquidity Transformers? KSG Working Paper No. RWP04-022. doi:10.2139/ssrn.556289.
- [53] Singh, A., & Sharma, A. K. (2016). An empirical analysis of macroeconomic and bank-specific factors affecting liquidity of Indian banks. *Future Business Journal*, 2(1), 40–53. doi:10.5267/j.ac.2020.7.014.
- [54] Singh, S. K., Basuki, B., & Setiawan, R. (2021). The Effect of Non-Performing Loan on Profitability: Empirical Evidence from Nepalese Commercial Banks. *Journal of Asian Finance, Economics and Business*, 8(4), 709–716. doi:10.13106/jafeb.2021.vol8.no4.0709.
- [55] Silwal, A. (2024). Measurement of Bank Performance in Nepal. *Nepalese Journal of Finance*, 11(4), 163–184. doi:10.3126/njf.v11i4.79775.
- [56] Haryati, N., Burhany, D. I., & Suhartanto, D. (2019). Assessing the Profitability of Islamic Banks: The Role of Bank Age and Bank Performance. *IOP Conference Series: Materials Science and Engineering*, 662(6), 62014. doi:10.1088/1757-899X/662/6/062014.
- [57] Regehr, K., & Sengupta, R. (2016). Has the relationship between bank size and profitability changed?. *Economic Review* (01612387), 101(2).
- [58] Yakubu, I. N., & Bunyaminu, A. (2024). Bank profitability in Sub-Saharan Africa: does economic globalization matter? *Journal of Economic and Administrative Sciences*, 40(3), 673–683. doi:10.1108/JEAS-08-2021-0158.
- [59] Beck, T., Döttling, R., Lambert, T., & van Dijk, M. (2023). Liquidity creation, investment, and growth. *Journal of Economic Growth*, 28(2), 297–336. doi:10.1007/s10887-022-09217-1.
- [60] Phung, Q. T., Van Vu, H., & Tran, H. P. (2022). Do non-performing loans impact bank efficiency? *Finance Research Letters*, 46, 102393. doi:10.1016/j.frl.2021.102393.
- [61] Al-Homaidi, E. A., Tabash, M. I., Farhan, N. H. S., & Almaqtari, F. A. (2018). Bank-specific and macro-economic determinants of profitability of Indian commercial banks: A panel data approach. *Cogent Economics & Finance*, 6(1), 1–26. doi:10.1080/23322039.2018.1548072.