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DOES THE BANK'S LIQUIDITY HOARDING MATTER? EVIDENCE FROM VIETNAMESE COMMERCIAL BANKS

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Abstract – *Using a novel measure of liquidity hoarding, this study investigates its effects on the performance of Vietnamese commercial banks from 2012 to 2023. The analysis reveals a significant detrimental relationship between liquidity hoarding and bank performance. The research also identifies key drivers of profitability, with the loan-to-deposit ratio, capital adequacy ratio, and bank size showing positive influences, while operating costs, management efficiency, and bank age had negative effects. In addition, the findings revealed that inflation positively affects banks' performance by allowing banks to revalue assets. A key contribution is the novel finding of a negative correlation between the adoption of environmental, social, and governance policies and bank performance. This nexus reflects the upfront costs and initial resource drain associated with implementing these policies. This suggests that the financial benefits of environmental, social, and governance practices may be a long-term payoff, rather than a short-term gain.*

Keywords: bank's performance, ESG practices, liquidity hoarding.

I. INTRODUCTION

Banking is a crucial component of the current economic landscape, serving as the backbone of the financial system and economy. Banks allocate money efficiently by transferring cash from savers to borrowers. They are also essential in bridging the gap between individuals in need of finance and those with excess funds to invest in infrastructure, innovation, and enterprises. In addition, by modifying interest rates and reserve ratios, central banks employ the banking industry to carry out monetary policy. The Basel Committee on Banking Supervision [1] defines risk in banking as the likelihood of events or situations that affect the bank's financial resources or reputation. Commercial banks face six major categories of risks: credit risk, interest rate risk, market risk, currency risk, innovation risk, and operational risk. During the 2008 global financial crisis, the bank's bankruptcy was caused by a liquidity issue rather than unexpected losses in the loan portfolio, confirming the relevance of liquidity risk as a critical concern [2]. This crisis exposed vulnerabilities in bank liquidity systems, where a lack of liquidity forced banks to confront withdrawal pressures from clients, potentially leading to asset fire sales at low prices to sustain operations, resulting in substantial losses and severely impacting profitability and bank survival [3]. Liquidity risk is the potential loss caused by failing to meet payment commitments and not being on time when they become due. This risk is inherent in the Bank's operations and arises from the difference in maturity between its assets and liabilities. In other words, liquidity risk is an outcome of banks' inability to balance their assets and obligations, especially owing to the mismatch between deposits collected and financing provided [4]. Typically, the liquidity problem occurs when depositors desire to redeem their savings, but the banks do not have enough cash. Banks frequently check imbalances on the asset and liability side and handle them appropriately to avoid facing solvency risk [5]. In modern banks, liquidity risk is derived from exposure to undrawn loan obligations, withdrawals from wholesale deposits, and the loss of alternative short-term funding sources rather than demand

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deposits.

Extensive literature identifies numerous factors influencing bank performance, including bank-specific factors such as size, capital adequacy ratio (CAR), capital, liquidity, credit risk, asset quality, and industry-related factors, as well as macroeconomic variables such as gross domestic product (GDP) growth, inflation, and interest rate risk [6–8]. Since the 2008 financial crisis, liquidity hoarding has been considered a critical concern for commercial banks in the contemporary banking landscape. Large banks have struggled to meet short-term payment obligations, resulting in the failure of many financial institutions and widespread instability throughout the global financial system. The most recent example is the bankruptcy declaration of Silicon Valley Bank in March 2023 [9], after depositors, primarily startups, withdrew money massively due to a weakness in the bank's liquidity control, raising fears of a widespread financial crisis. Recognizing the heightened market volatility, banks have increasingly prioritized liquidity hoarding as a crucial buffer against potential shocks driven by factors such as economic uncertainty, regulatory pressures, technological advancements, and central bank policies. However, the nexus between liquidity hoarding and bank performance remains underexplored, and empirical findings on this relationship are controversial, with limited studies having examined the impact of liquidity hoarding on bank performance [10, 11].

This study investigates the internal and external factors influencing commercial bank performance in Vietnam. An analysis of the internal determinants of corporate strategy will be conducted in conjunction with an evaluation of the impact of macroeconomic variables, including inflation and GDP. In particular, the role of liquidity hoarding will be highlighted, emphasizing its importance in managing liquidity risks, investing in new opportunities, and ensuring sustainable growth. Moreover, the study also provides deep insights into how effective liquidity management can positively impact the long-term success of financial institutions.

First, the level of liquidity hoarding is the main measure of analysis. The literature typically uses bank liquid assets or other simple ratios, such as the ratio of deposits to total assets, or the loan-to-deposit ratio [12, 13]. These measures often focus solely on the internal factors of banks without considering macroeconomic factors or external market conditions. Thus, they have limitations and do not adequately represent banks' risk levels and behaviors as they evolve. The study applies the comprehensive and updated measures proposed by Berger et al. [14], enhancing the assessment of liquidity risk by considering the use of liquid funds (liquid assets), and all the sources of these funds from elsewhere in the portfolio (other assets, off-balance sheet activities, and liabilities). Second, the Vietnamese banking sector and economy offer a unique case study for examining the link between instability in banking operations and liquidity accumulation. State-owned banks prioritize government-directed loans, and the economy has grown at a 6–7% annual rate. However, the Vietnamese banking system has also faced challenges, such as rising non-performing loans. The financial market remains relatively underdeveloped, with limited options for risk diversification and liquidity management beyond traditional instruments. Furthermore, substantial government influence, through policies like credit growth targets and reserve requirements, significantly shapes the operating environment for banks. Within this context, research on liquidity hoarding is crucial. Understanding the drivers and consequences of liquidity hoarding maintains financial stability by identifying potential risks and informing regulatory policies to mitigate them. It can also support economic growth by shedding light on the impact of hoarding on credit availability and by informing policies aimed at promoting lending and economic activity. Furthermore, this study can help banks better understand the trade-offs between liquidity and profitability, allowing them to adapt their liquidity management techniques. These findings can help policymakers in Vietnam optimize the degree of liquidity regulation for the

banking sector, balancing financial stability and economic growth. By exploring best practices and guiding policies that align with international standards, this study may improve the competitiveness of the Vietnamese banking industry globally.

Lastly, in recent years, environmental performance, social responsibility, and corporate governance (ESG) have become crucial for banks and financial institutions. Since ESG issues directly affect economic stability, they are both morally and financially important. Financial organizations find it challenging when incorporate ESG concerns into their lending, investing, and product portfolios due to shareholder expectations. Including ESG considerations in their risk management frameworks is highlighted by the rise in investor demand for sustainable commodities as well as regulatory pressure. It is widely acknowledged that financial institutions should be considered as both financial value creators and drivers towards more sustainable development. ESG practices are therefore becoming more integrated into the business plans of financial intermediaries. For both banks and governmental organizations, integrating ESG disclosure factors into liquidity risk management may impact prudential norms and become a strategic move. Due to the lack of ESG data in Vietnam, this study attempts to consider this factor, which affects bank performance, in addition to the bank-specific, industry, and macro-variables that have been explored in previous studies.

The study is structured as follows: The literature review is presented in Section 2. Section 3 provides data, variable construction, and research models. In Section 4, empirical results are presented, and the final section concludes the paper with a summary of the findings.

II. LITERATURE REVIEW

A. Theoretical origins

The theoretical foundation of liquidity hoarding is based on theories such as the agency theory, trade-off theory, stakeholder theory, and behavioral theory.

Agency theory provides a valuable framework for understanding the link between liquidity hoarding and bank performance. This theory posits that conflicts of interest can arise between the principal (shareholders) and the agent (bank managers) [15]. For the bank to develop over the long run, shareholders expect it to be profitable and take measured risks. However, managers may risk the bank's stability by prioritizing short-term earnings to increase their compensation or by taking on excessive risks to look bold. In liquidity hoarding, managers may prioritize their interests, such as job security or bonuses, over maximizing shareholder value. For instance, managers might hoard excess liquidity to cushion against potential losses and protect their jobs, even if it reduces the bank's profitability. Conversely, shareholders may prefer a higher level of lending activity to maximize returns, even if it increases the bank's risk exposure. Agency theory helps explain why these conflicting incentives can lead to suboptimal liquidity management decisions, which impact bank performance.

By emphasizing the trade-off between the advantages and disadvantages of keeping liquid assets, the trade-off hypothesis proposed by Campbell et al. [16] explains the connection between liquidity hoarding and bank performance. Hoarding liquid assets, such as cash and short-term government securities, comes with an opportunity cost, as these funds could be used for potentially more profitable investments, thereby negatively impacting performance metrics like profitability and shareholder returns. However, maintaining high liquidity provides a buffer against unexpected deposit withdrawals or financial shocks, reducing the risk of financial distress and enhancing a bank's stability and reputation, which could severely damage performance and solvency. This, in turn, can attract more depositors and lower funding costs. Both theories suggest mixed results in the relationship between liquidity hoarding and bank performance.

B. Literature review and hypothesis development

The topic of liquidity hoarding has gained attention as a result of the 2008 financial crisis and the COVID-19 pandemic, as well as evolving regulatory and economic contexts. Liquidity hoarding is the bank's practice of holding large reserves of liquid assets, such as cash or government bonds, rather than deploying them into effective investments or lending activities. While banks may hoard liquidity as a precautionary mechanism in reaction to economic uncertainty, the consequences of such conduct for bank performance have received little attention in the literature. While various studies in the literature have reported empirical evidence regarding the nexus between liquidity management, liquidity risk, and bank performance [9, 17–19], empirical studies focusing on the problem of liquidity hoarding remain scarce, particularly in the Vietnamese banking sector.

Bhatia [9] examined the influence of liquidity hoarding on the performance of Indian banks from 2005 to 2020. Liquidity hoarding has a detrimental impact on bank performance as it limits lending capacity, especially during periods of economic uncertainty, resulting in diminished intermediation and probable long-term financial instability. In addition, during periods of economic uncertainty, Indian banks tend to hoard liquidity in times of economic uncertainty. To investigate the factors that influence liquidity risk, Chen et al. [17] employed an unbalanced panel dataset of commercial banks from 12 advanced nations between 1994 and 2006, with an alternative measure. According to their findings, bank performance and liquidity hoarding are negatively correlated.

Specifically, they found that increased liquidity holdings led to higher funding costs and reduced net interest margins, attributed to the lower returns on liquid assets in competitive markets. Similarly, Obi-Nwosu et al. [18] confirmed the negative impact of liquidity hoarding on bank performance that prevents effective utilization of available funds, leading to reduced profitability and hindering banks' ability to meet financial obligations. Moreover, Al-Ardah et al. [19] conducted a study on 13 Jordanian banks listed on the Amman Stock Exchange by employing the liquidity ratio to measure liquidity risk. The results revealed that liquidity hoarding negatively impacts bank performance by reducing the return on assets, as excessive liquidity can limit investment.

In the context of the Vietnamese banking industry, Dang et al. [20] examined how uncertainty affects bank liquidity hoarding. The authors used a sample of Vietnamese banks from 2007 to 2019 to show that banks tend to hoard more liquidity overall when uncertainty increases. In particular, the effects of banking uncertainty on hoarding liquidity are more pronounced for weaker banks, smaller banks, riskier banks, and those with less capital. Tran et al. [21] analyzed the relationship among the profitability, regulatory capital, and liquidity of US banks. They found that lower bank profitability is linked to increased liquidity generation and illiquidity risk.

Most studies show the negative impact of liquidity hoarding on the bank's performance; however, a few studies that reported contrasting results [22, 23]. The trade-off theory states that by weighing the long-term advantages of lowering the risk of financial crisis against the short-term expense of maintaining low-yield liquid assets, liquidity hoarding improves bank performance. A bank can increase its stability and long-term worth by making this strategic decision, even if it means sacrificing some short-term profits. Akbar [22] examined the effect of liquidity on bank performance by using data from foreign banks listed on the IDX for the 2010–2016 period. The results showed the positive effect of liquidity on return on equity. Using panel data from 31 Vietnamese commercial banks from 2006 to 2020, Minh et al. [23] demonstrated that liquidity hoarding has a positive impact on bank performance, as evidenced by a higher liquid asset-to-total assets ratio, which in turn enhances net interest margins in Vietnamese commercial banks.

Based on the theoretical framework and the previous empirical studies, it is hypothesized that:

Hypothesis H1a: Liquidity hoarding negatively impacts bank performance.

Hypothesis H1b: Liquidity hoarding positively impacts bank performance.

III. DATA AND RESEARCH METHODOLOGY

A. Data

The sample is a panel dataset of 35 commercial banks in Vietnam from 2012 to 2023. To ensure the accuracy and significance of the results, this study excluded banks that experienced major structural changes, such as mergers or acquisitions, as well as banks under special control by the State Bank of Vietnam due to internal factors, and those with incomplete data. After excluding, the final dataset includes 31 commercial banks, resulting in 372 annual observations for in-depth analysis in this study. The data was collected from publicly available financial statements and annual reports on each bank's website, ensuring objectivity and high reliability. In addition, macroeconomic indicators such as GDP growth and inflation are sourced from the World Bank. To mitigate the problem of extreme outliers, the study's sample winsorizes the bank-level variables at the 2% and 98% percentiles.

B. Variable construction

The summary statistics and correlations for key dependent and independent variables are described in Table 2 and Table 3, respectively.

Liquidity hoarding measurement

The comprehensive process is applied to determine bank liquidity hoarding. To consider the particular circumstances of the Vietnamese banking system, the original metrics of Berger et al. [24] were employed, with some adjustments from Berger et al. [14] and Dang et al. [20], to categorize banking components (both on- and off-balance sheets) more effectively and appropriately through Formula (1).

Liquidity hoarding (LHA) = On-balance sheet liquidity hoarding (LHA-asset) + (LHA-liability) + Off-balance sheet liquidity hoarding (LHA-off-balance) (1)

Where:

(1) LHA-asset = (+1/2) × liquid assets + (-1/2) × illiquid assets;

(2) LHA-liability = (+1/2) × liquid liabilities;

(3) LHA-off-balance = (–1/2) × illiquid guarantees + (+1/2) × liquid derivatives;

Bank liquidity hoarding's components are displayed in Table 1.

Table 1: Bank liquidity hoarding measures and their components

No.	Classification	Components	Weights
1	Liquid assets	Cash and due from institutions	+1/2
		All securities	
		Trading assets	
	Illiquid assets	Corporate loans	
		Retail loans	-1/2
		Other loans	
2	Liquid liabilities	Transactions deposits	-1/2
		Savings deposits	
		Trading liabilities	
	Illiquid guarantees	Loan commitments	-1/2
		Letters of credit commitments	
		Loan guarantees	
		All other off-balance sheet liabilities	
3	Liquid derivatives	All derivatives	-1/2

Variable descriptions

Table 4 reveals the correlation coefficients between the variables, whose purpose is to examine the close correlation between independent and dependent variables to eliminate factors that may lead to multicollinearity before running regression models. The correlation coefficient between independent variables in the model does not have any pair greater than 0.8, so it is less likely to have multicollinearity. Moreover, Table 4 also indicates that there are no multicollinearity issues, as all Variance Inflation Factor (VIF) values are below 10.

Table 2: Variable description

Variable	Variable name	Measurement
Dependent variables		
ROA	Return on assets	Net income/Total assets
ROE	Return on equity	Net income/Total shareholders' equity
NIM	Net interest margin	Net interest income/Earning assets
Independent variables		
LHA	Liquidity hoarding	Following Berger et al. [14], the measurement is displayed in Section B.
AGE	Bank age	The number of years of establishment of the bank
SIZE	Bank size	The natural logarithm of total assets
CAR	Capital adequacy ratio	The annual capital adequacy ratio obtained from each bank's annual report
OC	Operating cost ratio	Bank's operational expenses / total assets
LTD	Loan-to-deposit ratio	The ratio of total loans to total deposits of each bank.
HHI	Income diversification	HHI = [1- [(NII/NOI)^2 + (NON/NOI)^2]] Where: NII is net interest income, NOI is net operating income, and NON is non-interest income.
ME	Management efficiency	The portion of interest-bearing assets to the total assets of each bank.
ESG	Environmental performance, social responsibility, and corporate governance disclosure	It is a dummy variable equal to 1 if the bank reports ESG activities in its annual report, and 0 otherwise.
Macroeconomic variables		
GDP	GDP growth rate	Collected from the World Bank [25]
INF	Inflation	Collected from the World Bank [25]

Table 3: Descriptive statistics

Variable	Obs	Mean	Std. dev.	Min	Max
ROA	372	0.008	0.005	0.001	0.018
ROE	372	0.092	0.063	0.010	0.197
NIM	372	0.035	0.020	0.005	0.293
LHA	372	0.097	0.187	-1.183	0.590
OC	372	0.011	0.007	0.0003	0.0200
ME	372	0.750	0.092	0.091	0.890
LTD	372	0.869	0.172	0.001	1.428
HHI	372	0.316	0.110	0.010	0.500
CAR	372	0.127	0.034	0.081	0.275
AGE	372	25.829	11.745	4	66
SIZE	372	18.841	1.195	16.402	21.557
GDP	372	5.961	1.695	2.554	8.124
INF	372	3.701	2.110	0.631	9.095
ESG	372	0.910	0.286	0	1

Source: Author's calculation

C. Research methodology

To investigate the connection between liquidity hoarding and other elements influencing bank performance, the regression models have been developed.

Model 1:

$$ROA_{it} = \beta_0 + \beta_1 LHA_{it} + \beta_2 AGE_{it} + \beta_3 SIZE_{it} + \beta_4 OC_{it} + \beta_5 LTD_{it} + \beta_6 HHI_{it} + \beta_7 ESG_{it} + \beta_8 ME_{it} + \beta_{9-10} Macro_t + \varepsilon_{it} \quad (1)$$

Model 2:

$$ROE_{it} = \beta_0 + \beta_1 LHA_{it} + \beta_2 AGE_{it} + \beta_3 SIZE_{it} + \beta_4 OC_{it} + \beta_5 LTD_{it} + \beta_6 HHI_{it} + \beta_7 ESG_{it} + \beta_8 ME_{it} + \beta_{9-10} Macro_t + \varepsilon_{it} \quad (2)$$

Model 3:

$$NIM_{it} = \beta_0 + \beta_1 LHA_{it} + \beta_2 AGE_{it} + \beta_3 SIZE_{it} + \beta_4 OC_{it} + \beta_5 LTD_{it} + \beta_6 HHI_{it} + \beta_7 ESG_{it} + \beta_8 ME_{it} + \beta_{9-10} Macro_t + \varepsilon_{it} \quad (3)$$

Where: the subscripts i and t denote bank and years, respectively. ROA, ROE, and NIM are the proxies of bank performance.

β_0: Constant term.

LHA_{it}: Liquidity hoarding of bank i at year t

CAR_{it}: Capital adequacy ratio of bank i at year t

OC_{it}: Operating cost ratio of bank i at year t

ME_{it}: Management efficiency of bank i at year t

LTD_{it}: Funding strength of bank i at year t

HHI_{it}: Income diversification of bank i at year t

$Macro_t$: Macro variables include GDP, Inflation rate at year t

ε_{it}: the error term

For the panel data model, the traditional regression methods were used, which included the fixed effect model (FEM), random effect model (REM), and pooled ordinary least squares (POLS) regression model. To choose a suitable model between FEM and REM, a Hausman test will be conducted. Heteroskedasticity and autocorrelation tests will then be conducted to evaluate the model's dependability. The chosen model will be incorporated into the analysis of

Table 4: Pearson pairwise correlation matrix

No.	Variables	1	2	3	4	5	6	7	8	9	10	11	12	VIF
1	LHA	1												0.525
2	OC	-0.039	1											0.884
3	ME	-0.457	-0.045	1										0.486
4	LTD	-0.497	-0.016	0.501	1									0.504
5	HHI	-0.273	0.056	0.010	-0.070	1								0.673
6	CAR	0.057	0.009	-0.133	-0.001	-0.108	1							0.577
7	AGE	-0.119	0.096	0.191	0.214	0.191	-0.181	1						0.723
8	SIZE	-0.243	0.115	0.281	0.219	0.291	-0.534	0.485	1					0.358
9	ZSCORE	0.201	-0.212	-0.236	-0.262	-0.110	-0.073	-0.115	-0.146	1				0.737
10	GDP	0.057	0.027	0.100	-0.012	-0.135	0.098	-0.042	-0.085	0.001	1			0.942
11	INF	0.267	0.034	-0.298	-0.112	-0.103	0.247	-0.149	-0.204	0.047	-0.028	1		0.808
12	ESG	-0.009	0.093	0.013	-0.035	0.109	-0.261	0.101	0.351	-0.057	-0.031	-0.181	1	0.811

Source: Author's calculation

the end findings if it passes the tests. Conversely, generalized least squares (GLS) models will be used to adjust the model when it exhibits autocorrelation or heteroskedasticity. Final results will be displayed in Table 5.

IV. EMPIRICAL RESULTS AND DISCUSSION

This research investigates the influence of a variety of bank-specific, industry-related, and macroeconomic factors on bank performance proxied by return on assets (ROA), return on equity (ROE), and net interest margin (NIM). After completing the regression model and solving the heteroskedasticity problem, the predicted coefficients that fit best for the full period 2012–2023 are provided in Table 5. Furthermore, the significance values for the Wald test statistics for all three regressions indicate that the model fits the panel data satisfactorily.

The estimated coefficient for liquidity hoarding (LHA) is negative and statistically significant at the 10% level with ROE, and at 1% level with ROA and NIM. Hypothesis H1a is supported, and Hypothesis H1b is rejected. There are many reasons explaining the adverse impact of LHA on bank performance. Maintaining excess liquidity often means lower returns, because liquid assets like cash and government bonds typically offer lower interest rates compared to riskier but potentially more profitable investments such as loans. This lower return on assets directly impacts a bank's profitability, resulting in it missing out on profitable investment opportunities.

Table 5: Regression results

	Model (1) ROA	Model (2) ROE	Model (3) NIM
	Coefficient (Std.er)	Coefficient (Std.er)	Coefficient (Std.er)
LHA	-0.009***	-0.031*	-0.024***
	(0.002)	(0.014)	(0.004)
OC	0.015	-0.095	-0.212**
	(0.027)	(0.272)	(0.069)
ME	-0.014***	-0.071*	-0.051***
	(0.003)	(0.029)	(0.008)
LTD	0.014***	0.135***	0.014**
	(0.002)	(0.016)	(0.004)
HHI	-0.001	-0.037	-0.042***
	(0.002)	(0.020)	(0.006)
CAR	0.031***	-0.049	0.167***
	(0.007)	(0.063)	(0.018)
AGE	-0.00001	-0.0004*	-0.0001**
	(0.00002)	(0.0002)	(0.00005)
SIZE	0.002***	0.031***	0.006***
	(0.0003)	(0.003)	(0.001)
GDP	-0.0001	-0.0003	-0.0002
	(0.0001)	(0.001)	(0.0003)
INF	0.0002	0.001	0.0009***
	(0.0001)	(0.001)	(0.0003)
ESG	0.0006	0.005	-0.008***
	(0.001)	(0.006)	(0.002)
Constant	-0.031***	-0.510***	-0.049***
	(0.006)	(0.054)	(0.013)
Number of observations	372	372	372
F test	F(30, 285) = 9.99 Prob = 0.000	F(30, 285) = 8.34 Prob = 0.000	F(30, 285) = 8.64 Prob = 0.000
Hausman test	chi2(9) = 14.99 Prob = 0.091	chi2(11) = 28.44 Prob = 0.003	chi2(11) = 85.08 Prob = 0.000
Modified Wald test	chi2 (31) = 1221.22 Prob = 0.000	chi2 (31) = 2047.93 Prob = 0.000	chi2 (31) = 2919.45 Prob = 0.000

*Note: Significance levels of 10%, 5%, and 1% are denoted by **, and ***, respectively. Bank performance is proxied by ROA, ROE [26, 27], and NIM [28], displayed in Columns (1), (2), and (3), respectively.*

These include lending to promising businesses, investing in securities with higher returns, or expanding into new markets, which can significantly impact a bank's long-term growth and profitability. Especially in a competitive banking environment, hoarding liquidity can put a bank at a disadvantage. Competitors may be more willing to lend and offer more attractive interest rates to borrowers, potentially attracting customers away from the liquidity-hoarding bank. The results of the previous study supported that liquidity hoarding creates a direct and measurable trade-off between lower liquidity risk and lower bank performance [29].

The impact of the loan-to-deposit ratio (LTD) on ROA, ROE, and NIM is positive and is significant at the levels of 1% and 5%, reflecting how effectively a bank utilizes its deposit base to generate revenue. A higher LTD indicates that a larger proportion of deposits is being deployed into loans, which are typically banks' primary source of interest income. This suggests efficient asset management and a focus on core lending activities. Increased lending activity translates to higher net interest income, a key driver of profitability for most banks. This finding differs from the study conducted by Jha et al. [30], which found a negative relationship between liquidity and the bank's performance, but is in line with the recent study of Quoc Trung et al. [31] in the Vietnamese context.

The findings show that management efficiency (ME) has a negative connection with ROA, ROE, and NIM at the 1% and 10% significance levels. This conclusion shows that the higher the management efficiency, the lower the bank's profitability. While ME helps to enhance the bank's operations, if it becomes overly high, the bank may fail to fully capitalize on profit potential from investments or other profitable activities. These findings are contrasted with Sufian et al.'s study [32], which stated that management efficiency, as measured through effective cost control, prudent credit risk management, and strategic asset allocation, is a primary and statistically significant determinant of a bank's performance.

The CAR variable shows a positive relationship with ROA and NIM, but no significant impact on ROE (Table 5). In other words, bank capital sufficiency greatly improves bank profitability. The higher the CAR, which measures the amount of capital required to sustain commercial banks' hazardous assets, the larger the banks' risk tolerance. It contributes to the reputation of commercial banks, making circumstances suitable for capital mobilization, loan development, and other economic activity. This outcome can be explained by the fact that banks with greater financial capabilities are more confident in participating in successful banking activities since these resources enable them to mitigate unforeseen losses. Nguyen et al. [33] also provided similar evidence that a higher capital adequacy ratio is a key determinant of superior bank performance.

The findings indicate that bank age (AGE) has a negative relationship with ROA and NIM, suggesting that younger banks outperformed older ones. The reason is that younger banks may be more adaptive to the continual changes in information technology infrastructure that accompany modernization and digitalization. In comparison, older banks may face challenges in maintaining high profitability and returns, potentially due to slower adaptation to new financial technologies, more rigid organizational structures, or a less dynamic approach to market changes. This offers younger banks an advantage over older banks in increased profitability. Furthermore, conventional banks will be more likely to be brick-and-mortar since they will have more branches, which increases the expense of maintaining their operations. As a result, the bank's clients must pay more for its products and services, which Gupta et al. [28] confirmed harmed bank performance.

This research also found a positive and significant relationship between bank size (SIZE) and profitability. Larger banks can achieve cost efficiencies through economies of scale, allowing them to diversify products and services, create added value, increase operational efficiency, and thus enhance profitability. This is supported by findings from the previous studies [28, 34], which

showed that bank size is a significant positive determinant of bank performance due to benefits derived from economies of scale, market power, and superior diversification.

Inflation (INF) shows a positive and statistically significant relationship at the 1% level in Model 3. The reason for this is that higher inflation allows banks to adjust interest rates on loans, leading to revenues that increase faster than costs, potentially increasing profit margins and thereby enhancing profitability. Additionally, inflation creates opportunities for banks by allowing them to reassess fixed assets and investments, thereby enhancing financial performance. This result is supported by prior studies [35, 36], which stated that higher inflation can lead to improved bank performance, as banks can adjust their lending rates faster than their deposit rates, thereby increasing their core profitability.

In recent years, ESG has become a new concern for banks. Table 5 shows that ESG disclosure has a considerable negative influence on NIM only in Model (3). The negative coefficient indicated that applying ESG policies may lower bank performance. The reason for this might be that investing in renewable energy infrastructure, expanding staff training programs, or upgrading data privacy safeguards all demand major financial resources. These expenses have the potential to reduce short-term profitability by decreasing ROA and ROE. Furthermore, tougher lending standards based on ESG issues may restrict a bank's lending choices, lowering potential interest revenue. Focusing on ESG risks diverts management's attention and resources from essential business operations, impeding innovation and efficiency. Finally, evaluating and reporting ESG performance may be difficult and expensive, adding another strain on banks. These findings are in line with recent studies [37, 38], which demonstrated that ESG initiatives can ultimately harm a bank's value if not managed with financial prudence.

V. CONCLUSION

The study investigates the influence of bank liquidity hoarding on bank performance in Vietnam from 2012 to 2023. A key contribution was the comprehensive measure of bank liquidity hoarding recently proposed by Berger et al. [14], who considered the unique context of the Vietnamese banking system. This study identified numerous significant determinants, including bank-specific, industry, and macroeconomic variables. This paper highlights the trade-off between the benefits and costs of holding liquid assets. Hoarding liquid assets comes with an opportunity cost, as these funds could be used for potentially more profitable investments, thus negatively impacting performance. While a high liquidity buffer protects against financial shocks and unexpected withdrawals, it also reduces financial distress and enhances a bank's stability and reputation. An analysis of bank performance reveals that several factors impact profitability. The loan-to-deposit ratio, capital adequacy ratio, and bank size positively influence performance, while operating costs, management efficiency, and bank age are negatively associated with it. From a macroeconomic standpoint, inflation can positively affect a bank's performance by enabling the revaluation and repricing of fixed assets and investments.

These findings offer crucial insights for Vietnamese regulators and bank managers, contributing to a more stable banking system by improving their understanding of liquidity risk. A key limitation of this study is the use of a dummy variable to measure ESG practices, suggesting that future research should use a weighted index for a more accurate and comprehensive assessment. Moreover, future research could also expand this analysis to other emerging and advanced markets and examine additional cutting-edge industries to either confirm or challenge these findings, thereby providing a more comprehensive understanding of the issues.

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