

## **Factors Affecting the Liquidity of Firms After Mergers and Acquisitions: A Case Study of Commercial Banks in Vietnam**

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### **Abstract**

The purpose of the research is to assess the factors affecting the liquidity of the commercial banks that are conducting mergers and acquisitions activities in Vietnam during the 2008–2018 period. This study employs samples based on 2-component data sets with cross-section and time-series data collected from the annual report of the State Bank and the audited acquisitions financial statements of nine commercial banks engaged in mergers and acquisitions activities. To carry out the research objectives, the authors conducted quantitative analysis through the Pooled OLS, REM, FEM and GMM models. The results shown that: (i) bank liquidity is positively affected by liquidity lagged, the return on equity (ROE) and economic growth; negatively affected by bank size, non-performing loan, short-run loan to deposit ratio; (ii) there is not enough evidence to conclude about the relationship between net profit margin, equity-to-assets ratio and inflation rate to bank liquidity; (iii) notably, we found evidence that, after the mergers and acquisitions, the liquidity of Vietnamese commercial banks decreased. The findings of this study suggest that bank managers take a more comprehensive view of the results of mergers and acquisitions and implications for banks to improve liquidity in the post-merger and acquisitions conditions.

**Keywords:** Bank, Liquidity, Mergers, Acquisitions

**JEL Classification Code:** G21, G33, G34

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### **1. Introduction**

Since the global financial crisis of 2007–2009, bank managers and researchers have pointed out various reasons for this crisis. According to the International Monetary Fund (IMF), it is the risk-taking activity of financial institutions during this period, most of the assets of many financial institutions in the world invest in subprime credit items or risky financial instruments while the global financial

monitoring system is too loose, which made the financial system unable to withstand financial shocks. Moreover, the problem of bank liquidity and capital that had not been given adequate attention before was one of the basic causes of this crisis. Meanwhile, bank liquidity is considered an important indicator, not only affecting operational efficiency and cash flow balancing capacity, but also the value and success of the bank (Tahir et al., 2020). Therefore, the liquidity of commercial banks has now received great attention from policymakers, administrators and researchers. The fact is that commercial banks have received a lot of support from governments and central banks, but there are still quite a lot of banks in the world facing many financial risks due to liquidity problems.

In Vietnam, in order to meet the increasingly diverse demand and increasingly fierce competition of international economic integration, the government has been restructuring the banking system through mergers and acquisitions. This restructuring aims to eliminate weak banks and improve the performance of banks after the mergers and acquisitions. Liquidity of the banking system is considered a very necessary issue, which not only helps the financial market to develop stably and sustainably, but also helps

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the economy operate smoothly. However, after the mergers and acquisitions, the liquidity of Vietnamese commercial banks all dropped sharply right after the time of mergers and acquisitions. In the following years, the liquidity tended to increase, but was not as high as the liquidity before the mergers and acquisitions.

Therefore, this study is conducted to supplement empirical evidence on factors affecting the liquidity of Vietnamese commercial banks that have carried out merger and acquisition activities during 2008–2018, as an important basis for bank managers to propose solutions to improve liquidity in the following mergers and acquisitions. At the same time, the research results are an important basis for bank managers to propose solutions to improve liquidity in the conditions after mergers and acquisitions. If previous research only mentioned factors affecting bank liquidity through internal factors, in this study, the authors considered and analyzed macro factors. In particular, the merger and acquisition dummy variables are added to the research model. In addition, the authors used the GMM model in analyzing panel data to solve endogenous problems and autocorrelation.

The authors structure the article into five sections. Section 1 is the introduction, the significance of research problem, research gaps and research objectives. Section 2 presents a brief literature review. Section 3 spells out the research methodology to be applied. Section 4 presents and discusses the results. Section 5 offers conclusions and suggestions for further research.

## 2. Literature Review

### 2.1. Liquidity of Commercial Banks

According to the Basel Committee on Banking Supervision, liquidity is the ability to meet the demand of using usable capital for business activities at all times such as payment of deposits, loans, payments, and capital transactions. According to Duttweiler (2009), liquidity is a qualitative representation of a bank's financial strength. Liquidity consists of two aspects: natural liquidity and artificial liquidity. Natural liquidity is a cash flows derived from assets and liabilities for a specified period of time, such as cash inflows from customers, customers repay bank loans, and revenue from providing service level. Artificial liquidity is created from converting assets into cash before the maturity date. According to Rose (2002), liquidity is met by cash flows such as customers depositing money, issuing short-term valuable papers, and borrowing in the interbank money market (this cash flows are called liquidity supply from the capital source); selling securities, paying from customers, etc. (these flows are called liquidity supply from assets). Hence, liquidity represents the ability to perform

all maturity payment tasks. To measure the liquidity of commercial banks, scientists often use the indicators  $LIQ_1$ ,  $LIQ_2$ ,  $LIQ_3$  as follows:

$$LIQ_1 = \frac{\text{Liquidated assets}}{\text{Total assets}} \quad (1)$$

The  $LIQ_1$  ratio reflects the proportion of liquid assets on the total short-run mobilized capital of the bank. The higher this indicator, the better the liquidity of the bank and vice versa. Where, liquid assets include cash and transferable assets. More specifically, liquid assets include cash, deposits at central banks and other banks, trading securities and available-for-sale investment securities. The  $LIQ_1$  indicator was used by Aspachs et al. (2005); Rychtárik (2009); Praet and Herzberg (2008); Demirguc-Kunt and Huizinga (1999); Anamika and Anil (2016).

$$LIQ_2 = \frac{\text{Liquidated assets}}{\text{Short-run mobilized capital}} \quad (2)$$

The ratio of  $LIQ_2$  reflects how much proportion of the liquid assets on of short-run mobilized capital of the bank. Similar to  $LIQ_1$  indicator, the higher this indicator, the better the liquidity of the bank and vice versa. In particular, short-term mobilized capital sources include debt sources maintained over a period of less than 12 months, such as government debts and central banks, deposits at other banks, customer deposits, for less than 12 months. The  $LIQ_2$  indicator has been used by Moore (2010) and Praet and Herzberg (2008).

$$LIQ_3 = \frac{\text{Loans}}{\text{Total assets}} \quad (3)$$

The ratio of  $LIQ_3$  reflects in the total assets of the bank, how much proportions of the loan. The higher the ratio, the lower the liquidity of the bank. The  $LIQ_3$  indicator has been used by Demirguc-Kunt and Huizinga (1999) and Athanasoglou et al. (2006).

### 2.2. Factors Affecting the Liquidity of Commercial Banks

#### 2.2.1. Intrinsic Factors of Commercial Banks

Bank size (SIZE) is considered by many researchers to be an important factor and has a negative impact on bank liquidity (Kiyotaki & Moore, 1997; Holmstrom & Tirole, 1998; Kashyap et al., 2002; Vodová, 2011; Anamika & Anil, 2016). Their results show that small-scaled commercial banks often have disadvantages in accessing capital markets, so they tend to have in reserve plenty of liquidity assets.

In contrast, large-scaled commercial banks often maintain low liquidity because they believe in the central bank's support if a financial shock impacts them. Different from the above arguments, some study shown that small-sized commercial banks often focus on credit activities, liquidity assets often have a very low rate in the total asset accounts item so their liquidity is often worse than that of big banks (Berger & Bouwman, 2009). Other studies argue that a nonlinear relationship exists between bank size and bank liquidity (Dinger, 2009; Bonner & Eijffinger, 2015; Deléchat et al., 2014). Thus, the effect of bank size (SIZE) on bank liquidity is not specifically expected.

As regards non-performing loan (NPL), some researchers believe that bad debts (overdue debts over 90 days, or unpaid interests over 90 days, or late payment of interest and principal raises doubt about the solvency of the loan) has a significant impact on commercial banks. In particular, high bad debt ratio can affect credit supply, reducing confidence of customers, which led to massive withdrawals due to customers' concerns about the bank's liquidity, resulting in large-scale liquidity demand. Therefore, previous studies by Barr et al. (1994); Bloem and Gorter (2001); Lucchetta (2007); Vong and Chan (2009); Sabri et al. (2020) show a negative relationship between bad debt ratio and bank liquidity. However, research by Vodová (2011) suggests that there is a positive relationship between bank liquidity and non-performing loan. Thus, the impact of NPL ratio on bank liquidity is not specifically expected.

About the return-on-equity (ROE), many studies found the negative impact of ROE on bank liquidity has a negative impact of ROE on bank liquidity (Aspachs et al., 2005; Lucchetta, 2007; Vodová, 2011). When banks increase lending to customers, or invest in assets that are considered highly profitable, ROE will increase, but these items are considered as low liquid assets. Other studies have found a positive impact of ROE on bank liquidity (Bourke, 1989; Bunda & Desquilbet, 2008; Bonfim & Kim, 2008; Angela & Alina, 2015; Anamika & Anil, 2016; Ayoush et al., 2020). Thus, the effect of the return-on-equity (ROE) on bank liquidity is not specifically expected.

As regards net profit margin (NIM), according to Baltensperger (1980) and Santomero (1984), the level of bank liquidity depends on the level of holding liquid assets to prevent risks, thus increasing the opportunity cost of holding this asset, the bank's profits will accordingly decrease. Empirical result research by Valla and Saes-Escorbiac (2006) also confirmed the findings of Baltensperger (1980) and Santomero (1984). Thus, net profit margin (NIM) is expected to have a negative impact on bank liquidity.

The ratio of equity-to-total assets (ETA) is one of the indicators showing the capital adequacy and financial safety of a bank. This low ratio proves that the bank uses high financial leverage, which contains a lot of risks and

can make bank liquidity decrease. Bunda and Desquilbet (2008); Vodová (2011); Bonfim and Kim (2008); Aspachs et al. (2005); John and Caterina (2019); Sabri et al. (2020) also show the positive effects of the ratio of equity-to-total assets on bank liquidity. Thus, the ratio of equity-to-total assets (ETA) is expected to have a positive impact on bank liquidity.

The higher ratio of loans to short-run capital mobilization (LSC) proves that the bank lends much higher than the mobilized capital. Therefore, when banks have difficulties in liquidity, it will be difficult to mobilize cheap capital sources if they lend too much, making liquidity decrease. On the contrary, if this ratio is low, it indicates that the bank lends less than the mobilized capital or may have other sources such as borrowing on the interbank market, issuing valuable papers, lower than deposits increasing the bank's liquidity (Golin, 2001). Previous studies such as Aspachs et al. (2005); Bonfim and Kim (2008), Golin (2001) all showed a negative relation between the ratio of loans to short-run capital mobilized from bank liquidity. Thus, the ratio of loans to short-run capital mobilization (LSC) is expected to have a negative impact on bank liquidity.

### **2.2.2. Macro Factors**

As regards economic growth (GDP), banks can change the status of assets to adapt to the risk fluctuations arising from the fluctuations of the economic environment. Specifically, in a state of economic recession, inefficient economic operations, and risky lending operations, commercial banks will tend to hold more liquid assets. On the contrary, in the context of good economic growth, banks will tend to reduce the liquidity reserve to lend, while capital mobilization from the economy may decline due to the subjects expected to earn billions. The return on investment is higher than bank deposits. This relation was found by Aspachs et al. (2005), Valla and Saes-Escorbiac (2006), Chung-Hua Shen et al. (2009), Dinger (2009), Deléchat et al. (2014), Anamika and Anil, (2016). Thus, economic growth is expected to have a negative impact on bank liquidity.

As regards the inflation rate (INF), inflation represents the purchasing power of money and interferes with the ability of the financial sector to allocate resources effectively. Specifically, when inflation rises, leading to a shift of the economy's resources from lenders to borrowers as borrowers can pay debts with lower value currencies, and this will divert the bank's resources by reducing the liquidity reserve for lending, the level of liquidity will tend to decrease, this relationship was also found in the research of Bunda and Desquilbet (2008), Vodová (2011). Thus, inflation rate is expected to have a negative relation on bank liquidity.

Regarding the merger and acquisition operations (DMA), according to Michael (2010), the nature of the merger

and acquisitions activities are the conversion of business ownership with the aim of concentrating capital and expanding the size of bank. Therefore, after the mergers and acquisitions, the size of the bank increases, which in turn will make the bank liquidity decrease. On the other hand, after the mergers and acquisitions, banks mainly promote lending activities, or invest in other assets for the purpose of profitability rather than the purpose of improving liquidity. Therefore, the merger and acquisition activities are expected to have a negative relation with bank liquidity (Al-Hroot et al., 2020).

### 3. Research Methods and Materials

To carry out the research objectives, the authors mainly use quantitative research methods with secondary data sources from the annual reports of the State Bank and the audited acquisitions financial statements of nine commercial banks have activities of merger and acquisitions, the specific steps are as follows:

Overview of research and development of research models: The authors review the domestic and foreign research works and identify research gaps. Based on the research of Kashyap et al. (2002), Aspachs et al. (2005), the authors set up a research model in accordance with the research objectives.

$$\begin{aligned} LIQ_{i,t} = & \beta_1 LIQ_{i,t-1} + \beta_2 SIZE_{it} + \beta_3 NPL_{it} + \beta_4 ROE_{it} \\ & + \beta_5 NIM_{it} + \beta_6 ETA_{it} + \beta_7 LSC_{it} + \beta_8 GDP_{it} \quad (4) \\ & + \beta_9 INF_{it} + \beta_{10} DMA_{it} + \varepsilon_{it} \end{aligned}$$

In particular, the authors use  $LIQ_2$  to measure bank liquidity, because this indicator most accurately reflects the liquidity status of banks, this indicator shows in the total capital that the bank mobilizes. In the short run, if possible, to provide loans, the assets with the highest liquidity represent a percentage. The method of measuring variables is shown in Table 1.

Data collection: Research data was collected from the annual report of the State Bank of Vietnam and audited consolidated financial statements as of December 31, 2018 of nine commercial banks carrying out mergers or acquisitions.

With nine commercial banks (Table 2) studied for 11 years (from 2008 to 2018), we obtained panel data consisting of two components with cross-sectional data and time series data, with 94 observations in which PVCom Bank carried out acquisition activities in 2013, so there were no figures for 2008–2012.

Data processing: The authors use STATA software in analyzing panel data with Pooled OLS model, random-effects model (REM), fixed-effects model (FEM), and Generalized method of moment (GMM). In particular, the authors used Pooled OLS, REM, FEM to examine the heteroskedasticity, autocorrelation, and endogenous. Moreover, GMM gives results on robust estimate, normal distribution, and efficient.

## 4. Results and Discussion

### 4.1. Descriptive Statistics

The statistics described in Table 3 show that, except for the GDP, INF and SIZE variables, the value of each variable

**Table 1:** Measure Variables in the Model

| Variable    | Description                              | Measure  | Expectation |
|-------------|--|--|-------------|
| LIQ         | Bank liquidity                           | $\frac{\text{Liquidated assets}}{\text{Short-term mobilized capital}}$   |             |
| $LIQ_{t-1}$ | Liquidity lag                            |  |             |
| SIZE        | Bank size                                | Logarithm of total asset   | +/-         |
| NPL         | Non-performing loan                      | Non-performing loan/Total outstanding loans  | +/-         |
| ROE         | Return of equity                         | Profit after tax/Total assets  | +/-         |
| NIM         | Net profit margin                        | (Interest income – Interest expenses)/ Total assets  | –           |
| ETA         | The ratio of equity to total assets      | Owner's equity/Total assets  | +           |
| LSC         | Loans to short-term capital mobilization | Loans/ Mobilizing short-term capital   | –           |
| GDP         | Gross domestic product                   | GDP growth rate  | –           |
| INF         | Inflation                                | Inflation rate   | +           |
| Dummy M&A   | Merger and acquisitions operation        | = 1 if the bank conducts a merger or acquisitions operation within 1 years;<br>= 0 if the bank has not yet made a merger or acquisitions | –           |

**Table 2:** Commercial Banks have Conducted Merger/Acquisitions Activities

| No | Commercial Banks   | The Bank is Merged and Acquired | Form         | Year |
|----|--------------------|---------------------------------|--------------|------|
| 1  | SCB                | Ficombank, TinNghiaBank, SCB    | Acquisitions | 2011 |
| 2  | LienViet Post Bank | LienVietBank, VPSC              | Acquisitions | 2011 |
| 3  | SHB                | Habubank                        | Merger       | 2012 |
| 4  | HD Bank            | Dai A Bank                      | Merger       | 2013 |
| 5  | PVCom Bank         | Western Bank, PVFC              | Acquisitions | 2013 |
| 6  | BIDV               | MHB                             | Merger       | 2015 |
| 7  | Vietinbank         | PG Bank                         | Merger       | 2015 |
| 8  | Sacombank          | Southern bank                   | Merger       | 2015 |
| 9  | Maritime Bank      | MDB                             | Merger       | 2015 |

**Table 3:** Descriptive Statistics the Variables in the Research Model

| Variable | Min   | Max    | Mean  | Std. Deviation |
|----------|-------|--------|-------|----------------|
| LIQ      | 0.00  | 108.76 | 43.32 | 18.86          |
| SIZE     | 3.87  | 6.08   | 5.15  | 0.45           |
| NPL      | 0.29  | 12.21  | 2.41  | 2.16           |
| ROE      | 0.29  | 28.48  | 10.56 | 6.34           |
| NIM      | -0.70 | 6.80   | 2.76  | 1.35           |
| ETA      | 3.50  | 46.24  | 9.39  | 5.56           |
| LSC      | 36.34 | 141.48 | 82.74 | 20.55          |
| GDP      | 5.23  | 7.31   | 6.14  | 0.64           |
| INF      | 0.60  | 23.10  | 7.79  | 6.53           |

in the model fluctuates quite large. Among the independent variables, the biggest range in value is the variable of the loan-to-deposit ratio (LSC), from 36.34% (Maritime bank, 2014) to 141.48% (HD Bank, 2018). Next is the variable ratio of profit after tax to equity (ROE), the range varies from 0.29% (LienVietPostBank, 2009) to 28.48% (Maritime bank, 2009). The liquidity dependent variable (LIQ) has an average of 43.32%, ranging from 0.00% (Vietinbank, 2016) to 108.76% (LienVietPostBank, 2008).

## 4.2. Results

To evaluate the factors affecting the liquidity of nine Vietnamese commercial banks that have carried out merger and acquisition activities, the authors used four different regressions. At the same time, the authors use LM and Hausman tests to select the appropriate model. The VIF coefficients are all less than 4, so the model has no

multicollinearity phenomenon. The Hausman test results in a *P*-value of less than 0.05, which means that FEM is more suitable than REM and Pooled OLS. However, the Wald test and Wooldridge tests with *P*-value less than 0.05 indicate that heteroskedasticity and autocorrelation exist in FEM, which results in regression coefficient results is inefficient.

The authors used Sargan test to assess the over-identifying feature of the instrument variable. The results show that *p*-value coefficients are greater than 0.05. As such, the instrument variables used in the GMM model satisfy over-identifying. In addition, the autocorrelation test results in *p*-value both greater than 0.05, meaning that the remainder of the GMM model does not exist the second-degree autocorrelation phenomenon. The instrument variables used in the model all satisfies the tests. The results in the model show a robust and normal distribution.

Research results on factors affecting the liquidity of Vietnamese commercial banks to conduct merger and acquisition activities during 2008–2018 are as follows (Table 4):

Table 5 shows that the lag of liquidity variable ( $LIQ_{t-1}$ ) has a positive relationship with liquidity at the 5% significance level; this study is completely consistent with Delécha et al. (2012), the liquidity of Vietnamese commercial banks that have merger and acquisition activities has mutual impacts and have positive relationships between the periods.

## 4.3. Discussion

The relationship between liquidity and bank size (SIZE) is negative; this result is consistent with research by Kiyotaki and Moore (1997); Holmstrom and Tirole (1998); Kashyap et al. (2002); Vodová (2011); Anamika and Anil (2016). This implies that in Vietnam, bank liquidity decreases as the bank size increases, the reason is that the smaller the size of banks, they may have to choose a good liquidity strategy, maintaining high liquidity due to limited access to financial

**Table 4:** The Influence of Factors on Bank Liquidity

| Variable           | OLS                      | REM                      | FEM                    | GMM                      |
|--------------------|--------------------------|--------------------------|------------------------|--------------------------|
| LIQ <sub>t-1</sub> | 0.5860378** [0.1510461]  | 0.5860378** [0.0957189]  | 0.2705127* [0.1191676] | 0.5860378** [0.089387]   |
| SIZE               | -5.445546** [2.725789]   | -5.445546 [3.4267]       | -11.33818 [6.661321]   | -5.445546*** [3.200021]  |
| NPL                | -0.8764072** [0.325357]  | -0.8764072** [0.4719806] | -0.7065453 [0.4564707] | -0.8764072** [0.4407587] |
| ROE                | 0.5335675 [0.2865444]    | 0.5335675** [0.2483402]  | 0.4647368 [0.2403806]  | 0.5335675** [0.2319123]  |
| NIM                | -0.9362383 [1.52799]     | -0.9362383 [1.113599]    | -0.6849081 [1.376787]  | -0.9362383 [1.039934]    |
| ETA                | -0.3023544 [0.3553886]   | -0.3023544 [0.3238697]   | -0.3067497 [0.490904]  | -0.3023544 [0.3024455]   |
| LSC                | -0.2355151** [0.0965013] | -0.2355151** [0.0864078] | -0.0926282 [0.0993365] | -0.2355151** [0.0806919] |
| GDP                | 6.36715** [1.522567]     | 6.36715** [1.72575]      | 5.236472* [1.657786]   | 6.36715** [1.611591]     |
| INF                | 0.2813103 [0.271195]     | 0.2813103 [0.2529563]    | 0.5510729* [0.2439345] | 0.2813103 [0.2362231]    |
| DMA                | -5.829776** [2.2727]     | -5.829776** [2.868698]   | -5.377031 [3.43535]    | -5.829776** [02.678932]  |
| Cons               | 28.45511 [19.71955]      | 28.45511 [21.78924]      | 65.83092 [40.74707]    | 28.45511 [20.34787]      |
| Observations       | 94                       | 94                       | 94                     | 94                       |
| R <sup>2</sup>     |                          | 0.8005                   | 0.7296                 |                          |

Note: \*\*\*, \*\*, \* level of significance 1%, 5%, 10%.

**Table 5:** Summary of Research Results

| Independent Variable | Research Hypotheses | Research Results | Conclusion             |
|----------------------|---------------------|------------------|------------------------|
| LIQ <sub>t-1</sub>   | +                   | +                | Relevance              |
| SIZE                 | +/-                 | -                | Relevance              |
| NPL                  | +/-                 | -                | Relevance              |
| ROE                  | +/-                 | +                | Relevance              |
| NIM                  | -                   | K                | Not enough conclusions |
| ETA                  | +                   | K                | Not enough conclusions |
| LSC                  | -                   | -                | Relevance              |
| GDP                  | -                   | +                | Not relevance          |
| INF                  | -                   | K                | Not enough conclusions |
| DMA                  | -                   | -                | Relevance              |

Note: K indicates not enough grounds to conclude the relationship.

resources, such as LienViet Post Bank, after the merger, in 2011, the total value of assets ranged from VND56,132.34 billion to VND163,433.64 billion, after the merger, the bank's liquidity is high, average of 8 years is 57.73%. In contrast, some large-scale banks such as BIDV, after the merger of MHB, in 2015, the average value of total assets in the 4 years of study was VND1019723.81 billion, because

they believed in the liquidity supply was from the capital source, so it only kept the liquidity at a low rate, averaging 29.66% in 4 years.

The relationship between bank liquidity and bad debt ratio is an inverse relationship, this result is also in agreement with Barr et al. (1994), Bloem and Gorter (2001), Lucchetta (2007); Vong and Chan (2009); Sabri et al. (2020). During the research period at nine Vietnamese commercial banks, mergers and acquisitions were conducted; it can be seen that, if the credit risk is higher, the liquidity supply from the source of capital decreases, and at the same time, the demand for liquidity from the source of capital increased because the customers' confidence in the bank's operations decreased. Typically, PVComBank, after merging two financial institutions in 2013, the average bad debt ratio in 5 years of PVComBank was 3,498%, higher than the average of nine commercial banks in the research period of 2.41%. Liquidity of PVComBank only reached an average of 39.04%, while this figure of nine banks was 43.32%.

The relationship between bank liquidity and the ratio of after-tax profit to equity is positive with the significance level of 5%; this result is consistent with Bourke (1989); Bunda and Desquilbet (2008); Bonfim and Kim (2008); Angela and Alina (2015); Anamika and Anil (2016); Ayoush et al. (2020). The positive relationship can be explained by such aspects as, in Vietnam, commercial banks with high profitability and reputation of that bank in the financial market will if it increases, the bank will easily mobilize capital from the economy, the supply of liquidity from the source of capital will increase. This can be clearly seen

through the results of SCB, after the 2011 acquisitions, the bank's ROE only reached the average value of 5.48%, lower than the average of nine commercial banks of 10.56. %. The liquidity of SCB was only 17.83%, lower than the average of nine commercial banks at 43.42%.

The relationship between bank liquidity and the ratio of loans to short-term deposits is an inverse relationship, which is entirely consistent with the research hypothesis and in line with Aspachs et al. (2005); Bonfim and Kim (2008), Golin (2001). Because, after the mergers and acquisitions, Vietnamese commercial banks stepped up lending to customers, while this item was considered as an illiquid asset. At the same time, in the total of short-term mobilized capital, the bank lends a lot, the remaining assets to finance the liquid assets will be less, thereby reducing the liquidity supply from the assets.

In a macro perspective, economic growth has a positive effect on bank liquidity, which is contrary to previous empirical studies. Our research results show that, in a state of good economic growth, the liquidity supply will increase, whereas the supply will decrease when the economy recedes. This is also in line with the theory of “loan fund interest rates” and Pilbeam's research (2005).

Mergers and acquisitions have an inverse relationship with bank liquidity. This result is consistent with Al-hroot et al. (2020), Michael (2010). This relationship can be explained as follows: after the mergers and acquisitions, the size of banks' assets increases, the total amount of short-term mobilized capital increased, and at the same time, banks also expanded their lending activities to customers. However, liquidity assets such as cash, deposits at the State Bank and other credit institutions, trading securities and ready-to-sell investment securities have increased, but the growth rate is not high, leading to reduced banking liquidity. Thus, it can be noticed that Vietnamese commercial banks after the mergers and acquisitions, capital mobilization activities from the economy have mainly promoted lending activities, or invested in other assets, not the purpose of liquidity reserve, so liquidity dropped.

Therefore, in the context of post-mergers and acquisitions, the size of the bank increases, the value of loan items increases, Vietnamese commercial banks want to improve liquidity, need to control the bad debt ratio well, and increase the rate of return on equity. In particular, banks need to manage liquidity well through liquid assets and liquidity management. Specifically, to manage liquidity assets, Vietnamese commercial banks need to: (i) Maintain liquidity assets items with reasonable scale and structure; (ii) Analyze the liquidity of each asset item. In particular, it is necessary to calculate accurately and timely the cost of converting assets into cash; (iii) Select a portfolio of liquid assets in accordance with the business characteristics of the bank; (iv) Adjust the liquidity of assets by changing the term structure of liquid

assets. In order to manage liquidity capital, Vietnamese commercial banks need to: (1) Analyze factors affecting the time and cost of capital mobilization; (2) Analyze and assess term types of capital sources periodically; (3) Establish good relationships with big customers, traditional customers, and wholesale banks; (4) Diversify mobilized capital sources, diversify term of capital sources; (5) Research new debt instruments to save time and cost of deposits; (6) Compare costs of holding new liquid assets and deposits.

In addition, the study results also found no statistically significant evidence of the impact of the net profit margin (NIM), the ratio of equity-to-total assets (ETA) and inflation (INF) on the liquidity of Vietnamese commercial banks conducting merger and acquisition activities during the research period.

## 5. Conclusion

Through quantitative research method with panel data collected from the annual report of the State Bank and audited consolidated financial statements of nine Vietnamese commercial banks that have carried out merger and acquisition operations, our research has shown that bank liquidity is positively affected by liquidity lagged, the return on equity (ROE) and economic growth; is negatively affected by bank size, non-performing loan ratio, short-run loan to deposit ratio, and mergers and acquisitions. In addition, with the research data, there is not enough evidence to conclude that the net profit margin (NIM), equity-to-assets ratio (ETA) and the inflation rate (INF) affect to the liquidity of bank. This study helps bank managers to have a more comprehensive view of the results of mergers and acquisitions, and the implications for banks to improve liquidity in the post-merger and acquisition conditions. This study also suggests a more in-depth study of the differences in the factors affecting the liquidity of commercial banks with and without merger and acquisition activities, over a longer period.

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