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Factors affecting the level of customer deposit: the case of commercial banks in Vietnam

Le Hoang Vinh[1]
University of Economics and Law, Vietnam National University - Ho Chi Minh City, Ho Chi Minh City, Vietnam

Pham Le Quang
University of Economics and Law, Vietnam National University - Ho Chi Minh City, Ho Chi Minh City, Vietnam

Bui Anh Thanh
University of Economics and Law, Vietnam National University - Ho Chi Minh City, Ho Chi Minh City, Vietnam

Nguyen Duy Phuong
Vietnam Joint Stock Commercial Bank for Industry and Trade, Quy Nhon City, Vietnam

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Abstract

This study aims to evaluate the factors affecting the level of customer deposits in Vietnamese commercial banks. The research sample includes 25 banks from 2009 to 2021. The secondary data were collected from the audited financial statements of banks and the statistical information of the Hanoi and Ho Chi Minh Stock Exchanges. The regression results show that bank profitability, loan quality, listing status, and state-controlled ownership have a positive effect on the level of customer deposits, while bank liquidity, average interest rate, and global financial crisis negatively affect the level of customer deposits. According to these results, commercial banks should focus on developing benefits for depositors and strategies to build customer trust and confidence to increase the level of customer deposits. The findings also imply the positive role of deposit insurance and the State Bank, together with the government, in mobilizing deposits from customers. Our study provides reliable empirical evidence of the impact of state-controlled ownership, stock listing, and global financial crisis on the level of customer deposits. Bank managers and other stakeholders attract deposits from customers, and the findings add to the evidence for developing related theories.

Keywords: Commercial bank, Level of customer deposit, Vietnam

[1] Corresponding author: vinhlh@uel.edu.vn

1. Introduction

Fitch (2000) argues that commercial banks mobilize deposits from customers, make loans to customers, and provide payment and other financial services to customers. An increase in customer deposits will increase the opportunity to expand lending or other capital needs. These are expected to increase banks' income and profitability based on a reasonable balance between income and related expenses (Rao, 1975). Varman (2005) affirms that customer deposits are the foundation for the growth and development of banks. More broadly, Tun (2019) concludes that an increase in savings deposits will contribute positively to economic growth. Samson and Abass (2013) also conclude that customer deposits play an important role in promoting economic growth, especially for developing countries and emerging economies. However, Rao (1975) points out that mobilizing customer deposits is a difficult task. Commercial banks face competition not only within the banking industry, but also with non-banking credit institutions. Entities with excess capital can have many investment channels and opportunities to use capital, not just depositing money in banks. Therefore, commercial banks need to identify both internal and external factors to choose appropriate policies with the expectation of maintaining and increasing the level of customer deposits.

For the case of Vietnamese commercial banks, data from financial statements for the period 2009-2021 of 25 banks indicate that the ratio of customer deposits to total assets is 63.68%. Considering the volatility trend, this ratio increased from 54.62% in 2009 to 65.01% in 2021. These figures imply that customer deposits are important funding source and are suitable for the financial intermediation function of commercial banks. Vu and Le (2021) concluded that customer deposits at Vietnamese commercial banks are not only affected by bank-specific factors such as bank size, bad loans, profitability, and stock listing, but also affected by macro factors such as inflation and economic growth. Similarly, Nguyen *et al.* (2021) studied the case of Vietnam and suggested that customer deposit growth at commercial banks was influenced by inflation, refinancing interest rate, stock index, profitability, credit risk, and the level of financial intermediation. In this paper, we both inherit and complement our research model on factors affecting customer deposits. Our findings are expected to enrich the empirical evidence and provide additional information useful to bank managers and stakeholders. In addition, they are also evidence to develop theories about the factors affecting the level of customer deposits at commercial banks.

The rest of the paper is organized as follows. Section 2 analyzes theories, reviews empirical evidence, identifies research gaps, and develops research hypotheses. Section 3 details the research model and methods. Section 4 analyzes and discusses the research results. Finally, section 5 concludes the research.

2. Literature reviews and hypothesis development

2.1 Theoretical reviews

Keynes's theory points out three motives for individuals and companies to hold cash: transaction, provision, and speculation motives. To support these motives, commercial

banks provide financial services to customers. The deposit service provided by the bank can bring convenience to customers in carrying out daily transactions, increase their income and asset value, and satisfy their backup needs for unexpected cases. In addition, Keynes (1936) proposed the absolute income hypothesis and suggested that real consumption is a function of real disposable income, implying that the determinant of real consumption is real income. Next, Friedman (1957) developed the permanent income hypothesis, arguing that the best way to explain saving and consumption behavior is to consider how individuals plan their spending. He also predicted that higher future income would reduce current savings. Thus, the level of customer deposits is influenced by the consumption needs and income generating ability of entities in the economy.

Modigliani and Brumberg (1954) proposed the life-cycle hypothesis, emphasizing that individuals' primary motivation for saving is the formation of capital accumulation for retirement. These authors explained that, in the early stages of an active life, individuals tend to spend more than what they earn by increasing debt because they expect their future income to increase. The savings rate is negative at first, then it turns positive and will increase until the maximum income is reached in the years before retirement. Finally, the savings will be used up in retirement and beyond. Thus, the life-cycle savings rate of people exists in the form of a bell. Accordingly, the level of customer deposits can have an inverted U-shaped nonlinear relationship according to the life cycles of economic entities.

Carroll *et al.* (1992) proposed the buffer-stock theory of saving, arguing that entities hoard assets to ensure consumption demand in the face of unpredictable fluctuations in income. This theory suggests that consumers become impatient and cautious of income uncertainty. Therefore, to minimize the risk of future income fluctuations and secure consumption, entities will have to reserve by reducing current consumption. Accordingly, the level of customer deposits at commercial banks will tend to increase if customers' income is higher.

2.2 Empirical evidence and research gap

Many empirical studies have confirmed the factors affecting customer deposits at commercial banks. Jifar (2021) divides these factors into two groups, namely bank-specific factors and macroeconomic factors. Femi *et al.* (2021) concluded that bank size had a positive impact on the level of customer deposits at Nigerian commercial banks in 20 years from 2000 to 2019. This positive relationship is consistent with the findings of Unvan and Yakubu (2020), Baehaqie *et al.* (2017), Eriemo (2014), and Ferrouhi (2017). Unvan and Yakubu (2020) explained that the economies of scale and extensive branch networks of larger commercial banks would help them mobilize customer deposits more efficiently. However, Islam *et al.* (2019) found that the bank size has a weak negative effect on the growth of customer deposits at commercial banks in Bangladesh from 2007 to 2016.

According to the estimation results, Eriemo (2014) concluded that the deposit interest rate is the main determinant of customer deposits at commercial banks in Nigeria, but this relationship is less concerning, and safety is preferred by customers who choose to make

deposits in the context of high crime rates. Larbi-Siaw and Lawer (2015), Akhtar *et al.* (2017), and Ayene (2020) asserted that the deposit interest rate has a positive influence on customer deposits at commercial banks. Accordingly, Akhtar *et al.* (2017) pointed out that the customer's motive is profit, so an increase in interest rates can attract more customer deposits to commercial banks, while Ayene (2020) believed that the regulation of the lowest and highest deposit interest rates in Ethiopia is not attractive in mobilizing customer deposits.

According to Yakubu and Abokor (2020), banks' stability has no significant impact on customer deposits in the short term. It is difficult for banks to achieve short-term stability due to the volatile economy in Turkey, and customers believe that deposits at banks have become less safe. However, in the long term, bank stability has a positive effect on customer deposits. It is explained that a flexible and stable banking system will strengthen customers' confidence in the bank, or it could be. For that reason, the Central Bank of Turkey has taken strict measures to build confidence in the financial system, which has contributed to improving the operating activities of the banking system. In addition, Yakubu and Abokor (2020) also confirmed that Turkish banks do not effectively invest customers' money in the long term, so lower deposit rates can reduce customers' willingness to deposit money in the bank.

Unvan and Yakubu (2020) find a negative relationship between profitability and customer deposits, suggesting that the banks' high profitability provides a signal of more financial soundness, which is likely to lead to a decrease in the level of customer deposits. On the contrary, Vu and Le (2021) suggested that depositors tend to pay more attention to bank profitability. Commercial banks with better profitability are more appreciated by depositors; in other words, the bank's profitability has a positive effect on customer deposits. Regarding other specific factors, customer deposits negatively correspond to bank liquidity (Unvan and Yakubu, 2020) and bank capital (Baehaqie *et al.*, 2017). Meanwhile, the factors that have a positive relationship with customer deposits are stock listing (Vu and Le, 2021), loan-to-asset ratio (Ambe, 2017), loan quality (Baehaqie *et al.*, 2017), confidentiality of customer information (Ayene, 2020), automated teller machine system (Asayesh *et al.*, 2017).

Macroeconomic and other factors (e.g., money supply, inflation, economic growth, exchange rate) are confirmed by many empirical studies. Yakubu and Abokor (2020) argued that the broad money supply has a significant positive impact on customer deposits in the long run. However, this effect has the opposite direction in the short term, which is consistent with the results of Larbi-Siaw and Lawer (2015) and is explained by lower borrowing costs, increased credit and consumption demand, and reduced savings. Legass *et al.* (2021), Akhtar *et al.* (2017), Femi *et al.* (2021), and Islam *et al.* (2019) also concluded that an increase in the broad money supply can contribute to the rise in customer deposits and vice versa.

Asayesh *et al.* (2017), Unvan and Yakubu (2020), Eriemo (2014) and Jifar (2021), and Nguyen *et al.* (2021) found evidence that bank customers tend to reduce savings during periods of higher inflation, thereby reducing customer deposits. Abiodun *et al.* (2021) explained that the inflation rate in Nigeria during the research period is quite high, which is the reason why

inflation has a negative effect on domestic currency deposits. In contrast, Legass *et al.* (2021), Yakubu and Abokor (2020), Larbi-Siaw and Lawer (2015) found inflation to have a positive effect on customer deposit growth, supporting the precautionary theory of saving, classical interest rate theory, and neo-classical growth theory.

Jifar (2021), Yakubu and Abokor (2020) believed that, in the long run, economic growth has a negative effect on customer deposits. Besides, Yakubu and Abokor (2020) asserted that the positive impact of economic growth on customer deposits is negligible in the short term. Boadi *et al.* (2015) demonstrated the strong existence of economic growth that has a positive impact on customer deposits. The findings of Tun (2019), Azolibe (2019), Vu and Le (2021), and Abiodun *et al.* (2021) also supported this positive relationship. In addition, according to the study of Jifar (2021) and Tun (2019), customer deposits are positively affected by exchange rates, but Asayesh *et al.* (2017) found the opposite result. Some other macro factors are also confirmed by empirical studies such as monetary policy (Larbi-Siaw and Lawer, 2015), unemployment rate (Ferrouhi, 2017; Jifar, 2021), financial depth of the economy (Islam *et al.*, 2017), population growth (Legass *et al.*, 2021).

According to the empirical evidence mentioned above, previous studies tend to pay more attention to macroeconomic or external factors than bank-specific factors. In the research model of this article, we focus on assessing the bank-specific factors from a financial perspective, and these factors have not been mentioned much in empirical studies. This choice of approach was expected not only to provide additional empirical evidence, but also to contribute scientific value in testing and developing relevant theories. In this paper, we tested and evaluated the influence of profitability, loan quality, bank liquidity, and deposit interest rate on the level of customer deposits. Eichengreen and Gupta (2013) suggested that the global financial crisis inevitably impacted the banking system in India. Andries and Ursu (2016) showed that the financial crisis has a positive effect on both cost and profit inefficiencies of commercial banks. Therefore, we additionally investigated the impact of the global financial crisis on customer deposits in the case of commercial banks in Vietnam.

Next, we tested the impact of the bank's stock listing on the level of customer deposits. This factor has been approached by Vu and Le (2021), who confirmed the positive relationship. However, their conclusion was made from data analysis of commercial banks in Vietnam between 2006 and 2019. In addition, the analysis results for each period were not consistent; it was negative at 5% statistical significance for the period from 2006 to 2010 and did not guarantee statistical significance for the other two periods (2011-2015 and 2016-2019). However, these authors explain inadequately based on the actual listing of shares of banks. There are seven banks listed shares from 2010 or earlier, nine banks by the end of 2015, and eleven banks as of 2019 year-end.

Finally, Djankov and Murrell (2002) concluded that, in countries with transition economies, the state owns a certain percentage of equity in enterprises after equitization; therefore, the state plays the role of both the owner and the representative in enterprises. According to the agency theory, Dharwadkar *et al.* (2000) also suggested that it is necessary to evaluate state

ownership's influence on companies' performance. Eichengreen and Gupta (2013) showed that banking activities could be stabilized thanks to the large state ownership ratio, prudent management, and the government's implicit guarantee for the bank's debt obligations. Thus, state-owned commercial banks will have more advantages in operating activities in general and in mobilizing customer's deposits in particular. Therefore, we decided to add state-controlled ownership to our research model.

2.3 Hypothesis development

Profitability is a basic and important financial goal for banks. It is also a foundation to ensure the stability and development of banks, which can help these banks easily attract more deposits from customers (Herald and Heiko, 2008). Vu and Le (2021) found a positive effect of bank profitability on the level of customer deposits. Bank profitability is financial information signaling that the bank is growing well. It is the basis for capital accumulation, so that customers will have better confidence in the bank's operations, and commercial banks can increase the level of deposits from customers. Thus, the following hypothesis is established:

H1: Profitability has a positive effect on the level of customer deposits in the case of commercial banks in Vietnam.

Liquidity represents the ability to satisfy financial needs. Accordingly, from the customer's perspective, banks with high liquidity will be considered more reliable when choosing to deposit money. Herald and Heiko (2008) argue that bank liquidity plays an important role in growing customer deposits. According to Nada (2010), banks with liquidity difficulties will make customers afraid and choose not to deposit. However, from the perspective of financial management, based on the motives of cash holdings according to Keynes's theory (1936) and the model of cash management of Baumol (1952), when banks hold a lot of cash, although their liquidity increases, opportunity cost also increases and return on capital will decrease. This makes banks with higher liquidity tend to refrain from attracting customers' deposits. Unvan and Yakubu (2020) provided empirical evidence on the negative effect of liquidity on the level of customer deposits. Accordingly, the following hypothesis is suggested:

H2: Liquidity has a negative effect on the level of customer deposits in the case of commercial banks in Vietnam.

Bessis (2015) argues that commercial banks should pay special attention to credit risk in lending activities because it ensures the quality of loans. The loan quality is often assessed through non-performing loans (Baehaqie *et al.*, 2017; Vu and Le, 2021). Better loan quality, reflected in low non-performing loan rate, within allowable limits and decreasing trend. It will signal the success of the banks in using capital to generate profit and act as the driving force for the banks to attract more customer deposits to meet this capital use demand (Park and Peristiani, 1998; Herald and Heiko, 2008). A high bad debt ratio can make depositors feel unsafe when depositing their money in banks, so this reduces the level of customer deposits. Fueda and Konishi (2007) argue that the non-performing loan ratio negatively affects banks' deposit growth, and Baehaqie *et al.* (2017) have asserted that better loan quality, as

demonstrated by a lower non-performing loan ratio, would increase the level of customer deposits. Accordingly, the following hypothesis is proposed:

H3: The loan quality has a positive effect on the level of customer deposits in the case of commercial banks in Vietnam, meaning the non-performing loan has a negative effect on the level of customer deposits.

Interest rate is one of the factors that can be considered when customers choose to deposit their money in banks (Namazi and Salehi, 2010). Herald and Heiko (2008) and Philip (1968) affirm that interest rate is one of the determining factors for the level of customer deposits. Mustafa and Seyra (2009) indicated that low deposit rates discourage savings mobilization. Eriemo (2014), Larbi-Siaw and Lawer (2015), Akhtar *et al.* (2017), Ayene (2020), and Ferrouhi (2017) found a positive relationship between deposit interest rates and customer deposits. Accordingly, the following hypothesis is established:

H4: Deposit interest rates have a positive effect on the level of customer deposits in the case of commercial banks in Vietnam.

Commercial banks listing shares on stock exchanges must comply with the conditions on operational capacity, financial performance, information disclosure, and other conditions. According to the asymmetric information theory, the level of information asymmetry between banks and customers will be reduced if shares are listed, through which banks can easily mobilize deposits from customers. Vu and Le (2021) found a positive relationship between stock listing and customer deposits. Besides, the listed banks have advantages in operating activities, and most commercial banks listed in Vietnam have large equity and assets, stable and efficient operations. Therefore, the following hypothesis is developed:

H5: Listing shares has a positive effect on the level of customer deposits in the case of commercial banks in Vietnam.

One of the basic principles of deposit mobilization from customers is trust. Ayene (2020) shows that the higher the customer's trust in the banking system, the higher the customer's deposit. Davydov (2018) indicates that state-owned banks are better protected against default. He also argues that state-owned banks do not need to be fully privatized, even if these banks are inefficient and less profitable. The government could focus on improving the quality of corporate governance mechanisms and the efficiency of these banks by reducing political influence. Accordingly, state-owned-controlled commercial banks are often highly appreciated by customers for their safety, so the level of customer deposits will be higher. In fact, in Vietnam, the network of commercial banks controlled by the government is still "covering" the whole country, which is also an advantage in attracting customer deposits. Thus, the following hypothesis is suggested:

H6: State-controlled ownership has a positive effect on the level of customer deposits in the case of commercial banks in Vietnam.

Countries are often heavily affected by global financial crises; the greater the economic openness is, the greater the impact will be. Accordingly, the performance of the banking system is negatively affected by the financial crisis (Eichengreen and Gupta, 2013; Andries and Ursu, 2016). Hosono *et al.* (2005) found that depositors' reactivity to bank risk-taking was lower during and after the crisis compared to before the crisis. Cubillas and Suarez (2018) confirmed the negative impact of the global financial crisis on the provision of credit to banks' customers. Thus, with the presence of a financial crisis, banking activities are negatively affected, according to which the following research hypothesis is developed:

H7: The global financial crisis has a negative effect on the level of customer deposits in the case of commercial banks in Vietnam.

3. Research method

3.1 Research model

Based on the discussion and identification of the research gap in combination with the research hypotheses mentioned in section 2, the research model is proposed as follows:

$$LDEP_{i,t} = \sigma + \beta_1.RETURN_{i,t} + \beta_2.LIQ_{i,t} + \beta_3.NPL_{i,t} + \beta_4.RATE_{i,t} + \beta_5.LISTED_{i,t} + \beta_6.SOWN_{i,t} + \beta_7.CRISIS_{i,t} + \varepsilon_{i,t}$$

where i and t represent each commercial bank and each year, ε is the random error. The dependent variable *LDEP* is the level of customer deposits. The independent variables: *RETURN* is the bank's profitability, *LIQ* is the bank's liquidity, *NPL* is the quality of loans represented by nonperforming loans, *RATE* is the average deposit interest rate, or average interest expense rate, *LISTED* is the listing status of the bank's shares, *SOWN* represents state-controlled ownership, and *CRISIS* represents a financial crisis. Table 1 presents the method of measuring the variables in our research model.

Table 1. The method of measuring the variables

Symbol	Variable name	Measurement	Empirical studies
LDEP	The level of customer deposits	Natural logarithm of the customer deposit balance	Femi *et al.* (2021), Unvan and Yakubu (2020), Larbi-Siaw and Lawer (2015)
RETURN	Profitability	Return on Asset: $\frac{\text{Earnings after taxes}}{\text{Average total assets}}$	Vu and Le (2021), Unvan and Yakubu (2020), Eichengreen and Gupta (2013), Amba and Almukharreq (2013), Herald and Heiko (2008)
LIQ	Bank liquidity	The proportion of liquid assets in total assets: $\frac{\text{Liquid assets}}{\text{Total assets}}$	Vu and Le (2021), Unvan and Yakubu (2020), Cubillas and Suarez (2018)

Table 1. The method of measuring the variables *(continued)*

Symbol	Variable name	Measurement	Empirical studies
NPL	Loan quality	The nonperforming loans ratio: Loan balance of group 3-5 / Total outstanding loan	Nguyen *et al*. (2021), Vu and Le (2021), Baehaqie *et al*. (2017)
RATE	Deposit interest rate	Deposit interest rate: Interest expenses / Average total deposit	Islam *et al.* (2019), Azolibe (2019), Davydov (2018), Ambe (2017), Larbi-Siaw and Lawer (2015)
LISTED	The listing of share	Dummy variable. It takes the value of 1 for listed cases and 0 for unlisted cases.	Vu and Le (2021)
SOWN	State-controlled ownership	Dummy variable. Commercial banks controlled by the State will receive the value 1, otherwise, it will receive the value 0.	Authors' suggestion
CRISIS	Global financial crisis	Dummy variable. It has a value of 1 for 2009 and 2010; the remaining years are 0.	Davydov (2018), Ferrouhi (2017), Andries and Ursu (2016), Eichengreen and Gupta (2013)

Source: Authors' compilation

3.2 Research sample and data

We used the purposive sampling method to determine the research sample. Accordingly, the research sample includes 25 commercial banks in Vietnam in the period of 13 years from 2009 to 2021 (Appendix 1). The purpose of this selection is to ensure that the research data are fully and continuously collected from the audited financial statements to measure variables. Thus, commercial banks that do not have sufficient information will not be included in our research sample. In addition, since 2009, Vietnamese commercial banks have faced a significant increase in non-performing loans and liquidity risks, and a significant decrease in operational efficiency due to the impact of the global financial crisis and other domestic factors; therefore, the government had requested to implement measures to restructure these banks, even though they have effectively implemented restructuring through loan expansion to increase profits in the previous period (Vo and Nguyen, 2018). The secondary data were used in this article, including financial statements published by banks and statistical documents of the Hanoi and Ho Chi Minh Stock Exchanges on listed companies.

3.3 Estimation method

According to the research model mentioned above, the variable SOWN is a dummy variable that does not change over time; so the fixed effects model (FEM) is unsuitable. For panel data, we selected the random effects model (REM). However, the test results of heteroskedasticity and autocorrelation showed that the model has these problems. According to Baltagi (2008), Greene (2018), and Gujarati (2008), these problems are fixed by the Generalized Least

Squares (GLS) method. In addition, we also applied the LASSO regression method proposed by Tibshirani (1996) to evaluate the stability of the model. It is a method that performs both selecting variables and adjusting to increase the accuracy of the estimations and the interpretability of the resulting statistical model.

4. Findings and discussions

4.1 Stationarity of data and descriptive statistics

We evaluated the stationarity of data through the panel unit root test. The P-values from Levin, Lin and Chu's (2002) test for the variables LDEP, RETURN, LIQ, NPL, and RATE are all less than 5% (Table 2). These results concluded that the panel data series is stationary. Next, we performed a descriptive statistical analysis of the variables according to mean, maximum, minimum, standard deviation, and number of observations in Table 3 below.

Table 2. Stationarity of data

Variable	Levin, Lin and Chu test		
	Statistic	**Prob.**	**Conclusion**
LDEP	-5.015	0.000	Stationary
RETURN	-6.625	0.000	Stationary
LIQ	-7.512	0.000	Stationary
NPL	-8.498	0.000	Stationary
RATE	-3.426	0.000	Stationary

Source: Authors' calculation

Table 3. Descriptive statistics

	LDEP	**RETURN**	**LIQ**	**NPL**	**RATE**
Mean	18.014	0.010	0.187	0.020	0.060
Maximum	21.045	0.055	0.610	0.065	0.158
Minimum	13.965	-0.059	0.045	0.000	0.021
Standard deviation	1.306	0.008	0.090	0.010	0.023
Observations	325	325	325	325	325

Source: Authors' calculation

4.2 Correlation coefficient matrix and variance inflation factor

Table 4 presents the matrix of correlation coefficients and variance inflation factors (VIFs). Accordingly, at 1% significance level, the variable LDEP is negatively correlated with LIQ, NPL, RATE, and CRISIS, and is positively correlated with the variables LISTED and SOWN. The positive correlation coefficient between LDEP and RETURN does not guarantee statistical significance.

Table 4. Correlation coefficient matrix and VIFs

	LDEP	RETURN	LIQ	NPL	RATE	LISTED	SOWN	CRISIS
LDEP	1.0000							
RETURN	0.042^{ns}	1.000						
LIQ	-0.287***	0.001^{ns}	1.000					
NPL	-0.164***	-0.188***	0.025^{ns}	1.000				
RATE	-0.525***	-0.036^{ns}	0.194***	0.104*	1.000			
LISTED	0.639***	0.132**	-0.182***	-0.128**	-0.300***	1.000		
SOWN	0.568***	-0.012^{ns}	-0.043^{ns}	-0.136**	-0.195***	0.334***	1.000	
CRISIS	-0.368***	0.309***	0.302***	-0.175***	0.180***	-0.142**	0.000^{ns}	1.000
VIFs		1.179	1.148	1.094	1.163	1.278	1.162	1.317

Notes: *, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively. ns denotes not significant (> 0.1).

Source: Authors' calculation

Considering the correlation coefficient among the independent variables RETURN, LIQ, NPL, RATE, LISTED, SOWN, and CRISIS in Table 4, the positive values range from 0.0018 to 0.3341, the negative values range from -0.3004 to -0.0120, and one case is zero. Thus, the absolute values of these coefficients are all less than 0.8, showing that the model does not have a strong correlation among these variables. According to Gujarati (2008) and Hair *et al.* (2006), we confirmed that the model does not have serious multicollinearity. In addition, according to Table 4, the VIF has the highest value of 1.317 for the variable CRISIS and the lowest value of 1.094 for the variable NPL. The VIFs of all cases are less than 10, indicating no serious multicollinearity in our model (Gujarati, 2008).

4.3 Estimation results

According to the REM estimation results, we took the residuals to evaluate the problem of autocorrelation and then used the Wald test on the residual regression results (Table 5). The P-value is 0.000, and less than 0.05. Thus, it is concluded that the rejection of hypothesis H0 is appropriate, and the model has an autocorrelation problem.

Continuing with the estimation results according to REM, we performed the panel cross-section heteroskedasticity LR test. The P-value of this test in Table 5 is 0.000, and less than 5%, indicating that the model has the existence of heteroskedasticity problem.

With the estimation results according to REM, the model has two problems that make the results unreliable, which are autocorrelation and heteroskedasticity. Therefore, we used GLS to overcome; the results presented in Table 5. In addition, Table 5 also shows the estimation results by the LASSO regression method. Comparing the estimation results between GLS and LASSO showed that the model has ensured stability. Accordingly, the results found seven factors affecting the level of customer deposits, including bank profitability, bank liquidity,

the quality of bank loans, deposit interest rate, stock listing status, State-controlled ownership, and global financial crisis.

Table 5. Estimation results

Independent variable	Dependent variable: LDEP		
	REM	**GLS**	**LASSO**
RETURN	3.883^{ns}	8.226*	9.708**
	(3.520)	(4.401)	(4.895)
LIQ	-0.707**	-1.041***	-0.954**
	(0.343)	(0.296)	(0.454)
NPL	-9.224***	-9.513***	-9.052**
	(2.670)	(2.916)	(3.807)
RATE	-14.831***	-15.189***	-15.200***
	(1.277)	(1.343)	(1.794)
LISTED	0.495***	0.840***	0.952***
	(0.089)	(0.060)	(0.087)
SOWN	1.776***	1.402***	1.538***
	(0.344)	(0.077)	(0.127)
CRISIS	-1.086***	-0.944***	-1.015***
	(0.078)	(0.084)	(0.121)
C	18.939***	18.916***	18.768***
	(0.162)	(0.130)	(0.173)
R-squared	0.706	0.835	0.726
Wald test	3188.94 [0.000]		
Likelihood ratio	124.101 [0.000]		

Notes: Standard errors are reported in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively. ns denotes not significant (> 0.1).

Source: Authors' calculation

4.4 Discussions

The positive regression coefficient of the variable RETURN according to GLS and LASSO in Table 5 shows that the bank's profitability has a positive effect on customer deposits. The research hypothesis H1 is accepted, and this finding is consistent with the conclusion of Vu and Le (2021). According to Herald and Heiko (2008), banks with higher profitability will signal success and opportunities for a stable development of the banks, which can help these banks mobilize deposits from the customers more easily; the level of customer deposits will increase, and vice versa. In addition, from a financial perspective, high profitability

showed that the banks have effective financial management. Combined with the financial intermediary function of commercial banks, higher profitability motivates banks to promote deposit mobilization from customers to perform operations using capital to generate profit.

The results of the GLS and LASSO estimates of the variable LIQ in Table 5 show that bank liquidity has a negative effect on the level of customer deposits. The hypothesis H2 is accepted, and this finding supports the empirical evidence found by Unvan and Yakubu (2020). From a financial management perspective, the opportunity cost of capital will increase with an increase in the bank's holdings of liquid assets. In addition, an asset structure that maintains more liquid assets will correspond to lower profitable assets. According to the financial intermediary function, commercial banks will reduce deposit mobilization from customers to reduce the negative impact on capital efficiency.

Based on the results of the GLS and LASSO estimates of the variable NPL in Table 5, we found that non-performing loan has a negative effect; that is, the quality of loans has a positive effect on the level of customer deposits. Thus, the hypothesis H3 is accepted, and it is consistent with the conclusion of Baehaqie *et al.* (2017). Fueda and Konishi (2007) asserted that non-performing loan is one of the factors that have a negative impact on deposit growth. This can be explained that, for banks that do not meet the requirements of financial soundness and safety, the level of customer deposits will decrease. The non-performing loan causes the bank's reputation to deteriorate. Therefore, customers may think it is unsafe to deposit their money, which reduces the level of customer deposits.

With the estimation results according to GLS and LASSO in Table 5, the negative regression coefficient of the variable RATE indicates that the average interest cost, or the average deposit interest rate, negatively impacts the level of customer deposits. This relationship does not support hypothesis H4 and contrasts with the results found by Eriemo (2014), Larbi-Siaw and Lawer (2015), Akhtar *et al.* (2017), Ayene (2020), and Ferrouhi (2017). From the perspective of financial management perspective, interest expense from deposit mobilization has a direct impact on the profitability of banks, which is why banks with higher average interest costs will be more cautious when mobilizing deposits. In addition, with a strength in the currency business and the deposit structure of banks, including demand deposits, term deposits, savings deposits, margin deposits, and deposits for other purposes, commercial banks not only meet the needs for income of depositors, but also meet many different needs, be it the use of payment services via banks or the need for asset safety; this can explain the negative correlation between the average deposit interest rate and the level of customer deposits.

Based on the positive regression coefficient of the variable LISTED according to GLS and LASSO in Table 5, this result indicates that the listing of shares has a positive influence on the level of customer deposits at commercial banks in Vietnam. Thus, the hypothesis H5 is accepted, and this result is consistent with the finding found by Vu and Le (2021). This can be explained that to list shares, commercial banks must not only be approved by the regulators of stock exchanges, but also by the government's management regulators of currency, banking operations, and foreign exchange. The regulations on listing shares require commercial banks

to ensure the safety of the banking business; additionally, these banks will have to disclose information according to regulations. Accordingly, banks with listed shares are more valued and trusted by the customers, and the information asymmetry between customers and banks is reduced, which is an important foundation for banks to attract more customer deposits. Moreover, by listing shares, commercial banks can indirectly get incentives and are strictly controlled by the government and the State Bank, especially in difficult times. Accordingly, customers can feel more secure when dealing with the banks, and the level of customer deposits can increase.

Based on the estimated results according to GLS and LASSO in Table 5, the positive regression coefficient of the variable SOWN indicates that state-controlled ownership helps banks receive more deposits from customers; hence, the hypothesis H6 is accepted. This result can explain that the trust of depositors is greater in banks controlled by the government (Ayene, 2020) because in this case, the government plays not only the role of managing and regulating the macro economy, but also the role of shareholders. Accordingly, the security for customer deposits increases even more, so ownership controlled by the government contributes positively to attracting customer deposits. In addition, the network of commercial banks owned and controlled by the government covers the whole country and expands to foreign countries, which also contributes to increasing opportunities for customer deposit mobilization.

The regression coefficient of the variable CRISIS according to GLS and LASSO in Table 5 shows that the occurrence of a global financial crisis has a negative effect on the level of customer deposits; the hypothesis H7 is thus accepted. This relationship can be explained that the occurrence of a financial crisis causes negative effects (Eichengreen and Gupta, 2013; Hosono *et al.*, 2005; Andries and Ursu, 2016; and Cubillas and Suarez, 2018), such as reduced consumer demands, shrank production activities, potential job losses, reduced citizen's income, reduced remittance flowing into the country, and many other negative effects. Amba and Almukharreq (2013) indicate that the profits of commercial banks were reduced due to the financial crisis. These have made it more difficult to attract customer deposits. In addition, this finding also implies the lagged impact of the global crisis on Vietnamese banking activities.

6. Conclusion

Customer deposits are an important source of capital for commercial banks. For the specific case of banks in Vietnam, the regression analysis results show that the level of customer deposits is positively influenced by bank profitability, loan quality, stock listing, and state-controlled ownership. In addition, bank liquidity, deposit interest rate, and global financial crisis negatively affect the level of customer deposits. To be able to mobilize more deposits from customers, these conclusions suggested that commercial banks need to focus on developing benefits for customers in addition to deposit interest rates and strengthen strategies to build customer trust and confidence through the appropriate assurance of loan quality, asset structure, bank profitability, and information disclosure. More broadly, the research results also imply the positive role of deposit insurance, or the support and supervision of the State Bank together

with the government in ensuring the interests of depositors, especially in the case of a crisis at each commercial bank, and the banking system, or the business and financial environment.

We have provided reliable empirical evidence to fill the research gaps on the influence of State-controlled ownership, stock listing, and global financial crisis on the level of customer deposits. Accordingly, the bank managers and other stakeholders get useful information for attracting deposits from customers. In addition, the findings also add to the evidence for the development of related theories. However, further studies can expand the approach towards testing and evaluating the moderating or intervening role of these factors on the relationship between the other factors and the level of customer deposits; or comparative analysis among the groups of commercial banks to increase the specificity and rigor of reference information for the implementation of the deposit mobilization policy of commercial banks in Vietnam. Regarding the scope of the research, future studies can assess the fluctuations of customer deposits at banks before, during and after the global financial crisis.

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Appendix 1. List of commercial banks in our research sample

No.	Symbol	Full name
1	ABB	An Binh Commercial Joint Stock Bank
2	ACB	Asia Commercial Joint Stock Bank
3	BAB	Bac A Commercial Joint Stock Bank
4	BID*	Bank for Investment and Development of Vietnam
5	CTG*	Vietnam Joint Stock Commercial Bank for Industry and Trade
6	EIB	Vietnam Commercial Joint Stock Export-Import Bank
7	BVB	Viet Capital Commercial Joint Stock Bank
8	HDB	Ho Chi Minh City Development Joint Stock Commercial Bank
9	KLB	Kien Long Commercial Joint Stock Bank
10	LPB	LienViet Post Joint Stock Commercial Bank
11	MBB	Military Commercial Joint Stock Bank
12	MSB	Vietnam Maritime Commercial Joint Stock Bank
13	NAB	Nam A Commercial Joint Stock Bank
14	NVB	National Citizen Commercial Joint Stock Bank
15	OCB	Orient Commercial Joint Stock Bank
16	PGB	Petrolimex Group Commercial Joint Stock Bank
17	SSB	Southeast Asia Commercial Joint Stock Bank
18	SGB	Saigon Bank for Industry and Trade
19	SHB	Sai Gon - Ha Noi Commercial Joint Stock Bank
20	STB	Saigon Thuong Tin Commercial Joint Stock Bank
21	TCB	Vietnam Technological and Commercial Joint Stock Bank
22	TPB	Tien Phong Commercial Joint Stock Bank
23	VCB*	Joint Stock Commercial Bank for Foreign Trade of Vietnam
24	VIB	Vietnam International Commercial Joint Stock Bank
25	VPB	Vietnam Prosperity Joint Stock Commercial Bank

Notes: * State-controlled ownership.

Source: Authors' compilation