

## Determinants of Commercial Banks' Lending Behavior: Evidence from Vietnam

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### ABSTRACT

The paper examines the factors affecting the lending behavior of commercial banks by using panel data of Vietnam's listed commercial banks on two stock exchanges, namely the Ho Chi Minh Stock Exchange (HOSE) and the Hanoi Stock Exchange (HNX) from 2009 to 2018. According to the results of the regression analysis, the GDP has a positive and significant influence on bank lending, whereas the liquidity ratio (LIR), management quality (MQR), and cash reserve ratio (RRR) all have a negative influence on bank loans (LOA). Moreover, operating expenses (OEA) and lending rates (LDR) do not appear to influence bank lending behavior. To prevent the occurrence of bad debt, the results recommend that banks work harder to increase deposits and exercise caution when making lending decisions.

**Keywords:** *Lending, Management quality, liquidity*

**JEL classifications:** G21, G32, C33

### 1. Introduction

The banking sector has a crucial socioeconomic role in the areas of trade and currency, as well as being a significant resource and force behind the nation's development. To lend and invest profitably, banks mobilize funds from residents. The primary job of most commercial banks is to encourage saving and distribute money into the economy through lending activities. It is extremely difficult to effectively increase investment in

manufacturing, agriculture, real estate development, commerce, tourism, etc, without bank credit (Beck et al., 2004; Jamil, 1988). Olokoyo (2011) asserts that banks have the capacity and opportunity to efficiently mobilize and allocate resources. A substantial share of the bank's financial activities—which are regarded as one of its main sources of income - comes from interest income from loans. Many nations view bank loans as a crucial and long-term source of funding (Ayieyo, 2016). The administrators of the bank are concerned about when to lend, how much is the ideal credit limit for credit activities, how to recover the loan, etc.

This also partly implies that there is a certain level of risk between the lender and the borrower. Diamond & Rajan (1998) assert that banks frequently switch from highly liquid assets like deposits to illiquid assets for loans. Lending activities are impacted by both internal and external variables throughout the changeover. Furthermore, because they rely on the state bank for backing or because some commercial banks believe they are too big to fail due to their significant commerce and well-known brand, banks continue to increase their loan activities despite the risks. Banks have a greater capital holding policy merely because their loan portfolio is hazardous, but this move also has something of an impact on the lending behavior of banks, according to Hellmann et al. (2000), Kim & Santomero (1988), and Rochet (1992).

The risk is at a concerning level and might have a domino effect. For a variety of reasons, the State Bank of Vietnam has imposed several conditions on the bank to maintain its liquidity. The business operations of Vietnamese banks, particularly their lending operations, are being impacted by a few variables. More specifically, the needed reserve amount. According to certain analyses, this rate control will result in a decline in the bank's credit (Cargill & Mayer, 2006; Christian & Pascal, 2012; Glocker & Towbin, 2012; Montoro & Moreno, 2011). Studies, however, also contend that this has a favorable impact on lending capacity (Chandler, 1971; Friedman & Schwartz, 1963; Olusanya et al., 2012; Meltzer, 2003; Chandler, 1971).

There are even studies that suggest that reserve requirements have only a small and statistically insignificant impact on bank loans and investments (Wilcox, 2012). Therefore, the question of how the reserve ratio affects lending behavior is controversial.

Not to mention that the recent emergence of several new investment channels, the rise in loan demand, and the decline in deposit volume all have an impact on the bank's lending practices in Vietnam. The authors also want to consider other elements that could influence loan performance. Research on banks' lending practices is primarily conducted in developed financial markets. The following variables were used as independent and dependent variables in the studies examined here: total lending, deposit volume, loan interest rate, cash reserve ratio, liquidity ratio, risk credit, GDP, interest rate differential, portfolio, capital structure, and exchange rate (Irungu, 2013; Olokonyo, 2011; Olusanya, 2012; Malede, 2011; Theodossiou, 2011). Olokonyo (2011) and Olusanya (2012) conducted some studies in less-developed financial markets. Similarly, to this, there is a dearth of pertinent literature about studies on the variables influencing bank lending behavior in the Vietnamese financial sector (Onyango, 2015). Most of the research done in Vietnam focuses on the determinants of interest rate differentials among commercial banks (Karimi, 2006; Kimura, 1997; Muriuki, 2013; Olweny, 2011; Were & Wambua, 2013).

As a result, the authors aim to revisit the question of whether the minimum reserve is related to Vietnamese banks. Based on prior research, the author considers both internal and external factors that influence how the bank operates its lending behavior, as well as the significance of those factors. Although Basel II was officially applied in many countries and put into practice in the years before 2008, however, it was only applied in major economies until early 2008. This has affected the regulations of the state banks and commercial banks in many countries, including Vietnam. This has affected the regulations of the state banks and commercial banks in many countries, including Vietnam. Therefore, this study examines the lending behavior of the bank after Basel II was applied in Vietnam.

This study is divided into the following sections: The introduction, which is the first section, emphasizes the necessity of researching the variables that influence the bank's lending practices. The theory and literature review follow next; here, the author is trying to carefully examine prior research to identify the research gap for this study. The authors explain how to gather samples, identify variables, formulate research hypotheses, and apply procedures in the section on data and research methods. The

results and discussion will be presented in Section 4, and finally, the conclusion and policy implications of the study will be presented.

## **2. Theory and Literature Review**

### **2.1. Theory**

A bank's primary role is to serve as an intermediary by gathering savings from depositors and disbursing them as loans to borrowers. The environment in which banks operate frequently regulates them as they carry out this function. It is maintained that banks cannot offset a higher failure risk by increasing interest rates (Stiglitz & Weiss, 1981). This causes any financial institution to ask the borrower for collateral to reduce losses that could result from loan defaults. Banks face obstacles that prevent them from expanding, though. This is a consequence of the risks they are exposed to while performing their responsibilities. By solving the problem of asymmetric information among agents and diversifying risks, banks manage to reduce the costs that would be incurred on the exchange of financial funds. This enables the efficient allocation of financial resources within the economy (King & Levine, 1993; Olusanya, 2012). Economic decisions related to consumption and investment are made possible through the financial system since it is aimed at increasing the productivity growth of the economy (Karimi, 2006). As posited by different theories, a bank's lending behavior is a culmination of a number of factors both external and internal to the bank. However, each theory addresses the effects of a certain identical variable on lending behaviour by banks (Ewert et al., 2000). For instance, bank lending channel theory only looks at the effects of reserve requirements while pro-concentration theory focuses on how bank capitalization affects the bank's lending behaviour. Alternatively, Kashyap et al. (1993) argue that bank lending reduces through monetary contraction as posited by the Keynesian theory. This implies credit available from the banks is reduced. Further, within finance literature, there exist several theories concerning banks' lending behavior. In this study, the theories reviewed are summarised as follows:

**Loan pricing theory**

This asserts that banks cannot always set high-interest rates. Therefore, in trying to earn maximum interest income banks should consider the problems of adverse selection and moral hazards since it is very difficult to forecast the borrower type at the start of the banking relationship (Stiglitz & Weiss, 1981) given the high credit market information asymmetry. If banks set interest rates too high, they may induce adverse selection problems because high-risk borrowers are willing to accept these high rates. Once these borrowers receive the loans, they may develop moral hazard behaviour since they are likely to take on highly risky projects or investments (Chodecal, 2004). It argued that at times it may be difficult to find interest rates set by banks that are commensurate with the risk of the borrowers. This theory suggests that loans advanced to the public may or may not increase in the end. A moral hazard occurs when a contract is executed between two parties. The two types of moral hazard are hidden information and hidden action (Arrow, 1985). Hidden information occurs when one contract party does not unveil the full range of his or her options and the consequent risk factors. Hidden action occurs when one contract party chooses options that are not in the interest of the counterparty and cannot be observed and managed thus moral hazard may arise. In relation to credit markets and analyzing the lender-borrower relationship in more detail, the financial institutions may not have the capacity to ensure that the borrower invests the borrowed loan in productive investments, and because of this information asymmetry, the borrower may decide to invest in risky projects leading to defaulting. (Diamond, 1984).

**Credit Market Theory**

The neoclassical credit market model suggests that the terms of credits clear the market. In this model, the interest rate is the only price mechanism that can clear the credit market, given that the loan collateral remains constant. With a growing demand for credit and a given loan and advances supply by the banks, the interest rate can only rise if the credit market is clear, and the reverse is true. The greater the borrower's default risk, the higher the interest premium (Ewert et al., 2000), to compensate for any possible losses. The increase in demand for credit brought about by low-interest rates may eventually lead to a depreciation of the currency. The central bank therefore must adjust the interest rate to increase the cost of borrowing. Commercial banks in turn must

increase their rates and therefore reduce their lending activities in the long run. Although the increased cash requirement ratio also acts as a mechanism for restricting credit availability, considering the macroeconomic environment (Vazakidis & Adamopoulos, 2009). According to Bolton & Freixas (2001), this leaves commercial banks with close to no alternative other than lowering lending volumes. This theory explains changes in market interest rates. In this study, it contributes to influencing the lending behavior of banks.

## **2.2. Literature review**

Commercial banks play a significant role in the economy's financial intermediation. Olokoyo (2011) asserts that the expansion of credit in the private sector also helps to stimulate the economy. However, a variety of circumstances affect how banks behave in terms of lending. Most banks maintain liquid assets to avoid cash shortages and to make timely loans in challenging circumstances (Fama, 2013). Numerous earlier studies have also examined how liquidity influences lending, most notably Altunbas et al. (2009), who studied European banks and discovered that banks are also impacted by monetary policy and that prospects for loan growth increase with increasing liquidity-account balances. Studies that evaluated the adverse association between commercial bank lending and liquidity ratio, such as Amidu (2014), Malede (2014), and Olokoyo (2011), also produced similar findings. One of the factors that influence a customer's decision to borrow money is the interest rates charged by the bank. This implies that banks carefully evaluate the proper level when setting interest rates rather than always setting them high. Olokoyo (2011) showed that there is a direct correlation between bank lending volume and interest rates. This claim is supported by research by Djiogap and Ngomsi (2012), Malede (2014), Olokoyo (2011), and Tabila (2016).

Vo (2018) demonstrates that, in Vietnam, bank lending behavior is highly influenced by bank-specific factors, particularly operating costs. An increase in interest rates, therefore, results in a decrease in the bank's lending rate. However, some research does not support the idea that a rise in operational expense ratio will result in a decline in lending activity; rather, it supports a positive impact, as Sapeinza (2004) demonstrated when examining the banks mentioned above. In contrast, the author demonstrates that loan activity becomes more efficient as the cost of total assets increases.

The State Bank also establishes the required reserve ratio in cash for banks to guarantee the solvency of accruing debts, payments, recurring expenses, and loans. The quantity of money that banks have available for lending activities has been impacted by this. The bank will typically drastically cut its spending on credit activities if the needed reserve ratio for cash is high, and vice versa. According to studies by Olokoyo (2011) in Nigeria, Mufandaedza (2017) on banks in Zimbabwe, and Olumuyiwa et al. (2012), who investigated lending behavior and discovered that reserve requirement volume had a negative relationship with it. Malede (2014) asserts that the necessary cash reserve has no impact on Nigerian commercial banks. According to King (1986), regulation is required to prevent the creation of excessive amounts of credit. The amount of money in the economy must be sufficient but not excessive, or else significant inflation may result.

According to Constant and Ngomsi's (2012) study, which looked at the long-term lending practices of 35 commercial banks in Central Africa, GDP growth is one of the most significant and reliable ways to gauge a bank's long-term business lending characteristics. It is also one of the most important factors influencing bank lending. In a similar vein, Amidu (2014) discovers that rising GDP in sub-Saharan Africa causes a growth in bank lending. Similar findings have also been found in certain Asian research, including Rabab'ah (2015), Al-Kilani & Kaddumi (2015), Imran & Nishat (2013), and Sarath (2015). The gross domestic product and bank lending, however, were found to be negatively correlated by Moussa & Chedia (2016).

Additionally, the study by Vazakidis and Adamopoulos (2009) investigated the connection between economic progress and loan growth in Italy. The results show the positive impact of economic growth on the development of the credit market with a log-linear regression model. Irungu (2013) demonstrated a positive and important relationship between the financial performance of commercial banks and the interest rate differentials of 43 commercial banks in Kenya. It turns out that interest rate differentials affect operating assets in banks because they increase the cost of borrowing.

At banks, the management role of the leader is very important. They set policies to ensure the bank's continuous operation and high profits from loans and investments. Therefore, to create credibility and avoid bad debts, they have established quality management throughout the bank's sector.

The managerial position of the leader is crucial in banks. They establish regulations to guarantee the bank's ongoing function and strong returns on investments and loans. They have therefore implemented quality management throughout the bank's structure to establish a reputation and prevent bad debts. Because they think effective management will lower the bank's risk. The credit officers involved in the disbursement process as well as the credit granting leaders' lending decisions have both been considerably impacted by this reason, though. The research of Alhassan et al. (2013), Qudah (2017), and Tabila (2016) had the similar result. All came to the same conclusion: banks' lending behavior would decrease with higher management quality.

### **Objectives**

Since the majority of studies, including the research done in Vietnam, only use methods like OLS, FEM, and REM models, this study intends to close the methodological and empirical gap. Furthermore, the necessary tests were performed to confirm the estimates. While past research is still debatable, the author wants to consider it once more concerning banks in Vietnam. Additionally, based on prior research, the author considers both internal and external elements that have an impact on how the bank operates its lending behavior and how big of an impact they have. Determinants of commercial bank lending behavior will therefore be studied in this article using data from the Vietnamese stock exchange in the period 2009 – 2018.

## **3. Research data and methods**

### **3.1. Data**

Currently, in Vietnam, there are a total of 49 banks. including 31 joint-stock commercial banks, 4 banks with 100% state capital, 2 policy banks, 2 joint-venture banks, 9 banks with 100% foreign capital, and 1 cooperative bank. However, the author excluded banks with a lot of missing data, and the banks participating in the study must

have existed for at least 5 years. Therefore, in this study, the data was collected from 20 Vietnamese commercial banks serving the Vietnamese market in the period 2009–2018. Information was collected from audited annual consolidated financial statements posted on the websites of listed banks. After processing, secondary data will be used as data for 6 descriptors: required cash reserve ratio (RRR), operating expense ratio (OEA), liquidity ratio (LIR), management quality ratio (MQR), loan interest rate (LDR), and GDP period (2009–2018).

### **Hypothesis**

Loans (LOA) represent bank lending behavior as measured by the bank's loan growth rate. In this study, loan growth is an important measure of bank lending behavior, as bank lending growth is monitored by Vietnam's banking and financial supervisory authorities. This indicator also reflects the strength and financial soundness of the bank because the local government determines the loan growth rate based on its assessment of the soundness of commercial banks.

#### *Operation expenses ratio (OEA)*

Operating expenses are expenses to ensure the operation of the banking apparatus related to the main business activities of the bank. Typically, operating expenses are sales or administrative expenses. The operating expense ratio is calculated as operating expenses to total assets. One of the responsibilities that managers must consider is determining how to reduce operating costs without significantly affecting their ability to compete with the bank's competitors. Some banks are successful in reducing operating costs to gain a competitive advantage and increase income. However, reducing operating costs can also affect the quality of operations. According to Vo (2018), the variable operating cost ratio harms the LOA variable. However, according to Sapienza (2004), the variable operating expense ratio positively affects the variable LOA. Expected signs are positive because when costs increase, banks will boost lending to increase profits to cover costs.

*H<sub>1</sub>: The operating expense ratio has a positive effect on bank lending behavior.*

*Gross domestic product (GDP)*

Gross domestic product (GDP) is the best way to measure economic growth and represent the overall state of the economy. Mansor HI (2016) notes that gross domestic product positively affects bank loans because an increase in GDP increases both the demand and supply of loans. An increase in GDP means more money for banks to lend as deposits are more likely to increase. Pruteanu-Podpiera (2007) investigated the effects of monetary policy, gross domestic product growth, and inflation on the growth rate of total lending in Czech banks from 1996 to 2001. The results show a strong positive effect of GDP on loan rate growth. Therefore, GDP is one of the factors affecting bank lending growth.

*H<sub>2</sub>: Economic growth is positively related to the lending behavior of banks.*

*Cash reserve requirement ratio (RRR):*

The cash reserve ratio is the minimum reserve ratio that commercial banks are required to maintain as regulated by the central bank. If all commercial banks keep all deposits and do not lend, it means that the banking system has a hundred percent of reserves. If all commercial banks keep only part of their deposits and lend the rest, it is a partial reserve banking system. Modern banks keep only a small portion of deposits and find ways to lend the rest. The central bank can influence the money supply through the cash reserve ratio. The cash reserve ratio affects the amount of money the banking system can generate from each reserve currency. An increase in the required reserve ratio means that banks have to hold more reserves, thus lending less. According to Shylet (2017), the required reserve ratio in cash harms the LOA variable. The expected sign is negative because when this ratio increases, the bank's lending capacity decreases.

*H<sub>3</sub>: Required reserves in cash have a negative impact on the lending behavior of banks.*

*Liquidity ratio (LIR)*

A bank's liquidity ratio is a measure of a bank's ability to immediately respond to customers' withdrawal needs and disburse credits as committed. A bank is considered to be highly liquid when it has sufficient capital and other liquid assets along with the ability to raise capital quickly from various sources at a low cost. As for the bank's liquidity, depending on the characteristics of the demand, the liquidity time will be short

or long-term. Whether short-term or long-term liquidity requires banks to have reserves is unclear. When the liquidity ratio is high, it means that the amount of idle money in the bank is high, which shows that the bank has not used capital effectively for lending activities to earn profits. Therefore, while the liquidity interest rate is high, the lending interest rate is low. According to Amidu (2014), Getahun (2014), Olokoyo (2011), and Tabila (2016), the liquidity ratio has a negative impact on the LOA variable. The authors, therefore, expect to be negative in this relationship.

*H<sub>4</sub>: Liquidity ratio is negatively related to bank lending behavior.*

#### *Management quality ratio (MQR)*

Quality management is defined as the ongoing efforts of an organization's management and employees to ensure long-term customer loyalty and customer satisfaction. Employees must continuously improve the quality of their products and services through appropriate feedback and research to meet and exceed customer satisfaction levels. strengthen the bank's loan quality management through the issuance of policies to tighten the bank's lending to minimize lending risks. According to Alhassan et al. (2013), Qudah (2017), and Tabila (2016) management quality has a negative impact on the LOA variable. The measurement used is total operating expenses relative to total operating income, and the expected sign is negative. As income increases, the lending activities of banks are boosted, which will cause banks to loosen lending policies to facilitate more customers. The loosening of lending policies will reduce the quality of management.

*H<sub>5</sub>: Management quality is negatively related to the lending behavior of banks.*

#### *Lending rate (LDR)*

An interest rate is the amount of interest due per period, as a proportion of the amount lent, deposited, or borrowed (called the principal sum).

Interest rates are one of the important factors affecting the economy in any country. Interest rates play an important and major role in affecting the economy and especially the banking sector. An interest rate is the portion of the principal that the lender charges

for the usage of its funds<sup>1</sup>. This interest is calculated as the interest rate multiplied by the principal amount for a specified period agreed upon by the two parties<sup>2</sup>. Interest rates are always the primary concern of borrowers and lenders, and they are also a concern of governments. In a country where interest rates greatly affect the economy, when interest rates fluctuate, the economy is also at risk of imbalance. If the interest rate increases, the ability to borrow will decrease, the demand for savings deposits will increase, and consumption will decrease, affecting the demand for cash flows. Conversely, if interest rates decrease, the demand for loans will be higher, savings deposits will decrease, and supply will increase, leading to inflation. According to Imran et al. (2012), Malede (2014), Mukhanyi (2016) and Olokoyo (2011) the MQ variable has a negative effect on the LOA variable. Therefore, the expected sign is negative.

*H<sub>6</sub>: Lending interest rates are negatively related to the lending behavior of banks.*

**Table 1: Expectations of Research Results**

| Variables                      | Sign       | Expectation | Previous research                                                                                              |
|--------------------------------|------------|-------------|----------------------------------------------------------------------------------------------------------------|
| Operation expenses ratio       | <i>OEA</i> | +           | Vo (2018),                                                                                                     |
| Economic growth rate           | GDP        | +           | Amidu (2014); Pruteanu - Podpiera (2007)                                                                       |
| Cash reserve requirement ratio | <i>RRR</i> | -           | Shylet (2017); Glocker & Towbin, 2012; Christian & Pascal, 2012; Cargill & Mayer, 2006; Montoro & Moreno, 2011 |
| Liquidity ratio                | <i>LIR</i> | -           | Tabila (2016), Olokoyo (2011), Getahun (2014) & Amidu (2014)                                                   |

<sup>1</sup> [https://en.wikipedia.org/wiki/Interest\\_rate](https://en.wikipedia.org/wiki/Interest_rate)

<sup>2</sup> <https://www.investopedia.com/terms/i/interestrates.asp>

|                          |            |   |                                                                     |
|--------------------------|------------|---|---------------------------------------------------------------------|
| Management quality ratio | <i>MQR</i> | - | Tabila (2016), Qudah (2017) & Alhassan et al. (2013)                |
| Lending rate             | <i>LDR</i> | - | Mukhany (2016), Olokoyo (2011), Imran et al. (2012) & Malede (2014) |

### 3.2. Methods of Research

The impact of several factors on the lending behavior of commercial banks in Vietnam between 2009 and 2018 is examined in this study by the authors using multivariate regression. The banks taking part in the study must have been operational up until the study period, as there are 20 banks and 200 observations. The table data regression analysis method was used to determine the influence of factors on lending behavior using six descriptive variables: required cash reserve ratio (RRR), operating expense ratio (OEA), liquidity ratio (LIR), management quality ratio (MQR), and loan interest rate (LDR), for the period (2009-2018). The general model is shown below:

$$LOA_{it} = \alpha + \beta_1 * LDR_{it} + \beta_2 * LIR_{it} + \beta_3 * RRR_{it} + \beta_4 * MQR_{it} + \beta_5 * OEA_{it} + \beta_6 * GDP_{it} + \varepsilon$$

where  $\alpha$  is a constant, and  $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ , và  $\beta_6$  are the parameters related to the corresponding independent variables included in the model.

Although OLS is frequently used in research due to its simplicity and dependability, this approach frequently causes autocorrelation in the data or imposes a requirement that the residuals be normally distributed, lowering the Durbin value. Additionally, the conditions are difficult to meet because of how closely the assumptions are restricted. As a result, the author suggests adopting more fixed-effects and random-effects models. These two models can consider the difference between the cross-objects in analyzing the impact of some factors on lending behavior. The F test and the Hausman test will be used by the author to choose the best model for the investigation. The author will include the step of selecting the best model for the study using the F test and the Hausman test.

$$H_0: \alpha_1 = \alpha_2 = \alpha_3 = \dots = \alpha_n = 0$$

$$H_1: \alpha_j \neq 0 \ (j=1, n)$$

If  $\beta \geq \alpha$ ,  $H_0$  is accepted, choose the model Pooled Regression.

If  $\beta < \alpha$ ,  $H_0$  is not accepted and selects the Fixed Effect model.

The Hausman test is used to select between a fixed effect model and a random effect model. The following assumptions are made:

$H_0$ : Estimates of FEM and REM are not different.

$H_1$ : Estimates of FEM and REM are different.

If the p-value is less than 0.05, reject  $H_0$ .

At that time, REM is not reasonable and should use FEM and vice versa. The Wooldridge test and Breusch test will be used to assess the autocorrelation phenomenon in addition to making sure the model is free of flaws or, if there are, to identify them. When FEM or OLS is selected, the Modified Wald test is employed, and when REM is selected, the Pagan Lagrangian multiplier is applied. To overcome the issues of variable variance or autocorrelation, the GLS regression approach is then used. The autocorrelation between residuals of different variables and the variance of error are both problems that can be effectively solved by this regression technique.

## 4. Results

**Table 1: Descriptive statistics of variables**

| Variables                   | Obs | Mean      | Sta. Dev. | Min        | Max       |
|-----------------------------|-----|-----------|-----------|------------|-----------|
| <b>Dependent Variable</b>   |     |           |           |            |           |
| <b>LOA</b>                  | 200 | 11.02551  | 1.189066  | 8.485703   | 13.79156  |
| <b>Independent Variable</b> |     |           |           |            |           |
| <b>LDR</b>                  | 200 | 0.101229  | 0.0324528 | 0.0696     | 0.1695    |
| <b>LIR</b>                  | 200 | 1.500089  | 0.3385421 | 0.8585705  | 3.250801  |
| <b>RRR</b>                  | 200 | 0.0066464 | 0.005695  | -0.0004347 | 0.0465449 |

|            |     |           |           |           |           |
|------------|-----|-----------|-----------|-----------|-----------|
| <b>MQR</b> | 200 | 2.382635  | 2.324468  | 0.4318755 | 13.75362  |
| <b>OEA</b> | 200 | 0.0161154 | 0.0053807 | 0.0058263 | 0.0373773 |
| <b>GDP</b> | 200 | 6.33985   | 0.6086828 | 5.398     | 7.08      |

*Source: Author's calculation*

**Table 2: Correlation Matrix**

|     | LOA     | LDR     | LIR     | RRR     | MQR    | OEA    | GDP |
|-----|---------|---------|---------|---------|--------|--------|-----|
| LOA | 1       |         |         |         |        |        |     |
| LDR | -0.3204 | 1       |         |         |        |        |     |
| LIR | -0.3622 | 0.5441  | 1       |         |        |        |     |
| RRR | 0.2179  | -0.1323 | -0.1557 | 1       |        |        |     |
| MQR | -0.1513 | -0.2611 | -0.2029 | -0.0736 | 1      |        |     |
| OEA | -0.0341 | -0.1064 | -0.2131 | 0.4009  | 0.0796 | 1      |     |
| GDP | 0.3493  | -0.4707 | -0.2076 | 0.0139  | 0.1516 | 0.0178 | 1   |

*Source: Author's calculation*

**Table 3. Variance inflation factor**

| Variable        | VIF         | 1/VIF    |
|-----------------|-------------|----------|
| LDR             | 1.81        | 0.551759 |
| LIR             | 1.49        | 0.672925 |
| GDP             | 1.29        | 0.772308 |
| OEA             | 1.24        | 0.807427 |
| RRR             | 1.23        | 0.810874 |
| MQR             | 1.11        | 0.903551 |
| <b>Mean VIF</b> | <b>1.36</b> |          |

*Source: Author's calculation*

**Table 4. Final results - GLS model**

| Variables | LOA        |           |       |         |
|-----------|------------|-----------|-------|---------|
|           | Coef.      | Std.Err.  | (z)   | (P> z ) |
| LDR       | -1.04802   | 1.826982  | -0.57 | 0.566   |
| LIR       | -1.155881  | 0.1574394 | -7.34 | 0.000   |
| RRR       | -25.33545  | 8.525956  | -2.97 | 0.003   |
| MQR       | -0.0946855 | 0.0176401 | -5.37 | 0.000   |
| OEA       | 11.00818   | 9.846757  | 1.12  | 0.264   |
| GDP       | 0.580109   | 0.0833888 | 6.96  | 0.000   |
| _cons     | 9.36427    | 0.6540516 | 14.32 | 0.000   |

*Source: Author's calculation*

## 5. Discussion

Table 1 provides a descriptive analysis of the variables included in the study. The mean of the LOA is approximately 11.03%, with a standard deviation of over 1.19. Namely, Kien Long Bank had the lowest value of 8.48% in 2009, and Investment and Development Bank had the highest value of 13.79% in 2018. The lending rate is around 10.12%, and the good liquidity ratio is about 1.5 with a standard deviation of 0.34. In addition, the cash reserve requirement ratio has an average of 0.0066 with a minimum value is -0.0004347 (Nam Viet Commercial Joint Stock Bank in 2016) and the maximum value is 0.0465449 (Asia Commercial Joint Stock Bank in 2009) and the standard deviation is near 0.006. The management quality ratio has a standard deviation of 2.32, while the largest ratio is 0.43 compared to the lowest ratio of 13.75. The last 2-variable is the ratio of operating expense and gross domestic product (GDP) with the average rate being 1.61%, and 6.34%; the lowest growth rate being 3.73%, 7.08%; and the highest being 0.58%, 5.398%, respectively, during our studying period.

In order to detect the multicollinearity problem and important to review the correlation between variables. We estimate the Pearson coefficient of correlation between any pair of the variables and exhibit the results in Table 2. The highest correlation is between the lending rate and liquidity ratio around (0.5441). On the other hand, all the remaining variables do not have a high correlation with each other therefore the variables are proper for the panel regression analysis.

To identify multicollinearity, the author bases on the variance inflation factor (VIF). The results are shown in Table 3. In the regression model, if the independent variables are closely related, there will be multi-collinear phenomena. Based on the search results in Table 3, the independent variables have no collinearity problem because VIF is less than 2 and  $1/VIF$  is less than 0.1

To choose a suitable model for research, the author performs regression for Pooled ordinary least squares (POLS), Fixed effects model (FEM) and Random effects model (REM), respectively.

Using the Hausman test to select a suitable estimation method between the three methods of estimating POLS, FEM, and REM was witnessed in the studies of Baltagi (2008) and Gujarati (2004). The results indicate that Fixed Effects model (FEM) is more appropriate for LOA because the result of Hausman test with  $\text{Prob} > \chi^2 = 0.006$  is less than alpha (5% level);

In order to examine whether there are any defects in the selected model after the Hausman test, the author conducts Modified Waldtest for group-wise heteroskedasticity in the fixed effect regression model and Wooldridge test for autocorrelation in panel data between LOA and the independent variables. The results show that the model has the heteroskedasticity with  $\text{Prob} > \chi^2 = 0.000 < \alpha$  ( $\alpha = 0.05$ ).

We use the general least squares model (GLS) to overcome the autocorrelation phenomenon between the residuals of the variables and the variance phenomenon of errors of change according to Wooldridge (2002), and the results are reported in Table 4.

The resulting study had 4 independent variables including cash reserve requirement ratio (RRR), liquidity ratio (LIR), management quality ratio (MQR), and gross domestic product (GDP) affecting LOA at a 1% significance level. While the ratio of

operation expense (OEA) and lending rate (LDR) is not statistically significant so there is not enough basis to conclude the impact on the lending behavior of Vietnamese commercial banks in the study period.

The results of the regression model on banks' lending behavior (with the dependent variable LOA in Vietnam are presented as follows:

$$\text{LOA} = 9.364 - 1.156 * \text{LIR} - 25.335 * \text{RRR} - 0.095 * \text{MQR} + 0.580 * \text{GDP}$$

**Liquidity ratio (LIR):** The liquidity ratio has a negative impact on banks' lending behavior. Namely, if the Liquidity ratio increases by 1 unit, LOA will decline by -1.156 units. The supply and demand of liquidity of a bank rarely balance with each other at a specific time. Banks often have to face and deal with either liquidity status or a deficit. When more capital is retained to meet the liquidity needs, the profitability of the bank is lower and vice versa. The higher the liquidity ratio of Vietnamese banks, the lower the lending rate. The results of this study are in line with the previous research results of Altunbas et al. (2009), Amidu (2014), Djioap & Ngomsa (2012), Getahun (2014), Malede (2014), Olokoyo (2011), and Tabila (2016).

**Cash reserve requirement ratio (RRR):** The cash reserve requirement is inversely correlated with banks' lending behavior. An increase in the required reserve ratio implies that banks have to reserve more, thus lending less. This finding is similar to Bhattarai (2019), Malede (2014), Mufandaedza (2017), Olokoyo (2011), and Olumuyiwa et al. (2012). The regression results for the RRR variables have a large impact at a significant 1%, namely Cash reserve requirement ratio increases by 1 unit, and LOA will go down by -25.34 units.

**Management quality ratio (MQR):** Management quality is negatively related to banks' lending behavior. Quality management is the ongoing effort of management as well as employees of an organization to ensure long-term customer loyalty and customer satisfaction. Quality management is the coordinated activities to direct and control a quality organization. Quality orientation and control often include policy formulation, goals, planning, control, assurance, and quality improvement. Improving the quality of loan management is tightening policies and reducing credit. As such, reducing the quality of management will increase the lending activities of banks. This negative result is supported by Alhassan et al. (2013), Le et al. (2019), Qudah (2017), and Tabila (2016). The regression result shows that MQR has little effect on the lending behavior

when the Management quality ratio increases by 1 unit, LOA will decrease by -0.0947 units.

**Gross Domestic Product (GDP):** Gross Domestic Product has a positive impact on banks' lending behavior. The conditions and economic development determine consumer and investment needs and thus reflect credit demand. GDP growth is associated with strong lending activity and credit growth related to GDP growth (Barajas et al., 2010). Domestic demand growth is associated with GDP growth and impacts credit growth (Bakker and Gulde, 2010). As a result, GDP is one of the factors influencing bank loan growth. The higher GDP growth rate means the whole economy is growing, credit demand will increase, and commercial banks will tend to lend more. The results of this study are consistent with the previous results of Al-Kilani & Kaddumi (2015), Amidu (2014), Constant & Ngomsa (2012), Djigap & Ngomsa (2012), Imran & Nishat (2013), Imran et al. (2012), Pruteanu-Podpiera (2007), Vo (2018), Rabab'ah (2015), and Sarath (2015). When GDP increases by 1 unit, the LOA will increase by 0.580 units.

### Implications

The paper examines the factors to impact on the lending behavior of 20 commercial banks listed on the Vietnamese HOSE and HNX for the period from 2009 to 2018 with 200 observations. Pooled regression models (POLS), fixed effects models (FEM), random effects models (REM), and generalized least squares (GLS) were used to test the influencing factors. affect the lending behavior of banks. From the findings above, the author found that the cash reserve requirement ratio (RRR), liquidity ratio (LIR), management quality ratio (MQR), and Gross domestic product (GDP) was significant in determining lending behavior in Vietnam's commercial banks. However, there is evidence to conclude the impact on bank lending behavior of the ratio of operation expense (OEA) and lending rate (LDR).

Lending is the basic element and main source of income for banks. The main objective of this study is to establish the determinants of the lending behavior of commercial banks in Vietnam. Specifically, the study finds the strong influence of the required cash reserve ratio on lending behavior. This means that commercial banks need to consider keeping a low number of cash reserves which is enough to comply with the regulations of the State Bank. Because once the bank has more reserves, the source of money for

lending will be reduced. In fact, it is difficult to find a balance between Supply and Demand in terms of a bank's liquidity at a particular time. It requires that banks need to have good liquidity to avoid the domino effect. However, the State Bank will be the final savior for commercial banks if they fall into a serious liquidity situation, so the leadership of banks is necessary to calculate the level of capital maintenance sufficient to create trust from customers. if depositors need to withdraw or disburse loans urgently.

Besides, banks should also consider setting the quality management policy at a moderate level to reduce pressure on credit officers during their work. Commercial banks are required to relook into more innovative ways of improving their loan books so as to raise their income. For example, a commercial bank may reconsider its pricing strategy, offer more attractive products, and maintain better banking relationships with its clients. Finally, on the significant relationship established between Real GDP growth rate and lending behavior, the study recommends re-examination of the good or bad projects that are funded by Commercial banks during periods of economic booms or recessions. This is because bad projects may not in the long run yield expected outcomes and in times of financial depression many loans may become non-performing and thus constraining credit available to the private sector.

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