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Net Interest Margin of Commercial Banks in Vietnam*

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Abstract

The paper investigates the factors that affect the net interest margin (NIM) of commercial banks (CBs) in Vietnam between 2008 and 2018. We examine secondary data of CBs with 308 observations during the period 2008-2018, and apply a range of investigative methods to confirm the empirical findings. The results show that operating expenses and credit risk have a positive impact on NIM, whereas the level of risk aversion, quality of management, income from trading, and the proportion of deposits have negative impacts on NIM. The empirical findings offer suggestions which should help bank management to identify the factors affecting the marginal interest rate to apply suitable policies in supervising CBs in Vietnam.

JEL: E42, G20, G21, O16, O53

Keywords: Marginal rate, net interest margins, operating costs of commercial bank, market power.

1. Introduction

From 2008 to the present, the prevailing interest rate in Vietnam has had many fluctuations that have mirrored fluctuations in the economy. Basically, interest rates increased sharply in the period 2009-2011 due to rising inflation, causing the State Bank of Vietnam (SBV) to apply tight monetary policy. This led to a scarcity in the national currency, the dong (or VND), across the system, prompting banks to increase their interest rates, even as the SBV introduced a number of policies to curb interest rate hikes. During the period 2012-2014, interest rate levels were gradually reduced in line with the prevailing policies of the SBV.

Consistent with SBV policies, macroeconomic indicators, such as favourable GDP and lowering inflation, have become a weather vane for lower interest rates. This creates a momentum for banks to continue reducing interest rates in order to support businesses in developing production, thereby promoting further growth in the economy. From 2015 to the present, VND interest rates have been maintained at a relatively stable level in the direction of a slight decrease. Nevertheless, medium- and long-term interest rates have recently tended to increase because banks have mobilized medium- and long-term capital to meet Circular 06. This has led to USD deposit rates at 0% and a further reduction in USD lending rates to support economic growth and anti-dollarization.

In the banking sector, the marginal interest rate is the difference between the bank's borrowing and lending rates, or the difference between the interest income and interest payments to lenders. This is referred to as the ratio of net interest margin (NIM), which plays an important role in determining bank profitability. A lack of profitability has led to a period of merger and acquisition (M&A) in Vietnam, so that at the end of the second quarter in 2015, the number of banks in Vietnam was reduced to 34. Some small and weak banks were the subject of M&A because they were too small, as was their performance. Generally, Vietnam's banking system has operational profit from interest revenues at a very high percentage (70% -85%), while the remaining service operations provide only about 15% -30%.

In recent years, the interest rate of Vietnam's banking system has again undergone a number of changes. It is not clear, however, how and to what extent the variability of interest rates affects the

marginal rate of Commercial Banks (CBs) (see Table 1 for detailed bank information). Therefore, by controlling the cost factors that affect the marginal rate, CBs can seek to narrow the distance between the interest rate of their inputs and outputs. In addition, increases in the competitive nature among commercial banks has led to lower costs of borrowing. In order to reduce the gap between the lending and borrowing interest rates, banks need to find specific evidence in order to lead to better solutions.

[Table 1]

Furthermore, the bankruptcy of many businesses is due to inefficient business operations, which is caused as a direct result of high borrowing costs. In order to improve the economic efficiency and create a competitive environment between domestic banks and foreign banks, the government needs to have information to conduct better monetary policy. Therefore, it is necessary to find the causes of the increases in the bank interest rate margin. From the empirical findings, it is possible to suggest policies for commercial banks to control their business activities, and for the State Bank to have better solutions to manage interest rates and credit policy.

The important question is how to determine the factors that affect the NIM, and the directions in which they lead. In order to address these issues, we will construct a model for the NIM. Regression models that are intended to capture the dependence are developed to analyze overseas economies that show the dependence of NIM on a range of explanatory factors. However, these models may not be appropriate for Vietnam. For this reason, we are motivated to construct a model for the rate of NIM that is appropriate for the CBs in Vietnam. Such a model can also allow for managers and investors to evaluate the operational efficiency of the business and management of commercial banks in Vietnam.

The remainder of the paper is given as follows. Section 2 presents a literature review. Section 3 discusses the research method, including data, model specification, and estimation. Sction 4 analyzes the empirical results, including the outcomes of hypothesis tests. Some concluding remarks are given in Section 5.

2. Literature Review

The rate of NIM measures the net profitability of the bank as the difference between interest income and interest expense, divided by the total bank assets (Brock and Franken, 2003). When net profit from interest is higher than normal, the implication is that of low operational efficiency of a bank, in effect implying that the cost control is weak, thereby leading to a negative impact on financial development with low investment and slow economic growth. High marginal rates should reflect the higher level of risk in bank activities (Claeys and Vander Vennet, 2008).

On the other hand, marginal rates in financial markets are expected to decrease with the development of such financial markets. Low interest rates encourage investment and support economic growth. However, Schweiger and Liebeg (2009) emphasize that the benefits from a low cost of financial intermediation can only be truly effective when the risk to the bank is controlled carefully.

From the bank perspective, the marginal interest income is an important factor in determining the profitability of bank operations. From the economy's perspective, the marginal interest rate is associated with factors such as domestic risk, macroeconomic variables, risk customers, and bank competition. These factors are key to the determination of interest rates in the private sector.

For Asian emerging markets, where the banking system dominates, bank loans are the major funding source, so that the factors that affect loans must also affect the stability of the banking sector in that area. We can expect that increased competition will lead to a lower marginal rate. Dietrich and Wanzenried (2011) suggest that higher concentrations can result in strong competition among banks, thereby leading to lower marginal rates.

The evidence here, however, is not all one way. The relationship of marginal interest rates and the competitiveness of banks, as recognized by Claeys and Vander Vennet (2004) and Schweiger and Liebeg (2009), among others, is that such competitiveness can encourage banks to become riskier by failing to conduct commensurate evaluations. Such behaviour results in non-optimal interest margins and a weaker operation of the banking sector, with consequent instability.

In addition to the microeconomic and macroeconomic factors that have impacts on the interest rate margin, political factors and unstable institutions also impact on the NIM. With increasing institutional instability, the risk of bank operations also increases, so that the NIM will inevitably increase (Claeys and Vander Vennet, 2004).

High economic growth can also affect marginal rates because of the sensitivity of credit operations, combined with more efficient operations for the loan. Many studies have made the point that low inflation implies a low marginal rate. In this regard, in an empirical study of bank marginal rates in the Czech Republic, Horváth (2009) finds that stable interest rates lead to a decrease in marginal rates, and that a higher capital adequacy leads to a lower marginal rate, which then contributes to the banking system's stability.

Operating expenses (Operating Costs-OC), calculated as the ratio of operating expenses to total assets, provides an index to measure how effectively the banks manage their cost of activities. Following Maudos and Fernández de Guevara (2004) and Maudos and Solisa (2009), we use the ratio of operating expenses divided by total assets to assess bank operational efficiency. When banks fail to operate efficiently with high cost ratios, the high cost of this component is likely to be detrimental to customers.

As the banking system in Vietnam is relatively young, cost management plays an important role in promoting the development of a bank. A positive sign is expected for this variable because the investment in human resources leads to high costs, which the bank can pass on to customers. Fernández de Guevara's Maudos (2004) and Maudos and Solis (2009) note that operating costs have an impact that is correlated with the marginal rate. Doliente (2005) find that such costs can be either positively or negatively correlated with bank rates.

Level of risk aversion (Risk aversion- RA) is determined as the ratio of equity to assets. Many authors have argued that risk aversion is positively correlated with the marginal rate (including Saunders and Schumacher, 2000; Brock and Suarez, 2000; Maudos and Guevara, 2004; Doliente, 2005; Hawtrey and Liang, 2008; Maudos and Solís, 2009; Garza-García, 2010; Ugur and Erkus, 2010; Kasman and Cs, 2010; and Fungáčová and Poghosyan, 2011). The explanation is that equity

increases lead to lower equity costs, and consequently a lower cost of capital. The resulting reduction of interest cost implies that the marginal interest income of the bank will increase.

Credit risk (CR) is the probability that a debtor would fail to execute its financial obligations. Therefore, the creditor faces the risk of losing at least a part of its loan money. Credit risk is represented as the ratio of loan loss provision to total loans (Tarus et al., 2012). Earlier research calculated credit risk as the ratio of total debts to total assets. Based on this measurement, Angbazo (1997) and Carbo and Rodriguez (2007) conclude that the higher is the credit risk to which a bank is exposed, the higher should be its NIM.

The reason for the positive correlation between credit risk and net interest margin is that, as the bank makes riskier loans, it perceives the credit risk more carefully, sets out more money for the loan loss provision, and thus requires a higher risk premium. In turn, this is passed on to bank borrowers in the form of higher lending rates for loans (Maudos and Fernández de Guevara, 2004).

Quality of management (quality of management-QOM) is calculated as the ratio of operating expenses to income. As a result of the high proportion of operating costs per unit of income showing that the bank is not effective in the management of its operations, the implication is that the bank has fewer resources in relation to costs at the same time that its payable debts are higher (Angbazo, 1997; Maudos and Fernández de Guevara, 2004; Maudos and Solis, 2009; Zhou and Wong, 2008). For this reason, the ratio has negative connotations for net interest margins.

Lending rate (Loans-LO) is calculated as the ratio of the sum of bank loans to assets. Consistent with Zhou and Wong (2008), Wong (2008), Carbo and Rodríguez (2007), and Solis Maudos (2009), the empirical findings in this paper indicate that the higher is the ban lending rate, the higher is the bank interest income. This may imply that, in order to reduce lending rates, banks will need to increase their lending activity in order to exploit the efficiency of their bank capital.

Deposit ratio (Deposits-DE) is the ratio of total deposits from customers to total assets. Carbo and Rodríguez (2007) and Maudos and Solis (2009) find that the ratio is inversely correlated with the marginal rate. This empirical result is consistent with research that finds that an increase in operating

capital from savings leads to higher marginal rates, thereby contributing to a reduction in profit margins (Hassan Hamadi and Ali Awdeh, 2012). However, well-exploited lending activities will offset such interest expenses, so that the marginal rate is increased. Mirna dumičić and Tomislav ridzak (2012) find that developed economies normally mobilize deposits less effectively compared with developing countries, so that the cost pressures of developing economies are higher, thereby leading to lower marginal interest income.

Income from investment activities (income from trading-TI) is calculated as the ratio of profits and losses generated by trading in securities and currency divided by total assets. Maudos and Solis (2009) find that income from the business is negatively correlated with the marginal rate.

Economic growth (Gross Domestic Product-GDP) is also considered as an important element of the bank marginal rate. As economies develop, capital requirements also increase so that the banks can more safely promote their development. Thus, the speed of GDP growth has a positive impact on the marginal rate. Maudos and Solisa (2009), Drakos (2002), and Vander Claey Vennet (2007) have found positive results, while Martínez and Mody (2004), Gelos (2006), and Carbo and Rodríguez (2007) have found a negative correlation.

3. Research Method

3.1 Data

The data are obtained from the financial statements, including the balance sheet and income report on websites, for 28 of 31 joint stock commercial banks in Vietnam over the period 2008 to 2018. Banks have chartered capital that range from VND 3,000 billion to VND 37,234 billion. Banks differ markedly in their proportion of charter capital, the lowest being 0.81% (VCB: 3,000 billion VND) and the highest being 10.06% (CTG: 37,324 billion VND).

[Figure 1]

Data for the macroscopic variables were taken from the statistical website of the World Bank for 2008- 2018, and are given in Figure 2.

[Figure 2]

3.2 Model Specification

The methodology is based on the model of Ho and Saunders (1981), as well as the models of Maudos and Fernandez de Guevara (2004) and Claeys and Vander Vennet (2008). The model comprises factors that theoretically affect the net interest margin, consisting of operating expenses, risk aversion, deposit risk, liquidity risk, interest risk, the scale of banks, and the market structure. The model also incorporates the macroscopic variables of economic development to evaluate how their promotion affects the bank net interest margin.

The model specification is given as:

$$NIM_{it} = \beta_1 OC_{it} + \beta_2 RA_{it} + \beta_3 CR_{it} + \beta_4 QOM_{it} + \beta_5 TI_{it} + \beta_6 DE_{it} + \beta_7 LO_{it} + \beta_8 GDP_t + \beta i + u_{it}$$

where $u_{it} = n_i + v_{it}$, u_{it} is an observed time invariant effect, and v_{it} is a disturbance term; $t = 1,\ldots,T$ is the time period; $i = 1,\ldots,I$ is the bank observations; the variables NIM, OC, RA, CR, QOM, TI, DE, LO, GDP are given in Table 2.

[Table 2]

3.3 Estimation Method

The paper applies the estimation method of Pooled OLS Model, Fixed Effects model (FEM), and Random Effects model (REM). In order to determine the choice between Pooled OLS and FEM models, we use tests of Redundant Fixed Effects. The paper also uses the Hausman test to select between the FEM and REM models. In addition, the paper uses a range of other methods to check for collinearity, autocorrelation, and the variances in the errors. Where there is a heteroskedastic

error term, we use the GLS to rectify the deviation from the classical assumptions. The model is similar to the models applied by Kasman (2010), Claeys and Vander Vennet (2008) and Maudos and Fernandez de Guevara (2004).

4. Empirical Results

4.1 Statistical Description

Table 3 presents the minimum and maximum average values, and standard deviations of the variables. The proportion of net interest margin (NIM) has an average value of 2.87%. The largest NIM is about 7.64%, and the smallest is about -2.43%. The standard deviations are in excess of 1.21%. The average net interest margin between banks from 2008 to 2018 is not noticeably different. The highest rate belongs to SGB with 0.048, and the lowest rate is SCB at 0.016, which are represented in Figure 2. The differences between the minimum and maximum values are not excessive, so that the differences between the highest NIM and lowest NIM of banks are reasonably moderate.

[Table 3]

[Figure 2]

4.2 Collinearity

Table 4 presents the correlation matrix of the variables. It is observed that the coefficient correlations in absolute values are all quite low (at less than 0.4084), so that collinearity among the explanatory variables does not appear to be an issue for purposes of determining the significance of the individual variables, as distinct from the joint significance of the regression model as a whole. The table analyzes collinearity, and the model determines VIF (Variance inflating factor) as VIF = $1/(1- R^{2)}$, where R^2 is the coefficient of determination. In Table 4, the VIF of all the variables are less than 10, and VIF average = 1.35, which suggest that collinearity is not a serious issue in analyzing the empirical results.

[Table 4]

4.3 Empirical Results

The model is used to determine the statistical relationship between the dependent variable and the explanatory variables. The regression models are estimated by ordinary least squares (OLS), that is, Pooled OLS, in order to evaluate the effect of each factor on the NIM. In addition, we apply Fixed Effects model (FEM) and Random Effects model (REM) to enhance the reliably of the empirical findings.

We conducted the Redundant Fixed Effects test to determine whether the Pooled OLS or FEM is more appropriate for purposes of fitting the data. The first pair of null and alternative hypotheses is given by:

H_0: There are no differences between the observations (Pooled OLS)
H_1: There are differences between the observations (FEM)

Table 5 shows the results of the Redundant Fixed Effects tests for choosing between FEM and Pooled OLS. As the probability of the Cross-sectional Chi-Squared statistic is 0, which is considerably lower than $\alpha = 0.05$ (that is, a significance level of 5%), we reject H_0 in favour of H_1. Consequently, FEM is determined to be the superior model.

In order to refine the selection of the appropriate model, we also conduct tests to choose between FEM and REM. The Hausman test is used to test the following REM null hypothesis against the FEM alternative hypothesis:

H_0: There is no correlation between the explanatory variables and random components (REM)
H_1: There is correlation between the explanatory variables and random components (FEM)

Table 5 presents the Hausman test statistics for choosing between FEM and REM. The probability of the Chi-Squared statistic is 0.0228, which is lower than $\alpha = 0.05$, H_0 is rejected in favour of H_1,

so that FEM is appropriate. Thus, FEM is more appropriate than REM, and we shall use FEM to analyze the results for NIM.

In addition, Table 5 suggests that there are not substantial differences between FEM and REM. Therefore, the selection of FEM is appropriate to obtain reliable results.

[Table 5]

Having determined that the empirical results are not substantially different, we conduct an error variance test, as changes in the error variance reduce the reliability of the regression results. We use White's heteroskedasticity test of whether the error variance changes to ensure that the regression model has high reliability. The null and alternative hypotheses are as follows:

H_0: No change in the error variance
H_1: Change in the error variance

In Table 5, we present the results of testing the error variance using White's heteroskedasticity test. The probability of the Chi-Squared statistic (20) of 0.0001 < 0.05 (at the 5% significance level). Thus, the null hypothesis is rejected, with the implication that the model has a change in the error variance. The regression results are re-estimated after correcting for autocorrelation and changes in the error variance.

In order to overcome changes in the error variance, we apply generalized least squares (GLS) in estimation. The final results are presented in Table 6.

[Table 6]

Operating cost (OC) has a positive impact on marginal interest income. This result is consistent with the expectations and the findings of Maudos and Fernández de Guevara (2004), Maudos and Solisa (2009), and Hamadi and Awdeh (2012). This means that, if banks are not operating efficiently with high operating costs, they tend to increase lending rates accordingly. When banks increase

operating costs, such as expanding branches and hiring more employees, there is a higher risk for the bank, such that the bank tends to transfer the higher risk to their customers by raising lending rates. The commercial banking system in Vietnam is relatively inexperienced, so operating costs play an important role in promoting the development of banks.

As expected, **Risk Aversion (RA**) is inversely proportional to Net Interest Margin. This is consistent with the empirical results of Saunders and Schumacher (2000), Brock and Suarez (2000), Maudos and Guevara (2004), Doliente (2005), Hawtrey and Liang (2008), Maudos and Solís (2009), Garza-García (2010), Ugur and Erkus (2010), Kasman and Partner (2010), and Fungáčová and Poghosyan (2011). As a result of the higher ownership equity scales, interest expenses will decline proportionately. This is an advantage for banks with a high proportion of ownership equity.

Credit risk (CR) results reveal that credit risk has an impact on net interest margin (NIM), particularly as credit risk increases will cause marginal interest to increase. This result is similar to the results in previous empirical studies, such as Angbazo (1997) and Carbo and Rodriguez (2007). This is a negative result, and negatively affects the bank's business performance, as well as the impact on borrowing costs.

In other words, as credit risk increases, the impact of risk shifts to the borrower, so that the burden of interest expense results in a worse business performance. This risk is also partly due to the fact that the bank does not control the initial loan appraisal, and that the bank may accept the trade-off between benefits and risks. This finding is in contrast to the empirical results of Hoang Trung Khanh and Vu Thi Dan Tra (2015).

Quality of management (QOM) appears inversely proportion to the Net Interest Margin. This result is consistent with expectations, and accords with the empirical findings in Angbazo (1997), Maudos and Fernández de Guevara (2004), Maudos and Solisa (2009), and Zhou and Wong (2008). The high rate of operation expense to one unit of income reflects the degree of inefficiency in the management of the bank. An increase in this rate implies that the bank has lower profits with higher expenses for liabilities. Such banks will have to pay greater expenses for their working activities, but their income falls short of what is required to maintain NIM.

Income from investment activities (TI) is directly proportional to the net interest margin. This empirical result is consistent with expectations, and accords with the findings in Maudos and Solisa (2009). Higher operating profits assist banks to increase their loans and decrease accrued interest expenses, all of which lead to higher NIM. Mirna dumičić and Tomislav ridzak (2012) show that when commercial banks increase their efficiency from securities investment activities, this contributes to increasing their business efficiency.

This situation can also contribute to reducing lending pressure, and possibly decreasing lending rates. The empirical findings along these lines are negative, as in Mirna dumičić and Tomislav ridzak (2012). This is a typical feature of the banking industry in Vietnam when investment activities have not been evaluated. Consequently, the risks related to investment activities are included in bank business activities, thereby leading to an increase in NIM.

Deposit ratio (DE) is inversely proportional to the net interest margin, which is consistent with expectations, and is in accord with the empirical results obtained in Carbo and Rodríguez (2007) and Maudos and Solisa (2009). When a bank calls too much capital, this will lead to substantially higher interest expenses. When banks are collectively inefficient, the mobilization of redundant capital will lead to greater payments in interest expenses from such capital.

Loan ratio (LO) does not appear to affect the net interest margin. This is in contradiction to expectations, as well as to past research. For example, Carbo and Rodríguez (2007) and Maudos and Solisa (2009) report an inverse relation of LO to the net interest margin. The explanation is that there was a stage from 2008 to 2018 when the State Bank of Vietnam released information about fixing interest rates, which caused interest rates in Vietnam banks to change continually. During this prolonged period, the interest rates of banks decreased by relatively small amounts, but they were still higher than the rates demanded by borrowers (especially for firms). Consequently, this led to stagnancy in bank capital between 2008 and 2018.

Gross Domestic Product (GDP) does show a significant correlation with the net interest margin. This result is consistent with expectations, as well as with previous research in Maudos and Solisa

(2009), Drakos (2002), and Claey and Vander Vennet (2007). As the Vietnam economy continues to develop, this is potentially an important factor in determining the net interest margin of banks. When the economy is growing rapidly with a high demand for capital, banks have an opportunity for increase their development. Nevertheless, over the period 2008 to 2018, albeit with an increase in the economy, high interest rates led to stagnant capital in banks.

5. Concluding Remarks

The paper examined the factors that affect the net interest margin (NIM) of commercial banks (CBs) in Vietnam between 2008 and 2018. We used secondary data of CBs with 308 observations from 2008 to 2018, and applied a range of investigative methods to confirm the empirical results. The findings showed that operating expenses and credit risk had a positive impact on NIM, whereas the level of risk aversion, quality of management, income from trading, and the proportion of deposits had negative impacts on NIM.

Although there have been a number of previous studies relating bank interest rates to micro and macro variables, few studies have been conducted in developing countries such as Vietnam. The characteristics of the economy in Vietnam are different from those of most countries that have been considered in previous research. Nevertheless, our empirical findings regarding the factors that were found to affect the marginal interest rate are generally in agreement with those of previous studies, although interesting differences in the levels of impact have been determined.

An interesting departure of the paper from previous studies is that the risk of credit had a positive impact on marginal interest. The empirical results suggested the need for a more focused credit risk management approach. Thus, our findings predict that attempts to control credit risk can reduce the pressure on interest rates, thereby reducing the cost of capital, and will also reduce the cost of capital in the economy.

The paper provided important information for bank managers by highlighting the factors that affect net interest margin, and by offering suitable solutions for bank management. Furthermore, the findings provide investors with an insight regarding the factors that affect bank viability and

recommendations regarding investment opportunities. For further research, we suggest that the findings can provide a basis for further inquiry, and hence further research aimed at promoting the development of banking, in general, and for Vietnam, in particular.

In addition, Vietnam is an emerging economy in which asymmetric information exists between banking and business activities. This leads to a difference between input and output interest rates. According to the results of the paper, an increase in operating costs and credit risk causes higher NIM for Vietnam banks. Therefore, the State Bank of Vietnam should issue more policies which can control or limit the operating costs for banks, particularly limitations to open more branches, as well as marketing costs.

For risk variables, the State Bank needs to manage the bad debts of commercial banks. Methods and approaches need to be established in order to be able to supervise the subprime lending activities of commercial banks, such that commercial banks in Vietnam are in a viable position to be able to reduce NIM.

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Table 1

Commercial Bank Information

	Name of Bank	Charter Capital (VND billion)	Proportion	Website
1	Viet Capital Bank	3,000	0.81%	vietcapitalbank.com.vn
2	Joint Stock Commercia Petrolimex Bank	3,000	0.81%	pgbank.com.vn
3	Saigon Bank For Industry And Trade	3,080	0.83%	vietbank.com.vn
4	Kien Long Commercial Joint Stock Bank	3,237	0.87%	kienlongbank.com
5	Nam A Bank	3,353	0.91%	namabank.com.vn
6	Viet A Bank	3,500	0.95%	vietabank.com.vn
7	National Citizen Bank	4,000	1.08%	ncb-bank.vn
8	Bao Viet Bank	5,200	1.40%	baovietbank.vn
9	An Binh Bank	5,319	1.44%	abbank.vn
10	Bac A Bank	5,500	1.49%	baca-bank.vn
11	Orient Commercial Joint Stock Ba nk	7,899	2.13%	ocb.com.vn
12	Tien Phong Bank	8,566	2.31%	tpb.vn
13	Joint stock commercial Lien Viet postal bank	8,881	2.40%	lienvietpostbank.com.vn
14	Vietnam International and Commercial Joint Stock Bank	9,245	2.50%	vib.com.vn
15	South East Asia Bank	9,369	2.53%	seabank.com.vn
16	Ho Chi Minh City Housing Development Bank	9,810	2.65%	hdbank.com.vn

	Name of Bank	Charter Capital (VND billion)	Proportion	Website
17	Vietnam Maritime Joint - Stock Commercial Bank	11,750	3.17%	msb.com.vn
18	Saigon - Hanoi Commercial Joint Stock Bank	12,036	3.25%	shb.com.vn
19	Vietnam Joint Stock Commercial Vietnam Export Import Bank	12,335	3.33%	eximbank.com.vn
20	Sai Gon Commercial Bank	15,232	4.11%	scb.com.vn
21	Asia Commercial Joint Stock Bank	16,627	4.49%	acb.com.vn
22	Sai Gon Thuong Tin Commercial Joint Stock Bank	18,852	5.09%	sacombank.com.vn
23	Military Commercial Joint Stock Bank	21,605	5.84%	mbbank.com.vn
24	Vietnam Prosperity Bank	25,300	6.83%	vpbank.com.vn
25	JSC Bank for Investment and Development of Vietnam	34,187	9.24%	bidv.com.vn
26	VietNam Technological and Commercial Joint Stock Bank	34,966	9.45%	techcombank.com.vn
27	JSC Bank for Foreign Trade of Vietnam	37,089	10.02%	vietcombank.com.vn
28	Vietnam Joint Stock Commercial Bank for Industry and Trade	37,234	10.06%	vietinbank.vn

Table 2

Synthesis of previous studies on variables and hypotheses

Variables	Variable descriptions	Empirical Reference	Hypothesis
NIM	NIM is defined as the difference between interest income and interest expenses divided by total earning assets	Ho and Saunders (1981), Maudos and Fernandez de Guevara (2004)	
OC	Operating cost/Total asset	Maudos and Fernández de Guevara (2004), Maudos and Solisa (2009), Hamadi and Awdeh (2012), Doliente (2005)	(+)
RA	Risk Aversion: Total Equity/ Total Asset	Saunders and Schumacher (2000), Brock and Suarez (2000), Maudos and Fernandez de Guevara (2004), Doliente (2005), Hawtrey and Liang (2008), Maudos and Solís (2009), Fungáčová and Poghosyan (2011)	(+)
CR	Credit Risk: Loan loss /Total loans	Angbazo (1997), Demirgüç-Kunt and Huizinga (1999), Abreu and Mendes (2003), Maudos and Fernández de Guevara (2004), Carbo and Rodriguez (2007),	(+)
QOM	Quality of management: Operating cost/Net income	Angbazo (1997), Maudos and Fernández de Guevara (2004), Maudos and Solis (2009), Kaiguo Zhou and Michael C.S. Wong (2008)	(-)
TI	Income from investment activities: (Other Income-Operating Income)/ Total Asset	Maudos and Solis (2009)	(-)
LO	Loan ratio: Loans/ Total Asset	Carbo and Rodríguez (2007), Maudos and Solis (2009), Kaiguo Zhou and Michael C.S. Wong (2008)	(+)
DE	Deposit ratio: Deposit/Total Asset	Carbo and Rodríguez (2007), Maudos and Solisa (2009)	(-)
GDP	Real GDP growth	Maudos and Solisa (2009), Martínez and Mody (2004), Carbo and Rodríguez (2007)	(+)/(-)

Table 3

Descriptive Statistics

Variables	Mean	Median	Maximum	Minimum	Std. Dev.	Obs
NIM	0.0287	0.028	0.076	-0.024	0.012	308
OC	0.0160	0.016	0.037	0.006	0.005	308
RA	0.096	0.079	0.444	0.027	0.057	308
CR	0.010	0.007	0.0524	-0.002	0.008	308
QOM	1.305	1.047	7.35	0.078	0.954	308
TI	0.003	0.002	0.075	-0.020	0.006	308
DE	0.793	0.810	0.960	0.506	0.093	308
LO	0.542	0.560	0.852	0.114	0.134	308
GDP	0.061	0.062	0.071	0.052	0.006	308

Table 4

Correlation matrix

Variables	OC	RA	CR	QOM	TI	DE	LO	VIF=1.35
OC	1							**1.61**
RA	0.3016	1						**1.43**
CR	0.3168	-0.077	1					**1.37**
QOM	0.1052	-0.0501	-0.24	1				**1.35**
TI	-0.1101	-0.0367	0.0054	-0.195	1			**1.17**
DE	-0.0832	-0.4084	0.056	0.3321	-0.275	1		**1.52**
LO	0.2952	-0.0789	0.0124	-0.017	-0.109	0.1353	1	**1.23**
GDP	-0.1054	-0.2069	0.0851	0.0529	-0.177	0.1634	0.1302	**1.12**

Table 5

Result of regression (Pool OLS, FEM, REM model)

Variables	NIM		
	Pool OLS	**FEM**	**REM**
OC	1.426***	1.407***	1.421***
RA	-0.030***	-0.058***	-0.046***
CR	0.157**	0.105	0.124*
QOM	-0.004***	-0.003***	-0.004***
TI	0.228***	0.274***	0.256***
DE	-0.025***	-0.036***	-0.032***
LO	0.003	0.001	0.002
GDP	-0.238***	-0.255***	-0.246***
Intercept	0.045***	0.058***	0.052***
No. of Observations	308	308	308
R-Squared	0.613	0.718	0.570
F-statistic	59.32	19.77	49.68
Redundant test	3.727 (0)		
Hausman test		17.792 (0.023)	
White's heteroskedasticity test	9.438(0)		

Note: The variables NIM, OC, RA, CR, QOM, TI, DE, LO, GDP are given in Table 2. ***, ** and * denote significance at the 1% 5%, 10% levels, respectively. P-values in parentheses.

Table 6

Regression Estimates

Variables	Coefficient	Std. Error	t-Statistic	P-value
OC	1.406***	0.072	19.61	0
RA	-0.019***	0.007	-2.82	0.0051
CR	0.137***	0.048	2.84	0.0048
QOM	-0.004***	0.0004	-10.76	0
TI	0.233***	0.067	3.50	0.0005
DE	-0.023***	0.004	-6.08	0
LO	-0.001	0.003	-0.298	0.7661
GDP	-0.259***	0.052	-4.93	0
Intercept	0.045***	0.005	9.96	0
Adjusted R-squared	0.740			
Durbin-Watson	1.144			
No. of Observations	308			
F-statistic	106.49			
Prob (F-statistic)	0			

Note: The variables NIM, OC, RA, CR, QOM, TI, DE, LO, GDP are given in Table 2. ***, ** and * denote significance at the 1% 5%, 10% levels, respectively.

Figure 1

Charter Capital of Commercial Banks to 2018

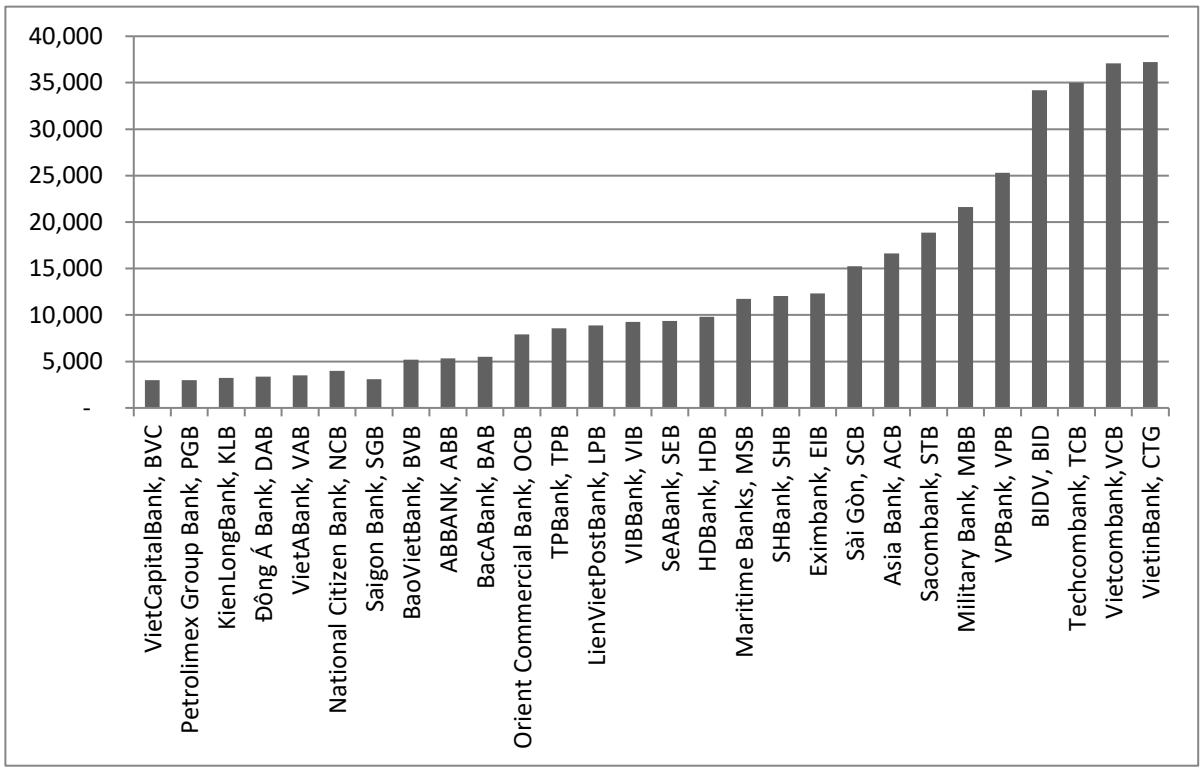

Figure 2

NIM average for 2008-2018