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Determinants influencing capital adequacy ratio of Vietnamese commercial banks

Hung Phuong Vu[a*] and Ngoc Duc Dang[b]

[a]*National Economics University, 207 Giai Phong Road, Hanoi, Vietnam*

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A B S T R A C T

This study employs a panel data analysis to identify the factors that significantly affect the capital adequacy ratio (CAR) of Vietnamese commercial banks for the period from 2011 to 2018. During this period, the number of banks had decreased from 41 to 31 due to mergers and acquisitions. The variables that are hypothesized to affect the capital adequacy ratio of commercial banks in Vietnam include bank size (SIZE), deposit (DEP), loan (LOA), loan loss reserves (LLR), liquidity (LIQ), return on assets (ROA), return on capital (ROE), net interest margin (NIM), non-performing loans (NPL) and leverage (LEV). The results indicate that LEV, LLR, ROE had a negative impact, ROA had a positive impact, and SIZE, DEP, LOA, LIQ, NIM, NPL did not significantly influence the CAR of Vietnamese commercial banks.

1. Introduction

First implemented in 1988, Basel I set a capital ratio of 8% as an adequate level for covering the potential losses resulted from loan losses and other risk taking by commercial banks (Casu et al., 2015). The level was considered to be adequate to ensure the safety and soundness of a banking system. However, Basel I provided a framework for risk measurements that was considered too preliminary and a regulatory structure that is too weak for supervisions. It was therefore revised in June 2004 to become Basel II. Basel II not only provided a more detailed framework for risk measurements of a broader category of risks (including credit risk, market risk, and operational risk), procedures for a more restrictive regulatory supervision are also included. The Vietnam banking supervisory agency, the State Bank of Vietnam, decided to adopt the basic principles of Basel II as the appropriate approach for setting the level of capital requirements (or capital adequacy ratio, CAR) for Vietnamese commercial banks. In March 2015, State Bank of Vietnam selected 10 domestic commercial banks to pilot the implementation of Basel II, with the goal of completing the trial by the end of 2018 and intended to apply the Basel II CAR requirements to the entire commercial banking system in Vietnam after that. These 10 banks including Vietnam Joint Stock Commercial Bank for Foreign Trade of Vietnam (Vietcombank), Vietnam Joint Stock Commercial Bank for Industry and Trade (Vietinbank), Joint Stock Commercial Bank Investment and Development of Vietnam (BIDV), Vietnam Prosperity Joint Stock Commercial Bank (VPBank), Technological and Commercial Joint Stock Bank (Techcombank), Maritime Commercial Joint Stock Bank (Maritime Bank), Military Commercial Joint Stock Bank (MB), Bank Saigon Commercial Joint Stock Bank (Sacombank) and Asia Commercial Joint Stock Bank (ACB). Under the capital adequacy framework of Basel II, the minimum capital adequacy ratio required is 8% of risky assets for banks around the world. This ratio is unchanged from Basel I to Basel III, the risky asset measurements, however, were expanded to include market and operation risks in addition to credit risk that was included in

* Corresponding author.
E-mail address: phuongvh@neu.edu.vn (H.P. Vu)

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Basel I. In Vietnam, the commercial bank regulatory agency (the State Bank) initially set a minimum capital adequacy ratio of 9% for all banks, including domestic commercial banks, joint-venture banks, and foreign bank branches, and was intended to decrease to 8% to comply with the Basel Committee international standards. With the rapid growth of the number of commercial banks in the last 20 years, unfair competition had negatively affected the quality of the banking system in Vietnam as the performance of some banks had deteriorated. The State Bank of Vietnam had to encourage or even to force mergers, consolidation and acquisitions to resolve some of the poorly performing commercial banks. As a result of excess competition, it is not sure that Vietnamese commercial banks would be able to meet the capital requirements as required by Basel II. It is the purpose of the paper to study the factors that are affecting the capital adequacy ratio (CAR) of the Vietnamese commercial banks, which can then be used to determine whether the amount of capital held by Vietnamese commercial banks is adequate or not.

2. Literature review and hypotheses

Determinants of the capital adequacy ratio has been documented in many other studies and some expected conclusions were obtained. In this study we selected the following determinants, based on the potential significance of importance in determining the capital adequacy ratio of Vietnamese commercial banks and the availability of the Vietnamese banking data, include: bank size (SIZE), deposit (DEP), loan (LOA), loan loss reserves (LLR), liquidity (LIQ), return on assets (ROA), return on capital (ROE), net interest margin (NIM), non-performing loans (NPL) and leverage (LEV). Their important and expected effects are explained below:

Bank size (SIZE)

The natural logarithm of total assets is used as a representative of bank size (SIZE). The size of the bank is important because of its relationship with the financial markets for easy accessing of capital. Larger banks have a better access to the capital market at a lower cost because of their larger capacity in paying back and lower bankruptcy risk to investors. Jackson et al. (2002) showed that large banks with good ratings should be able to tap the market-defined excess reserves. Gropp and Heider (2007) and Shrieves and Dahl (1992), however, found opposite evidence that larger banks have lower capital adequacy ratios. This happens because banks with a larger size are capable of diversifying their assets, reducing risks and hence a lower capital ratio is needed. With opposite arguments, whether the relationship between bank size and capital adequacy ratio is positive or negative is to be hypothesized and tested.

Deposits (DEP)

The deposit ratio (DEP) is calculated as a ratio of a bank's total deposits to its total assets. Deposits are considered to be cheaper than other sources of funds (such as bond financing and new equity issuance) for banks (Kleff and Weber, 2003). In order to attract deposits, a bank would have to be adequately capitalized with sufficient liquidity so that depositors could fell safe and be protected. If a bank doesn't have sufficient capital and liquidity, a run could occur when all depositors are rushing to withdraw their deposits, some depositors might not be paid. A capital adequate bank will also be able to attract depositors at a lower interest rate. It is therefore hypothesized that banks with a larger deposit ratio should have a higher capital adequacy ratio. This hypothesis is supported by many other studies. Asarkaya and Özcan (2007) on the other end found an inverse relationship between the deposit ratio and the capital adequacy ratio. The effect of the deposit ratio is therefore to be tested.

Loans (LOA)

Loan size (LOA) is the ratio of total loans to total assets. All loans together represent the single most important investment asset on the balance sheet of a bank. Lending, however, has two faces. On the one end, it provides the majority of income to commercial banks, and one the other, it determines the amount of credit risk that a bank will have resulted from lending. The risk and returns of the loan portfolio depend on the characteristics of the loans and the extent of portfolio diversifications of a bank. In general, the more loans extended, the higher is the risk. To hedge again the risk, a larger amount of capital will be needed. As a result, the relationship between the loan size and the capital adequacy requirement is expected to be positive. This positive association between the capital adequacy ratio and the loan ratio was found in a study by Mpuga (2002).

Loan loss reserves (LLR)

Loan loss reserves (LLR) are cash reserves set aside by a bank in anticipation of potential losses from lending. Banks typically hold enough reserves to cover the anticipated losses in the loan portfolio. The larger the loan portfolio, the more losses that are likely to incur, and the higher the loan loss reserves will be required. We consider the ratio of loan loss reserves to total loans is a proxy for bank risk as it could indicate the financial health of banks. When a bank suffers from losses in lending, it has to set aside reserves from its earnings, and from its equity if earnings are not enough to pay for the reserves, which will reduce its capital. A higher loan loss reserve ratio also signals a higher risk taking by the bank, which will make it more difficult to raise capital. A negative relationship between loan loss reserves and the capital adequacy ratio is to show this financial difficulty that a bank could be facing. On the contrary, a positive relationship may signal that banks are willing to raise capital to a greater extent to remedy their worsening financial situation. Estimations obtained by some studies show opposite results. Blose (2001)

found that provisioning for loan losses caused a decline in the capital adequacy ratio. On the other hand, Hassan (1992) and Chol (2000) found a positive relationship between the capital adequacy ratio and loan loss provision. In a study of Pakistan banking system, Usman and Sanuallah (2016) also showed that LLR has a significant positive impact on the determination of CAR.

Liquidity (LIQ)

Liquidity (LIQ) held by a bank affords the bank the ability to immediately meet the demand of depositors' withdrawal and disbursement of committed credits. The increase in bank liquidity (high LIQ) can have a positive impact on the capital ratio.

Liquidity held by a bank affords the bank the ability to immediately meet the demand of depositors' withdrawal and disbursement of committed credits. Angbazo (1997) argued that as the ratio of capital investments in cash or cash equivalents increases, the bank's liquidity risk leading to lower liquidity premiums in the net profit margin. Therefore, the increase in bank liquidity (high LIQ) can have a positive impact on the capital ratio.

Profit (ROA & ROE)

In this study, returns on assets (ROA) and return on equity (ROE) are used to measure the profits to a bank and returns to equity shareholders. In general, commercial banks raise capital through retaining earnings and/or new equity offering. A higher return allows a bank to increase capital through retained earnings. A higher return also makes a bank to be more attractive in raising capital. Gropp and Heider (2007) found that banks with higher returns tend to have more capital than banks with lower returns. Therefore, a positive relationship is expected between profits and the capital adequacy ratio.

Net interest margin (NIM)

Net interest margin (NIM) is the ratio of net interest income to total interest-earning assets, where the net interest income is the difference between interest revenues received from loans and interest costs paid for deposits. Although net interest income is an important element of bank profits, net interest margin is very much affected by the interest rate movements in the market. Banks can manipulate their lending rates and deposit rates so that they can maximize the net interest margin, but it will come with certain level of interest rate risk. Banks can raise the net interest margin to generate additional net interest income which in turn will raise the capital ratio (Angbazo, 1997), which implies a positive relationship between net interest margin and the capital adequacy ratio. However, bank managers can reduce the capital buffer if the default risk is low. As a result, an inverse relationship is expected between net interest margin and capital adequacy ratio. Mohamed (2018) found that net interest margin negatively affects bank capital of the Tunisian bank system significantly.

Leverage (LEV)

A bank's leverage ratio (LEV) is measured by the ratio of total equity to total liabilities. From shareholders' perspective, a bank with a higher leverage ratio typically is riskier than less leveraged banks, and as a result, is required to provide a higher return to shareholders for compensation. With a higher cost of equity, highly leveraged banks may find it difficult to raise new equity. In addition, highly leveraged banks may hold less capital than lowly leveraged banks in the first place. Therefore, a negative relationship is expected between the leverage ratio and capital adequacy ratio.

Non- performing loans (NPL)

The Non-performing loan ratio (NPL) is the ratio of total amount of non-performing loans to total amount of loans. It can also be called bad debt ratio. A non-performing loans ratio higher than the industry average and a rising trend of the non-performing loans may be a sign that a bank is running into difficult in managing the quality of loans. Banks with a higher non-performing loan ratio may have to raise more capital for payments. As a result, the relationship between the ratio of non-performing loans and CAR will be positive. This is evidenced by Ahmad et al. (2008), who found a positive relationship between bad debts and CAR when studying commercial banking systems in developing countries for over an 8-year period. On the other hand, banks with a higher non-performing loan ratio could be weak in its capital position, and so exhibit a negative relationship between the NPL ratio and CAR. Abusharba et al. (2013) showed that bad debt has a negative relationship with CAR using data from 11 Indonesian banks from 2009 to 2011.

3. Research methodology

3.1. Perspective on capital adequacy ratio

Capital adequacy ratio is a long-discussed issue in the world and also not new in Vietnam. However, studies have focused on the role and importance of this ratio in safeguarding the banking system, not many have looked into what determines the appropriate level of the CAR ratio in the banking system. This is what we attempt to investigate. Before setting up a model for studying the determinants of the capital adequacy ratio (CAR), we define and calculate the CAR as:

$$CAR = \frac{Equity\ Capital}{Risk\ Adjusted\ Total\ Assets}$$

That is the CAR is measured by the amount of equity capital that a bank has against its risk adjusted total assets. Among the risks encountered by commercial banks, Basel I focused more on credit risk in its risk adjusted total assets calculation. This was expanded in Basel II to include market and operational risks, in addition to credit risk. Based on the formula specified in Basel II, the CAR equation is revised to:

$$CAR = \frac{C}{RWA+12.5(K_{OR}+K_{MR})}\ x100\%$$

where:

- *C: Equity capital*

- *RWA: Total assets calculated according to credit risk*

- *KOR: Regulatory capital for operational risk*

- *KMR: Regulatory capital for market risk*

According to Base II, this ratio would have to be at least 8% to ensure the safety and soundness of a bank. This is the level considered enough to compensate for losses due to unforeseen credit, market, or operational risks. For the capital requirement framework to work, banks would have to measure the amounts of credit, market, and operational risk that they have from lending, investing, and operating and compute the risk-adjusted total assets accordingly. This basic capital requirement framework has been followed in Vietnam since 2018. However, Circular No. 41 of the State Bank of Vietnam focuses only the minimum amount of capital required based on Pillar 1 of the Basel II, it doesn't provide a guideline for how this CAR ratio is to be calculated. How to compute the risk adjusted total assets to account for credit, market, and operational risks remains unclear, not to mention that the specific guidelines for how to supervise banks based on Pillar 2 has not been implemented.

Thus, it can be seen that the concept of capital adequacy ratio does not have a clear definition, and it depends a lot on the calculation of equity capital and the risk coefficients.

3.2. Model, assumption and variables

Model

A panel data estimation method is used to identify the relationship between the CAR, the dependent variable, and a set of independent variables, including bank size (SIZE), deposit (DEP), lending (LOA), and loan loss reserves (LLR), liquidity (LIQ), profitability ratio (ROA and ROE), net interest (NIM), bad debt ratio (NPL), and leverage (LEV).

Both the dependent and independent variables are calculated based on the definitions outlined above. The relationship between the dependent variable CAR and those independent variables is specified as in the equation below:

$$CAR_{it} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 DEP_{it} + \beta_3 LOA_{it} + \beta_4 LLR_{it} + \beta_5 LIQ_{it} + \beta_6 ROA_{it} + \beta_7 ROE_{it} + \beta_8 NIM_{it} + \beta_9 ELV_{it} + \beta_{10} NPL_{it} + \varepsilon_{it}$$

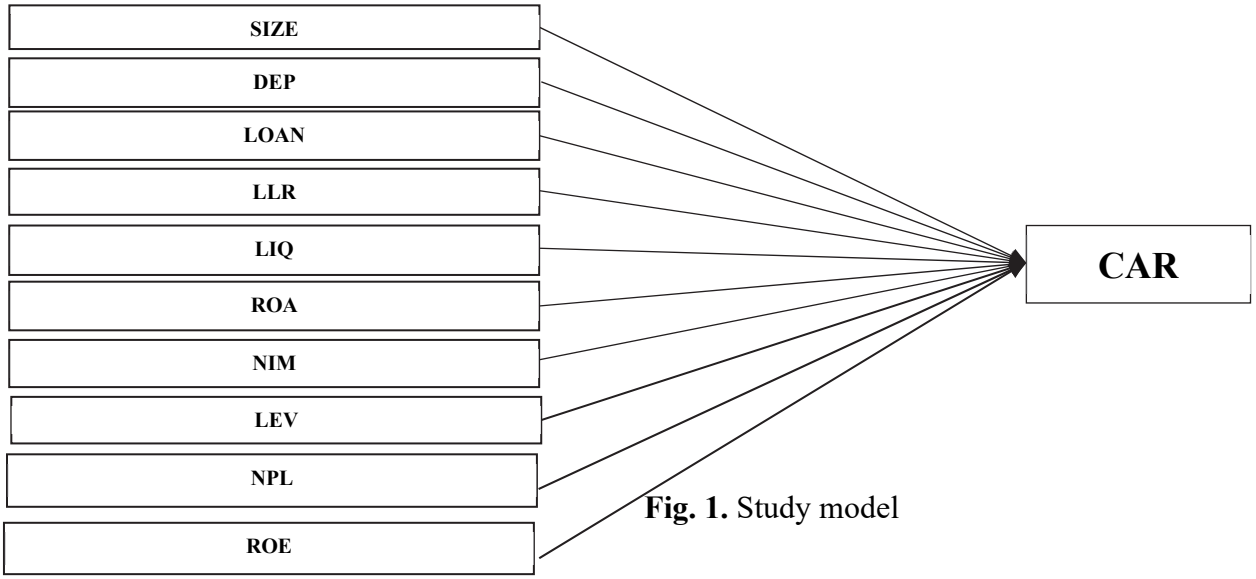

Fig. 1. Study model

Variables and assumptions

Ten variables are included in the model with the hypothesis that they can impact on the bank's capital adequacy ratio. The bank's specific variables are SIZE, DEP, LOA, LLR, LIQ, ROA, ROE, NIM, NPL and LEV. They are expected to have positive or negative effects on the capital adequacy ratio of Vietnamese commercial banks as argued in the last section above and are summarized in Table 1 below.

Table 1
Assumptions and expected impacts of independent variables

Variables	Hypothesis	Expect Effect	Sources
SIZE	*H1: Bank size could have a positive or negative effect on the capital adequacy ratio*	+/-	Weber (2003), Wong and et al. (2005), Le and Nguyen (2017)
DEP	*H2: Deposit size has a negative impact on the bank's capital adequacy ratio*	-	Özcan (2007), Bokhariet et al. (2012)
LOA	*H3: The size of the loan has a positive effect on the bank's capital adequacy ratio*	+	Hassan an Bashir (2003), Büyükşalvarcı and Abdioğlu (2011)
LLR	*H4: Loan loss reserves has a positive impact on the bank's capital adequacy ratio.*	+/-	Al-Sabbagh (2004), Thiam, (2009), Masood & Ansari (2016), Le and Nguyen (2017)
LIQ	*H5: Liquidity coefficient has a positive effect on the bank's capital adequacy ratio.*	+	Angbazo (1997)
ROA and ROE	*H6: Return on assets has a positive effect on the bank's capital adequacy ratio.* *H7: Return on equity has a positive impact on the bank's capital adequacy ratio.*	+ and +	Heider (2007), Yuanjuan and Shishun (2012), Büyükşalvarcı and Abdioğlu (2011)
NIM	*H8: Net interest margin has the negative effect on the capital adequacy ratio of the bank.*	+/-	Angbazo (1997), Mohamed (2018)
LEV	*H9: Leverage has a positive effect on the bank's capital adequacy ratio.*	+	Gropp and Heider (2009), Octavia and Brown (2008)
NPL	*H10: Non-performing loan has a positive or negative impact on the bank's capital adequacy ratio.*	+/-	Ahmad et al. (2008), Abusharba et al. (2013)

Methods of estimating models

We first use the Hausman test to choose between the random and fixed effects models, where in the case of available data the fixed effect model is chosen. Since there existed heteroscadasticity and serial correlation in the data. Therefore, using OLS method, the results would be less efficient. To overcome this phenomenon, the Feasible General Least Square (FGLS) regression is applied.

Descriptive statistics

This study investigates the factors determining the capital adequacy ratio of Vietnamese commercial banks of 31 banks for the period from 2011 to 2018. This study uses data collected from the annual reports of banks, Hanoi Stock Exchange, Ho Chi Minh Stock Exchange, the State Bank of Vietnam, securities companies and financial institutions. The number of commercial banks has decreased from 41 in 2011 to 31 in 2018 due to mergers and acquisitions (M&A). Both state- and privately-owned banks are included.

Table 2
Descriptive Statistics of Variables

	CAR	DEP	LEV	LIQ	LLR	LOA	NIM	NPL	ROA	ROE	SIZE
Medium	0.144	0.686	0.095	0.179	0.013	0.542	0.028	0.024	0.007	0.078	194790.600
Median	0.123	0.700	0.083	0.165	0.012	0.561	0.028	0.022	0.006	0.063	98717.890
Max	0.615	0.934	0.241	0.404	0.030	0.791	0.071	0.090	0.028	0.303	1293929.000
Min	0.052	0.288	0.032	0.016	0.000	0.139	-0.007	0.003	0.000	0.000	13322.650
Standard deviation	0.076	0.114	0.042	0.068	0.005	0.125	0.012	0.015	0.005	0.062	265020.400
Deviation	3.491	-0.540	1.366	0.805	1.070	-0.569	0.324	1.989	1.238	1.015	2.392
Sharpness (Kurtosis)	18.797	3.271	4.604	3.650	4.619	2.906	3.907	8.015	4.821	3.739	8.377
Jarque-Bera	3082.272	12.790	103.746	31.157	74.419	13.488	12.831	423.431	97.622	48.258	535.327
Probability	0.000	0.002	0.000	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.000
No. of observations	248	248	248	248	248	248	248	248	248	248	248

Source: Compilations by the authors

Descriptive statistics are compiled to show the basic characteristics of these variables. Table 2 summarizes the descriptive statistics of the variables including sample mean, median, maximum, minimum, standard deviation, deviation, Kurtosis, Jarque-Bera statistics and probability (p value). All variables are asymmetric. More precisely, the deviations are positive for nine strings, whereas DEP and LOA have negative deviations. Kurtosis values of all variables show that the data is not normal distributed because the values of kurtosis are skewed from 3. Jarque-Bera statistics and the corresponding p values are calculated to test the assumption that data is standard normal distribution. Based on Jarque-Bera's statistics and p values, this assumption is rejected at the 1% significance level for all variables. The dependent and independent variables are tested for polymorphism based on a simple correlation matrix. As described in Table 3, they all have no collinearity problems evidenced by the fact that no specific variables are highly inter-correlated and there is no multicollinearity among these variables. This research employs the Feasible Generalized Least Square method for the panel data analysis. This method corrects the phenomenon of variance and auto correlation, which is superior to the method of fixed effects and the random effects model.

Table 3
Correlation Matrix Between Variables

	CAR	DEP	LEV	LIQ	LLR	LOA	NIM	NPL	ROA	ROE	SIZE
CAR	1										
DEP	-0.002	1									
LEV	0.023	-0.350	1								
LIQ	-0.026	-0.481	0.132	1							
LLR	-0.088	-0.143	-0.020	0.078	1						
LOA	0.054	0.579	-0.153	-0.507	-0.238	1					
NIM	0.118	0.045	0.339	-0.098	-0.034	0.323	1				
NPL	-0.053	-0.151	0.231	-0.098	0.426	-0.128	-0.013	1			
ROA	0.056	-0.140	0.242	0.055	-0.017	0.092	0.651	-0.150	1		
ROE	-0.004	0.044	-0.200	0.049	-0.021	0.184	0.466	-0.269	0.830	1	
SIZE	-0.004	0.337	-0.455	-0.249	0.073	0.414	0.050	-0.161	0.054	0.340	1

Source: Compilations by the authors

4. Results and discussion

$$\hat{CAR} = \underset{(0.0295)}{0.154} + \underset{(0.306)}{0.418}NIM + \underset{(1.46e-08)}{6.01e-09}SIZE - \underset{(0.077)}{0.162}** LEV - \underset{(0.077)}{1.474}** LLR + \underset{(0.029)}{0.018}DEP - \underset{(0.028)}{0.023}LOA - \underset{(0.0436)}{0.008}LIQ$$
$$+ \underset{(1.400)}{3.425}** ROA - \underset{(0.214)}{0.047}NPL - \underset{(0.118)}{0.318}*** ROE$$

*Note: i) Standard- errors are reported in brackets; (ii) ***/**/* Statistical significance at 1%, 5% and 10% levels, respectively.*

Table 4
Summary of hypothesis testing results

No.	Variables	Reject the hypothesis H_0	Sig.	No.	Variables	Reject the hypothesis H_0	Sig.
1	SIZE	Yes	-	6	ROA	Yes	5%
2	DEP	No	-	7	ROE	Yes	1%
3	LOA	No	-	8	NIM	No	-
4	LLR	Yes	5%	9	NPL	No	-
5	LIQ	No	-	10	LEV	Yes	5%

Estimated results from the FGLS detailed regressions results are presented in above equation, in which all variables potentially affecting the capital adequacy ratio (CAR) are included in the regression model. The results show that LEV, LLR, ROA, and ROE. The ROA variable a positive effect on the CAR. The coefficient of the ROA variable indicates that if the profitability increases by 1 unit (expressed through an increase of 1 unit of ROA) will increase the bank's capital by 3.425 units. The LLR variable has a negative effect on the bank's capital adequacy ratio. This result shows the better the financial capability of the bank (the lower the rate of loan provision), the higher the capital adequacy ratio. This also shows that ensuring the quality of loans and avoiding loss of capital are the key factors that can help banks to maintain their capital adequacy. However, interesting results are found that the LEV and ROE variables have a negative impact (contrary to expectation) on the bank's capital adequacy ratio at a significant level of 1%. The coefficient of ROE variable shows that increase in the bank's profitability by 1 unit (represented by an additional 1 unit in ROE) reduces the bank's capital adequacy ratio 0.318 units, as shown in the estimation equation. The coefficients of the remaining variables are not statistically significant at the 10% level. This suggests that there is no sufficient evidence to conclude on the impact of NIM, SIZE, DEP, LOA, LIQ and NPL on the capital adequacy ratio of banks. The insignificance of these variables may be due to limited number of samples and period. In summary, LLR, ROA, ROE and LEV are shown to have significant effect on CAR. On the other hand, SIZE, DEP, LIQ, NPL and NIM do not have a significant impact on the capital adequacy ratio. The hypothesis test results are summarized in Table 4. The results of the study indicate that the variables LEV, LLR, ROE have a negative impact on CAR while ROA has a positive impact on CAR. The remaining variables SIZE, DEP, LOA, LIQ, NIM, and NPL do not significantly affect CAR.

5. Policy implications

5.1. Vietnamese State Bank

Credit Risk

Continue to build and improve the bank information system: The State Bank needs to require commercial banks to build a system for information gathering and transmission safeguarded by a network security algorithm. The information collection, data transmission and links to networks for assessment are also to be improved to increase the autonomy and information sharing in the banking system. Need to develop a comprehensive Risk Management System for the Vietnamese commercial banking system, under a unified legal framework. Improve the banking inspection and supervision system, in a coordinated effort of inspection agencies, for the supervision of the financial markets and institutions in the economy, both domestically and internationally.

Leverage, Return on Equity and Return on Asset in the Banks - mainly expressed in terms of operational risks

The State Bank should improve a system of measuring, documenting, and regulating the operational risk management of banks.

Build a database of operation risk throughout the banking system in order to detect and check on any operational risk events so that the new types of operational risks, their trends, and illegal behaviours can be identified, supervisory consultancy can be provided and information can be shared.

Strengthen the role of the State Bank of Vietnam for supervising credit risk management activities of commercial banks

Improve the effectiveness of inspection and supervision by the State Bank of Vietnam, as well as offering guidelines to commercial banks for compliances.

5.2. Commercial Banks

Provisions for potential loan losses

Provisions for bad debts should be based on the risk characteristics of credit activities (lending activities) that a bank practices, the higher the credit risk, the larger the provisions will be required. Provisions for bad debt are also to be related to the bank's capital position, as any unused provisions will be returned to equity based on the GAPP accounting standards. Loan loss provisions allow banks to have resources to deal with arising bad debts without affecting the bank's profitability. It is important that commercial banks assess the potential losses from credit activities and keep adequate provisions to pay for the losses resulted from credit risks.

Equity and leverage

To ensure the safety and soundness of a banking system, it requires banks to minimize risk taking and to increase capital of banks at the end. The basic principle is that as the level of risk taking by a bank increases, it should have a greater amount of capital reserves for payments. That is, the ratio of total equity to total assets is should be positively correlated with risk. This indicates that increasing equity is a necessary solution to maintain the safety of a bank, along with a reduction in risky assets. Currently Vietnamese commercial banks have now reached the required capital adequacy ratio of 9% of risky assets (according to Circular No. 36). It will be converted into 8% by 2020 comply with the Basel II standard.

5.3. Other regulatory

Ministries and industries need to take drastic measures in carrying out their functions and duties, to work out solutions to restructure the economy, to consolidate the banking system, and to develop and deepen the financial system further.

Enhance the effectiveness of state supervision of commercial banks' risk management activities for the purpose of minimizing risks in the course of business activities of commercial banks.

Improve the quality of the stability analysis of the financial system and to develop an early warning system to prevent bankruptcies of commercial banks in the system.

Ministry of Finance, Ministry of Justice, Ministry of Natural Resources and Environment, Ministry of Construction, Ministry of Planning and Investment, Ministry of Public Security, Supreme People's Procuracy, Court, Hanoi City People's Committee, Ho Chi Minh City and Vietnam Asset Management Company (VAMC) should coordinate to command the handling of rising bad debts situations and to resolve the large bad debt portfolio of the VAMC. Regulatory agencies should coordinate with the VAMC in handling and managing bad debts, these could include accelerating the process of completing legal documents, seizing and handling collateralized assets, improve the procedures for transferring collaterals and the tax requirements related to the transfer of collaterals. Recovery of bad debts can be done with different methods, such as urging debt recovery, seizing, selling collaterals, selling debt in accordance with the law through a public auction in a transparent manner.

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