

GMM Method Assessing Factors Affecting Capital Adequacy Ratio of Commercial Banks: A Case Study in Vietnam

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Abstract: The GMM estimation method is used for a data sample of 21 commercial banks in Vietnam (excluding overseas branches) from 2008 to 2019 to evaluate the factors affecting commercial banks' capital adequacy ratio (CAR). The results show that not only do bank-specific factors such as size, leverage ratio, loan ratio, deposit ratio, and profitability affect CAR adjustment, but so do macro factors such as GDP growth rate, regulatory pressure, and banking system restructuring. As a result, the study will help commercial banks develop more solid foundations for CAR implementation strategies. Simultaneously, The State Bank of Vietnam will have a basis with the regulatory agency to introduce and/or adjust capital adequacy regulations in line with the reality of commercial banks in Vietnam.

Keyword. Capital adequacy ratio (CAR), commercial banks, Vietnam, GMM method.
JEL Classification: C13, D24.

1. INTRODUCTION

The banking sector is regarded as the backbone of an economy, and it plays an important role in the country's development. It contributes to the achievement of growth targets, the stabilization of the macroeconomy, and the control of inflation through the management of monetary policy in each period, in the face of complicated economic developments. Monetarist economists (Friedman and Schwartz, 1965) linked the financial crisis to the banking crisis several decades ago. They believe that if there is a banking crisis, there will be a financial crisis, and the stability of the banking system will be jeopardized and the financial infrastructure will collapse if central banks do not intervene. However, the recent increase in the size and diversity of the banking system has hidden huge risks that directly affect the banking system's safety and soundness. As a result, the fact that banks continue to ensure operational stability has become a hot topic at a time when Vietnam's economy is undergoing deeper and deeper integration.

As a result, banking regulations must adhere to common standards. In which, The Basel Capital Agreement issued by the Basel Committee on Banking Supervision, is regarded as a universally recognized and accepted common capital standard. The minimum capital adequacy ratio (CAR) requirement is one of the Basel Capital Agreement' issues. In 1988, The Basel Committee on Banking Supervision

(BCBS) issued the first Basel, known as Basel I. The emphasis is on determining regulatory capital, calculating risk-weighted assets, and minimum capital levels. Basel II, the second Basel Agreement, was released as a new version of Basel I, with three main priorities: minimum capital obligations, audits, and the business regulatory names of three platforms. Under Basel I, enterprises must be able to keep at least 8 percent of their assets. In 2010, the Basel Committee on Banking Supervision implemented the Third Basel Agreement, also known as Basel III, as an additional support agency for the three pillars: banking regulation, supervision, and risk management after the economic crisis in 2008 and the collapse of financial institutions. According to the Basel III, the CAR threshold for banks' risk-weighted assets has been raised from 8 percent to at least 10.5 percent.

In accordance with the regulations on safe capital in the spirit of the Basel II, in order to prevent bank collapse and protect depositors, Vietnamese bank operators are becoming increasingly interested in the importance of capital adequacy ratio (CAR). Therefore, the systems of Vietnamese commercial banks in general, and commercial banks listed on the Vietnamese stock exchange in particular, are gradually improving in order to meet CAR standards in accordance with Basel regulations. As a result of assessing the factors affecting CAR, commercial banks will have a better foundation for developing CAR implementation strategies. Simultaneously, the State Bank of Vietnam will have a basis with the regulatory agency to introduce and/or adjust capital adequacy regulations in line with the reality of commercial banks in Vietnam. This is also the purpose of the paper.

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2. THEORETICAL BASIS

According to Kjeldsen (2004), the primary income-generating activities of commercial banks are deposit mobilization and lending. According to Bhattacharya et al. (1998), the existence of the deposit and lending system as well as the commercial banking system is due to the fact that depositors are not afraid of risk and are unsure when to use the deposit for consumption, but commercial banks are high-liquidity financial intermediaries who share that risk with depositors. However, in addition to the deposit source, the bank has its own money fund that is formed from non-deposit sources and is known as the bank's capital. Despite accounting for a small portion of total capital, this capital plays a critical and indispensable role in the bank. Capital is not only a necessary condition for doing business, but it is also a critical foundation for competing with other banks. The capital ratio of the bank must adhere to capital theories such as:

The pecking order theory: first proposed by Donaldson (1961) and later developed by Myers and Majluf (1984), the authors contend that companies prefer to use retained earnings over borrowed capital, with the issuance of shares serving as a last solution. In short, the company prioritizes using internal capital before deciding to use external capital, according to pecking order theory. Pecking order theory, according to Ross et al. (2019), follows two rules: "use of internal capital" and "if external capital is required, the safest debt securities should be issued first."

The foundation of pecking order theory is information asymmetry theory, which was introduced by Akerlof (1970) and developed by Cleary (1999). According to Cleary (1999), the reason for asymmetric information in the market is that external funders have evaluated investment projects based on the project's quality and risks. As a result of this risk premium, the cost of external capital is higher than the cost of endogenous capital.

Bank capital can be viewed from various perspectives depending on the goals of each commercial bank. To create a level and safe playing field for banks around the world in the face of globalization, as well as to protect depositors from the consequences of banks' risky portfolio management, it is necessary to issue common standards which must be agreed upon by countries. That is why the Basel Committee on Banking Supervision was formed and accords on banking capital were issued. The Basel Committee on Banking Supervision's mission is to create and publish standards for bank capital, as well as to monitor operations to ensure compliance with capital regulations.

Although the Basel Accord is not legally binding and does not require countries to comply, it has become an international standard in banking supervision activities worldwide. Basel I (BIS, 1999), Basel II (BIS, 2006), and Basel III are the current capital accords (BIS, 2011). The study's scope focuses primarily on assessing the factors affecting CAR in Vietnam before and after the implementation of the Basel II Accord.

Basel II Accord (BIS, 2006): promulgated in 2004, entered into force in 2007, and expired in 2010. The Basel II Accord was established for the following reasons: (i) To promote safety and strong cold in commercial bank activities; (ii) To

determine capital requirements using a more comprehensive and accurate calculation method than Basel I; (iii) To improve commercial banks' level playing field in the international market; and (iv) To strengthen the unification of standards among commercial banks. CAR calculation formula based on Basel II Accord:

$$CAR = \frac{\text{Tier 1 capital} + \text{Tier 2 capital} - \text{Deduction}}{\sum (\text{Asset} \times \text{Risk Coefficient}) + (\text{Market Risk} + \text{Operational Risk}) \times 12.5} \geq 8\% \quad (1)$$

Basel II's credit risk measurement method is far more complicated than Basel I's. Under Basel II, banks can use the standard method - measuring credit risk based on credit rating of external organizations approved by the banking supervisor, or an internal credit rating method - measures the level of credit risk based on a bank's assessment by estimating the likelihood of bankruptcy, outstanding loans when the customer is unable to pay the debt.

3. LITERATURE REVIEW

Many studies on capital adequacy of commercial banks and factors affecting capital adequacy of commercial banks have been conducted around the world. Demsetz and Strahan (1997) demonstrated, using a dataset of US banks from 1980 to 1993, that large banks have a better chance of creating a greater degree of diversification (diversification of capital sources or sectors/investment customers/lending...), as well as firm-specific risks, when compared to smaller banks. According to Kleff and Weber (2003), the higher the profit, the more opportunities to increase capital by retaining profits; the larger the size of the bank, the lower the capital ratio because these banks are easier to refinance in the capital market; large banks may have more diversified portfolios and thus may require a lower capital "buffer".

Similarly, Wong et al. (2005) demonstrated that return on equity, bank size, and GDP growth rate are all statistically significant and backward related to CAR. Concurrently, the previous period's CAR, the average CAR of banks of the same size, the interbank interest rate, and the required capital ratio all have a forward and statistically significant relationship with CAR. Furthermore, Ahmet and Hasan (2011) concluded that there is a backward relationship between the credit risk provision ratio and the capital adequacy ratio, because the authors states that when banks increase the credit provision ratio, the bank must make many provisions to compensate, reducing the bank's own capital. In addition, Mpuga (2002) demonstrates that increasing the loan ratio raises the bank's capital adequacy ratio. Williams (2011) also demonstrated that higher real interest rates have a negative impact on capital adequacy ratio at multinational bank branches, as well as the backward relationship between exchange rate and CAR.

Using the GMM estimation method, Asarkaya and Zcan (2007) studied determinants of commercial banks' CAR and conducts an empirical analysis for Turkish commercial banks from 2002 to 2006. The study concluded that banks hold capital in excess of regulations, the risk level of assets, the size of the bank, and the proportion of deposits are all backward correlated with CAR. Shingiergi and Hyseni (2015) examined the factors influencing CAR of Albanian commer-

cial banks from 2007 to 2014, including bad debt ratio, loan-to-deposit ratio, equity ratio, bank size, return on total assets, and return on equity. The data is analyzed using the OLS method, which does not take into account model error issues such as endogeneity or model uniformity with models panel data. Thus, the model results may be inconsistent.

In Vietnam, Thuy and Chi (2015) found that, micro-factors (bank size, customer deposits, return on total assets, equity to total debt ratio) play an important role in determining the CAR of Vietnamese commercial banks. However, the study does not take into account the impact of macroeconomic factors on CAR. Another study by Le Thanh Tam and Nguyen Dieu Linh (2017), came to the same conclusion about micro variables like bank size and credit risk provision, as well as macro variables like GDP growth rate and inflation that have a backward impact on CAR, while CAR is forward affected by ROA, equity to total debt ratio, and capital mobilization ratio. However, the bad debt ratio, loan to total asset ratio, and lending interest rate are not statistically significant.

In general, studies on CAR published outside or in Vietnam show that the factors influencing CAR change are influenced not only by bank-specific factors but also by macroeconomic factors of the country. That is, CAR is determined by the capital needs of each period and country, so the level of factors influencing CAR varies across countries due to the unique characteristics of each country.

4. DATA, MODELS AND RESEARCH METHODS

4.1. Data

Table 1. Summary of Variables in the Model.

Variables	Measure	Expectations of the sign	Source
Dependent variable			
CAR	$CAR = \frac{\text{Tier 1 capital} + \text{Tier 2 capital} - \text{Deduction}}{\sum (\text{Asset} \times \text{Risk Coefficient}) + (\text{Market Risk} + \text{Operational Risk}) \times 12.5}$		
Independent variables			
<i>For micro variables</i>			
SIZE	Log (Total assets)	-	Demsetz and Strahan (1997)
DPRR	Provision for credit risk / Total assets	+	Le Thanh Tam and Nguyen Dieu Linh (2017)
LOAN	Total loans / Total assets	-	Mpuga (2002)
ROE	Net Profit after taxes / Equity	+	Ahmet and Hasan (2011)
LEV	Total debt/Total Assets	-	Ahmet and Hasan (2011); Shingjergji and Hyseni (2015); Thuy & Chi (2015)
DEP	Total Deposit / Total Assets	+	Kleff and Webber (2003); Asarkaya and zcan (2007)
<i>For macro variables</i>			
PREIOD	= 1 in the years after the issuance of Decision 42/2017/QH14 and the value 0 in the remaining years	+	Le Thanh Tam and Nguyen Dieu Linh (2017)

A panel dataset of 252 observations was created using study data from 21 Vietnamese commercial banks, excluding overseas Vietnamese bank branches, from 2008 to 2019. The authors chose 2008 as the study timeline because: in 1999, Vietnam was only exposed to CAR regulations through Decision 297/1999/QD-NHNN5 (SBV, 1999), despite the fact that Decision No. 297 of the State Bank of Vietnam contains some errors and is not consistent with international standards. As a result, in 2005, the State Bank of Vietnam issued Decision 457/2005/QD-NHNN (SBV, 2005), which has been in effect since 2005. This Decision is consistent with international standards - Basel I Agreement due to implementation delays and legal issues, so 2008 is the ideal time to begin research.

4.2. Research Models

Based on the theoretical foundations and proposed models of previous studies such as Ahmet and Hasan (2011), Le Thanh Tam and Nguyen Dieu Linh (2017), and others, the authors have proposed a research model consisting of variables appropriate for Vietnam's economic conditions, which are as follows:

$$CAR_{i,t} = \beta_0 + \beta_1 SIZE_{i,t} + \beta_2 DPRR_{i,t} + \beta_3 LEV_{i,t} + \beta_4 DEP_{i,t} + \beta_5 LOAN_{i,t} + \beta_6 ROE_{i,t} + \beta_7 DGDPT + \beta_8 INF_{t} + \beta_9 INT_{t} + \beta_{10} REG_{t} + \beta_{11} PREIOD + \beta_{12} CAR_{i,t-1} + \epsilon_{i,t} \quad (2)$$

INF	Inflation rate	-	Williams (2011)
DGDP	$(GDP_t - GDP_{t-1})/GDP_{t-1}$	-	Le Thanh Tam and Nguyen Dieu Linh (2017)
REG	= 1 from the years applying the CAR calculation method according to Circular 36/2014/TT-NHNN and the value 0 in other years.	+	Kleff and Webber (2003)
INT	Interest rate	-	Williams (2011)
CAR(t-1)	Capital adequacy ratio in the previous period	+	Wong et al (2005)

Source: Summary of authors.

Table 2. Descriptive Statistics of Variables in the Model.

Variables	Average	Standard Deviation	Min	Max
CAR	15.3873	5.1619	8.6700	40.1100
DPRR	0.0057	0.0045	-0.0066	0.0413
LOAN	0.6917	0.0985	0.3734	0.8851
ROE	0.0882	0.0599	0.0020	0.2520
LEV	0.8916	0.0544	0.5780	0.9397
DEP	0.7925	0.0917	0.2940	0.9158
PREIOD	0.3333	0.4723	0.0000	1.0000
INF	107.5567	6.4988	100.6300	122.9700
DGDP	6.3962	0.5202	5.3979	7.0758
REG	0.4167	0.4940	0.0000	1.0000
INT	0.0899	0.0239	0.0650	0.1400

Source: Author's calculation.

Table 2 displays descriptive statistics for the model's variables. In particular, CAR has an average ratio of 15.4; in comparison to the capital adequacy ratio prescribed by Basel II of 8 percent, commercial banks in the research data have a higher reserve level than the capital requirement level. Banks' average profitability is around 8.82 percent, which is a stable level of profitability compared to the period from 2008 to 2019, but significantly lower than international standards on financial soundness indicators (FSIs). Low profitability will have an impact on commercial banks' capital adequacy ratio.

4.3. Research Methods

The study uses the two-step S-GMM method (two-step System-GMM) to solve the model's endogeneity problem as well as to overcome the phenomena of autocorrelation and variable variance better than the one-step S-GMM. However, in order to use the estimated results from the GMM method, the autocorrelation phenomenon in the error component must be tested using the Arellano-Bond test proposed in Arellano and Bond's (1991) study. Accordingly, the required GMM estimate can have residual autocorrelation of order 1 - AR(1) but no residual autocorrelation of order 2 - AR(2). The Sargan/Hansen test is the model's Over-Identifying Restrictions test, and it aims to determine the appropriateness of the instrumental variables in the GMM model.

5. ESTIMATION RESULTS

5.1. Result of tests

Following that, the paper will run some tests on the research model. The authors used White test in order to test the variance. The results show that $\text{Prob} > \chi^2 = 0.0000$, rejecting the hypothesis H_0 : fixed variance. Therefore, the model has a variable variance phenomenon, which must be overcome in order for the estimated results to be trustworthy.

To check for autocorrelation, the authors use the Wooldridge test. The results reveal that $\text{Prob} > F = 0.00005\%$, refuting the hypothesis H_0 : order 1 - autocorrelation does not exist. Thus, there is an autocorrelation problem in the research model, which must be resolved in order to assure the dependability of the regression results.

Through the tests, the research team will use the two-step S-GMM method to overcome the autocorrelation and variance issues in the model. Simultaneously, the independent variables in the model solve the endogeneity problem and the dependent variable's lagged variable appears (prior capital adequacy ratio CAR_{t-1} , GDP growth rate, profitability ROE, inflation rate INF (Berger et al., 1995).

5.2. Model Regression Result

Through this table of regression results, it can be seen that the Hansen and Sargan tests have results greater than 5, indicating that the instrumental variables in the model are strictly exogenous variables. The Hansen test and Difference (null H = exogenous) yields results of less than 5%, indicating that

the instrumental variables in the model are strictly exogenous and can be used to replace endogenous variables. Simultaneously, the AR(1) and AR(2) tests show that the model has order 1-autocorrelation but no order 2-autocorrelation, whereas S-GMM allows for order 1-autocorrelation can occur. Thus, the two-step S-GMM method has effectively overcome the model's flaws.

Table 3. Model Estimation Results by Two-Step S-GMM Method.

Variables	Estimated Coefficient	Standard Deviation	z	P>z
SIZE	-0.0808	0.0147	-5.4900	0.0000
DPRR	13.1936	10.9127	1.2100	0.2270
LOAN	-55.7589	2.9124	-19.1500	0.0000
ROE	10.4295	4.4183	2.3600	0.0180
LEV	-6.7468	1.5705	-4.3000	0.0000
DEP	-2.0413	1.0199	-2.0000	0.0450
PRERIOD	0.1374	0.0342	4.0200	0.0000
INF	0.0055	0.0081	0.6800	0.4960
GDP	1.0567	0.1943	5.4400	0.0000
REG	0.2260	0.0620	3.6400	0.0000
INT	-0.5345	0.6698	-0.8000	0.4250
CAR(t-1)	0.0837	0.0327	2.5600	0.0110
_cons	53.8930	2.9909	18.0200	0.0000
Hansen test			0.5710	
Sargan Test			0.8400	
Hansen test in excluding group			0.2950	
Difference (null H = exogenous)			0.6000	
AR(1)			0.003	
AR(2)			0.0880	

Source: Calculation of authors.

Table 4. Estimation Results of Model Robustness.

Variables	Estimated coefficient	Standard deviation	z	P>z
SIZE	-0.0620	0.0157	-3.9400	0.0000
DPRR	0.2008	6.1796	0.0300	0.9740
LOAN	-56.9682	1.9249	-29.6000	0.0000
ROE	14.8822	2.4983	5.9600	0.0000
LEV	-5.2455	1.5428	-3.4000	0.0010
DEP	-1.9416	1.0264	-1.8900	0.0590
PRERIOD	0.1326	0.0498	2.6600	0.0080
INF	-0.0008	0.0064	-0.1300	0.8980
GDP	0.4708	0.1652	2.8500	0.0040
REG	0.1017	0.0730	1.3900	0.1640

Int	-0.1358	0.7461	-0.1800	0.8560
CAR(t-1)	0.0503	0.0083	6.0400	0.0000
_cons	57.4423	1.2919	44.4600	0.0000

Source: Calculation of authors.

5.3. Robustness Test

The authors use the feasible generalized least squares (FGLS) estimation method to test the robustness of the effects of the coefficients estimated by the GMM method. This method is frequently used to overcome the model's error variance. The results show that the estimated coefficients have the same sign as the coefficients estimated by the GMM method.

Thus, it can be seen from the estimation results of Tables 3 and 4, which are related to micro factors, that bank size has a backward impact on CAR. This result is consistent with the study of Demsetz and Strahan (1997), who discovered that large banks often have a higher degree of operational diversification and more experience in risk management than banks. So, they have little incentive to keep CAR at a high level when compared to small banks. Similarly, the loan ratio has an backward relationship with CAR. This is explained by the fact that when banks increase lending by loosening policies and lending conditions, then risks rise. At this time, the bank must supplement capital to maintain a higher level of safe capital in order to avoid the risk of customers failing to pay their debts.

On the other hand, ROE has a positive estimator and is statistically significant to CAR. The meaning is that when banks increase their profitability, they increase their capital adequacy level, which is consistent with the study of Ahmet and Hasan (2011). Because increased profitability is accompanied by increased risk, which causes shareholders and depositors to be concerned, the new increase in capital adequacy ratio would be a good way to reassure them. The provision ratio for credit risk has a positive effect on CAR as well. The provision ratio for credit risk also has forward effect on CAR. This result, however, contradicts the result of Le Thanh Tam and Nguyen Dieu Linh's study (2017). This is explained by the fact that, under Vietnam's current CAR calculation method, general provisions are included in supplementary capital while specific provisions are deducted from risky assets. Therefore, as the credit risk provision ratio rises, the numerator for calculating CAR will increase and the denominator will decrease. As a result, an increase in credit risk provision raises the bank's CAR.

There is an backward relationship between leverage ratio and CAR in terms of leverage ratio. This study's results are consistent with those of Ahmet and Hasan (2011), Shingjergji and Hyseni (2015), and Thuy and Chi (2015). Likewise, the deposit ratio has a negative impact on CAR. The meaning is that banks with a high deposit ratio will keep their capital ratio low. Asarkaya and zcan (2007), as well as Kleff and Weber (2003), believe that external borrowing will increase costs and reduce profits. Consequently, increasing the deposit ratio does not necessitate a large mobilization of other sources of loans, and banks have little incentive to increase capital adequacy.

The process of restructuring the system has a positive impact on the bank's capital adequacy ratio in terms of macro factors. The government handles weak credit institutions properly, bad debts are resolved, and weak banks are bought and sold. These activities have screened and resolved issues for Vietnam's banking system. As a result of M&A and bad debt settlement, banks became stronger, which boosted commercial banks' capital adequacy ratio. GDP growth, on the other hand, will have a negative impact on banks' capital adequacy ratio. However, the data for this study was gathered in 2008, during the global financial crisis. At the time, Vietnam's economy grew slowly, never exceeding 7 percent, and peaked in 2012 with a growth rate of only 5.03 percent, less than two-thirds of what it had been before the crisis. This slump lasted until mid of 2015, when Vietnam's GDP growth rate just surpassed the 6 percent mark. Economic growth will assist banks in increasing profits, a portion of which will contribute to the capital recovery process.

Furthermore, strict management, supervision, and appropriate punishment for banks that violate regulations will compel commercial banks to adhere to capital regulations. Since the publication of Circular 36/2014/TT-NHNN, the ratio of safe capital of commercial banks has increased significantly in comparison to previous years. In addition, lending rate is statistically significant and negatively correlated with CAR. High interest rates complicate bank management by making the future value of assets and liabilities uncertain. High interest rates reduce the bank's income because it must pay off a large amount of debt, allowing the bank to keep the CAR low. The CAR from the previous period has a positive and statistically significant impact on the CAR from the current period. This is due to the problem of information asymmetry and adjustment cost of commercial banks of this period is determined by comparing it to the previous period. In addition to being an assessing indicator of soundness and safety, CAR is also considered an indicator of a commercial bank's financial capacity; that is, the higher the CAR, the greater the commercial bank's financial capacity. As a result, commercial banks are more likely to keep CAR higher this period than in the previous period.

6. CONCLUSIONS AND RECOMMENDATIONS

According to the findings of the study, CAR is affected not only by bank-specific factors such as size, leverage ratio, loan ratio, deposit ratio, and profitability, but also by other macro factors such as GDP growth rate, pressure from regulatory and the process of restructuring the commercial banking system, all influence capital adequacy ratio adjustment. The authors propose some recommendations and solutions to ensure capital adequacy for commercial banks in Vietnam based on the results of empirical research. More specifically:

(i) Increase in equity: The CAR ratio calculated under the Basel II Accord under Circular 41/2016/TT-NHNN decreased by 25 to 30 percent compared to the CAR calcula-

tion under Circular 36/2014/TT-NHNN. This new calculation causes commercial banks to increase risky assets, resulting in a much lower CAR than the Circular 36 calculation. Furthermore, while the equity capital of these Vietnamese commercial banks is increasing, it remains low in comparison to commercial banks in other countries in the region. As a result, increasing equity capital is one of the solutions that can assist commercial banks in ensuring the implementation of Basel II Accord's capital regulations in the near future. Among the applicable measures are: The issuance of new common shares; Reducing dividend payments while increasing retained earnings; Acquisition and merger

(ii) Increase operational efficiency: Based on the findings of the experimental research, the authors discovered that ROE profitability is positively correlated with capital adequacy ratio. As a result, improving and raising the efficiency of banking operations will be a solution for commercial banks in Vietnam today, when commercial banks in Vietnam have lower profitability than average. To be more specific, in order to improve operational efficiency, commercial banks must: Increase the capacity of the management team; Set the trend in the application of modern technologies in management and service activities; Tighten and improve commercial bank employee selection standards; Improve the technology system, expand the use of information technology in operations and management, risk assessment, and risk prevention.

(iii) System restructuring: Dealing with millions of bad debts and weak commercial banks is one of Vietnamese banking system's most important goals and tasks at the moment. The author discovered that the restructuring variable of the commercial banking system in phase 2 is positively correlated with the CAR ratio based on the experimental results. As a result, one of the most effective methods for ensuring the minimum capital of commercial banks today is for the Government and the State Bank to restructure the system. Measures that can be taken against the Vietnam State Bank include: Increasing the number of mergers and acquisitions of weak commercial banks; Create a set of criteria for evaluating, classifying, and ranking commercial banks that clearly distinguishes between healthy, weak, and important commercial banks in Vietnam's commercial banks; Nationalization of weak commercial banks; Pumping money into failing commercial banks to keep them running;

Encourage and create favorable conditions for foreign credit institutions to do business in Vietnam, while also assisting Vietnamese commercial banks in dealing with difficult problems, thereby creating a level playing field for Vietnamese commercial banks and foreign credit institutions.

(iv) Pressure from Regulatory: Research findings show that REG has a positive and statistically significant coefficient of estimation. As a result, increasing regulatory pressure can be viewed as a tool to assist commercial banks in maintaining a minimum capital level. Strengthen commercial bank supervision and inspection; Increase fines for regulatory violations; Accelerate the completion and promulgation of legal regulations in accordance with international standards. Measures that could be taken include: Strengthen commercial bank supervision and inspection; Increase fines for regulatory violations; Accelerate the completion and promulga-

tion of legal regulations in accordance with international standards.

(v) Economic growth: The positive correlation between economic growth and CAR shows that the macrotarget that Vietnam has always sought is the key to assisting commercial banks in maintaining minimum capital. Measures that could be taken include: implementing reforms and improving the quality of institutions and public governance; Attracting foreign direct investment (FDI); Prioritizing innovation and the use of technology to increase labor productivity.

However, in addition to the study's results, there are some limitations that the authors hope to overcome in future studies, such as: The data collected from 21 commercial banks is only representative of Vietnam's commercial banks. Furthermore, some micro variables (bad debt, bad debt sold to VAMC, government ownership, etc.) and macro variables (exchange rate, industry capital adequacy, etc.) are still not included in the model for testing.

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflict of interest.

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