

## DETERMINANTS OF CAPITAL ADEQUACY RATIO OF VIETNAMESE COMMERCIAL BANKS

Do Hoai Linh, PhD

Nguyen Thi Hoai Phuong, PhD

Ngo Thanh Xuan, MBA

Le Anh Duc, MA

Nguyen Thi Ngoc Diep, MA

Nguyen Huyen Trang, BA

### ABSTRACT

*By using the data of 26 Vietnamese Joint-stock Commercial banks, the paper researches the factors that impacted on Capital Adequacy Ratio of Vietnamese commercial banks. Through the Panel Tobit model, the research found out that the Net interest margin (NIM), Bank size, GDP Growth, Interest rate and Exchange rate have the inverse relationship with CAR while the Leverage and Deposits positively correlated to CAR. On this basis, the study gives some recommendations in order to improve the capital adequacy ratio for commercial banks in the future.*

Key words: Capital Adequacy Ratio, Net Interest Margin, Size of Banks, Deposits, GDP, Interest rate, Leverage.

### INTRODUCTION

The banking sector is considered as the backbone of an economy, it plays a huge role in the development of the country. A few decades ago, the economists of the school of Monetarism, (Friedman and Schwartz, 1963) has tied the financial crisis with the banking crisis. They said that a banking crisis will lead to a financial crisis and the stability of the banking system will be threatened, the financial infrastructure may collapse without the intervention of central banks. Besides, in Vietnam, we have seen the strong and completely better development of the domestic banking system. However, the boom in the activity of both scale and diversity of the banking system in recent years has hidden the huge risks directly affecting the safety and soundness of the commercial banking system. Therefore, to avoid the collapse of banks and protect the depositors, the banking regulators need to emphasize the importance of Capital Adequacy Ratio (CAR) in banking activities under Basel standards. CAR is one of the crucial factors in evaluating the health of one bank. For that reason, the research chooses the topic "Determinants of Capital Adequacy Ratio of Vietnamese Commercial Banks" to study.

### CAR OF VIETNAM BANKING SYSTEM

#### CAR Calculation of Vietnam Banking System

CAR of commercial banks is a measure of a bank's capital to total risk assets, indicating the financial strength of banks. Around the world, some countries adopt the safety assessment standards system under Basel Committee on Banking Supervision (BCBS). Basel was originally constructed to solve the urgent needs for creating a more stable and secure financial market. Up to the present time, Vietnam has not been a member of the BCBS, therefore, we are not bound by the deadline for Basel II compliance. However, in recent years, the SBV has gradually approached with Basel II by issuing many laws and regulations under the orientation of Basel II. Circular No 36/TT-NHNN with CAR calculation method in the joint stock commercial banks in Vietnam now are calculated with a specific formula as:

$$\text{Individual CAR} = \frac{\text{Equity capital}}{\text{Risk Adjusted Assets}} \quad (1.1)$$

$$\text{Consolidated CAR} = \frac{\text{Consolidated Equity Capital}}{\text{Risk Adjusted Assets}} \quad (1.2)$$

Although management of the SBV for capital adequacy ratio of commercial banks always follow and gradually approaching international standards, it still has a big difference between the CAR calculation of Vietnam and international standards.

According to Basel II and III standards, the CAR formula is:

$$\text{Consolidated CAR} = \frac{\text{Consolidated Equity Capital}}{\text{Risk Adjusted Assets} + \text{Operational Risk} + \text{Market Risk}} \quad (1.3)$$

Thus, the calculation of CAR Circular No. 36 had left the market risk and operational risk. This makes the CAR of commercial banks in Vietnam do not accurately reflect the degree of credit risk in the business activities of the bank. Therefore, although some banks have CAR at a high level, they are unlikely to ensure the level of capital adequacy.

### CAR in Vietnam Commercial Banking System

Tab 1. CAR of 26 commercial banks in the 2015 – 2018 period

Bank	2015	2016	2017	2018
ABBank	14.9%	15.0%	16.0%	17.0%
ACB	10.6%	9.3%	13.5%	14.5%
BIDV	9.3%	11.1%	9.7%	10.2%
DongA Bank	10.8%	10.0%	10.9%	10.4%
Exim bank	17.8%	12.9%	16.4%	14.5%
HDBank	12.7%	15.0%	14.0%	12.2%
KienLongBank	9.0%	15.0%	33.4%	20.7%
Maritime Bank	9.9%	10.6%	11.3%	10.6%
MBBank	11.1%	9.6%	11.2%	11.0%
Nam A Bank	18.0%	20.3%	19.2%	13.5%
National Citizen Bank	19.5%	17.2%	19.1%	16.0%
OceanBank	9.5%	11.7%	10.4%	9.2%
OCB	20.6%	17.2%	28.0%	22.4%
PG Bank	20.6%	16.7%	22.6%	19.1%
Sacombank	10.0%	11.7%	9.5%	10.2%
Saigonbank	16.3%	22.8%	23.9%	24.1%
SCB	10.3%	10.3%	9.5%	10.0%
SeaBank	13.7%	13.3%	15.5%	14.3%
SHB	13.8%	13.4%	14.2%	12.4%
Techcombank	13.1%	11.4%	12.6%	14.0%
TP Bank	18.0%	23.4%	40.2%	19.8%
VIBBank	10.1%	14.5%	19.4%	18.0%
Viet Capital Bank	54.9%	34.4%	27.5%	16.1%
Vietcombank	9.0%	11.1%	14.6%	13.1%
Vietinbank	8.0%	10.6%	10.3%	13.2%
VPbank	14.7%	11.9%	12.5%	12.5%

(Source: Annual Reports of 26 selected banks)

The period 2010 - 2013 implemented to ensure minimum CAR of 9% under the provisions of Circular No.13/2010/TT-NHNN but activities on ensuring capital adequacy is quite complicated. During this period, Vietnam commercial banks system met the minimum capital adequacy ratio at 9%; however, it did not fully reflect the capital adequacy level of the banking system. Because, firstly, the denominator of CAR as stipulated by Circular No.13/2010/TT-NHNN only identified credit risk rather than taking into account the market risk and operational risk. Secondly, according to the recommendations of the Basel III, we should raise capital adequacy to 13%, and including the risks from the fluctuations in macroeconomic because this is a cyclical risk and the cross risks in case of bank operating under the financial corporation's model.

## DETERMINANTS OF CAPITAL ADEQUACY RATIO OF VIETNAMESE COMMERCIAL BANKS

### Literature Review

Based on the researches of (Alfon et al., 2005), (Wong et al., 2005) and (Mili et al., 2014), this study classifies the determinants of CAR into 2 categories: The macroeconomics factors and microeconomics factors (internal financial criteria of banks).

#### The macroeconomics factors

The capital adequacy ratio may be affected by some macroeconomics factors like GDP growth rate, interest rate, and exchange rate.

##### GDP growth rate

Economic growth is an important variable to explain CAR and it is illustrated by GDP growth. (Mili et al., 2014) stated that if the economic growth of a country is positive, the bank might have less risk which leads the banks to reduce their regulations in capital and make more investment in other sectors. In contrast, when this growth rate is low or negative, that means the probability of bank risk is higher so the banks need to keep the high capital ratio to prevent the loss in the future. On the contrary, studies of (Ruckes, 2004) and (Aktas et al., 2015) found that the relationship between GDP growth and CAR is negative. During downturn, the GDP growth rate decreased, banks have to maintain a large amount of capital to deal with the losses could simultaneously narrow the quantity and areas of investment, therefore CAR tend to rise in this period

##### Interest rate

(Demirgüç-Kunt and Detragiache, 1997) found the relationship between the interest rate and capital. They stated that the ability to pay back the loans of borrowers would lower if the interest rate goes up. For that reason, the amount of bad debt increase leading to the negative influence on the capital ratio. Having the same idea, (Mili et al., 2014) found a negative relationship between the interest rate and the CAR of multinational banks' subsidiaries. Thus, we expect an inverse relation between CAR and interest rate.

##### Exchange rate

Another factor affecting the capital of the bank is the exchange rate. The study of (Williams, 1998) pointed out that there is a negative correlation between exchange rate and capital adequacy ratio. The increase of exchange rate will make the foreign investor restricts the direct investment leads to the decrease of capital adequacy ratio. While examining the determinants of capital adequacy ratio in Nigeria from 1980 to 2008, (Harley Tega and Williams, 2011) attained the real domestic and exchange rate have a negative correlation with the bank capital ratio.

#### Internal financial criteria of banks

##### Bank size

When making research about factors affecting the CAR in Hong Kong, (Wong et al., 2005) has shown that bank size (which is determined by the logarithm of total assets), has a negative correlation with CAR because large banks will have more risky assets than small banks. Along with that perspective, (Shrieves and Dahl, 1992, DRECA, 2014) argues that the scale of bank assets are very important and inversely correlated with the CAR. That means the bigger the bank, the smaller the CAR. Besides, in the study of (Demsetz and Strahan, 1997, Wong et al., 2005, Ahmad et al., 2008) and (Bateni et al., 2014), they claimed that the risk management technique of large banks is more developed, that means they can measure the risk better so they do not need to hold too much capital. Therefore, the capital adequacy ratio decreases with size. However, (Gropp and Heider, 2010, Brown and Octavia, 2010) suggest that the larger banks will tend to hold greater CAR, due to capital reserves exceeded market expectations. In conclusion, there is an interconnection between the bank size and the capital adequacy ratio; this correlation can be positive or negative.

##### Deposits

According to (Kleff and Weber, 2003), generally, the capital from customer deposits, have a lower cost than the cost of borrowing from other financial instruments (such as bonds or other equity securities). When the customer deposits rise, banks will have much more regulations and more tightly controlled to protect the depositors and preserve the bank's solvency. Moreover, (DRECA, 2014) mentioned that, if the depositor were not possible to determine the stability of the banks that they send money, the bank would maintain a CAR lower optimal capital ratio. However, if depositors can know exactly that the bank, where they put money in, having good financial soundness; the bank can maintain a large source of funds from depositors that will accept lower interest rates on deposits. Besides, (Asarkaya and Özcan, 2007) found a negative correlation between customer deposits ratio and CAR.

##### Bank loans

The lending activity of banks is also one of the factors affecting the CAR, expressed through the Loans-to-Assets ratio, which is measured by the total loans to total assets of banks. According to (Hassan and Bashir, 2003), this ratio is an important factor; it measures the total loans outstanding as a percentage of total assets. In other words, Loans to Assets ratio measures the impact of the loan in assets portfolios. The higher this ratio indicates the more risky a bank may be and higher defaults. When risks increase, the depositors will be compensated for their loss so the CAR also increase (DRECA, 2014). The study of (Mpuga,

2002) showed that the relationship between loans and CAR is positive, that means when the loan balance increases, the CAR has also increased and vice versa. On the contrary, (Aspal and Nazneen, 2014) mentioned in their research that lending is negatively correlated with capital adequacy ratio.

### **Profitability**

Return on assets (ROA) is considered as the most important criteria for evaluating the effectiveness of banking operations. Generally, most of the studies claim that the profitability has the impact on the capital adequacy of the bank. According to (Sabbagh, 2004), ROA and CAR can relate positively to each other because banks often increase expected risk assets to obtain high returns. (Mathuva, 2009) found that bank profitability has a positive influence on the core capital ratio and tier 1 risk-adjusted capital ratio. (Gropp and Heider, 2010), the study of banks in Europe, and (Brown and Octavia, 2010, Bateni et al., 2014) indicated that bank profits tend to retain to raise capital and to invest in risky assets, that means, the higher the profit is, the higher level of CAR.

### **Net Interest Margin**

NIM is defined as the ratio of net income to total assets and is called the net profit margin of the bank. Net profit margin is an important element of bank profits, influenced by the fluctuations in market interest rates and default risk. Profits of banks are used to pay for the intermediate costs; these also reflect the size of the assets and liabilities. More specifically, net interest income generated on the increased risks. (Angbazo, 1997) pointed out that the capital buffer could be less if default risk is low; it means the increase of NIM will lead to the decline of CAR. In the same view, (Ahmad et al., 2008, Dawit, 2015) found that the high profit makes banks reduce the capital cushions because the failure risk is low. Thus, NIM can have negative significance.

### **Leverage**

In the bank, leverage can be measured by total equity over total assets. Shareholders can find that the banks with high leverage will have more risks than other banks. Banks use high leverage to increase equity because the cost of equity is high. Furthermore, according to (Ahmad et al., 2008) the banks use high leverage will have a lower equity than capital created by the leverage. Moreover, when investigating the determinants of Capital adequacy ratio in Bosnia (DRECA, 2014) revealed that leverage has a negative impact on CAR.

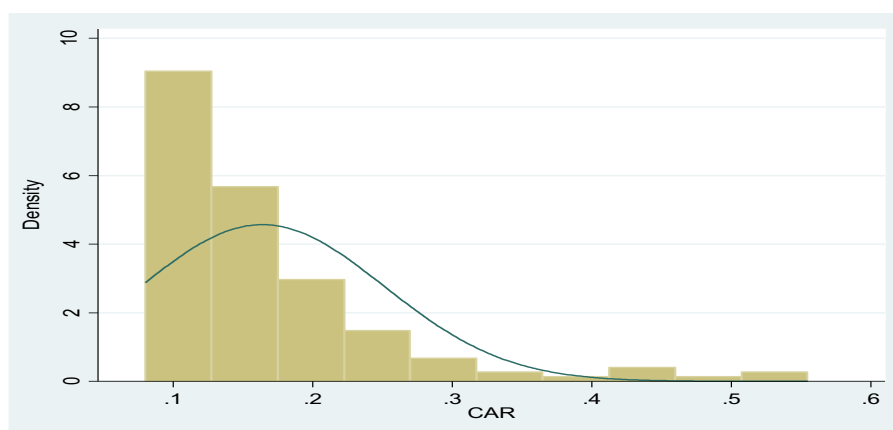
### **Methodology**

#### *Data collection*

The banks' financial data used in this research are the data from the annual reports of 26 commercial banks and the financial data of Vietnamese banks collected by Stoxplus. Besides, we collected the data of macro factors (GDP Growth, Exchange rate, and Interest rate) from World Bank and IMF.

#### *Econometric Model*

**Fig 1. Distribution of CAR**



In the previous studies of other authors, they often used FEM, REM or OLS pooled model to examine the factors affecting the CAR. However, in this paper, because data of the CAR does not follow a normal distribution and has a negative skewness (Figure 2) so the estimated results will be unreliable if we use OLS Model. For that reason, I decided to use the Panel Tobit Model instead of OLS.

### **Panel Tobit Model**

The assumption that  $C_i$  and  $X_{it}$  are independent is unattractive. We can adopt a Mundlak-Chamberlain approach and specify  $c_i$  as a function of observables, for example:

$$c_i = \psi + \bar{x}_i\xi + a_i.$$

This means we rewrite the panel Tobit as:

$$y_{it} = \max(0, \mathbf{x}_{it}\beta + \psi + \bar{x}_i\xi + a_i + u_{it})$$

$$u_{it} | \mathbf{x}_{it}, a_i \sim \text{Normal}(0, \sigma_u^2)$$

We cannot control for  $c_i$  by means of a dummy variable approach (incidental parameters problem), and no Tobit model analogous to the "fixed effects" logit exists. We, therefore, consider the random effects Tobit estimator

### Empirical model

The research model to examine the factors affecting the CAR in Vietnam is based on the model in studies of (Asarkaya and Özcan, 2007), (Ahmad et al., 2008) and (Wong et al., 2005) :

$$CAR_{it} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 DEP_{it} + \beta_3 LOA_{it} + \beta_4 ROA_{it} + \beta_5 NIM_{it} + \beta_6 LEV_{it} + \beta_7 IR_t + \beta_8 GGDP_t + \beta_9 EX_t + \varepsilon_{it}$$

In which:

$CAR_{it}$  is the capital adequacy ratio of the bank  $i$  at time  $t$ .

$SIZE_{it}$  is the size of bank  $i$  at time  $t$ .

$DEP_{it}$  is the deposits of customers at bank  $i$  at time  $t$ .

$LOA_{it}$  is the loans of bank  $i$  at time  $t$ .

$ROA_{it}$  is the profitability of bank  $i$  at time  $t$ .

$NIM_{it}$  is the net interest margin of bank  $i$  at time  $t$ .

$LEV_{it}$  is the financial leverage of bank  $i$  at time  $t$ .

$IR_t$  is Vietnam interest rate at time  $t$ .

$GGDP_t$  is Vietnam's annual GDP growth rate at time  $t$ .

$EX_t$  is the exchange rate of Vietnam at time  $t$ .

The following table summarizes the data used in econometrics model and the expected coefficient sign.

**Tab 2. Summary of empirical data**

Variables	Notation	Description	Expected sign
Capital Adequacy Ratio	CAR	The capital ratio of the bank at time $t$	
Bank size	SIZE	The logarithm of total assets	+/-
Deposits	DEP	Total customers deposits/total assets	+/-
Bank loans	LOA	Total loans/ total assets	+/-
Return on Assets	ROA	The net income before tax/ total assets.	+
Net interest margin	NIM	Net interest income/total earning assets.	-
Leverage	LEV	Equity/total assets	+/-
Interest rate	IR	Interest	-
GDP growth rate	GGDP	Annual GDP growth rate of Vietnam	+/-
Exchange rate	ER	The rate of converting from VND to USD	-

### Results of regression and analysis

- **Regression diagnostics tests**

Test for multicollinearity

**Tab 3. Matrix of correlation**

	CAR	SIZE	NIM	ROA	LEV	DEP	LOA	GGDP	Interest	ER
CAR	1									
SIZE	-0.635	1								
NIM	0.044	-0.097	1							
ROA	0.027	-0.135	0.592	1						
LEV	0.743	-0.706	0.240	0.280	1					
DEP	-0.323	0.296	0.161	0.034	-0.224	1				
LOA	0.026	0.011	0.347	0.208	0.059	0.493	1			
GGDP	-0.081	0.029	0.056	0.213	-0.039	-0.374	-0.143	1		
Interest	-0.172	0.203	-0.007	-0.168	-0.194	0.282	0.076	-0.458	1	
ER	-0.230	0.384	0.167	-0.168	-0.268	0.029	-0.100	-0.081	0.508	1

Obviously, all pairs of independent variables in the model having the linear correlation coefficient is less than 0.8. Therefore, the research data does not appear the phenomenon of serious multicollinearity.

Wooldridge test for autocorrelation

H0: no first-order autocorrelation  
F (1, 25) = 25.424  
Prob> F = 0.0000

With the H0 is no first order correlation, the results shows that the H0 is rejected that means there is first order correlation. For that reason, I used the Panel Tobit model with the dummy variable, i. year to solve this problem.

- **The results of regression and analysis**

**Tab 3. Estimation results of determinants of Capital Adequacy Ratio**

Variables	(1) CAR	(2) CAR	(3) CAR
SIZE	-0.0415267** (0.0235873)	-0.0480226** (0.0234228)	-0.0535742**(0.023298)
NIM	-0.9320416** (0.5004824)	-1.315023*** (0.4388976)	-1.445463***(0.4331465)
ROA	-1.301604 (0.841671)	<b>Eliminated</b>	<b>Eliminated</b>
LEV	0.3476673*** (0.0841801)	0.3183173***(0.0827637)	0.3055685***(0.0829676)
LOA	-0.0832667 (.0585488)	-0.0859904 (0.0590582)	<b>Eliminated</b>

DEP	0.1542317** (0.0627655)	0.1573471**(0.0633076)	0.11613** (0.057086)
G_GDP	-4.632132* (2.667561)	-4.790028*(2.690014)	-4.815218*(2.711803)
Interest	-0.4802393 (0.3410028)	-0.4157031 (0.3415384)	-0.5607333*(0.329344)
ER	-4.130385* (2.496839)	-4.642378*(2.497452)	-5.695896**(2.409753)
Constant	0.7250053** (0.3639225)	0.8831971** (0.3516174)	0.7272549* (0.3739562)
sigma_u	0.013663** (0.0057421)	0.0143247** (0.0057179)	0.0201474*** (0.0054507)
sigma_e	0.0462283*** (0.002867)	0.0466515*** (0.0028932)	0.0470304*** (0.0029167)
Wald Chi-squared	292.52***	279.23***	224.52***
P-value	0.00001	0.00001	0.00001
Observations	156	156	156
Number of bank	26	26	26

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

First of all, we put all the independent variables into the models as the formula conducted above. The estimated results show that the model (1) is statistically significant at 1% level. In particular, the LEV has the same direction as CAR at the 1% significant level, while the GDP and ER inversely related to CAR at the level of significance of 10%. The SIZE, NIM, and DEP are significant in the model at 5%. Besides three variables, ROA, Interest and LOA have no statistical significance.

After that, we try eliminating ROA out of the model, the result is the model (2) is still significant at 1% level. Besides, the majority of the coefficients of the variables included in this model increases, especially in this model, NIM correlated with CAR at 1% significance level. Therefore, we can say that ROA is an irrelevant variable and it should be excluded from the model. However, Interest and LOA still have no statistical significance in this model.

Finally, in model (3), we eliminated both variables ROA and LOA. Surprisingly, in this model, the variable Interest and ER negatively correlated with the CAR at the level of significance of 10% and 5%, respectively. Along with that, the p-value of this model is still 0.00001<0.01(1%) that means this model is statistically significant at 1% level.

**Tab 4. Summary of estimated results**

Variables	Reject H0	Expected sign	Estimated sign	Significant level
SIZE	Rejected	Positive/Negative	Negative	5%
NIM	Rejected	Negative	Negative	1%
ROA	Not rejected	Positive	-	-
LEV	Rejected	Positive/Negative	Positive	1%
LOA	Not rejected	Positive/Negative	-	-
DEP	Rejected	Positive/Negative	Positive	5%
G_GDP	Rejected	Positive/Negative	Negative	10%

Interest	Rejected	Negative	Negative	10%
ER	Rejected	Negative	Negative	5%

The estimated results indicate that in the internal financial criteria group, the Leverage and the Deposits has the same direction with CAR at 1% and 5% significant level, respectively. Conversely, the Bank size and the Net interest margin (NIM) statistically negatively correlated to the CAR at 5% and 1% of the significant level, respectively. Besides, 2 variables Bank loans (LOA) and Profitability (ROA) have no statistical significances in this model.

In the group of macroeconomic factors, both the GDP Growth and Interest rate have the negative relationship with CAR at the 10% level of significance while the Exchange rate inversely influence to the CAR at 5% significant level

#### **Further discussion**

- **The effects of the internal banking factors**

##### **Net Interest Margin**

Among the banking factors affecting the CAR in the Vietnam Joint Stock Commercial Banks, the net interest margin (NIM) has the strongest influence. In this study, the NIM of banks has a negative correlation with the CAR at the 1% significant level in the model; this is consistent with research by (Angbazo, 1997). While net interest margin increased meaning the lending will rise because most of the bank's profit comes from loans. Increasing lending would reduce the number of bank reserves and thereby reduce the liquidity as well as rising risks. In this study, for every 1% increase in net interest margin, the commercial banks in Vietnam will decrease 1.445% of CAR.

##### **Leverage**

Subsequently, the leverage ratio is the 2<sup>nd</sup> impactful factor affecting CAR. Leverage ratio of the bank has the same directed correlation with the capital adequacy ratio and is statistically significant at the 1% level of significance. In this model, if the leverage ratio increases 1%, commercial banks will increase 0.306% of CAR.

High-leverage ratio means that the scale of the equity of banks is high, which makes the capital adequacy ratio of the banks also increases. This is completely appropriate with the reality in Vietnam commercial banks system in recent years, especially since Vietnam joined the World Trade Organization (WTO). To ensure the soundness of banking operations as well as enhancing the competitiveness of domestic commercial banks, SBV issued regulations on capital adequacy, including the plan to increase the minimum charter capital to VND 3000 billion for Vietnamese commercial banks. Under that pressure, the banks had simultaneously raised their equity in many different ways, the result made the capital adequacy ratio of commercial banks increased. Besides, according to the schedule of restructuring the banking system, some banks had been selected to merge with another one, which helped the equity of the bank went up, leading to the increase of the CAR

##### **Deposits**

The third factor affecting the CAR of banks is deposits. In general, funds raised from customer deposits have lower costs than borrowing costs or other financial instruments. The result of research indicates that in Vietnam, the more deposits the banks can attract from customers, the higher the CAR is. These results match the findings of (Kleff and Weber, 2003) which show that customer deposits are considered as the cheapest sources of fund mobilization. While customer deposits increase, banks will have much more provisions and control to ensure the benefit of depositors and the liquidity of the banks. Conversely, if a bank attracted fewer deposits, in order to ensure their liquidity needs, banks have to borrow from the interbank market at high-interest rates, making the cost increases, thereby reducing the reserves and decreases the CAR.

##### **Bank size**

The next element influence on the capital adequacy ratio of commercial banks is the bank size. The size of the bank has a negative correlation with the CAR at 5% significant level in the model. This negative relationship indicates that the larger scale Vietnamese banks expand, the lower capital adequacy ratio is. This estimated result is consistent with previous findings of (Wong et al., 2005, Shrieves and Dahl, 1992, Ahmad et al., 2008) and (Bateni et al., 2014). These studies showed that the bigger banks would hold more risky assets than smaller banks. In this study, the relationship between the CAR and the size of the bank testified that every 1% increase in the size, the capital adequacy ratio was lowered by 0.0536%.

- **The effects of the macroeconomic factors**

##### **Exchange rate**

In the group of macroeconomic factors, Exchange rate is the factor most influence to CAR. Conforming to the expectation that the increase in the exchange rate would make the bank's CAR decreased. According to the estimated results in Table 6, exchange rate has the negative correlation with the CAR at the level of significance of 5%. In particular, when the exchange rate increases by 1%, the CAR will decrease by 5.695%.



During the period that exchange rate is rising, the tendency of dollarization the assets of public will be stronger leading to the increase of the demand of dollar. Foreign currency demand increasing makes the exchange rate continuously go up and the inflation rate is also higher.

### **Interest rate**

Another factor affecting the capital adequacy is the interest rate. This element has the opposite impact on the CAR at the commercial banks in Vietnam; this factor is statistically significant at 10%. Accordingly, when interest rates rise 1%, the CAR will decrease by 0.56%. The outcome is similar to the conclusion given in the empirical study of (Mili et al., 2014) when they determined the factors influence to CAR at multinational banks. Rising interest rates may affect the quality of bank loans, which lead to the increase of risky assets..

### **GDP growth rate**

The last factor influences to the Capital Adequacy ratio of commercial banks is the GDP growth rate. According to research results, the GDP growth rate in the opposite relationship with CAR at 10% level of significance, this is completely consistent with the findings of (Ruckes, 2004, Aktas et al., 2015) and (Aktas et al., 2015). Particularly, in this model, when the GDP Growth rate increases 1%, the CAR will be lowered by 4.815%.

## **RECOMMENDATIONS AND LIMITATIONS**

This study concluded that the decline in CAR in this period came from the changes in banks' risk appetite, the bank focused more on high-risk sectors, the expansion of bank assets mainly came from external borrowing. From that, this paper proposed some recommendation to improve the quality of capital adequacy.

### **Recommendations for commercial banks**

Currently, although the Vietnamese commercial banks reached the standard of capital under the provisions of Decree No.141/2006/ND-CP of the Government when compared the scale with other banks in the region, the equity of commercial banks in Vietnam are still modest even in the banks with large equity as Vietinbank, Vietcombank, BIDV..... Therefore, the Vietnamese commercial banks need to have some solutions to grow capital sustainably in order to raise the capital adequacy ratio. Besides, the bank not only needs to ensure minimum capital adequacy according to the regulations issued by the central bank but also gradually follow the international standards.

Mobilizing funds through the forms of taking customer deposits is still the platform of commercial banks operations and help banks to create funds to operate. Hence, the Vietnamese commercial banks should have some strategies to attract more customer deposits such as: i) Diversification of deposit forms; ii) Development of the banking network; iii) Enhance the reputation of the bank.

### **Recommendations for central banks**

Firstly, the SBV should continue to edit the rules to be closer with the standards of capital adequacy ratio under Basel Accord and gradually raise the targets in accordance with the progress of the Basel Accord. The study results showed that the expansion of the scale would reduce the capital adequacy ratio of the banks. Therefore, the State Bank should control and supervise the process of expanding the scale of commercial banks. At the same time, the State Bank should also have the flexibility in the requirement of minimum legal capital of commercial banks. The requirement that the banks must ensure a minimum legal capital on a timely basis might cause the race to raise capital, expand the scale leading to the increases of the risk for commercial banks.

Furthermore, to minimize the risks of the commercial banks, the SBV should also control the process of lending expansion, the utilization of the leverage of the banks as well as strictly manage the credit growth and leverage ratio under a permitted level of the SBV.

### **Limitations**

Besides these achieved results above, the study still has some limitations such as: i) the period of collecting data just fulfilled from 2008 – 2013; ii) The research scope was limited in the range of 26/37 Vietnamese commercial banks and did not research other types of banks like joint-venture banks or foreign banks' branches in VN. In addition, in fact, there are many types of exchange rate but this study only focused on the official exchange rate between USD and VND. Therefore, the study does not have the comprehensive view of the CAR as well as the full effects of determinants to the CAR of the whole banking system and have no basis for comparison between different types of banks; (iii) The data collected are partly based on the data in the annual report and financial statements of commercial banks published on their website. Thus, if these data are not reliable, they may affect the estimated results of the research; (iii)

Through the information from the annual report of commercial banks as well as the data from the central bank and by analyzing the implementation of the capital adequacy ratio, we can be concluded that, under the regulations of SBV, the Vietnamese commercial banks have met the minimum capital adequacy ratio of 9%. However, there are some limitations existing as the CAR did not accurately reflect the actual level of capital adequacy in banks, especially in the small-scale banks. From those results, the study gave some suggestions to improve the CAR as well as the soundness of Vietnamese commercial banks in the future.

## REFERENCES

### Article

1. Ahmad, R., Ariff, M. & Skully, M. J. 2008. The determinants of bank capital ratios in a developing economy. *Asia-Pacific financial markets*, 15, 255-272.
2. Aktas, R., Acikalin, S., Bakin, B. & Celik, G. 2015. The Determinants of Banks' Capital Adequacy Ratio: Some Evidence from South Eastern European Countries. *Journal of Economics and Behavioral Studies*, 7, 79.
3. Alfon, I., Argimón, I. & Bascuñana-Ambrós, P. 2005. How individual capital requirements affect capital ratios in UK banks and building societies. *Banco de Espa a Working Papers*.
4. Angbazo, L. 1997. Commercial bank net interest margins, default risk, interest-rate risk, and off-balance sheet banking. *Journal of Banking & Finance*, 21, 55-87.
5. Asarkaya, Y. & Özcan, S. 2007. Determinants of capital structure in financial institutions: The Case of Turkey. *Journal of BRSA Banking and Financial Markets*, 1, 91-109.
6. Aspal, P. K. & Nazneen, A. 2014. An empirical analysis of capital adequacy in the Indian private sector banks. *American Journal of Research Communication*, 2, 28-42.
7. Bateni, L., Vakilifard, H. & Asghari, F. 2014. The Influential Factors on Capital Adequacy Ratio in Iranian Banks. *International Journal of Economics and Finance*, 6, p108.
8. Brown, R. & Octavia, M. 2010. Determinants of bank capital structure in developing countries: regulatory capital requirement versus the standard determinants of capital structure. *Journal of Emerging markets*, 15, 50.
9. Dawit, W. 2015. *Determinants of Capital Adequacy Ratio: An Empirical Study on Commercial Banks of Ethiopia*. AAU.
10. Demirgüç-Kunt, A. & Detragiache, E. 1997. *The determinants of banking crises-evidence from developing and developed countries*, World Bank Publications.
11. Demsetz, R. S. & Strahan, P. E. 1997. Diversification, size, and risk at bank holding companies. *Journal of money, credit, and banking*, 300-313.
12. Dreca, N. 2014. DETERMINANTS OF CAPITAL ADEQUACY RATIO IN SELECTED BOSNIAN BANKS. *Dumlupinar University Journal of Social Science/Dumlupinar Üniversitesi Soysyal Bilimler Dergisi*.
13. Friedman, M. & Schwartz, A. J. 1963. *A Monetary History of the United States, 1867-1960*. Princeton: Princeton University Press.
14. Gropp, R. & Heider, F. 2010. The Determinants of Bank Capital Structure\*. *Review of Finance*, rfp030.
15. Harley Tega & Williams 2011. Determinants of capital adequacy in the Banking Sub-Sector of the Nigeria Economy: Efficacy of Camels.(A Model Specification with Co-Integration Analysis). *International Journal of Academic Research in Business and Social Sciences*, 1, 234-246.
16. Hassan, M. K. & Bashir, A.-H. M. Determinants of Islamic banking profitability. 10th ERF Annual Conference, Morocco, 2003. 16-18.
17. Hoggarth, G., Reis, R. & Saporta, V. 2002. Costs of banking system instability: some empirical evidence. *Journal of Banking & Finance*, 26, 825-855.
18. Kleff, V. & Weber, M. 2003. How Do Banks Determine Capital? Empirical Evidence for Germany. ZEW Discussion Papers.
19. Mathuva, D. 2009. The influence of working capital management components on corporate profitability: a survey on Kenyan listed firms. *Research Journal of Business Management*, 3, 1-11.
20. Mili, M., Sahut, J.-M. & Trimeche, H. 2014. Determinants of the Capital Adequacy Ratio of a Foreign Bank's Subsidiaries: The Role of the Interbank Market and Regulation of Multinational Banks.
21. Mpuga, P. 2002. The 1998-99 banking crisis in Uganda: What was the role of the new capital requirements? *Journal of Financial Regulation and Compliance*, 10, 224-242.
22. NFSC 2012. Restructuring the Credit Institutions System in the 2011-2015 period.

23. Ruckes, M. 2004. Bank competition and credit standards. *Review of Financial Studies*, 17, 1073-1102.
24. Sabbagh, N. M. 2004. Determinants of capital adequacy ratio in Jordanian banks.
25. Shrieves, R. E. & Dahl, D. 1992. The relationship between risk and capital in commercial banks. *Journal of Banking & Finance*, 16, 439-457.
26. Thái, P. H. H. 2013. Determinants of capital adequacy ratio for Vietnam's commercial banks in the 2006-2011 period. *Economic Studies* 4, 30-36.
27. Thùy, T. T. T. & Chi, N. K. 2015. The studies of factors affecting capital adequacy ratio of Vietnamese commercial banks. *Banking Review*, 11, 11-18.
28. Williams, B. 1998. A pooled study of the profits and size of foreign banks in Australia. *Journal of Multinational Financial Management*, 8, 211-231.
29. Wong, J., Choi, K.-F. & Fong, T. 2005. Determinants of the capital level of banks in Hong Kong. *Hong Kong Monetary Authority Quarterly Bulletin*, 14-37.

#### Authors

##### **Do Hoai Linh, PhD**

Vice Head of Banking Department, School of Banking and Finance, National Economics University, Vietnam  
Address: 207 Giai Phong Road, Hai Ba Trung District, Hanoi City, 100000, Vietnam  
Email: [linhdh@neu.edu.vn](mailto:linhdh@neu.edu.vn) ; [linhdo.neu@gmail.com](mailto:linhdo.neu@gmail.com)

##### **Nguyen Thi Hoai Phuong, PhD**

School of Banking and Finance, National Economics University, Vietnam  
Address: 207 Giai Phong Road, Hai Ba Trung District, Hanoi City, 100000, Vietnam  
Email: [phuongnh@neu.edu.vn](mailto:phuongnh@neu.edu.vn)

##### **Ngo Thanh Xuan, MBA**

School of Banking and Finance, National Economics University, Vietnam  
Address: 207 Giai Phong Road, Hai Ba Trung District, Hanoi City, 100000, Vietnam  
Email: [xuantn@neu.edu.vn](mailto:xuantn@neu.edu.vn)

##### **Le Anh Duc, MA**

Vice Head of Academic Affairs, National Economics University, Vietnam  
Address: 207 Giai Phong Road, Hai Ba Trung District, Hanoi City, 100000, Vietnam  
Email: [ducla@neu.edu.vn](mailto:ducla@neu.edu.vn)

##### **Nguyen Thi Ngoc Diep, MA**

School of Banking and Finance, National Economics University, Vietnam  
Address: 207 Giai Phong Road, Hai Ba Trung District, Hanoi City, 100000, Vietnam  
Email: [diepnn@neu.edu.vn](mailto:diepnn@neu.edu.vn)

##### **Nguyen Huyen Trang, BA**

International School of Management and Economics, National Economics University, Vietnam  
Address: 207 Giai Phong Road, Hai Ba Trung District, Hanoi City, 100000, Vietnam