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## Article

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# The Impact of Equity Capital on the Bank's Profitability: Evidence From Vietnam's Banking System

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## ABSTRACT

From 2008 to 2019, this research examines the effect of equity capital on the profitability of 24 Vietnamese commercial banks. The research findings indicate that, when ROAA and ROAE are used to measure the bank's profit, the equity capital ratio (CAP) has a statistically significant positive effect on the ROAA while having a negative effect on the ROAE. Between 2013 and 2019, the CAP variable has a positive effect on the ROAA and ROAE, indicating that banks with a larger equity capital ratio achieved higher profitability. Furthermore, the deposits-to-assets ratio (DTA) and loan-loss reserves ratio (LLR) both have a negative effect on both proxies for bank profitability, although bank size (SIZE) has a negligible effect on bank profits in the majority of circumstances. Additionally, the rate of GDP growth and inflation (INF) have a beneficial effect on the bank's profitability. The study's objective is to present some critical policy implications for bank executives about the importance of adequate equity capital for the bank's sustainability development.

*JEL Classification:* G20; G21

*Keywords:* bank equity capital, bank profitability, commercial banks.

## 1. INTRODUCTION

The COVID-19 epidemic triggered the world economy's worst crisis since the 2007–2009 global financial crisis, impairing the functioning of financial sectors, especially banks. It resulted in severe tightening of lending policy and a decrease in borrower creditworthiness, placing undue strain on the bank's buffer against risk – equity capital and profitability. In Vietnam, a wave of equity raising has lately swept across numerous commercial banks as a result of the Basel accords'

proposal for a stricter bank capital regime. Since January 1, 2020, when Circular 41/2016/TT-NHNN on the capital adequacy ratios (CAR) regulation was implemented, all Vietnamese banks and foreign bank branches have been required to maintain a minimum CAR of 8%. If they do not find ways to increase their CAR, businesses face a significant risk of being restricted in their credit expansion. According to bank financial documents, this research calculated an exceptional 18.61 per cent growth rate in equity capital from 2014 to 2019, compared to 3.12 per cent over the 2007–2014 period (Nguyen & Le, 2016). Due to the current rising trend in bank equity in Vietnam following the COVID crisis, our team conducted this research on the impact of equity capital on commercial bank profitability, utilizing 264 observations from 24 Vietnamese commercial banks from 2008 to 2019. Does a higher level of bank capital have an effect on the profitability of commercial banks in Vietnam during the 2008–2019 period and the post-crisis period (2013–2019)? Is the relationship comparable in terms of the State ownership structure: banks with State capital greater than 50% vs banks with State capital equal to or less than 50%? Which of the following variables has a greater impact on the profitability of commercial banks in Vietnam's economy during and after the crisis? Finally, what policy implications do these two types of banks have for the Vietnamese banking industry in the aftermath of the COVID crisis?

This paper also enriches the literature on banking and finance in this topic. Most existing literature on the relationship between the bank's equity capital and profit have been conducted in developed countries (Pettway, 1976; Berger, 1995; Goddard et al., 2004; Iannotta et al., 2007). Disagreements among various countries require further research to reach a suitable consensus on this issue. Many researchers approve of the positive correlation between the bank's equity capital and profits (Jacques & Nigro, 1997; Rime, 2001; Iannotta et al., 2007; Bitar et al., 2018; Bourke, 1989; Pasiouras & Kosmidou, 2007; Tan, 2016). In contrast, some studies explored a negative correlation between the bank's equity capital and profitability (Cavallo & Rossi, 2002; Goddard et al., 2010; Hermes & Vu, 2010; Nguyen, 2018; Dang, 2019). Although researchers are attempting to answer a similar research question in Vietnam, most Vietnamese papers ignore the heteroskedasticity and autocorrelation tests despite knowing that they are critical to confirm whether estimation results are reliable or not (Phan, 2016) or experiment on inadequate observants or in a short period of time (Do & Vu, 2019). As a result, this paper will fulfil the research gaps by providing more in-depth study based on two research time frames (12-year period comprising the crisis and 5 years later after crisis) and two types of research objectives (banks with State-owned capital greater than 50% and banks with State-owned equal to or less than 50%) and strengthen research technics to achieve more reliable results.

The rest of this paper is sequenced as follows: the second section contains relevant literature review about the bank's profitability and equity capital and their relationship. The third section contains the methodology, data collection sources, variables measurement and the mathematical model of the study. The fourth part contains discussions and an analysis of the results. Finally, suggestions and recommendations for further research are presented in the conclusion.

## 2. LITERATURE REVIEW

### 2.1. Bank's Profitability

Bank profits are recognized by how the bank uses its resources to generate income, reflecting its overall revenue and expenses, thus becoming an important financial indicator determining its effectiveness. The ratio of profit before (or after) tax/total assets (ROA) and the ratio of profit before (or after) tax/total equity (ROE) are the two profit indicators that managers, investors often use to assess the profitability and performance of banks (Berger, 1995; Naceur & Omran, 2011; Lee & Hsieh, 2013; Dang, 2019; Mishkin, 2013).

## 2.2. Bank Equity Capital

According to Mishkin (2013), equity capital is the bank's net worth, which is raised through fresh stock sales or retained earnings. Even though banks have the highest debt-to-equity ratios and typically have less than 10% equity in their capital structure, equity plays a key role in the bank (Rose & Hudgins, 2008). A new bank is required by law to raise a particular amount of legal equity capital in order to form, organize, and commence business. On the other hand, a bank's equity capital protects it against a decline in the value of its assets, which could force the bank into bankruptcy (Mishkin, 2013). This function of equity capital is to ensure that the bank is capable of mitigating risk. A high equity capital ratio fosters public trust and reassures creditors and borrowers that the bank will always be financially sound enough to meet their credit demands regardless of the economy's state (Rose & Hudgins, 2008). Additionally, capital adequacy has become a mandatory criterion for central bank oversight and regulation. The central bank strictly monitors bank activities based on the capital adequacy ratio in order to maintain the safety of banking operations and the financial system in general.

## 2.3. The Relationship Between Bank's Equity Capital and Profitability

There is a mix in results when researching the impact of the bank's equity capital on its profitability. There have been some research stating that the bank's equity capital positively relates to profitability (Berger, 1995; Jacque & Nigro, 1997; Demirgüç-Kunt & Huizinga, 1999; Rime, 2001; Goddard et al., 2004; Iannotta et al., 2007; Lee & Hsieh, 2013; Bitar et al., 2018). Berger (1995) used almost 80,000 observations to examine the link between a bank's equity capital and earnings for US commercial banks from 1983 to 1989. Granger causality tests revealed that a rise in equity capital results in an increase in profits and vice versa. Demirgüç-Kunt & Huizinga (1999) used bank-level data from 80 countries between 1988 and 1995 and found a positive correlation between bank equity capital, net interest margin (NIM), and profits before taxes (EBT) to total assets. Similarly, Goddard et al. (2004) discovered a strong and favourable association between the capital-to-assets ratio and return on equity (ROE) in six key European banking sectors throughout the 1990s. Iannotta et al. (2007) established a favourable correlation between the book value of equity to total assets and the operational profit to total assets ratio in a large number of banks. Private banks, in particular, are more profitable on average than mutual and public banks.

Lee & Hsieh (2013) recently adopted four profitability proxies: return on assets (ROA), return on equity (ROE), net interest margin (NIM), and net interest revenue as a percentage of average assets (N.R.). The authors acknowledged the ambiguity of their findings. Investment banks have the smallest positive capital effect on NIM and N.R.; banks in middle-to-high-income nations have the largest positive capital effect on ROE but the smallest on N.R. As a result, in lower-income countries, the equity capital of the bank has a greater impact on profitability. Bank capital and profit (excluding ROE) are positively associated across all samples. Similarly, Bitar et al. (2018) conducted an empirical study from 1999 to 2013 on 1,992 banks in 39 OECD countries and discovered that increased equity capital ratios significantly improve banking institutions' efficiency and profitability. Specifically, the author claimed that equity capital has a greater impact on larger and "too big to fail" banks, whereas high liquidity institutions utilize equity capital less effectively. During times of stress, highly capitalized banks have larger loan loss reserves, bigger net interest margins, and lower costs. This result is in line with Coccoresse & Girardone's (2017) research, in which 4,414 banks from 77 countries over 2000–2013 were observed. This study found that the capital-profitability relationship is significantly stronger in crisis periods, in lower- and middle-income countries with higher corruption levels and larger banks. Several empirical studies further report a positive relationship between the bank's equity capital and profitability

(Munyambonera, 2013; Pervan et al., 2015; Ozili, 2017; Islam & Nishiyama, 2016; Abbas et al., 2019; Arshad, 2019).

Nguyen & Le (2016) are among researchers who support positive results when analyzing bank capital's effect on 30 Vietnamese commercial banks' risk and profit from 2007 to 2014. Nevertheless, the study contains limitations since its data do not include joint-venture banks and foreign bank branches in Vietnam; hence, the generalization is not high. Supporters of this result are Do & Vu (2019), whose research makes a difference using NIM besides ROA as proxies for bank profit. In addition, some notable independent variables are "growth deposit", "funding cost", "ownership" and "lend". The paper also reached different conclusions based on different bank sizes and types of ownership. Accordingly, the effect of capital on profit is larger for small banks than for large ones. Huynh (2019) obtained the same result but brought remarkable points in his research when measuring profitability by ROAA (return on average asset). Besides, independent variables such as net interest margin (NIM), cost-to-income ratio (CIR), loan loss provision (LLP), non-performing loan (NPL), and Herfindahl-Hirschman Index (HHI) are also incorporated in the model.

On the other hand, several investigations discovered the opposite. Pettway (1976) examined the negative association between bank equity capital and profitability in the United States of America for banks and bank holding corporations between 1971 and 1974. The author discovered that by combining the beta and P/E models, the equity capital requirement reduces operational efficiency, predicting a drop in bank profitability. Additionally, Altunbas et al. (2007) showed that inefficient European banks appear to have a higher level of equity capital and lower risk tolerance. According to Modigliani and Miller's (1963) "risk-reward trade-off concept," low risk levels result in low potential profits. Indeed, according to Fotios et al. (2009), capitalization has a statistically significant detrimental effect on both cost and profit efficiency. Additionally, Goddard et al. (2010) discovered that the average profitability of efficient and diverse banks is higher than that of heavily capitalized institutions. Between 1992 and 2007, a negative relationship between equity capital and profitability, implying an opportunity cost associated with high capital levels, tended to decrease European banks' shareholder returns.

Dang (2019) claimed that the higher the equity ratio banks have, the fewer risks banks take; hence, the profit would lower. Interestingly, the study found a nonlinear relationship that explains that credit risk lessens the impact of equity on returns. However, one disadvantage of the study is that the paper only applies traditional accounting methods and does not approach a more complete data set.

Mixed results can also be found in recent studies. Tran et al. (2016), who took British banks data from 1996–2013 into the VAR and the generalized method of moments model (GMM), pointed out a negative correlation with large-capitalized banks, yet a positive correlation with small-capitalized banks. Specifically, the researchers used three ways to measure bank capital: (i) the ratio of tier 1 capital to total risk-weighted assets (RWA); (ii) the ratio of total equity to total assets; (iii) tangible ordinary equity ratio to RWA, denoted as CARA, CARB, and CARC respectively. Besides, Hasnaoui & Fatnassi (2019) also applied the GMM method with the secondary data of 85 banks in the Gulf Cooperation Council (GCC) countries in the period 2003–2011 and described the following: (i) Islamic banks with high capitalization produce low profits, while conventional banks with high capitalization produce high profits; (ii) GCC banks (including Islamic and conventional banks) have greater risk compared to others; (iii) all the risk and return variables are statistically significant. Saona (2016) and Le & Nguyen (2020) concluded an inverse U-shaped relationship between the bank's capital ratios and profitability. In contrast, Barth et al. (2008) concluded that the equity capital and performance do not have a linear relationship.



### 3. METHODOLOGY AND DATA

#### 3.1. Research Hypotheses

Based on literature reviews, this paper will measure profitability by return on average equity (ROAE) and return on average assets (ROAA) for the following reasons: (i) the indicator depicts the evolution throughout time, not a single point in time; (ii) if the asset or equity value fluctuates significantly over time, the simple ROA and ROE ratios will not be as accurate as the average ratios (Abbas et al., 2019). These proxies were confirmed by Dietrich and Wanzenried (2011), Batten and Vo (2016), Chiaramonte and Casu (2017), Abbas et al. (2019).

In addition to the primary explanatory variable (capital-to-assets ratio), other variables used in this study have been verified by much prior research. Tan and Floros (2013), Lee and Hsieh (2013), and Hasnaoui and Fatnassi (2019) adopted the loan-loss-reserve ratio, loans-to-assets ratio, GDP growth rate, and inflation rate to estimate their impact on bank profitability. Besides, the bank's primary source of funds is derived from deposits. Hence the deposits-to-assets (DTA) ratio plays a vital role in the regression model. This variable is supported by Lee and Hsieh (2013), Ramlan and Adnan (2016), Ali et al. (2017), Dang (2019), Arshad and Iskandar (2020). On the other hand, we use the bank size variable to consider whether big banks or small banks generate more profit over time. Many researchers expressed concern about this issue, such as Berger and Bouwman (2013), Cohen and Scatigna (2016), Abbas et al. (2019), Kanga et al. (2020), Arshad and Iskandar (2020). Finally, Iannotta et al. (2007), Lee and Hsieh (2013), and Do & Vu (2019) considered State ownership factors affecting the bank's profitability.

Based on the reviewed literature, the study regresses the following variables to measure their impact on bank profitability and proposes 8 hypotheses as follows (Table 1):

**Table 1**  
Description of the variables and expected correlation coefficient

	Indicator	Measured by	Notation	Related studies	Hypothesis
Dependent variable					
Profitability	Return on average equity	$\frac{\text{Net income}}{\text{Average total equity}}$	ROAE	Dietrich & Wanzenried (2011), Batten & Vo (2016), Abbas et al. (2019)	
	Return on average assets	$\frac{\text{Net income}}{\text{Average total assets}}$	ROAA	Dietrich & Wanzenried (2011), Batten & Vo (2016), Chiaramonte & Casu (2017), Abbas et al. (2019), Huynh (2019)	

Table 1 (cont.)

	Indicator	Measured by	Notation	Related studies	Hypothesis
Independent variable					
Internal control variables	Equity capital-to-total assets ratio	$\frac{Equity}{Total\ assets}$	CAP	Altunbas et al. (2007), Goddard et al. (2010), Dietrich & Wanzenried (2011); Lee & Hsieh (2013), Tan & Floros (2013), Nguyen & Le (2016), Dang (2019), Kanga et al. (2020)	+
	Loans-to-assets ratio	$\frac{Total\ loans}{Total\ assets}$	LTA	Iannotta et al. (2007), Tan & Floros (2013), Lee & Hsieh (2013), Nguyen & Le (2016), Coccorese & Girardone (2017), Hasnaoui & Fatnassi (2019), Le & Nguyen (2020), Kanga et al. (2020)	+
	Loan-loss-reserves ratio	$\frac{Loan\ loss\ reserves}{Total\ loans}$	LLR	Dietrich & Wanzenried (2011), Tan & Floros (2013), Ozili (2015), Ranajee (2018), Dang (2019), Abbas et al. (2019), Hasnaoui & Fatnassi (2019), Kanga et al. (2020)	-
	Deposits-to-assets ratio	$\frac{Total\ deposits}{Total\ assets}$	DTA	Acharya & Naqvi (2012), Lee & Hsieh (2013), Ramlan and Adnan (2016), Ali et al. (2017), Dang (2019), Arshad & Iskandar (2020)	-
	Bank size	Natural logarithm of total assets	SIZE	Altunbas et al. (2007); Lee & Hsieh (2013), Berger & Bouwman (2013), Cohen & Scatigna (2016), Abbas et al. (2019), Kanga et al. (2020), Arshad & Iskandar (2020)	+
	State ownership	= 1 if the States owns > 50% shares = 0 if the States owns ≤ 50% shares	OWN	Iannotta et al. (2007), Dietrich & Wanzenried (2011), Vu & Nahm (2013), Ongore & Kusa (2013), Lee & Hsieh (2013), Do & Vu (2019)	-
Macroeconomic control variables	GDP growth rate	World Bank data	GDP	Tan & Floros (2013), Lee & Hsieh (2013), Dietrich & Wanzenried (2014), Coccorese & Girardone (2017), Hasnaoui & Fatnassi (2019)	+
	Inflation rate	World Bank data	INF	Tan & Floros (2013), Lee & Hsieh (2013), Tan & Floros (2013), Dang (2019), Hasnaoui & Fatnassi (2019)	+

Notes:

(+) Independent variable has positive effect on profitability

(-) Independent variable has negative effect on profitability

Source: Authors' compilation, 2020.

### 3.2. Model, Data and Analytical Methods

The data were compiled from the audited financial statements of 24 Vietnamese commercial banks over a 12-year period, from 2008 to 2019. The shortlisted banks must demonstrate that they are viable businesses with adequate financial disclosures during this time period. We omit banks that have been merged or acquired by other banks, joint venture banks, foreign bank branches, and banks that have ceased to exist. Additionally, macroeconomic data are derived from the World Bank's annual report. After gathering and compiling data indicators in Microsoft Excel, the authors run the models using the Stata 14 software.

First, the authors used the following two tests to determine which method is the most suitable for the research model.

#### **Breusch & Pagan Lagrangian multiplier test**

To determine whether the Ordinary Least Square (OLS) or Random Effects Model (REM) is more suitable, we use the Breusch & Pagan Lagrangian multiplier test.

H0: The OLS model is suitable and efficient

H1: The REM model is suitable and efficient

#### **Hausman test**

To select a more suitable approach between Fixed Effects Model (FEM) and Random Effects Model (REM), we use the Hausman test.

H0: REM is consistent and efficient

H1: REM is inconsistent

After choosing a suitable regression method, the authors examined the model for the following defects: multicollinearity, heteroscedasticity and autocorrelation. To correct these two problems, models with the robustness option should be performed.

#### **Variation Magnification Factor (VIF)**

The authors used the defect model to test multicollinearity based on the Variance Magnification Coefficient (VIF) to check if the eight explanatory variables of the model have high collinearity phenomenon or not. When the VIF coefficient is greater than 5, the model has high collinearity, if the VIF is greater than 10, the research model will definitely have multicollinear defects.

#### **LM – Breusch & Pagan Lagrangian multiplier test (for REM model) or Wald (for FEM model)**

H0: Model has homoscedasticity

H1: Model has heteroscedasticity

#### **Wooldridge test**

H0: There is no autocorrelation

H1: Model has autocorrelation

**Table 2**

Tests for selecting the most appropriate model and tests for defects

	Tests for selecting the most appropriate model		Tests for detecting problems	
	Breusch & Pagan Lagrangian multiplier test	Hausman test	Heteroskedasticity test	Wooldridge test for autocorrelation
<b>H0</b>	OLS is consistent and effective	REM is consistent and effective	Homoscedasticity	No first-order autocorrelation
<b>Ha</b>	REM is consistent and effective	FEM is consistent and effective	Heteroskedasticity problem	Autocorrelation problem

Source: Authors' compilation, 2020.



The proposed research model is as follows:

$$ROAE_{it} = \beta_0 + \beta_1 CAP_{it} + \beta_2 LTA_{it} + \beta_3 LLR_{it} + \beta_4 DTA_{it} + \beta_5 SIZE_{it} + \beta_6 OWN_{it} + \beta_7 GDP_{it} + \beta_8 INF_{it} + \varepsilon_{it} \text{ (Model 1)}$$

$$ROAA_{it} = \beta_0 + \beta_1 CAP_{it} + \beta_2 LTA_{it} + \beta_3 LLR_{it} + \beta_4 DTA_{it} + \beta_5 SIZE_{it} + \beta_6 OWN_{it} + \beta_7 GDP_{it} + \beta_8 INF_{it} + \varepsilon_{it} \text{ (Model 2)}$$

#### 4. RESULTS AND DISCUSSIONS

Table 3 summarizes the factors used statistically. The average ROAE and ROAA for dependent variables are 0.106 and 0.009, respectively. The lowest ROAE and ROAA were 0.0004 and 0.00004, respectively, achieved by Viet Capital bank in 2016; the highest ROAE is 0.291, earned by SGB in 2010, while the lowest ROAA is 0.059, acquired by LPB in 2008. In terms of the bank's internal factors, the CAP variable averages 0.098 and varies somewhat widely (0.028–0.462). The bank's equity capital has a rather high standard deviation of 0.058. Additionally, the loans-to-assets ratio (LTA) is frequently high, averaging 0.574, indicating that Vietnamese commercial banks continue to rely substantially on credit. Additionally, the results indicate that LLR and DTA have mean values of 0.012 and 0.759, respectively. On the other hand, the mean bank size (SIZE) is 11.516, with the largest and smallest banks measuring 14.188 and 7.790, respectively, as reported by BID in 2019 and TPB in 2008. Additionally, the State ownership variable (OWN) only includes four banks that have State equity greater than 50% in their capital structure: AGRI, VCB, CTG, and BID. In terms of macroeconomic control factors, the sample averages 0.061 GDP growth and 0.076 inflation.

**Table 3**  
Summary statistics for variables

Variables	Mean	Std. Dev.	Min	Max
ROAE	0.1068556	0.0734671	0.0004372	0.2911836
ROAA	0.0098269	0.0079141	0.0000459	0.0595733
CAP	0.0983710	0.0582819	0.0289337	0.4624983
LTA	0.5740402	0.1356559	0.1139038	0.8604010
LLR	0.0127397	0.0062340	0.0005517	0.0646743
DTA	0.7590368	0.0846606	0.5098618	0.9138934
SIZE	11.5168300	1.3175450	7.7909620	14.1881800
OWN	0.1666667	0.3733267	0	1
GDP	0.0618104	0.0061956	0.052500	0.070800
INF	0.0767642	0.0644769	0.008800	0.231200

Source: Authors' calculations using Stata 14, 2020.

Table 4 demonstrates that the correlation among variables is acceptable because the correlation coefficient between the two independent variables is less than 0.8 (Kennedy, 2008). We perform a multicollinearity test based on the Variance Inflation Factor (VIF) (see Appendix 1) to reinforce this conclusion. According to the results, all the models' explanatory variables have VIF coefficients of less than five and an average VIF of 2.04. Therefore, we assert that there is no high multicollinearity between independent variables.

**Table 4**  
Correlation matrix

	ROAE	ROAA	CAP	LTA	LLP	DTA	SIZE	OWN	GDP	INF
<b>ROAE</b>	1.000									
<b>ROAA</b>	0.6895	1.000								
<b>CAP</b>	-0.1892	0.4359	1.000							
<b>LTA</b>	-0.0015	-0.1745	-0.1774	1.000						
<b>LLR</b>	0.0388	-0.0952	-0.1913	0.0021	1.000					
<b>DTA</b>	-0.1772	-0.3675	-0.3959	0.2775	-0.0508	1.000				
<b>SIZE</b>	0.3127	-0.1940	-0.7156	0.3566	0.2485	0.1579	1.000			
<b>OWN</b>	0.2223	-0.0831	-0.3057	0.4317	0.3351	-0.0365	0.6184	1.000		
<b>GDP</b>	0.0842	-0.0912	-0.2525	0.1937	-0.1152	0.2426	0.3339	-0.0002	1.000	
<b>INF</b>	0.1574	0.2937	0.3188	-0.3302	0.0880	-0.2867	-0.3577	-0.0002	-0.4283	1.000

Source: Authors' calculations using Stata 14, 2020.

After regressing Breusch & Pagan Lagrangian multiplier test and Hausman test (see Appendix 2), we conclude that FEM is best suited for model 1, while REM shows reliable results for model 2 2008–2019. Both models have heteroskedasticity and autocorrelation problems (see Appendix 3). Hence, we regress models with the robustness option to fix these defects and draw some conclusions as the following states (Table 5):

**Table 5**  
Full sample: estimation results in period 2008–2019

Variables	ROAE		ROAA	
	FEM robust		REM robust	
	Coef	Robust Std. Dev	Coef	Robust Std. Dev
<b>CAP</b>	-0.3967729***	0.1262998	0.0513069**	0.0224545
<b>LTA</b>	0.0162335	0.0416814	-0.0045832	0.0052219
<b>LLR</b>	-2.5069490***	0.8052045	-0.1604198**	0.0814649
<b>DTA</b>	-0.2796916***	0.0489450	-0.0221347***	0.0058308
<b>SIZE</b>	0.0026836	0.0116522	0.001129	0.0008066
<b>OWN</b>	0	(omitted)	-0.0003426	0.0028326
<b>GDP</b>	1.8415200**	0.6841281	0.1048647*	0.0557855
<b>INF</b>	0.3162656***	0.0761189	0.0236709***	0.0078575
<b>R-squared</b>	0.1636		0.2874	

Note: \*\*\*, \*\*, and \* denote significance levels of 1%, 5%, and 10%, respectively.

Source: Authors' calculations using Stata 14, 2020.

To begin, when a bank's profitability is measured using the dependent variables ROAE and ROAA, inconsistent results about the relationship between equity capital and profitability are discovered. The equity capital ratio has a negative correlation with ROAE but a positive correlation with ROAA. Specifically, the CAP variable in model 1 has a coefficient of -0.396, implying that

a 1% increase in capital reduces ROAE by 39.67%. This conclusion is logical given that enterprises have a high capital ratio, which increases risk aversion (Berger, 1995), and a high capital ratio also diminishes the beneficial effect of the tax shield (Modigliani & Miller 1958; Berger, 1995; Goddard et al., 2010). These measures may result in a decrease in profit and ROAE. On the other hand, the coefficient of CAP is 0.051 at a 5% significance level in model 2, indicating that a 1% rise in equity capital ratio results in a 5.13 per cent increase in ROAA, all other variables remaining constant. Better capitalized banks may demonstrate increased creditworthiness, management quality, and competitiveness, allowing them to earn a high profit while maintaining a low cost (Iannotta et al., 2007). Additionally, lower predicted bankruptcy costs associated with a greater equity capital ratio may result in increased profitability and ROAA (Berger, 1995).

Second, the loan-loss-reserves ratio (LLR) has a statistically significant and negative effect on both profitability variables with estimated coefficients of -2.506 and -0.160. Most banks increase the provisions for credit losses due to the increased non-performing loans ratio, leading to an increase in risk provision expenses and debt recovery costs, which reduce profits.

Third, the deposit-to-assets ratio (DTA) is inversely connected to both ROAE and ROAA. The regression coefficients on DTA are -0.279 and -0.022 for model 1 and model 2, respectively, at a 1% significance level. Individual deposits account for the majority of commercial banks' deposit ratio. The increase in the deposit ratio will attract additional rivals in the supplement market, such as insurance, pension funds, and people's credit funds. Simultaneously with inadequate loan quality management and control, banks take risks by raising leverage at a high cost, resulting in a lower profit.

Fourth, regarding the macroeconomic conditions, the regression results show that the GDP growth rate (GDP) and inflation (INF) have a positive effect on the bank's ROAE and ROAA. These figures indicate that a significant increase in GDP with a moderate increase in inflation will enhance the profitability of the banking system (Iannotta et al., 2007; Lee & Hsieh, 2013; Dang, 2019; Hasnaoui & Fatnassi, 2019).

To further test the models' validity, the authors decided to evaluate the impact of the bank's equity capital on profitability for five years after recovering from the 2008 global financial crisis. Then, the results are as follows (Table 6):

**Table 6**

Full sample: estimation results in period 2013–2019

Variables	ROAE		ROAA	
	FEM robust		REM robust	
	Coef	Robust Std. Dev	Coef	Robust Std. Dev
CAP	0.7377549***	0.2521130	0.1346286***	0.0195851
LTA	0.1433555	0.0862052	0.0103041	0.0077162
LLR	-4.6452200**	1.9431560	-0.2204951	0.1518059
DTA	-0.1680508**	0.0813887	-0.0196563***	0.0066072
SIZE	0.0718427***	0.0248148	0.0054861***	0.0012364
OWN	0	(omitted)	-0.0078536**	0.0030812
GDP	2.2263480*	1.1945660	0.2181179***	0.0754550
INF	1.0401030***	0.2464699	0.0822023***	0.0160999
R-squared	0.3171		0.4052	

Note: \*\*\*, \*\*, and \* denote significance levels of 1%, 5%, and 10%, respectively.

Source: Authors' calculations using Stata 14, 2020.

To begin, between 2013 and 2019, CAP has a significant beneficial effect on ROAE and ROAA at the 1% level. As previously stated, highly capitalized banks generate considerable profits as a result of their high creditworthiness and limited reliance on external financing. In accordance with National Assembly Resolution 24/2016/QH14 dated November 8, 2016, the State Bank of Vietnam implemented Basel II regulations in the domestic banking sector, requiring a minimum capital adequacy ratio based on risky assets. That is, a larger capitalization ratio suggests that banks own more hazardous assets (Iannotta et al., 2007), which also implies a greater projected return.

Second, the link between LLR and ROAE is negative, consistent with the finding of full sample estimation, but in model 2, this association is inconsequential. Bank size is positively related to profit at a 1% significance level. Hughes et al. (2001) pointed out that as banks' scale gets more extensive, they will gain better advantages from potential diversification, leading to a positive relationship between the operational efficiency and size, thereby increasing the bank's profit.

Third, the OWN variable is negatively related to ROAA and barely affects ROAE. The OWN coefficient of -0.007 implies that a 1% increase in equity capital decreases ROAA by 0.7%. Similarly, Iannotta et al. (2007) argue that private banks appear to be more profitable than both mutual and public banks. The remaining variables, including LTA, DTA, SIZE, GDP, and INF, have similar results with the full sample regression over the period 2008–2019.

To examine the effect of equity capital on bank profits according to the State ownership structure, the entire sample is separated into two subsamples: banks with more than 50% of State ownership and banks with equal to or less than 50% of State ownership. The computed coefficients for both categories are consistent with the full sample regression results for the period 2008–2019, which indicates that equity capital has a negative effect on ROAE and a positive effect on ROAA. The DTA is inversely connected to the dependent variables. Additionally, LTA is statistically significant and has a negative influence on the profitability of > 50% of State-owned banks at a 1% significance level. However, this effect is negligible for banks with a 50 per cent State control. For a developing country like Vietnam, the government controls a sizable portion of the banking sector (Qian et al., 2015). Government engagement in banks owned by the State at a level greater than 50% is greater than in other banks. These banks place a premium on large-scale projects and wholesale products, resulting in low loan profitability (Dang & Huynh, 2019). On the other hand, LLR has a negative effect on bank profitability for banks with less than 50% of State control but is positively associated with bank profitability for banks with more than 50% of State ownership. This conclusion could be explained by the fact that banks held by the State at a level greater than 50% receive benefits from government guarantees, which help them minimize default risk (Brown & Dinç, 2011). As a result, an increase in loan loss reserves suggests an increase in high-risk loans, which results in increased profitability (risk-reward trade-off) (Kanga et al., 2020). Meanwhile, State-owned banks are under immense pressure to manage credit risk; as a result, they must bear increased credit risk management expenses if LLR increases. Finally, macroeconomic factors (GDP and INF) have a favourable effect on the profitability of banks with less than 50% of State control but have no effect on banks with more than 50% of State ownership. Bolt et al. (2012) once stated that the relationship between macro variables and profitability is ambiguous.

**Table 7**

Different state-ownership levels: estimation results for period 2008–2019

Variables	> 50% State-ownership banks		≤ 50% State-ownership banks	
	REM robust	REM robust	REM robust	REM robust
	ROAE	ROAA	ROAE	ROAA
<b>CAP</b>	-0.855384* (0.4574056)	0.0701839*** (0.0250811)	-0.3394482** (0.1333827)	0.0495747** (0.0243919)
<b>LTA</b>	-0.4030582*** (0.0855576)	-0.0234738*** (0.0045473)	0.0257587 (0.0390479)	-0.0031481 (0.0058385)
<b>LLR</b>	0.8252344* (0.4342548)	0.0620873*** (0.0178626)	-2.647073*** (0.9616007)	-0.197238* (0.1025384)
<b>DTA</b>	-0.2473062*** (0.0168161)	-0.013401*** (0.0016899)	-0.2761599*** (0.0492013)	-0.0241525*** (0.0062252)
<b>SIZE</b>	0.0074127 (0.0351398)	-0.0000602 (0.0019466)	0.0122636 (0.0106802)	0.0012912 (0.0009043)
<b>GDP</b>	2.808265 (2.311432)	0.1714896 (0.1305927)	1.381056* (0.7147939)	0.1011338 (0.0637513)
<b>INF</b>	0.0629943 (0.2772859)	-0.000029 (0.0144965)	0.3715141*** (0.0812546)	0.026919*** (0.0094111)
R-squared	0.3552	0.5545	0.1972	0.2950

Note: \*\*\*, \*\*, and \* denote significance levels of 1%, 5%, and 10%, respectively.

Source: Authors' calculations using Stata 14, 2020.

## 5. CONCLUSION

The primary objective of this study is to examine in depth the influence of equity capital on bank profitability in a rising economy such as Vietnam, using secondary data compiled from 24 Vietnamese commercial banks during a 12-year period from 2008 to 2019. Our findings indicate that when a bank's profitability is measured across the full research period, the equity capital ratio has a negative effect on ROAE and a favourable effect on ROAA. A detailed examination of the period from 2013 to 2019, five years following the financial crisis, reveals that the CAP variable has a positive effect on both ROAA and ROAE, indicating that banks with a higher capital-on-assets ratio achieved greater profitability. The inconsistent outcomes are partially a result of the 2008 financial crisis detrimental influence on the commercial banking industry. Specifically, interest rates climbed significantly between 2009 and 2011 as a result of the government's tight monetary policy (Nguyen et al., 2020). This constrains the credit area, which was the primary activity of commercial banks, and results in decreased bank efficiency. To provide a more detailed explanation, we will conduct a follow-up study on "the impact of monetary policy on bank profitability." Additionally, this has been a point of contention in recent years as a result of COVID-19.

Along with contributing to the understanding of the relationship between bank equity capital and profitability, our research has some policy implications for banking operations management. To begin, banks should seek short-, medium-, and long-term capital. Second, commercial banks must strengthen their capital management capabilities, as this enables them to prepare capital budgets more accurately and efficiently.



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## APPENDICES

**Appendix 1**

Multicollinearity test results

Variables	VIF	1/VIF
CAP	2.71	0.369200
LTA	1.60	0.625876
LLR	1.20	0.835388
DTA	1.46	0.685076
SIZE	4.05	0.247098
OWN	2.41	0.414668
GDP	1.39	0.720573
INF	1.55	0.646200
Mean VIF	2.04	

Source: Authors' calculations using Stata 14, 2020.

**Appendix 2**

Full sample: tests to select the appropriate model 2008–2019

	Model 1		Model 2	
Breusch and Pagan Lagrangian multiplier test	Chibar2(1) 149.32	Prob > chibar2 0.0000	Chibar2(1) 62.83	Prob > chibar2 0.0000
Hausman test	Chi2(7) 14.62	Prob > chi2 0.0411	Chi2(7) 10.67	Prob > chi2 0.1539

Source: Authors' calculations using Stata 14, 2020.

**Appendix 3**

Problem testing

Test	Model 1		Model 2	
Heteroskedasticity tests	Modified Wald test	Prob > chi2	Breusch and Pagan Lagrangian multiplier test	Prob > chibar2
	485.63	0.0000	62.83	0.0000
Wooldridge test for autocorrelation	F (1, 23) 56.165	Prob > F 0.0000	F (1, 23) 6.908	Prob > F 0.0150

Source: Authors' calculations using Stata 14, 2020.