

## Does bank capital affect profitability and risk in Vietnam?

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CHRONICLE

ABSTRACT

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In this paper, we attempt to answer the question of whether or not bank capital affects profitability and risk. The paper forms an unbalanced panel with 354 observations using both data of 35 banks over the period 2007–2018. Two-step GMM is used to estimate the impacts of bank capital on profitability and risk in order to eliminate endogeneity and serial correlation issues. As a proxy of bank capital, the bank equity ratio, and equity level are used. Return on assets (ROA), return on equities (ROE), and net interest margin (NIM) are used to measure bank profitability, whereas nonperforming loan ratio and loan loss reserve ratio are used to measure bank risk. Bank capital displays significant impacts on profitability, which is measured by ROA and ROE, whereas capital shows no impact on bank NIM. When the loan loss reserve ratio is considered as proxy of bank risk, bank capital does not affect bank risk. The equity ratio, the proxy of bank capital, displays significant negative impacts on risk, whereas the equity level, the other proxy of bank capital, shows positive impacts on bank risk.

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## 1. Introduction

During the economic boom in the period 2006–2007, the exploitation of exchange market developed the new banks as well as the expansion of the existing banks in Vietnam, especially the private commercial banks. However, the economic growth was reduced by the economic recession during the period 2009–2011, and banks were struggling because of their small size of capital. In this period, the income of banks reduced sharply because they had to raise their reserve and faced more challenges in controlling nonperforming loans and increasing capital (Dimitrios et al., 2010; Alper & Anba, 2011). In addition, Vietnam has faced many challenges in economic performance after becoming a member of WTO in 2007. According to the agreement of WTO, Vietnam has to open the financial market for foreign investors, which led to the competition in the financial sector. The competition becomes more severe in the presence of 100% foreign capital banks. This leads to higher demand in the service quality as well as larger capital in the banking sector. Therefore, increasing the capital of commercial banks not only fulfills the requirements of the State Bank of Vietnam (SBV) but also meets the needs of these banks in order to ensure credit growth as well as low operating risk. However, an increase in bank capital may also affect bank profitability and risk in Vietnam. Until recently, most studies have been conducted in developed economies such as the United States and Europe as compared to less developed economies such as Vietnam. After the global financial crisis in 2008, the Basel Committee on Banking Supervision (BCBS) introduced Basel III for enhancing supervision and risk management in the banking industry. In order to consolidate the procedure of risk management in the banking industry, Basel III introduces new issues related to bank capital, rate of capital, and liquidity. In the period 2007–2018, bank equity has increased with an average of 17.2% per year in Vietnam. Concurrently,

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bank profitability and risk also fluctuated during this period. The answer to the question if an increase in the capital can promote profitability and can reduce the risk is important for policymakers. Many studies on this subject have been carried out so far but not in Vietnam, and thus this paper attempts to answer the question if bank capital has any impact on profitability and risk in Vietnam.

## 2. Literature review

Some of the studies have focused on the impacts of bank capital on bank profitability and risk. It has been observed that the impacts of capital on bank profitability are still inconclusive (Muda et al., 2013; Jafari & Alchami, 2014). During the period 1998–2002, Athanasoglou et al. (2005) investigated determinants of the profitability of 65 banks in the South and East Europe. The equity rate was used to measure bank capital, whereas ROE and ROA were used to measure bank profitability. The results of the random effect model revealed that capital exhibited positive impacts on bank profitability (in both ROE and ROA). The results further revealed that financial systems in the South and East Europe have not reached the perfect capital market, therefore when banks increase their capital the cost expectation of finance difficulty decreases. Increasing bank capital also indicates better bank output. In another study, Flamini et al. (2009) examined factors that affected bank profitability in 41 economies in Sub-Saharan Africa. Based on data from 389 commercial banks from the period 1998 to 2006, the study used the random effect model and concluded that bank capital exhibited a positive impact on profitability. Berger (1995) also supported the positive impacts of bank capital on profitability. In other studies, however, the effects of bank capital on profitability are unclear. In one of the studies, Lee and Hsieh (2013) used the generalized method of moments (GMM) for examining the impact of bank capital on profitability of 42 banks in Asia from the period 1994 to 2008. The rate of equity on the total assets was used to measure bank capital, whereas ROA, ROE, NIM were used to measure bank profitability. The impacts are ambiguous, which depend on the income level of a country. Bank capital showed positively significant impacts on profitability in low-income economies, whereas the impacts were observed to be insignificant in high-income economies. Altunbas et al. (2007) reported that capital shows negative impacts on the profitability of banks in 15 European economies from the period 1992 to 2000. A higher capital rate in commercial banks would result in a lower rate of profitability, whereas the capital rate positively affected the profitability of cooperative and saving banks. The fact that higher capitalization would generate lower bank profitability was supported by Goddard et al. (2013). In this paper, the dynamic model was used to investigate the determinants of bank profitability in eight European countries from the period 1992 to 2007 and reported that higher bank profitability would result in bank efficiency and diversification. Moreover, it has also been reported that higher bank capital would result in lower profitability of banks. Furthermore, the negative impact of bank capital also indicated that the opportunity cost of capital would decrease the owner profit.

The impacts of bank capital on risk led to ambiguous conclusions in the literature (Nguyen & Le, 2016). Some of the researchers indicated positive impacts of bank capital on risk, whereas others indicated negative effects. A sample of 181 commercial banks of Europe was used by Iannotta et al. (2007) from the period 1994 to 2004. According to the results, the equity rate showed positive impacts on bank risk. Based on the minimum capital requirement of the Basel Committee, the implication was that banks with higher equity rate had relatively high-risk capital portfolio. According to Lee and Hsieh (2013), the level of impacts of bank capital on risk depends on the types of banks and the development of economies. Bank capital showed negatively significant impacts on risk in commercial and cooperative banks, whereas these impacts showed no significant impact on risk in investment banks. In relatively high-medium economies, bank capital negatively affected risk but this effect was also found to be negative in low-income economies. According to Ayaydin and Karakaya (2014) who used a sample of 23 commercial banks from the period 2003 to 2011, the impacts of bank capital were found to be different depending on how bank risk was measured. Bank capital positively affected risk when bank risk was considered as loan loss reserves or as variance of return on assets. The existence of regulatory hypothesis might be the primary reason for this positive impact wherein the policymakers often encouraged commercial banks to increase capital in accordance with bank risk. However, bank capital showed negative impacts on risk when the variance of return on equity was used as bank risk, which might be resulted from the moral hazard hypothesis. According to this hypothesis, banks with a lower capital rate often had high-risk loans. Another study of Jabra et al. (2017) applied the two-step GMM (Doytch & Uctum, 2011) on 174 commercial banks and 23 investment banks in BRICS economies (Brazil, Russia, India, China, and South Africa) from the period 2004 to 2012. Separating the research period into two subperiods, namely, before economic crisis 2007 (pre-crisis) and after economic crisis (post-crisis), the study showed that bank capital, measured by the rate of equity on the total assets, exhibited negatively significant impacts on risk of commercial banks (measured by credit risk) in two subperiods. The same negatively significant impacts of investment bank capital on risk could be found in the postcrisis period, whereas no significant impacts of bank capital on risk were observed in the pre-crisis period. In sum, all studies reported that the results of the impacts of bank capital on profitability and risk are inconclusive. Finally, the conclusion is consolidated in this study contributing to the empirical literature of the bank industry.

## 3. Methodology

A sample of 354 observations of 35 commercial banks in Vietnam from the period 2007 to 2018 has been used in this study. Bank data are collected from bank financial reports, which have been audited, whereas macro-data are collected from the IMF

website. The panel data (Blundell & Bond, 1998) are not consistent because some banks have just merged together, or some banks are under special supervision of the Central Bank of Vietnam, or some banks were established after 2007. This study applies the two-step GMM for analysis in order to estimate the broad and past impacts of bank profitability and risk. Endogeneity and serial correlation in the models will be eliminated by the two-step GMM. Bank capital is considered as endogenous variable, whereas controlled variables are considered as exogenous ones. Lagged differences of endogenous variables are added to instruments at different moments. Based on the studies of Lee and Hsieh (2013), Ayadin and Karakaya (2014), and Jabra et al. (2017), the following research models are proposed in this paper in order to examine the impacts of bank capital on profitability and risk of commercial banks in Vietnam from the period 2007 to 2018:

$$\pi_{it} = \alpha_0 + \alpha_1\pi_{it-1} + \alpha_2CAP_{it} + \alpha_3F_{it} + \gamma_i + \varepsilon_{it}, \quad (1)$$

$$R_{it} = \beta_0 + \beta_1R_{it-1} + \beta_2CAP_{it} + \beta_3F_{it} + \mu_i + \lambda_{it}, \quad (2)$$

where  $\pi_{it}$  is the bank profitability that is estimated by return on assets (ROA), return on equity (ROE), and net interest margin (NIM).  $R_{it}$  is a bank risk that is estimated by the rate of nonperforming loans to total gross loans (NPL) and the rate of loan loss reserve to total assets (LLR). The definition of other variables is provided in Table 1.

**Table 1**  
Variable definitions

Group	Variable	Definition
Bank profitability	ROA	Return on assets
	ROE	Return on equity
	NIM	Net interest margin
Bank risk	LLR	Loan loss reserve ratio
	NPL	Non-performing loan ratio
Bank capital	ER	Equity ratio
	EQT	Equity level
Controlled variables	NLTA	Net loans to assets ratio
	DEP	Deposit ratio
	LIQ	Liquidity ratio
	INF	Inflation rate
	GDP	GDP growth
	M2	Money supply growth

Source: Author's summarize

The correlation of variables shows how variables are correlated. Table 2 presents the correlation between dependent variables.

**Table 2**  
Correlation of dependent variables

	NIM	ROA	ROE	LLR	NPL
NIM	1.0000				
ROA	0.6022	1.0000			
ROE	0.4311	0.7310	1.0000		
LLR	0.4955	0.0755	0.0877	1.0000	
NPL	-0.0759	-0.2763	-0.2960	0.0861	1.0000

Source: Author's calculation

The correlation between NIM, ROA, and ROE is observed to be high and positive because they all estimate bank profitability. Concurrently, the correlation between LLR and NPL is estimated to be positive and low. This low correlation can be attributed to the transactions between commercial banks and Vietnam Asset Management Company (VAMC), a state-owned company that buys and sells nonperforming debts of banks and other financial institutions. In other words, commercial banks may sell nonperforming loans to VAMC and receive noninterest bonds from the VAMC. Commercial banks have no longer nonperforming loans in the balance sheet once nonperforming loans are sold. However, these banks have to use their profit as loan loss reserve for 20% of nonperforming loans every year, which are sold to VAMC by banks. Thus, the nonperforming loan ratio decreases year by year but the loan loss reserve ratio remains stable. Table 3 demonstrates the correlation between dependent variables.

**Table 3**  
Correlation of dependent variables

	ER	EQT	NLTA	DEP	LIQ	INF	GDP	M2
ER	1.0000							
EQT	-0.534	1.000						
NLTA	-0.101	0.154	1.000					
DEP	-0.383	-0.041	0.211	1.000				
LIQ	0.252	-0.366	-0.342	-0.121	1.000			
INF	0.296	-0.310	-0.152	-0.240	0.304	1.000		
GDP	-0.145	-0.024	0.128	0.220	-0.084	-0.255	1.000	
M2	0.187	-0.312	0.021	0.053	0.311	-0.066	0.150	1.0000

Source: Author's calculation

According to Table 3, two main variables, ER and EQT, are negatively correlated. This happens when commercial banks increase the equity which consequently increases the total assets. However, the rate of equity to total assets decreases when the total assets increases faster than equity. Therefore, in the case of commercial banks of Vietnam, the increase in equity results in a decrease in the rate of equity and the liquidity ratio but it increases the loan ratio.

### 3.1 Estimation results

In this subsection, the results of the impacts of bank capital on profitability and risk are presented. The effects on profitability are analyzed in the first part and the effects on risk are discussed in the second part. The results of the two-step GMM are presented in Tables 4 and 5. In these tables, the Sargan test is applied to examine the overidentification restriction of instruments and the Arellano–Bond test is applied for the serial correlation estimation. Both tests indicate that the results are consistent and reasonable for all estimations.

**Table 4**  
Bank profitability

	ROA		ROE		NIM	
ROA <sub>t-1</sub>	0.139***	0.374***				
ROE <sub>t-1</sub>			0.138*	0.154***		
NIM <sub>t-1</sub>					0.877***	0.768***
ER	-0.081**		-0.602***		0.140	
EQT		-0.004**		-0.111***		-0.024
NLTA	0.043***	0.055***	0.408***	0.627***	0.053***	0.079***
DEP	-0.033***	-0.039***	-0.625***	-0.566***	0.009	-0.041*
LIQ	0.009*	0.003	0.152***	0.232***	0.014	0.047
INF	-0.029***	-0.012***	-0.031	-0.020	-0.090	-0.055*
GDP	0.240***	0.081***	2.442***	1.984***	0.167	0.013
M2	-0.003	0.008*	0.311***	0.127***	-0.081***	-0.094***
Observations	288	288	288	288	288	288
Instruments	25	30	30	30	17	17
Sargan test	0.210	0.970	0.280	0.310	0.560	0.340
Arellano-Bond test AR (2)	0.587	0.125	0.720	0.470	0.080	0.110

Source: Author's calculation

First, bank profitability is estimated by its capital. As the equity ratio and the equity level are used to measure bank capital, the effects are observed to be consistent. Bank capital negatively impacts profitability when bank profitability is measured by using ROA and ROE. This result is in agreement with those of Altunbas et al. (2007) and Goddard et al. (2013), who claim that banks with a higher equity ratio would not receive the advantage of income tax as well as will have to pay a higher opportunity cost for cash holding. Thus, bank profitability will be reduced with a higher equity ratio. However, the significant impacts of bank capital on profitability are not found when NIM is used as a proxy of bank profitability (Lee & Hsieh, 2013).

**Table 5**  
Bank risk

	NPL		LLR	
NPL <sub>t-1</sub>	0.315***	0.115**		
LLR <sub>t-1</sub>			0.121**	0.154**
ER	-0.168**		-0.009	
EQT		0.015***		-0.001
NLTA	-0.002	-0.010	-0.002	-0.001
DEP	-0.034**	0.020	0.003	0.002
LIQ	-0.030***	0.022	-0.026**	-0.023**
INF	-0.098*	0.021	-0.011**	-0.021**
GDP	-0.563***	-0.564***	-0.054**	-0.072**
M2	-0.065**	-0.034	-0.018***	-0.019***
Observations	288	288	288	288
Instruments	20	20	20	20
Sargan test	0.280	0.215	0.120	0.158
Arellano-Bond test AR (2)	0.171	0.082	0.370	0.350

Source: Author's calculation

Second, the impacts of bank capital on risk depend on the factor that is used for bank risk. The effects are observed to be significant when the nonperforming loan ratio is used for bank risk, whereas no impact is observed when the loan loss reserve ratio is used. The equity ratio negatively affects bank risk and this result is in agreement with those of Jacques and Nigro (1997), Altunbas et al. (2007), Agusman et al. (2008), Lee and Hsieh (2013), and Jabra et al. (2017). However, the equity level shows

positive impacts on bank risk. In Vietnam, banks have to promote their sale and investment when they increase their capital levels, which may lead to higher nonperforming loans. In reality, in order to fulfill the commitment of capital level, commercial banks increase their capital during the period 2008–2010 and as a result, the nonperforming loan ratio sharply increased in the next period of 2011–2013, peaking 4% in 2012. The impacts of controlled variables on bank profitability and risk are estimated to be relatively consistent with other studies. The net loans to assets ratio demonstrates a positive impact on bank profitability (Iannotta et al., 2007; Lee & Hsieh, 2013; Ayaydin & Karakaya, 2014; Menicucci & Paolucci, 2015; Jabra et al., 2017) because until now offering loans is the primary source of bank income in Vietnam, like most developing economies. According to this study, NLTA does not show a significant impact on bank risk and this result is partly in agreement with those of Lee and Hsieh (2013) and Jabra et al. (2017). The deposit ratio shows significant negative impacts on both bank profitability and risk. A higher deposit ratio creates more pressure on banks to use deposits effectively. Similarly, a rapid increase in deposit may result in a higher level of interest paid, which will reduce profitability. On the other hand, an increase in the deposit ratio may ensure low reserve from banks or may increase bank liquidity, which in turn may reduce the operational risk. In general, the liquidity ratio shows positive impacts on profitability and negative impacts on risk. For short-term sale, such as interbank loans, short-term loans, etc., high liquid assets may be used. Hence, these short-term sales can make banks more effective. Macroindicators are positively related to bank profitability and risk. Inflation shows negative impacts on bank profitability (Naceur & Kandil, 2009; Lee and Hsieh, 2013). Similarly, unexpected inflation can make banks inactive by adjusting their interest rates, which may reduce the net interest margin of banks. In this period, inflation was under control in Vietnam, indicating that moderate inflation is a favorable condition for economic development, which in turn reduces bank risk. A higher rate of GDP growth can lead to higher bank profitability and lower bank risk. The improvement in the economy will generate more demand in the capital market which will have positive impacts on bank operation or bank profitability. Flamini et al. (2009), Lee and Hsieh (2013), and Jabra et al. (2017) show similar results. Finally, money supply (M2) shows positive impacts on ROA and ROE of banks, whereas M2 negatively affects the NIM of banks. An expansionary monetary policy not only improves ROA and ROE of banks but also increases the cost of the marginal interest rate. In addition, the expansion of loans can create higher cost of reserve, which reduces the net interest margin of banks.

#### 4. Conclusion

In this paper, the impacts of bank capital on profitability and risk in Vietnam were empirically investigated from the period 2007 to 2018. The equity ratio and the equity level were considered as bank capital. ROA, ROE, and NIM were used to measure bank profitability, whereas the loan loss reserve ratio and the nonperforming loan ratio were used to measure the proxy of bank risk. In this paper, data of 35 commercial banks were merged into an unbalanced panel sample by collecting bank data from the audited balance sheet. In addition, inflation, GDP growth, and M2 were also used as controlled variables in the model. The two-step GMM, which controls endogeneity and serial correlation, was used to estimate the impacts. Bank capital, in both equity ratio and equity level, has shown significant negative impacts on bank profitability (ROA and ROE), whereas it showed no impacts on NIM. Moreover, the impacts of bank capital on risk also depend on how capital and risk are measured. Bank capital was found to have no impact on risk if the loan loss reserve ratio was considered bank risk. If the nonperforming loan ratio is used to measure risk, the equity ratio shows significant negative impacts on risk whereas the equity level shows positive impacts on risk. The impacts of bank capital on profitability and risk may propose some implications. First, it depends on what banks need, high profitability, and high risk or vice versa, in the case of commercial banks. Banks can reduce the equity ratio or the equity level if commercial banks want to raise their profit. Moreover, banks can buy their stocks for reserve or can increase deposits in order to decrease the equity ratio. However, a decrease in the equity ratio may lead to higher bank risk. Banks can reduce the deposit ratio or increase the capital level if banks want to reduce their risk. Banks require performing well in investment risk management in order to lower their risk. In order to obtain the targeted capital ratio, banks also increase deposits nowadays when they increase their equity. Second, the nonperforming loan ratio may increase sharply, as happened in the past, if the policymakers instruct banks to increase their capital in a short time. Therefore, policymakers should instruct every bank to outline their own procedure for managing risk management and gradually fulfilling the global requirements. In addition, policymakers should also draw a roadmap for banks in order to increase their bank capital. Simultaneously, banks should also develop their risk management system in order to strengthen their ability to control the increasing risk.

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