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Should Vietnamese Banks Need More Equity? Evidence on Risk-Return Trade-Off in Dynamic Models of Banking

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Abstract: This study employs generalized method of moments (GMM) for dynamic panel data models to deal with the nature of banking behaviour, aiming at investigating the impact of bank equity on the risk and return of Vietnamese commercial banks during the period of 2006–2017. The study finds that increasing bank equity is not always the best strategy to be accompanied by absolute benefits, increasing returns and reducing risks for banks but is a trade-off instead. More precisely, banks with larger capital buffers tend to take less risk but are less profitable. In addition, the study also finds a non-linear relationship revealing that bank risk mitigates the effect of bank equity on profitability. Most estimations show strong robustness checked by some alternative techniques. Based on the findings, the study provides some important policy implications to improve the performance of the banking system in Vietnam as well as in other emerging countries.

Keywords: bank equity; emerging country; return; risk; Vietnam

1. Introduction

Regulatory authorities establish capital safety limits with the purpose of reducing bank riskiness, especially preventing bank collapses after crises (Demirgüç-Kunt et al. 2013). The Basel Accords propose capital standards which are increasingly becoming tighter. However, there have been many concerns about the effectiveness of new guidelines for ensuring the bank safety and soundness (Khan et al. 2017).

Regulations to enhance capital strength create heterogeneous effects for the banks' benefits (Basher et al. 2017). A high capital ratio tends to be costly, implying a decline in profitability but at the same time it could also reduce bank risk, as many arguments suggest (Meriläinen 2016). As profit-driven businesses, banks could determine an optimal capital ratio to maximize their value. However, the regulators govern the banks' operations by strict requirements to maintain capital beyond their optimal levels (Miller 1995). As a result, banks tend to finance with equity passively without considering the role of the capital buffer (Sorokina et al. 2017). This is especially true for a developing country like Vietnam, where banks are complying with capital regulations in a coping, unintended manner.

There exists much capital pressure for Vietnamese banks after the period of rapid growth (Vo 2016). Meanwhile, the Vietnamese banking system is dominated by state-owned banks as well as large banks (Batten and Vo 2016). In terms of economic development, Vietnam has the high rate of growth, supported by the stable political system (Nguyen et al. 2016). These are the differences of the Vietnamese banking market when compared with other countries, especially developed ones. Moreover, Vietnamese banks are slower than those in other countries to follow the guidelines of Basel II, as the global capital standards are only applied partially at some banks instead of to the whole system. The capital increase is an urgent requirement of the regulatory authorities in Vietnam.

Accordingly, does equity improve bank performance? There are many scholars focusing separately on this topic, from the perspective of risks and returns for banks. Due to bank development and data

availability, most of the existing literature focuses on banks in developed countries such as the United States or European countries (see Lee and Hsieh 2013; Bitar et al. 2018). With concerns about the urgency as well as the role of increasing bank capital, especially in the recent period when many developing countries have started applying new guidelines under Basel Accords, some studies pay attention to these countries. For example, Barth et al. (2008) study a number of Asian countries and realize that a group of countries tried to strengthen capital resources after stress time, while the other group did the opposite. In particular, they note that some of the countries actively loosened regulations on capital safety, which made the banking system more fragile. Differently, in Vietnam recently, regulations on raising capital power are performed very seriously and thus, banks in the whole system have made great efforts to improve their capital buffer. Another study conducted by Tan and Floros (2013) assesses the relationships between the bank efficiency, capital and risk of the Chinese banking market. The authors discover the negative impact of bank capital on risk, measured by the Z-score index. However, the regression results of this study may be negatively affected by spurious regression when applying a Z-score measure along with a bank equity ratio (see Khan et al. 2017; Bitar et al. 2018).

The issues mentioned have motivated this study to find out how the bank equity of Vietnamese banks affects the trade-off between bank risk and return, which has drawn very little attention from researchers so far. To achieve these objectives, we apply the regression techniques based on the dynamic approach with the support of generalized method of moments (GMM). Besides, we also try to extend the existing literature by integrating into the estimation models the interaction terms between bank equity and risk to examine non-linear relationship. Previous studies have started to apply non-linear investigation techniques, with initial findings on the relationship between capital and profits that may change for banks with low capital (Gropp and Heider 2010). In a study of bank risk exposure in general, Agoraki et al. (2011) also find that this impact could be weakened or reversed, depending on the market power of banks; or Haq and Heaney (2012) suggest a U-shaped relationship between capital and risk in their study.

In addition to contributions to the current literature on the topic of bank equity, especially to better understand banking market in an emerging country as Vietnam, this study also provides some important policy implications. First, bank managers and policy-makers could strongly believe that bank capital is completely meaningful for banks' safety and soundness, so they could approach the standards relating to capital more proactively. Second, the regulatory authority should flexibly consider capital conditions for banks, in accordance with each stage of the economy, of the credit cycle to ensure harmony between the overall benefits of the economy and bank health.

The remainder of this study is structured as follows. Section 2 reviews the relevant literature, then develops the hypotheses. Section 3 presents the method, model and data applied for regressions. Section 4 reports and discusses the findings. Finally, Section 5 presents the conclusions as well as points out the current limitations and suggestions for the future research.

2. Literature Review

The negative impact of bank capital on risks is related to the "moral hazard hypothesis," which suggests that a lack of equity leads banks to behave more recklessly, explained by the existence of deposit insurance (Demirgüç-Kunt and Kane 2002). Jeitschko and Jeung (2005) argue that banks tend to take more risks when they possess lower capital ratio, because moral hazard problems could arise from information asymmetry and agency problems. Also from the perspective of the agency problem, Holmstrom and Tirole (1997) state that, motivated by greater benefits and incentives, shareholders will actively participate more in monitoring operations in case they have to invest more money in their banks. This increases the caution for bank portfolios and suggests the negative impact of bank capital on asset risk. Meanwhile, there are some studies with other arguments leading to contrastive results presented. Shrieves and Dahl (1992) emphasize that the positive correlation between bank capital and risk may come from the unexpected effect of minimum capital requirements, avoiding the risk of bankruptcy or the risk aversion of bank managers. Altunbas et al. (2007) and Iannotta et al. (2007) use

the term "regulatory hypothesis" to explain the direction of this impact, which means that government agencies urge banks to raise the capital ratio to be commensurate with the risk level.

Empirical studies have shown mixed results on the topic. Milne and Whalley (2001) indicate that banks will quickly find ways to decrease asset risk after raising equity but after these banks have the appropriate capital structure, the positive correlation between bank equity and risk is revealed. Haq and Heaney (2012) find a U-shaped relationship between bank capital and credit risk through a dataset collected in 15 European countries during the period from 1996–2010. This finding implies that the increased capital level initially reduces the risk but the opposite effect appears after bank capital ratio moves to a certain threshold. The authors also note that their findings are unfixed by some different risk measurements. In an emerging research strand, Basher et al. (2017) focus on Islamic banks from 2007 to 2013. They conclude that capital increase positively affects the level of asset risk for Islamic banks, while meeting Basel III requirements is simple for these banks.

We value the role of deposit insurance, the domination of major shareholder groups and the government's capital upgrading requirements for the Vietnamese banking market (Vo 2016); the "moral hazard hypothesis" will overwhelm the "regulatory hypothesis" to support our following hypothesis:

Hypothesis 1 (H1). *Banks with more equity tend to take less risks.*

According to the theory of Modigliani and Miller (1958), investors are encouraged to have higher leverage which promisingly increase benefits for businesses. Later studies suggest that this theory could apply for banks suitably, thus proposing banks to build optimal capital ratios to maximize their profit (Berger 1995). The key point of these documents focuses on the tax advantage of debt directly associated with bank equity. Besides, the influences from the market and regulatory agencies have made banks restrict their leverage. This originates from investors' fear of bankruptcy threats (Nier and Baumann 2006). In contrast, the relationship between shareholders and bank managers also reveals that more equity could help banks overcome troubles arising from the agency problems mentioned earlier (Holmstrom and Tirole 1997). Allen et al. (2011) add that this could constitute a greater capital ratio for banks in the competitive market, ensuring bank monitoring efficiency and thus reducing costs as well as making more profits.

In the stream of empirical research supporting positive correlations on the current topic, Chortareasa et al. (2012) use bank data in 22 European countries to conclude that larger capital buffers ensure more efficiency for bank operations. Researchers rely on the agency problem between managers and shareholders to explain that bank owners are motivated to monitor the asset portfolio more actively. Tan (2016) also figure out that well-capitalized banks tend to be more profitable, resulting from higher creditworthiness and more involvement in prudent lending, which cut bank cost significantly. In another direction, Demirgüç-Kunt et al. (2013) suggest that bank capital ratios positively affected banks' stock returns during the 2008 financial crisis. Most recently, Bitar et al. (2018) employ a sample collected from 39 member countries of Organisation for Economic Co-operation and Development (OECD) between 1999–2013 for their comprehensive study of the relationship between capital and bank performance in terms of bank risk, profitability and efficiency. They find that higher capital ratios increase bank profits and also reduce bank risk, emphasizing the importance of high-quality capital in these countries.

In contrast to most of the findings from recent studies, Altunbas et al. (2007) conclude that inefficient European banks seem to hold more capital. In the same vein, Goddard et al. (2010) discover the negative impact of capital buffer on bank profits, reflected by the EU members from 1992 to 2007. Meanwhile, Lee and Hsieh (2013) conduct a rare study investigating 42 Asian countries during the period of 1994–2008 and find many interesting results. However, most of these results are mixed by the usage of different profit calculations and thus the findings are inconclusive.

Overall, studies on how bank equity affects bank return are inconclusive, highly depending on the context of each banking system. Unlike most empirical surveys that find positive impacts (see

Bitar et al. 2018), however, to fit our initial objective, as well as the judgment of Goddard et al. (2004) on the trade-off between more safety and less profit, we expect that Vietnamese commercial banks having more equity will be less likely to achieve a higher return, due to cautious strategies with low profit margin.

Hypothesis 2 (H2). *Banks with more equity tend to have less returns.*

In the perspective of moral hazard, there is a motivation for less efficient enterprises to be more reckless to compensate for lost profit. Bank profits could therefore be affected by the level of risk (Berger and De Young 1997). Meanwhile, Roulet (2018) argues that a high risk level will create more pressure on capital, causing banks to reduce their desire to lend more. Vo (2016) states that after the period of excessive credit supply to the economy, asset quality of Vietnamese commercial banks have become worse and also for these banks, the capital burden would be different. We focus on the hypothesis that more risk makes banks more cautious in monitoring and expanding lending, suggesting a mitigation to the negative impact of bank capital on profits. The hypothesis is based on the belief that when banks suffer more risks, they have to behave much more cautiously, and this partly contributes to the improvement of bank profits if they increase capital.

Hypothesis 3 (H3). *Bank risk tends to mitigate the negative effect of bank capital on return.*

3. Methodology

3.1. Estimation Models

To examine bank behaviours, we apply the dynamic regression models as follows:

$$risk_{i,t} = \alpha + \beta \times risk_{i,t-1} + \gamma \times EQUI_{i,t-1} + \delta \times Bank\_Level_{i,t-1} + \varepsilon_{i,t}, \tag{1}$$

$$return_{i,t} = \alpha + \beta \times return_{i,t-1} + \gamma \times EQUI_{i,t-1} + \delta \times Bank\_Level_{i,t-1} + \varepsilon_{i,t}, \tag{2}$$

in which, *risk* indicator represents variables of bank risk; *return* indicator indicates variables of bank return; *EQUI* is a proxy for bank equity; *Bank_Level* indicates a vector of bank-specific variables; *i* denotes bank, *t* denotes time and ε is the error term.

We employ two popular measurements of bank risk, including the ratio of loan loss provisions to total asset (*LLA* variable) and the ratio of loan loss provisions to total gross loan for customers (*LLP* variable). *LLP* variable is very common in studies relating to bank risk (Altunbas et al. 2007; Lee and Hsieh 2013), while the *LLA* variable is to increase the robustness of research results, consistent with the idea of Bitar et al. (2018).

Bank return in this study is proxied by traditional accounting measurements applied in most studies on bank performance as well as on the same topic, consisting of *ROA* and *ROE* variables (Gropp and Heider 2010; Berger and Bouwman 2013; Tan and Floros 2013). *ROA* variable is calculated as the net return on total bank asset, indicating the ability to generate profit per unit of assets; *ROE* is determined by the total net return on bank equity, revealing benefits for bank shareholders. From the nature of these indicators, we also expect that the estimation coefficients of *ROE* variable will be bigger than those of *ROA* in case of determining the impact of bank equity on bank return.

Regarding the main explanatory variable in the models, the *EQUI* variable is simply measured by bank equity over total assets (see Bitar et al. 2018). In addition, to control the impact of bank-specific factors on risk-return trade-off, we also add control variables into the models, including *SIZE* and *FLIQ* variables. *SIZE* variable is proxied by the natural logarithm of total assets and *FLIQ* variable represents the ratio of customer deposits to total assets. Many studies have examined the role of these control factors (see Altunbas et al. 2007; Berger and Bouwman 2013; Cohen and Scatigna 2016).

Interestingly, to expand previous studies and contribute to the new research strand of non-linear impact on bank performance, we consider the role of bank risk for the relationship between bank capital and profitability. Hence, we incorporate into regression models the interaction terms between *EQUI* variable and risk indicators, including *LLP* and *LLA* variables. The high level of risk is expected to make banks with a large capital buffer more cautious with their lending behaviour, thereby creating a more effective loan portfolio and improving bank profitability. Accordingly, we expect that the impact of bank capital on bank performance may be affected in case banks adjust their behaviour according to high or low risk conditions. However, a positive sign of the interaction term's coefficient is expected. We set up the following model to capture these features:

$$return_{i,t} = \alpha + \beta \times return_{i,t-1} + \gamma \times EQUI_{i,t-1} + \delta \times Bank\_Level_{i,t-1} + \varphi \times EQUI_{i,t-1} \times risk_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

To confirm the reliability of our regression results, we apply an additional technique to check robustness. We chose to add a vector of variables which represents the macroeconomy, including the GDP growth rate (*GDP* variable) and the annual inflation rate (*INF* variable). The presence of these factors in the model (*Economy_Level* vector) without changing the previous results will help to strengthen our conclusions. Thus, we extend the specifications as follows:

$$risk_{i,t} = \alpha + \beta \times risk_{i,t-1} + \gamma \times EQUI_{i,t-1} + \delta \times Bank\_Level_{i,t-1} + \lambda \times Economy\_Level_{t-1} + \varepsilon_{i,t} \quad (4)$$

$$return_{i,t} = \alpha + \beta \times return_{i,t-1} + \gamma \times EQUI_{i,t-1} + \delta \times Bank\_Level_{i,t-1} + \lambda \times Economy\_Level_{t-1} + \varepsilon_{i,t} \quad (5)$$

$$return_{i,t} = \alpha + \beta \times return_{i,t-1} + \gamma \times EQUI_{i,t-1} + \delta \times Bank\_Level_{i,t-1} + \varphi \times EQUI_{i,t-1} \times risk_{i,t-1}$$
$$+ \lambda \times Economy\_Level_{t-1} + \varepsilon_{i,t} \quad (6)$$

3.2. Regression Methods

Bank behaviours in terms of operation profit and risk in the previous period may affect those of the next period, thus we use the lag of the dependent variable to play the role of explanatory variable. This constitutes the dynamic approach. Moreover, to overcome the problem of intrinsic endogeneity, the study uses GMM estimators, with both system GMM (SGMM) and difference GMM (DGMM) simultaneously (Arellano and Bond 1991; Arellano and Bover 1995). Besides, this method could easily handle typical defects, such as heteroskedasticity by using the Windmeijer correction for two-step GMM estimators (Windmeijer 2005). To validate the appropriateness of GMM estimators, we perform the Sargan test with the null hypothesis of exogeneity of the instrument set and the Arellano-Bond test with the null hypothesis that there is no second-order autocorrelation of the estimation residuals.

3.3. Data

The study uses data from the annual financial statements of Vietnamese commercial banks from 2006 to 2017, through Bankscope. Selected banks have to ensure continuous operation and publish annual financial statements for at least 5 years. We exclude banks that are merged or acquired into other banks and by the time of the current survey, these bank no longer exists. We also behave the same for banks which are under special control or transferred at a price of "zero dong" by the authorities. This study filters all banks by these conditions, instead of focusing on a group of listed commercial banks or other types of banks as many other studies on the same topic do (Lee and Hsieh 2013; Roulet 2018). In addition, macroeconomy data is collected from World Development Indicators (WDI). As a result, the final sample consists of 32 commercial banks with a total of 333 observations, creating an unbalanced panel data set.

Table 1 shows summary statistics for employed variables. We could observe the profitability and credit risk of Vietnamese banks have a wide range of distribution, denoted by the distance between the maximum and minimum value as well as large standard deviations. The average equity ratio of Vietnamese banks is 10.84%, however, there are cases banks do not meet the regulatory requirements

as statistics show that the minimum value is 1.07% of the equity ratio. Overall, banks still rely more on customer deposits for business, with the average value of deposit rate of 61.57%.

Table 1. Summary statistics for variables.

Variable	Descriptions	Mean	Std. Dev.	Min	Max	Obs.
EQUI (%)	Equity/Total assets	10.84	7.35	1.07	80.07	333
LLP (%)	Loan loss provisions/Total gross customer loans	1.43	2.45	0.01	43.97	333
LLA (%)	Loan loss provisions/Total assets	0.76	1.08	0.01	18.06	333
ROA (%)	Net return/Total assets	0.84	0.70	−5.51	4.68	333
ROE (%)	Net return/Equity	8.93	8.24	−82.00	43.20	333
FLIQ (%)	Deposits/Total assets	61.57	13.87	18.50	89.22	333
SIZE	Natural logarithm of total assets	17.96	1.36	13.57	20.87	333
GDP (%)	GDP annual growth rate	6.14	0.61	5.25	7.13	333
INF (%)	Annual inflation rate	8.20	6.06	0.88	23.12	333

Table 2 presents the correlation coefficients matrix between the variables. The results show that the variables proxied for bank risk (or bank return) all have a relatively high correlation with each other. Specifically, the correlation coefficient between *LLP* and *LLA* variables is 0.96 and that between *ROE* and *ROA* variables is 0.71. This supports the hypothesis that our study could apply variables in an alternate way. Meanwhile, the correlation of other variables has small value, suggesting multicollinearity problem does not appear in the models. Interestingly, we could observe that the correlation coefficient between *EQUI* and *FLIQ* variables is not large (−0.29). This is in line with the reality of Vietnamese banking market when bank funding comes not only from customer deposits and equity but also from the issuance of valuable papers and interbank capital and so forth. These items accounts for a significant proportion which is increasingly growing. The inclusion of *EQUI* and *FLIQ* variables in the study also implies the influence the financing structure on bank performance, supported by the unnecessarily extreme negative correlation of the two variables.

Table 2. Correlation coefficients matrix.

Variable	EQUI	LLP	LLA	ROA	ROE	FLIQ	SIZE	GDP	INF
EQUI	1								
LLP	−0.09	1							
LLA	−0.13	0.96	1						
ROA	0.29	−0.02	−0.01	1					
ROE	−0.20	0.08	0.16	0.71	1				
FLIQ	−0.29	0.03	0.14	−0.18	0.05	1			
SIZE	−0.62	0.11	0.20	−0.24	0.24	0.47	1		
GDP	0.01	0.03	0.03	0.04	0.09	−0.01	−0.02	1	
INF	0.16	0.01	0.00	0.20	0.09	−0.37	−0.24	−0.26	1

4. Results and Discussions

4.1. The Effects of Bank Equity on Bank Risk

Table 3 reports the regression results examining the effect of bank equity, measured by *EQUI* variable, on bank risk, proxied by dependent variables *LLP* and *LLA*.

Table 3. Regression results for bank risk.

Variable	(1) *LLP* (SGMM)	(2) *LLA* (SGMM)	(3) *LLP* (DGMM)	(4) *LLA* (DGMM)
LLP_{t-1}	0.014 (0.001) ***		−0.021 (0.001) ***	
LLA_{t-1}		0.052 (0.002) ***		−0.013 (0.001) ***
$EQUI_{t-1}$	−0.032 (0.004) ***	−0.012 (0.002) ***	−0.021 (0.005) ***	−0.017 (0.001) ***
$FLIQ_{t-1}$	0.002 (0.001) ***	0.005 (0.001) ***	−0.001 (0.001)	−0.001 (0.000) ***
$SIZE_{t-1}$	−0.071 (0.023) ***	0.019 (0.014)	−0.746 (0.036) ***	−0.421 (0.005) ***
Observations	301	301	269	269
Arellano-Bond test	0.53 (0.595)	0.87 (0.386)	−0.10 (0.917)	2.41 (0.016)
Sargan test	10.74 (1.000)	27.78 (1.000)	27.61 (0.377)	27.66 (0.306)

This table reports the regression results of Equation (1) by SGMM and DGMM estimators. The dependent variables are *LLP* (columns 1 and 3) and *LLA* (columns 2 and 4). We treat the lagged dependent variable as endogenous, so that instruments of deeper lags (limit to three periods) and first-difference of the lagged dependent variable are created. For Sargan test, we show the value of Z-test and Prob > Z; for Arellano-Bond test of second-order autocorrelation, we present the value of χ^2 test and Prob > χ^2. Symbol *** denotes statistical significance at the 1% level.

All estimation results in different specifications show the significant negative impact of bank equity on risk, at the level of 1%. This implies that well-capitalized banks tend to take less risk, thus supporting Hypothesis 1. When shareholders spend more money to finance their banks, they tend to behave more cautiously with investment strategies (Holmstrom and Tirole 1997) and, accordingly, the asset portfolio also becomes safer by way of strict supervision policies and regulations. This finding provides a meaningful implication emphasizing the role of bank equity not only for banks' survival probability during times of crisis (Berger and Bouwman 2013) but also for credit quality in general during normal periods.

Table 3 also shows the regression coefficients of the lagged variables of *LLP*, *LLA* and *FLIQ* variable, although they are significant but provide inconclusive results in case of applying different independent variables or different estimation methods. Cautiously, we do not rely on them to interpret the results. Turning to *SIZE* variable, we find the negative impact of bank size on risk, suggesting that smaller banks in Vietnam are riskier than larger banks. This result is consistent with the study of Vo (2016), who explains that, due to ineffective lending and a high level of bad debt, small banks in Vietnam have to be merged with other banks in the same system.

4.2. The Effects of Bank Equity on Bank Return

Table 4 presents results investigating the impact of bank equity on return, which is proxied by 2 variables, *ROA* and *ROE*, based on the traditional accounting approach.

We find in all columns that bank equity has a negative and significant effect on bank profitability, at the significance level of 1%. The studies of Altunbas et al. (2007) and Goddard et al. (2010) also show similar results, providing evidence to support Hypothesis 2. Although banks will have more resources to ensure investment as their equity increases, they tend to reduce the benefits of tax shield (Modigliani and Miller 1958; Berger 1995) and the over-cautious strategies usually result in less lucrative outcome. The regression results also indicate that the impact is more pronounced for the *ROE* variable, which has estimation coefficients much higher than the *ROA* variable in terms of absolute value, consistent with our initial expectation. These findings provide evidence to explain the reluctance and non-activeness of Vietnamese banks in raising capital ratios in the past years. This implication is particularly important for developing countries which are making much effort to pursue the capital guidelines of Basel II in a difficult and challenging way.

We move on to discuss control variables in the models. First, bank size has the negative effect on profitability. For an emerging country as Vietnam, the banking market is greatly dominated by the government (Qian et al. 2015) and large banks. In addition to being appointed, these banks tend to prioritize financing for large projects and wholesale products that lead to low interest margins (Dang and Huynh 2019). Thus, this finding does not support the argument of benefits from economies of scale. Meanwhile, we find a negative correlation between bank deposit and return. According to Acharya and Naqvi (2012), for banks which can access to more deposits, their managers are motivated by short-term growth targets and then expand their lending aggressively. This is a predictor of bank riskiness, threatening bank performance (Foos et al. 2010; Dang 2019).

Table 4. Regression results for bank return.

Variable	(1) *ROA* (SGMM)	(2) *ROE* (SGMM)	(3) *ROA* (DGMM)	(4) *ROE* (DGMM)
ROA_{t-1}	0.304 (0.007) ***		0.146 (0.003) ***	
ROE_{t-1}		0.313 (0.012) ***		0.109 (0.003) ***
$EQUI_{t-1}$	−0.015 (0.001) ***	−0.196 (0.035) ***	−0.034 (0.002) ***	−0.281 (0.021) ***
$FLIQ_{t-1}$	−0.002 (0.000) ***	−0.006 (0.011)	−0.008 (0.000) ***	−0.016 (0.009) *
$SIZE_{t-1}$	−0.115 (0.009) ***	−0.049 (0.273)	−0.405 (0.018) ***	−4.329 (0.106) ***
Observations	301	301	269	269
Arellano-Bond test	1.89 (0.058)	1.78 (0.075)	0.94 (0.344)	1.68 (0.092)
Sargan test	68.32 (0.333)	70.31 (0.275)	27.35 (0.391)	27.09 (0.404)

This table reports the regression results of Equation (2) by SGMM and DGMM estimators. The dependent variables are *ROA* (columns 1 and 3) and *ROE* (columns 2 and 4). We treat the lagged dependent variable as endogenous, so that instruments of deeper lags (limit to three periods) and first-difference of the lagged dependent variable are created. For Sargan test, we show the value of Z-test and Prob > Z; for Arellano-Bond test of second-order autocorrelation, we present the value of χ^2 test and Prob > χ^2. Symbols * and *** denote statistical significance at the 10% and 1% levels, respectively.

4.3. The Interaction Effect of Bank Equity and Risk on Return

To examine the non-linear impact of bank equity on return, our study incorporates interaction terms between *EQUI* variable and risk indicators. The results presented in Table 5, apart from primarily accounting for the interaction terms, also help to strongly confirm the significance and robustness of previous regression results as well (see Tables 4 and 5).

We find that the regression coefficients of interaction terms are significant positive, at the level of 1%, suggesting the ability of bank risk to influence the impact of bank equity on return. Furthermore, the results show that the total impact of bank equity (*EQUI* variable) on the dependent variable tends to decline (the sum of regression coefficients includes $\gamma + \varphi \times risk$) but still ensure the initial negative direction (because $|\gamma| > |\varphi|$). These findings reveal that bank risk could mitigate the negative effect of capital on bank profits, however, it is impossible to completely remove or reverse this impact. One possible reason to explain this is that, after suffering from high levels of risk, banks are under great capital pressure and tend to be more cautious in lending behaviour, which could modestly improve profit. These findings are very consistent with the context of Vietnamese banking market during the survey period as well as suggest new research strand in the future.

Table 5. Regression results for interaction effects.

Variable	(1) ROA (SGMM)	(2) ROE (SGMM)	(3) ROA (DGMM)	(4) ROE (DGMM)	(5) ROA (SGMM)	(6) ROE (SGMM)	(7) ROA (DGMM)	(8) ROE (DGMM)
ROA_{t-1}	0.311 (0.006) ***		0.142 (0.004) ***		0.307 (0.004) ***		0.141 (0.004) ***	
ROE_{t-1}		0.318 (0.020) ***		0.106 (0.003) ***		0.301 (0.012) ***		0.104 (0.004) ***
$EQUI_{t-1}$	−0.017 (0.002) ***	−0.189 (0.034) ***	−0.036 (0.002) ***	−0.282 (0.023) ***	−0.019 (0.002) ***	−0.213 (0.029) ***	−0.039 (0.002) ***	−0.301 (0.025) ***
$EQUI_{t-1} * LLP_{t-1}$	0.003 (0.000) ***	0.019 (0.002) ***	0.002 (0.000) ***	0.006 (0.001) ***				
$EQUI_{t-1} * LLA_{t-1}$					0.009 (0.000) ***	0.065 (0.004) ***	0.007 (0.000) ***	0.024 (0.003) ***
$FLIQ_{t-1}$	−0.002 (0.001) ***	−0.018 (0.009) *	−0.008 (0.000) ***	−0.016 (0.009) *	−0.002 (0.000) ***	−0.015 (0.013)	−0.007 (0.001) ***	−0.010 (0.012)
$SIZE_{t-1}$	−0.120 (0.015) ***	−0.249 (0.177)	−0.410 (0.019) ***	−4.404 (0.108) ***	−0.121 (0.013) ***	−0.028 (0.203)	−0.413 (0.018) ***	−4.294 (0.182) ***
Observations	301	301	269	269	301	301	269	269
Arellano-Bond test	1.97 (0.048)	1.77 (0.076)	1.02 (0.304)	1.70 (0.088)	1.97 (0.049)	1.71 (0.088)	1.04 (0.297)	1.69 (0.089)
Sargan test	69.71 (0.292)	71.13 (0.252)	27.12 (0.403)	26.25 (0.449)	69.85 (0.288)	71.64 (0.239)	26.30 (0.446)	27.47 (0.437)

This table reports the regression results of Equation (3) by SGMM and DGMM estimators. The dependent variables are *ROA* (columns 1, 3, 5 and 7) and *ROE* (columns 2, 4, 6 and 8). We treat the lagged dependent variable as endogenous, so that instruments of deeper lags (limit to three periods) and first-difference of the lagged dependent variable are created. For Sargan test, we show the value of Z-test and Prob > Z; for Arellano-Bond test of second-order autocorrelation, we present the value of χ^2 test and Prob > χ^2. Symbols * and *** denote statistical significance at the 10% and 1% levels, respectively.

4.4. Robustness Checks

This section reports the results of robustness check by adding macroeconomic variables into the original models. The regression results in Table 6 show similar results with previous estimations, strongly confirm the robustness of our findings. To save space, we do not present all the results that we have. However, these results are available upon request. Most of the tests for the validity of instrumental variables (Sargan test) and the second-order autocorrelation of residuals (Arellano-Bond test) give the evidence not to reject the null hypothesis at the significance level of 5%. Hence, we could rely on the regression results for decision making.

Regarding macroeconomic conditions, the study also points out some interesting findings. First, there exists a positive correlation between inflation and credit risk. In response to high inflation, central banks often choose tightened monetary policy, which creates more difficulty for borrowers and thereby increases the risk of default (Lee and Hsieh 2013). Meanwhile, economic growth shows a negative correlation with bank return, contrasting with most of other studies (see Iannotta et al. 2007; Tan and Floros 2013; Bitar et al. 2018). However, Bolt et al. (2012) argue that this relationship is ambiguous, in a comprehensive study of bank profitability. In Vietnam, the role of economic growth on banking performance is also demonstrated earlier by Nguyen et al. (2016), through the discovery of positive impact on cost efficiency by using Data Envelopment Analysis (DEA) method. Accurately predicting the impact of inflation and the economic cycle is an important requirement for banks to adjust interest rates or manage operating costs for better performance.

Table 6. Robustness checks of regression results.

Variable	(1) LLP (SGMM)	(2) LLA (SGMM)	(3) ROA (DGMM)	(4) ROE (DGMM)	(5) ROA (SGMM)	(6) ROA (DGMM)	(7) ROA (SGMM)	(8) ROA (DGMM)
LLP_{t-1}	0.009 (0.000) ***							
LLA_{t-1}		0.039 (0.002) ***						
ROA_{t-1}			0.141 (0.006) ***		0.292 (0.011) ***	0.139 (0.007) ***	0.289 (0.016) ***	0.142 (0.009) ***
ROE_{t-1}				0.131 (0.007) ***				
$EQUI_{t-1}$	−0.031 (0.005) ***	−0.013 (0.002) ***	−0.040 (0.002) ***	−0.336 (0.032) ***	−0.019 (0.003) ***	−0.043 (0.002) ***	−0.022 (0.003) ***	−0.044 (0.003) ***
$EQUI_{t-1} * LLP_{t-1}$					0.003 (0.000) ***	0.002 (0.000) ***		
$EQUI_{t-1} * LLA_{t-1}$							0.009 (0.000) ***	0.006 (0.000) ***
$FLIQ_{t-1}$	−0.004 (0.001) ***	0.008 (0.001) ***	−0.007 (0.001) ***	−0.014 (0.009)	−0.000 (0.001)	−0.006 (0.001) ***	0.000 (0.001)	−0.007 (0.001) ***
$SIZE_{t-1}$	−0.050 (0.019) ***	−0.023 (0.009) **	−0.437 (0.026) ***	−4.483 (0.135) ***	−0.121 (0.018) ***	−0.428 (0.034) ***	−0.129 (0.019) ***	−0.446 (0.032) ***
GDP_{t-1}	0.114 (0.014) ***	0.100 (0.009) ***	−0.121 (0.004) ***	−0.923 (0.170) ***	0.014 (0.018)	−0.116 (0.006) ***	0.016 (0.015)	−0.118 (0.006) ***
INF_{t-1}	0.026 (0.001) ***	0.019 (0.000) ***	0.007 (0.001) ***	0.045 (0.015) ***	0.017 (0.002) ***	0.007 (0.001) ***	0.016 (0.002) ***	0.007 (0.001) ***
Observations	301	301	269	269	301	269	301	301
Arellano-Bond test	−1.00 (0.317)	−1.07 (0.284)	0.95 (0.341)	1.84 (0.065)	1.68 (0.092)	1.02 (0.306)	1.75 (0.081)	1.02 (0.306)
Sargan test	10.04 (1.000)	23.94 (1.000)	29.52 (0.287)	26.58 (0.431)	64.66 (0.453)	28.47 (0.335)	64.98 (0.442)	29.59 (0.284)

This table reports regression results by SGMM and DGMM estimators. In Equation (4), the dependent variables are *LLP* (column 1) and *LLA* (column 2); in Equation (5), the dependent variables are *ROA* (column 3) and *ROE* (column 4); in Equation (6), the dependent variables is *ROA* (columns 5, 6, 7 and 8). We treat the lagged dependent variable as endogenous, so that instruments of deeper lags (limit to three periods) and first-difference of the lagged dependent variable are created. For Sargan test, we show the value of Z-test and Prob > Z; for Arellano-Bond test of second-order autocorrelation, we present the value of χ^2 test and Prob > χ^2. Symbols ** and *** denote statistical significance at the 5% and 1% levels, respectively.

5. Conclusions

The aim of this study is to investigate the impact of bank equity on risks and returns of Vietnamese banks during the period of 2006–2017. The findings show that bank equity is an important factor affecting risk-return trade-off, in terms of reducing loan loss provisions and decreasing bank profitability proxied by popular accounting measurements. Thus, banks with higher ratio of equity tend to not achieve higher profits but take less risks (Goddard et al. 2004). Unlike previous studies which only show linear relationships between bank capital and performance, by GMM estimators in dynamic panel regression models, we find that this relationship exists in a non-linear form. More specifically, when bank risks are high due to the decline of credit quality, the negative effect of bank equity on profitability will be mitigated.

In addition to extending the existing literature, the study also has some policy implications. First, the findings provide evidence to support the statements about the meaning of capital adequacy for bank safety and soundness. Hence, this could make banks more proactive to structure their financing rather than passively complying with regulatory requirements. Next, the negative effect of bank equity on profits suggests regulatory authorities to reconsider strict requirements for banks to raise capital. Finally, the authorities may also propose regulations on capital adequacy for bank groups based on their level of risks, in the context that risks have certain impacts on the role of bank equity.

Despite achieving some certain results as set out for the initial objectives, the study has encountered some limitations. We apply only traditional accounting methods, without access to a more complete set of data to calculate other proxies for bank risk and return. The rate of net charge-offs or non-performing loans are undoubtedly effective measures for bank risk, meanwhile the net interest margin could be an appropriate proxy of bank return. In addition, instead of simply considering the ratio of equity to total asset, it is interesting to expand to the other different definitions of bank capital ratios, such as risk-based ones. As Bitar et al. (2018) suggest, the key to improve bank performance must be the quality of capital, which we ignore in this study. Future studies may correct or develop these points to make more comprehensive contributions.

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