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Bank Capital and Lending Behavior of Vietnamese Commercial Banks*

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Abstract

The objective of the study is to empirically investigate the impact of bank capital on the lending behavior of Vietnamese commercial banks from 2007 to 2019. Lending behavior is captured by two dimensions, including the quantity (loan growth) and quality (credit risk) of loans. Instead of investigating loan growth and credit risk separately, we combine these two aspects in our study and further develop the interaction term between capital buffers and credit risk to capture the asymmetric impact. We apply the dynamic model (regressed by the generalized method of moments) and the static models (regressed using the fixed effects, random effects, and the pooled regression approach) to perform regressions. The results show that banks with higher capital ratios tend to expand lending more, while the risk of credit portfolios is controlled at lower levels at these banks. Further analysis reveals that credit risk mitigates some aspects of the relationship between bank capital and loan expansion. The patterns remain robust across alternative measures and econometric techniques. The study provides insightful policy implications for bank managers and regulators in the process of upgrading capital resources to ensure the safety and soundness of the banking industry in an emerging country.

Keywords: Capital, Credit Risk, Emerging Market, Loan Growth, Vietnam

JEL Classification Code: E58, G21, G28

1. Introduction

The consequence of the global financial crisis in 2008 has exhibited the weaknesses of the banking industry and proved that any bank could be at a risk of collapse (Louhichi & Boujelbene, 2017). Thereafter, the arguments insist that ineffective regulations and supervisions have been a major factor during the crisis (Hogan, 2015). Being aware of this issue, regulatory agencies have begun to apply critical changes in governance. Accordingly, capital adequacy limits are established to control bank risk in terms of increasing the ability to absorb potential losses as guidelines in the Basel Accords (Vazquez & Federico, 2015). Since then, bank capital becomes the center of debates on sufficient buffers. Many initiatives are conducted based on the belief that banks should have sufficient capital buffers and a stable funding structure to maintain and then expand their financial intermediation activities against negative shocks from external environments.

Bank capital and lending behaviors have been widely studied with abundant mixed results. It is of concern that the result of large losses will reduce the capitalization and negatively affect lending activities at banks, thereby proposing the increase in bank capital (Mora & Logan, 2012). However, the evidence from the 2008 crisis has shown that the concentration on investing in capital resources is not enough to prevent bank failure (Bitar et al., 2018). Moreover, there are also doubts about the effectiveness of increasingly tight capital standards from the recent versions of the Basel Accords (Khan et al., 2017). Meanwhile, banks are supposed to comply with only

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the regulations of capital structure but ignore the actual meaning of the capital buffer that they should actively build (Sorokina et al., 2017). There is previous evidence that banks often maintain their capital level substantially larger than regulators' requirement (Berger et al., 2008). In another vein, banking operations in emerging countries are subject to strict government control, especially relating to capital to determine allocated credit lines (Vo, 2016). These issues raise concerns on how the banking industry in emerging countries should invest in capital resources to meet business strategies and risk management.

Among developing markets, Vietnam emerges as an appropriate market to study bank capital and lending behavior. After completing the credit institutions system's restructuring project from 2011 to 2015, the Vietnamese banking system has overcome difficulties, prevented systematic failure, and achieved encouraging results on capital growth and business efficiency (Nguyen et al., 2016). The aspect of bank risk management is always highly valued for the banks themselves and the regulatory agencies (Dao & Nguyen, 2020; Ha, 2020; Tuan, 2020). The State Bank of Vietnam (SBV) has assigned ten commercial banks to apply the Basel II guidelines since 2013. The original plan has required these banks to fulfill their tasks in 2018 and then expanded the global standards to the remaining banks in the whole system. However, by the end of 2018, only a few banks completed their work. From the perspective of an emerging market like Vietnam, it takes time and effort to fully approach the capital safety standards compared to their counterparts in other developed countries. With the obvious trend of increasing integration and competition in the international financial market, step-by-step adapting to the requirements of raising capital buffers is crucial to both support business expansion and reduce bank risk. Research on the impacts of bank capital on lending behavior at Vietnamese banks is a matter of great concern and needs to be explored. More interestingly, the comprehensive analysis on this topic is very limited in the context of developing countries as this segment of literature has mostly focused on developed ones that have advanced markets and earlier access to new capital standards (Bitar et al., 2018; Kim & Sohn, 2017; Roulet, 2018).

The issues mentioned above have inspired this study, which aims at investigating the role of bank capital towards lending behavior by clarifying if it will lead banks to expand their loan growth more and help reduce credit risk in the Vietnamese market, an emerging market that is growing strongly. The findings under such an orientation could offer insightful implications for banks to be more proactive in capital resources investment rather than only passively complying with regulatory requirements. Besides, most scholars focus on the relationship between bank capital and lending behavior across all banks as a whole. Some exceptions are Carlson et al. (2013) who use the bank capital ratio to divide banks into groups of low, medium, and high level to design the analysis; or Kim and Sohn (2017) who emphasize that the relationship between bank capital and lending changes, depending on liquidity levels. However, we know of no studies examining the moderating impact of credit risk on the link between bank capital and loan growth. This research direction is significant as there are relatively large differences in risk characteristics among banks in the same system, which could modify the importance of bank capital. Our study is expected to shed light on this issue by integrating the interaction terms of bank capital and credit risk.

Our study has several contributions. First, it extends the extant documents by proving that bank capital is an essential driver for lending behavior, especially with observations in developing countries which have drawn little attention so far. Instead of separately investigating loan growth and credit risk, we combine these two aspects in our study and further develop interaction factors between capital buffers and credit risk to capture asymmetric impact. As far as we know, our study is the first attempt to contribute to this segment of literature. We apply the dynamic model, regressed by the generalized method of moments (GMM) and the static model, regressed using the fixed effects model (FEM), the random effects model (REM), and the pooled regression approach, (Pooled OLS) to perform regressions. The final results remain identical across alternative regression techniques, supporting the consistency and reliability of our findings. Hence, our findings display insightful implications for bank managers and policymakers associated with the current bank capital debates. More precisely, the findings offer supportive evidence to clear doubts about the importance of capital buffers for the banks' growth strategy and safety in Vietnam. Moreover, the SBV could refer to the capitalization of each bank in the system to allocate credit growth limits for them. If so, a framework allowing for risk characteristics of different bank groups to construct relevant regulations could be considered under such an approach.

2. Relevant Literature and Hypothesis Development

The importance of bank capital has been well studied. The first argument that needs to be mentioned is that higher capital ratios will improve the banks' ability to overcome negative shocks and reduce the threat of bankruptcy (Coval & Thakor, 2005). To stabilize finance, holding sufficient capital helps banks absorb losses that may arise from the sale of liquid investments to repay the debts on demand (Distinguin et al., 2013). Gambacorta and Mistrulli (2004) claim that banks' lending behavior depends on capital structure, implying that well-capitalized banks

could withstand borrowers' temporary difficult financial situations and sustain their long-term lending relationships. Košak et al. (2015) conclude that banks having more capital could survive crises and better maintain their lending activities during stressed times.

In the opposite direction, bank capital is perceived as a motivational factor, which means that an adequate capital buffer makes banks favor prudent business strategies by reducing risky behaviors (VanHoose, 2007). Given that the rapid loan growth is often a sign of risk (Dang & Huynh, 2019; Fahlenbrach et al., 2018), greater capital buffers lead banks to become more cautious and thereby expand lending to a smaller extent than those with smaller buffers. Additionally, bank capital constitutes a significant element of the framework linking to lending standards proposed by Hughes and Mester (1998). Accordingly, banks often establish stricter lending rules after a negative shock to the capital ratio, reducing the number of loans disbursed to the economy.

Empirical evidence of many recent studies provides mixed results like the previously executed stream of documents about the effect of bank capitalization on loan growth. Košak et al. (2015) examine the determinants of lending behavior at banks worldwide from 2000 to 2010, focusing mainly on bank capital quality with different measures. Through a positive impact of tier 1 capital on loan growth during the global financial crisis and the same pattern of tier 2 capital in the normal period, they conclude the critical role of bank capital on the bank's internal capacity. Louhichi and Boujelbene (2017) analyze the correlation between bank capital and lending behavior at Islamic and conventional banks in Asia and Europe. They reveal that capital buffers induce a significant positive impact on loan growth, confirming the view that sufficient capital help banks cope with the crisis.

Kim and Sohn (2017) use a sample of US commercial banks to conduct their research. Their principal findings show that the impact of bank capital buffer on credit growth, measured by the growth rate of net loans and unused funding commitments, is positively correlated with liquidity positions for large banks. The results also highlight that bank capital significantly drives lending activities only after large banks keep enough liquid assets. Roulet (2018) investigates the impact of capital on bank lending in Europe after the 2008 financial crisis. The study reveals that capital buffers posit a negative impact on retail lending growth and other loans. In the context of the credit crunch in Europe, more stringent capital safety standards have forced banks to replace risky loans with high liquid assets that have less risk exposures.

Overall, from the perspective of Vietnam, an emerging market with a strongly growing banking industry, banks are always willing to invest resources to develop. In our case, we tend to emphasize that banks with adequate capital could easily overcome financial difficulties and expand lending compared to low-capitalized counterparts. Therefore, our first hypothesis is as follows:

H1: *Banks with more capital tend to expand lending more.*

The existing economic theories make different judgements regarding the impact of capital on bank risk-taking. Thakor (2014) protects the view of "too big to fail" for banks with abundant equity. These banks tend to be more reckless in investment, causing many potential risks to the credit portfolio. Another hypothesis assumes that bad-controlled banks tend to accept excessive risks to maximize share value, creating moral hazards accompanied by credit risks (Bitar et al., 2018). Previously, Blum (2008) demonstrates that capital is positively correlated with credit risks by the observation that when banks cannot build up their capital buffers, then the feasible solution for these banks is to decrease the risk exposure of asset portfolios. In an empirical study, Iannotta et al. (2007) find a positive effect of capital, measured by total equity over total assets, on provisions for loan losses in a sample of European banks between 1999 and 2004.

From the agency problem's perspective, if banks incur more losses, bank shareholders will have a greater reason to be more involved in monitoring activity. The circumstance is far more pronounced for banks with a large buffer of capital. This theory was first defined by Holmstrom and Tirole (1997) based on a framework in which more investments in costly equity capital strongly encourage banks to monitor their customers, proposing a negative interaction between bank capital and the risk of investment. In this context, banks' equity capital functions as a protection tool and triggers prudent management (Mosko & Bozdo, 2015). Besides confirming that banks need to pursue high capital ratios to counteract income shocks and ensure the ability to meet commitments towards customers, Anginer and Demirgüç-Kunt (2014) also argue that costly buffers are offset by more prudence and wisdom in bank shareholders' investment decisions. Some empirical studies support these arguments. Berger and Bouwman (2013) realize that greater capital leads to a lower probability of collapse for small banks. Meanwhile, Anginer and Demirgüç-Kunt (2014) find the negative relationship between capital and bank risk through a bank sample from 48 countries. The effect of magnitude is more amplified for large banks and during periods of financial stress.

Recently, a new research stream has emerged, exploring the effectiveness of risk-based capital on bank credit safety. In this vein, Cathcart et al. (2015) report that the 25 leading

banks in the US and Europe have a much higher capital ratio than the Basel Accords' guidelines. These banks, however, are unable to absorb their risks and prevent systemic risks. Using a sample of banks in OECD countries during 1999–2013, Bitar et al. (2018) examine whether maintaining higher capital ratios could increase bank safety. They conclude that the risk-based capital (proxied by many different risk-weighted measures) does not mitigate bank risk. All in all, it is observed that most studies following this emerging trend have not shown the significant impact of risk-based capital on bank riskiness.

Supporting the arguments on the agency problem, in the context of an emerging banking system, which perceives bank capital as a costly source in Vietnam (Dang, 2019), and also linking to Hypothesis 1 when it comes to the meaning of capital buffer, when banks are called upon by the state agencies to improve it, we develop the following hypothesis:

H2: *Banks with more capital tend to take less credit risks.*

Many studies have looked into the impact of credit risk on bank lending behavior. Most of the findings agree that banks will issue fewer loans to the market if they get into more credit risks (Berrospide & Edge, 2010). (Roulet, 2018) concludes that the increase in credit risk will put pressure on capital buffers and reduce banks' desire to make more lending. From the Vietnamese banking industry's perspective, the low credit quality has also created a burden on bank capital after the credit boom period (Dang, 2019). Accordingly, we construct a hypothesis that the bank credit risk will mitigate the positive impact of bank capital on lending captured by loan growth. In other words, we expect that banks with more credit risks will expand less lending compared to counterparts with lower risk levels in case they have the same adjustment in capital buffers.

H3: *Bank credit risk tends to mitigate the impact of bank capital on loan growth*.

3. Methodology and Data

3.1. Models

The study uses the model based on the dynamic approach, which is suitable to explain the lending behavior and risk-taking of banks:

$$\begin{aligned}\text{Lending}_{i,t} &= \beta_0 + \beta_1 \times \text{Lending}_{i,t-1} + \beta_2 \times \text{Capital}_{i,t-1} \\ &+ \beta_3 \times \text{Bank}_{i,t-1} + \beta_4 \times \text{Macro}_{t-1} + \varepsilon_{i,t}\end{aligned} \quad (1)$$

$$\begin{aligned}\text{Risk}_{i,t} &= \beta_0 + \beta_1 \times \text{Risk}_{i,t-1} + \beta_2 \times \text{Capital}_{i,t-1} \\ &+ \beta_3 \times \text{Bank}_{i,t-1} + \beta_4 \times \text{Macro}_{t-1} + \varepsilon_{i,t}\end{aligned} \quad (2)$$

In model 1, the dependent variable is *Lending*, representing the annual growth rate of loans (we consider customer loans only). The dependent variable in model 2, denoted by *Risk*, includes loan loss reserves (*LLR*) and non-performing loans (*NPL*) as a share of gross loans. To ensure the robustness of the regression results, we alternatively use these indices in separate estimates.

The variable *Capital* represents bank capital, which is the primary explanatory variable of our regression models. Most banks in developed countries worldwide have completed Basel III standards, explaining the availability and easy access to tier 1 and tier 2 capital data. For the Vietnamese banking market, however, data on the breakdown of bank capital are scarce. Hence, based on the availability of the data, we consider the ratio of bank equity to total assets as a proxy for bank capital, which has been commonly applied in related studies (Louhichi & Boujelbene, 2017; Roulet, 2018; Sorokina et al., 2017).

Bank captures a group of bank-specific control variables, and *Macro* is a vector of variables that control the macroeconomic environment. Following the existing literature theoretically and empirically on the determinants of bank lending and credit risk (e.g., Chaibi & Ftiti, 2015; Dahir et al., 2019; Roulet, 2018), the specific variables are considered as follows. In model 1, we include the micro explanatory variables (liquidity, non-interest income, state ownership, bank size, internal risk, deposits, and profitability) and macroeconomic factors (monetary policy, inflation, economic growth, and exchange rate). In model 2, we allow for the micro explanatory variables (liquidity, non-interest income, state ownership, bank size, loan share, deposits, and management efficiency) and macroeconomic factors (monetary policy, inflation, economic growth, and exchange rate). The definitions of all variables are shown in Table 1.

When banks carry out capital allocation or implement credit policies and business strategies, it takes time to take effect. Also, banks cannot react immediately to changes in macroeconomic shocks. Therefore, all explanatory variables are lagged by one year.

In this study, we also focus on analyzing whether banks' risk characteristics influence the impact of bank capital on lending. The interaction between bank capital and credit risk (*LLR* and *NPL*) is included in model 1. Corresponding to Hypothesis 3, we expect the regression coefficient of the interaction term to be negative, implying that bank risk tends to mitigate the impact of bank capital on lending:

$$\begin{aligned}\text{Lending}_{i,t} &= \beta_0 + \beta_1 \times \text{Lending}_{i,t-1} + \beta_2 \times \text{Capital}_{i,t-1} \\ &+ \beta_3 \times \text{Capital}_{i,t-1} \times \text{Risk}_{i,t-1} \\ &+ \beta_4 \times \text{Bank}_{i,t-1} + \beta_5 \times \text{Macro}_{t-1} + \varepsilon_{i,t}\end{aligned} \quad (3)$$

Table 1: Summary Statistics of Research Variables

	Mean	SD	Minimum	Maximum	Definitions
Dependent variables					
Lending	29.533	29.671	−5.159	111.120	The growth rate of customer loans (%)
LLR	1.253	0.509	0.502	2.499	Loan loss reserves/Gross loans (%)
NPL	2.147	1.187	0.495	5.159	Non-performing loans/Gross loans (%)
Bank-specific factors					
Capital	10.072	4.647	4.939	21.884	Capital equity/Total assets (%)
Liquidity	17.453	9.594	5.570	38.193	Liquid assets/Total assets (%)
State	0.133	0.340	0.000	1.000	The dummy variable taking the value of 1 in the case of state-owned banks, and 0 otherwise
NII	22.796	13.182	4.504	53.662	Total non-interest income/Total operating income (%)
Size	31.972	1.233	29.943	34.269	Natural logarithm of total assets
Deposit	63.676	13.501	36.186	85.466	Deposits from customers/Total assets (%)
ROA	0.911	0.656	0.038	2.279	Returns on assets (%)
LoanShare	54.724	12.645	31.227	74.392	Customer loans/Total assets (%)
Efficiency	2.067	0.569	1.195	3.290	Operating income/Total operating expenses (%)
Macroeconomic factors					
MP	10.400	3.328	6.960	16.954	The refinancing rate of the SBV (%)
GDP	6.245	0.642	5.247	7.130	The growth rate of GDP (%)
Inflation	7.495	6.226	0.631	23.115	The inflation rate (%)
Forex	9.914	0.117	9.687	10.045	Natural logarithm of the average exchange rate

3.2. Estimation Methods

We employ the GMM estimator to deal with the dynamic nature of the proposed model. We prioritize the version of the system GMM together with the two-step estimation to achieve more efficient results (Arellano & Bover, 1995; Blundell & Bond, 1998). To validate the use of the GMM estimator, we conduct the Hansen test of over-identifying restrictions to determine whether there is a correlation between the instrumental variables and the residual in the models. We also perform the Arellano-Bond test to ensure that our regression is free from the second-order autocorrelation in first-differenced errors.

To ensure that our work could yield robust results, we also utilize the static models (by eliminating the lagged dependent variable on the right side of the equation 1). The models are estimated by the ordinary least squares (OLS)/generalized least squares in the FEM, REM, and Pooled OLS.

3.3. Data

The study uses annual financial data of Vietnamese commercial banks from 2007 to 2019, collected from the financial statements of each bank. We filter the observations by eliminating banks that have been acquired (by SBV or other banks) and under special control by the state to reduce outliers' impacts. Due to the recent health conditions, such as extremely low equity or poor-quality credit portfolios, those banks behave differently from others in the same system. After the filtering procedure, the sample includes 31 banks, forming an unbalanced panel dataset. Besides, macroeconomic data are collected from the World Development Indicators (WDI) and the International Financial Statistics (IFS).

Table 1 shows the summary statistics of the variables used. We observe that the average loan growth rate of the period 2007–2019 is 29.533%. For a developing country like Vietnam, credit growth is considered as a key factor to fuel economic development. Besides, the statistics indicate a wide range of loan growth distribution ranging from −5.159% to 111.120%, suggesting a massive difference in their expansion capabilities and strategies. From 2007 to 2019, the ratio of equity on total assets is 10.072% on average. This reflects a certain level of

safety, which could ensure the operation of Vietnamese commercial banks. Concerning indicators that denote credit risks and profits, the distance between the extreme values is quite significant, and the standard deviations are also large. This observation proves that Vietnamese banks differentiate in risk management and business efficiency.

Besides, the correlations between our explanatory variables are small, thereby supporting the absence of multicollinearity in the regression models. For the sake of brevity, we do not report the matrix of correlation coefficients in the paper.

4. Empirical Results and Discussions

The results of the necessary tests all indicate that the estimation models are reliable to make economic decisions. Specifically, in the GMM dynamic panel model, (i) the regression coefficients of the dependent variable are statistically significant, (ii) there exists the first-order autocorrelation, but no second-order autocorrelation, and (iii) the instrumental variables used are appropriate based on the Hansen test. For static panel models, the *F*-test values show that all models are appropriately determined.

4.1. The Effect of Bank Capital on Lending

Table 2 presents research results for the impact of bank capital on loan growth. To test the sensitivity of the results, we first perform regressions with a group of explanatory variables that include only bank-specific factors, and then we add macroeconomic factors to produce the model with all variables of interest.

The regression results indicate a positive and statistically significant link (at the 1% level) between bank equity and loan growth, suggesting that banks with more capital equity tend to expand lending activities more aggressively. This finding confirms Hypothesis 1 and supports many previous studies (Kim & Sohn, 2017; Košak et al., 2015). In the Vietnamese banking market, the government has stringent control over credit growth for banks, and capital adequacy is an essential criterion for regulators to consider and allocate the credit limits for each bank (Vo, 2016). For banks themselves, when they could meet the capital requirements, they are equipped with a good cushion and thereby ready to extend lending activities (Coval & Thakor, 2005; Distinguin et al., 2013). In the context that the Vietnamese banking system has been struggling to implement Basel II capital adequacy standards, this result has important practical implications, highlighting the importance of appropriate bank capital buffers to address growth strategy.

4.2. The Effect of Bank Capital on Credit Risk

The results in Table 3 show that the bank capital variable's regression coefficients are negative across all models with the dependent variable of the loan loss reserves ratio. The majority of regression coefficients are statistically significant at the level of 5%. Similar results are found in the non-performing loan function (Table 4), but the statistical significance of the results is slightly reduced. Thus, we have evidence to support Hypothesis 2 that there exists an adverse effect of bank capital on credit risk.

The findings show that the more equity banks have, the lower level of credit risk they suffer. Owning a larger buffer of bank capital makes bank owners more cautious in their investment decisions, which reduces agency costs and increases the efficiency and safety of loan portfolios (Mosko & Bozdo, 2015). The finding also shows practical value when implying that banks in an emerging market like Vietnam need to be aware of bank capital's importance to business safety.

4.3. The Interaction Effect of Bank Capital and Credit Risk on Bank Lending

Observing Tables 5–6, we find that the regression coefficients of the interaction terms between bank capital and bank risk (Capital*LLR, Capital*NPL, Capital*LLR, and Capital*NPL) are negative and mostly statistically significant at the 5% level. While the regression coefficient on bank equity is positive, this reveals that the greater bank risk level reduces the effect of bank capital on bank lending. The use of two alternative risk measures and different estimation models/methods does not change this result. Hence, the finding fully supports Hypothesis 3, that bank risks undermine the impact of bank capital on loan growth.

Overall, our finding is consistent with the argument that an increase in a bank's credit risk will put pressure on bank capital and thereby reduce its desire to lend (Roulet, 2018). Banks with more credit risk have shown more caution in their investment decisions to ensure future capital adequacy ratios. This result is also relevant to the Vietnamese banking system's situation in recent years when the signs of low credit quality have created burden on banks' capital equity after the credit boom period.

5. Conclusions

The objective of the study is to investigate the impact of bank capital on the lending behavior of Vietnamese commercial banks from 2007 to 2019. Lending behavior is demonstrated by two dimensions, namely, loan growth and credit risk. The robust results show evidence in favor of an essential role of bank capital in determining bank lending activities. Specifically, banks with higher capital ratios tend to expand lending more and suffer less credit portfolio risks. Additionally, we also analyze the marginal impact on bank loan growth through the interaction between bank capital and credit risk. As a result, we find that the bank's risk level reduces the impact of bank capital on loan growth, which enlarges the existing limited documents.

Table 2: Bank Capital and Loan Growth

The dependent variable is the growth rate of customer loans								
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
	GMM	**FEM**	**REM**	**Pooled OLS**	**GMM**	**FEM**	**REM**	**Pooled OLS**
Lagged dependent variable	0.106***				0.203***			
	(0.015)				(0.031)			
Capital	4.952***	2.282***	1.860*	1.491***	2.525***	2.321***	1.690***	1.280***
	(0.444)	(0.595)	(0.873)	(0.400)	(0.519)	(0.261)	(0.538)	(0.381)
Liquidity	1.489***	0.916**	0.914**	0.881***	1.201***	0.626**	0.647**	0.635***
	(0.157)	(0.383)	(0.360)	(0.160)	(0.255)	(0.268)	(0.277)	(0.157)
State	−8.588**	−0.001	−0.449	−1.126	−9.295**	−0.001	−12.764***	−8.722*
	(4.045)	(0.001)	(4.840)	(4.700)	(4.350)	(0.001)	(1.919)	(4.681)
NII	0.042	0.112	0.146	0.152	−0.064	−0.009	−0.014	0.009
	(0.053)	(0.169)	(0.194)	(0.098)	(0.056)	(0.155)	(0.191)	(0.093)
Size	15.864***	3.215	4.661*	4.729**	9.963***	19.075**	8.354***	6.476***
	(1.859)	(4.507)	(2.445)	(1.916)	(1.580)	(6.408)	(1.872)	(1.940)
LLR	−8.724***	−9.808**	−10.549**	−11.119***	−2.632	−7.188**	−7.829**	−8.732***
	(1.564)	(3.432)	(3.579)	(2.766)	(1.893)	(2.328)	(2.653)	(2.721)
Deposit	0.029	0.108	−0.066	−0.167	0.022	0.342***	0.016	−0.125
	(0.057)	(0.141)	(0.150)	(0.119)	(0.078)	(0.108)	(0.121)	(0.109)
ROA	−18.153***	−0.788	−1.711	−2.159	−8.628***	−1.428	−2.227	−2.769
	(3.009)	(2.794)	(2.980)	(2.155)	(2.529)	(1.957)	(1.463)	(2.223)
MP					−8.172***	−3.972***	−5.192***	−5.343***
					(0.522)	(1.001)	(1.004)	(1.004)
Inflation					4.396***	2.194***	2.645***	2.741***
					(0.264)	(0.446)	(0.488)	(0.504)
GDP					−13.503***	−7.956**	−9.073***	−9.618***
					(1.430)	(2.704)	(2.316)	(2.091)
Forex					1.975	−109.280***	−57.653***	−47.112***
					(18.761)	(23.441)	(11.969)	(15.675)
Observations	337	337	337	337	337	337	337	337
AR (1) test	0.004				0.002			
AR (2) test	0.685				0.153			
Hansen test	0.185				0.159			
F-test		0.000	0.000	0.000		0.000	0.000	0.000
R-squared		0.244	0.231	0.235		0.422	0.373	0.380
Notes. The tests (Hansen test, AR (1)/AR (2) tests, and *F*-test) are presented with *p*-values. *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.								

Table 3: Bank Capital and Loan Loss Reserves

The dependent variable is the ratio of loan loss reserves to gross loans								
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
	GMM	**FEM**	**REM**	**Pooled OLS**	**GMM**	**FEM**	**REM**	**Pooled OLS**
Lagged dependent variable	0.523***				0.368***			
	(0.062)				(0.060)			
Capital	−0.010	−0.012**	−0.010**	−0.006	−0.028**	−0.014***	−0.016**	−0.015*
	(0.011)	(0.005)	(0.004)	(0.008)	(0.013)	(0.004)	(0.005)	(0.008)
Liquidity	−0.001	−0.016**	−0.015***	−0.014***	−0.009*	−0.016**	−0.015**	−0.013***
	(0.003)	(0.005)	(0.005)	(0.004)	(0.005)	(0.006)	(0.005)	(0.004)
NII	0.004*	0.001	0.001	0.002	0.005**	0.003**	0.003*	0.004**
	(0.002)	(0.001)	(0.001)	(0.002)	(0.003)	(0.001)	(0.002)	(0.002)
Size	0.057	−0.033	0.005	0.029	0.005	0.185**	0.095**	0.023
	(0.037)	(0.030)	(0.032)	(0.038)	(0.049)	(0.062)	(0.035)	(0.042)
State	0.119	0.001	0.584**	0.557***	0.313**	0.001	0.202	0.438***
	(0.080)	(0.001)	(0.206)	(0.098)	(0.126)	(0.001)	(0.226)	(0.101)
LoanShare	0.007**	−0.006	−0.008**	−0.012***	0.008**	−0.001	−0.002	−0.009***
	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)
Deposit	−0.018***	−0.008***	−0.006**	−0.003	−0.014***	0.001	0.001	0.002
	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)
Efficiency	−0.054	−0.007	0.017	0.053	0.090*	0.018	0.025	0.063
	(0.043)	(0.070)	(0.067)	(0.048)	(0.048)	(0.058)	(0.066)	(0.053)
MP					0.051***	0.129***	0.118***	0.105***
					(0.011)	(0.010)	(0.015)	(0.020)
Inflation					−0.013***	−0.039***	−0.036***	−0.032***
					(0.004)	(0.006)	(0.009)	(0.010)
GDP					−0.018	−0.018	−0.021	−0.025
					(0.030)	(0.035)	(0.041)	(0.044)
Forex					0.482	−0.616*	−0.134	0.385
					(0.470)	(0.336)	(0.247)	(0.345)
Observations	320	335	335	335	320	335	335	335
AR (1) test	0.001				0.001			
AR (2) test	0.183				0.316			
Hansen test	0.538				0.483			
F-test		0.000	0.000	0.000		0.000	0.000	0.000
R-squared		0.082	0.241	0.255		0.262	0.319	0.346

Notes. The tests (Hansen test, AR (1)/AR (2) tests, and *F*-test) are presented with *p*-values. *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 4: Bank Capital and Non-Performing Loans

The dependent variable is the ratio of non-performing loans to gross loans								
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
	GMM	**FEM**	**REM**	**Pooled OLS**	**GMM**	**FEM**	**REM**	**Pooled OLS**
Lagged dependent variable	0.455***				0.441***			
	(0.038)				(0.042)			
Capital	−0.044***	−0.013	−0.014	−0.008	−0.033***	−0.021	−0.025	−0.025
	(0.012)	(0.019)	(0.013)	(0.022)	(0.013)	(0.013)	(0.016)	(0.022)
Liquidity	−0.027***	−0.042***	−0.040***	−0.036***	−0.037***	−0.040***	−0.038***	−0.033***
	(0.009)	(0.009)	(0.008)	(0.010)	(0.011)	(0.009)	(0.010)	(0.010)
NII	−0.002	−0.007	−0.004	−0.001	−0.001	0.002	0.003	0.004
	(0.006)	(0.005)	(0.007)	(0.005)	(0.006)	(0.004)	(0.005)	(0.005)
Size	−0.160***	−0.286**	−0.211*	−0.135	0.128	−0.013	−0.111	−0.169
	(0.054)	(0.106)	(0.098)	(0.105)	(0.111)	(0.118)	(0.103)	(0.115)
State	0.232	0.001	0.766*	0.598**	−0.400	0.001	0.155	0.373
	(0.223)	(0.001)	(0.411)	(0.263)	(0.283)	(0.001)	(0.404)	(0.270)
LoanShare	0.018***	−0.012	−0.013	−0.013	0.030***	0.002	−0.001	−0.006
	(0.003)	(0.010)	(0.011)	(0.008)	(0.007)	(0.011)	(0.012)	(0.008)
Deposit	−0.052***	−0.028*	−0.027*	−0.024***	−0.054***	−0.009	−0.011	−0.011
	(0.006)	(0.013)	(0.013)	(0.007)	(0.006)	(0.010)	(0.012)	(0.007)
Efficiency	−0.155	−0.282	−0.265	−0.223	−0.504***	−0.311**	−0.310	−0.239
	(0.112)	(0.197)	(0.199)	(0.135)	(0.179)	(0.122)	(0.180)	(0.150)
MP					0.242***	0.330***	0.319***	0.314***
					(0.018)	(0.042)	(0.047)	(0.056)
Inflation					−0.107***	−0.103***	−0.102***	−0.106***
					(0.009)	(0.022)	(0.024)	(0.028)
GDP					0.338***	0.165	0.156	0.128
					(0.068)	(0.112)	(0.104)	(0.124)
Forex					−3.395***	−0.261	0.315	1.049
					(1.063)	(0.958)	(0.836)	(0.982)
Observations	276	303	303	303	276	303	303	303
AR (1) test	0.004				0.019			
AR (2) test	0.093				0.173			
Hansen test	0.199				0.300			
F-test		0.000	0.000	0.000		0.000	0.000	0.000
R-squared		0.102	0.100	0.103		0.239	0.203	0.210
Notes. The tests (Hansen test, AR (1)/AR (2) tests, and *F*-test) are presented with *p*-values. *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.								

Table 5: The Moderating Role of Bank Risk (Loan Loss Reserves)

The dependent variable is the growth rate of customer loans				
	(1)	**(2)**	**(3)**	**(4)**
	GMM	**FEM**	**REM**	**Pooled OLS**
Lagged dependent variable	0.201***			
	(0.031)			
Capital	4.872***	2.573***	1.732**	1.713***
	(0.910)	(0.414)	(0.602)	(0.500)
Capital*LLR	−1.182*	−0.218	−0.387*	−0.395
	(0.697)	(0.320)	(0.195)	(0.295)
Liquidity	1.050***	0.603*	0.620**	0.619***
	(0.293)	(0.301)	(0.275)	(0.157)
State	−11.574***	−0.001	−9.253***	−9.070*
	(2.817)	(0.001)	(1.598)	(4.682)
NII	−0.058	−0.008	0.015	0.017
	(0.063)	(0.155)	(0.180)	(0.093)
Size	14.123***	19.390**	6.801***	6.704***
	(1.420)	(6.342)	(1.841)	(1.945)
LLR	1.351	−6.274**	−6.291***	−6.275*
	(2.930)	(2.058)	(1.614)	(3.281)
Deposit	0.017	0.347***	−0.115	−0.123
	(0.082)	(0.105)	(0.124)	(0.109)
ROA	−12.956***	−1.304	−2.606	−2.621
	(2.838)	(1.862)	(1.684)	(2.223)
MP	−7.378***	−3.804**	−5.142***	−5.148***
	(0.728)	(1.225)	(0.987)	(1.013)
Inflation	4.077***	2.133***	2.657***	2.662***
	(0.280)	(0.531)	(0.503)	(0.507)
GDP	−13.195***	−8.167***	−10.014***	−10.064***
	(1.575)	(2.440)	(1.781)	(2.115)
Forex	5.024	−107.822***	−43.344***	−42.644***
	(20.979)	(22.122)	(10.237)	(16.008)
Observations	337	337	337	337
AR (1) test	0.001			
AR (2) test	0.432			
Hansen test	0.204			
F-test		0.000	0.000	0.000
R-squared		0.423	0.383	0.383

Notes. The tests (Hansen test, AR (1)/AR (2) tests, and *F*-test) are presented with *p*-values. *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 6: The Moderating Role of Bank Risk (Non-Performing Loans)

The dependent variable is the growth rate of customer loans				
	(1)	**(2)**	**(3)**	**(4)**
	GMM	**FEM**	**REM**	**Pooled OLS**
Lagged dependent variable	0.183***			
	(0.040)			
Capital	2.557***	3.093***	2.292***	1.595***
	(0.812)	(0.345)	(0.467)	(0.419)
Capital*NPL	−0.623***	−0.349***	−0.360***	−0.375***
	(0.083)	(0.073)	(0.107)	(0.099)
Liquidity	0.243	0.463**	0.519**	0.532***
	(0.424)	(0.165)	(0.219)	(0.167)
State	−1.672	0.001	−8.995*	−6.098
	(4.821)	(0.001)	(4.346)	(4.431)
NII	0.130***	0.118	0.072	0.050
	(0.040)	(0.266)	(0.281)	(0.097)
Size	0.473	10.104*	3.382	1.778
	(2.465)	(4.644)	(2.317)	(2.022)
NPL	−2.800***	−2.293*	−1.260	−0.600
	(0.934)	(1.142)	(1.099)	(1.127)
Deposit	0.052	0.533***	0.141	−0.121
	(0.102)	(0.169)	(0.195)	(0.115)
ROA	−6.331*	−1.241	−1.831	−1.757
	(3.835)	(2.418)	(2.630)	(2.371)
MP	−4.362***	−3.568**	−4.421**	−4.593***
	(0.739)	(1.310)	(1.512)	(1.045)
Inflation	2.876***	2.192***	2.489***	2.560***
	(0.340)	(0.686)	(0.799)	(0.531)
GDP	−10.219***	−7.239**	−7.574**	−8.001***
	(2.187)	(2.732)	(2.608)	(2.217)
Forex	−16.048	−87.967***	−48.835***	−32.128**
	(21.440)	(20.691)	(13.912)	(16.118)
Observations	288	288	288	288
AR (1) test	0.008			
AR (2) test	0.643			
Hansen test	0.158			
F-test		0.000	0.000	0.000
R-squared		0.461	0.341	0.362

*Notes.*The tests (Hansen test, AR (1)/AR (2) tests, and F-test) are presented with p-values. *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

The study offers some insightful policy implications. Investing in equity capital to develop lending activities and improve credit quality is essential and should be implemented harmoniously, especially in the context of an emerging market like Vietnam, where banks are attempting to apply Basel II guidelines as required by regulators. The finding also suggests an equation for the government to measure each bank's credit growth ceiling based on their capital adequacy. In recent years, in addition to the regulations of short-term funding ratio to finance medium- and long-term loans, the SBV also applies the credit limit tool for banks to manage monetary policy. Finally, supported by the idea that different risk levels make bank capital react differently to lending expansion, regulations of minimum capital adequacy levels for separate bank groups should be considered based on bank riskiness.

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