

THE IMPACT OF COMPETITION ON CREDIT RISK: THE CASE OF VIETNAM COMMERCIAL BANKS

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Abstract - This main purpose of this research is to investigate the influence of competition on credit risk in Vietnam commercial banks over the period 2006 – 2016. Both Lerner indicator and Herfindahl Hirschman Index (HHI) are employed to measure competition degree while non-performing loan (hereafter, NPL) ratio is a proxy for credit risk. The main results indicate that competition positively impacts on the probability of loan non-payment. However, more specifically, expanding lending products also denotes a positive effect on the capability of non-repayment, supported by the "competition – instability" prevalent view. Otherwise, We further find strong evidence that the relationship between competition and credit risk is non-linear with U-shape.

Key words - competition; risk; credit risk; Lerner index; commercial banks.

1. Introduction

One of the extremely essential roles of competition is to enhance operational quality for the ultimate purpose of value maximization. However, we should not conclude that the competitive strategies do not lead to negative aspects. For example, banks that intend to compete excessively may lead to face NPLs, even results in going bankrupt. For that reason, the relation between competition and credit risk has received scholars' attentions. This is reflected in a series of studies published recently. However, these researches have not had a high consensus because the effect of competition on loan recovery is mixed.

On the one hand, the prevalent view point "competitive – instability" supposes that there is a positive correlation between competition and credit risk. This can be explained that profit margins are narrowed and banks might take excessive risks to maximize returns when a large number of banks expand competitiveness extent. Hence, expanding activities to compete contributes to eroding brand value, consequently leading to collapse (Keeley, 1990) or competition is one of the main sources of bank instability (Boyd et al, 2005) and therefore higher competitiveness will lead banks to more volatility (Soedarmono et al, 2011).

On the other hand, the recent empirical results supporting the "competition-stability" opinion document the less intensive the competition, the greater the credit risk. Allen and Gale (2004) further argue that the more competition will lead to a reduction in bad debt or "banks become more powerful in expanding profitability and mitigates NPLs" (Koetter and Poghosyan, 2009). Moreover, the reduction of interest rate or even lowering appraisal criteria encourages banks to be approachable and control each client segment easily. Sometimes, this can eliminate adverse selection and moral hazard encountered by customers, thereby contributing to the lower probability of loan payment.

In Vietnam, the integrated progress has helped Vietnam

banking system to develop in line with international standards and become stronger. However, Vietnam commercial banks also confront certain obstacles. One of them is competitive forces among Vietnam commercial and foreign banks. In the context of global integration, banking system plays an essential role in economy and therefore banks are forced to enhance their competitiveness and have their appropriate strategies to ensure their roles. It is certain that the impact of competition on credit risk is theoretically and practically significant. However, it remains silent on whether credit risk is a function of competition in Vietnam. Hence, in order to contribute theoretical and practical evidence to bank managers and policymakers, this impact needs to be examined in Vietnam.

2. Literature review and hypothesis development

2.1. Literature review

The nexus of competition and the probability of loan payment discussed in empirical studies in countries around the world indicate mixed results.

On the one hand, the overwhelming opinion of "competition - risk" suggests that diversification is one of the main sources of credit risk. The interests in the relationship between competition and stability in banking sector were triggered by Keeley (1990), who initiated an academic debate that product diversification to compete contributes to eroding brand value, consequently leading to collapse (Keeley, 1990). As the quality of the loan portfolio is likely to deteriorate due to debt holders' more marginal benefits requirements and thereby increase bank fragility. In addition to this, recent studies have illustrated that enhancing competitiveness makes banks reduce borrowers' loan-related information, their motivation to manage loans, resulting in a worse effect on bank stability (Allen and Gale, 2004). Furthermore, banks with high market power in lending sector are under pressure of increasing risk because high interest costs generate difficulties for customers to repay, leading to exacerbate adverse selection and moral hazard. Hence, greater competition encourages banks to accept more diversified risks, making banking system more vulnerable to shocks (Anginer et al, 2014).

We hypothesize that competition impacts positively credit risk of commercial banks (H1).

On the other hand, the "competition - stability" perspective favors the existence of a positive relationship between competition and credit risk. Enhancing competitiveness is encouraged to minimize the probability of increasing risk because the lack of competitive operations can exacerbate the instability of banks. Mishkin

(1999) paid attention to the notion of "too big to fail", documents that large banks exist moral hazard established by managers who usually accept risky deals under the patronage of the central bank. Furthermore, these banks are generally supported by governmental policies that encourage them to take more risks that destabilize the banking system (Acharya et al, 2012). Additionally, the nexus of bank concentration and NPL ratio indicates that more market power associates with riskier loan portfolios (Berger et al, 2009). Higher interest rate leads to the poorer loan portfolio's risk due to adverse selection and moral hazard (Stiglitz and Weiss, 1981).

We hypothesize that competition effect negatively on credit risk of commercial banks (H2).

Moreover, Martinez-Miera and Repullo (2010) document a non-linear relationship between competition and credit risk. This is because the ultimate purpose of enhancing competitiveness is to divergence bad effects with the immediate step of product quality improvement. Therefore, in the first period, improving competitiveness delivers banks to a better situation. However, a negative aspect of this issue is that banks tend to focus on operational diversification but they neglect intrinsic resources leading easily to unexpected risks. In detail, they find the evidence of a U-shaped relationship between competition and bank risk. The probability of default goes up following an increase in bank competition but it has a downward trend after reaching a threshold. The idea was supported by Berger et al (2009), Kasman and Kasman (2015).

We hypothesize that the nexus of competition and credit risk is nonlinear (H3).

2.2. Methodology

2.2.1. Methodology

The two-step System GMM method is utilized to examine whether credit risk is a function of competition.

Using benchmark estimators, such as Pooled Ordinary Least Square (OLS), Fixed-effects (FE) or random effect (RE) results in biasedness, leading to potentially misleading inferences. This is because OLS considers banks to be homogeneous. However, in reality, each bank has different characteristics, such as attention level to risk, competitiveness and corporate governance. Thus, OLS can lead to biased estimates if these bank fixed effects are not controlled. Otherwise, the other methods FE and RE cannot cover potential endogenous concerns. There are two main factors leading to endogeneity. Firstly, simultaneous effects indicate that the casual nexus in the specification can occur in two dimensions, so regression of these explanatory variables may be correlated with error term, leading to endogenous concern. Secondly, omitted-variable bias explains that FE and RE estimations do not take into account the external factors that are assumed in error terms and are not correlated with explanatory variables. However, these factors, namely, inflation, economic crisis could explain changes in banks' operation. In addition, these traditional econometric techniques above could not address all endogenous concerns with the visibility of the lagged dependent variable.

The System Generalized Method of Moments (S-GMM) initiated by Blundell and Bond (1998) uses the lagged explanatory variables to establish instruments. The conditions for the S-GMM estimation include: (1) the visibility of over-identifying restrictions in order to ensure the suitability of instrumental variables and no correlation between instrumental variables and error term; (2) no second-order autocorrelation in first-order differences. Therefore, Hansen and Arellano-Bond tests are employed with the aim of checking the suitability of two conditions above. Besides, the two-step GMM method is better than the one-step GMM because of using covariance-matrix in case of existing serially correlated errors in the second-order or heteroscedasticity. For these reasons, the two-step SGMM is the most appropriate method to regress this relationship.

2.2.2. Empirical model

The model to assess the impact of competition on credit risk in Vietnam commercial banks is as follows:

$$NPL_{i,t} = \beta_0 + \beta_1 NPL_{i,t-1} + \beta_2 COM_{i,t} + \beta_3 CON_{i,t} + u_{i,t} \quad (1)$$

Where $NPL_{i,t-1}$ is the one period-lagged NPL rates, COM and CON denote vectors of competition and control variables, respectively.

The study also adds one period-lagged value of NPLs as an independent variable in the model for the purpose of indicating that the rate at which bank risk converges toward a long-run level (Kasman and Kasman, 2015).

Moreover, to investigate the nonlinear relationship between competition and credit risk, the squared competition indices are added to the equation as follows:

$$NPL_{i,t} = \beta_0 + \beta_1 NPL_{i,t-1} + \beta_2 COM_{i,t} + \beta_3 COM_{i,t}^2 + \beta_4 CON_{i,t} + u_{i,t} \quad (2)$$

2.2.3. Variable construction

Credit risk

Credit risk is as a ratio of loans in groups 3, 4 and 5 to total bank loans or NPL ratio. If NPL is high and cannot be controlled it will lead to failures. Hence, NPL is an important factor that should be strictly followed because NPLs are mainly employed to describe credit quality. In the meanwhile, credit risk is one of the major risks. Hence, credit risk is a concern of interest in terms of bank stability (Kasman and Kasman, 2015). If the more the bad debt ratio to total outstanding loans is, the riskier the lending portfolios (Berger et al, 2009). Furthermore, the higher in NPL ratio, the more probable in bank insolvency (Kabir and Worthington, 2017).

Competition variables

The Lerner index initiated by Lerner (1934) is employed to measure bank competitive extent because the unstructured approach can evaluate market power of banks with the concentration on the difference of price and marginal costs (Tusha and Hashorva, 2015). Specifically, the Lerner index defined as the difference between output price and marginal cost exhibits that whether banks evaluate their products higher than marginal cost (Berger et al, 2009). If Lerner = 0, the market is perfectly competitive and vice versa. if Lerner = 1, the market is completely monopoly. The Lerner index is calculated as

follows: $Lerner_{i,t} = \frac{P_{i,t} - MC_{i,t}}{P_{i,t}}$

Where $P_{i,t}$ is the output price of bank i at time t which is the ratio of total revenue to total assets and $MC_{i,t}$ is the marginal cost of bank i at the end of period t .

Since the marginal cost of banks cannot be directly observed, the MC is calculated based on total cost. The bank's total cost (TC) is calculated by the logarithm of cost with one output factor (total assets (Q_i, t)) and three inputs (W_j) including: labor cost (W_1 - the ratio of employee cost to total asset); material cost (W_2 - the ratio of non-interest expense to fixed asset); capital cost (W_3 - the ratio of interest cost to total bank deposits (Berger et al, 2009)). Specifically, the specification of total cost is as follows:

$$\begin{aligned} \ln TC = & \beta_0 + \beta_1 \ln Q_{i,t} + \beta_2 \frac{1}{2} \ln Q_{i,t}^2 + \sum_{k=1}^3 (\gamma_{kt} \ln W_{k,it}) \\ & + \sum_{k=1}^3 (\phi_k \ln Q_{i,t} \ln W_{k,it}) \\ & + \sum_{j=1}^3 \sum_{k=1}^3 (\ln W_{k,i,t} \ln W_{j,i,t}) \end{aligned}$$

Following this, the marginal cost equation is computed by taking the first derivative of the total cost function, by:

$$MC = \frac{TC_{it}}{Q_{it}} [\beta_1 + \beta_2 \ln Q_{it} + \sum_{j=1}^3 (\phi_k \ln W_{k,it})]$$

Where (β) and (ϕ) coefficients are determined from the regression outcomes of the total cost specification constructed above.

Additionally, we also approach the traditional measure of HHI (Herfindahl-Hirschman Index) in order to consider as a proxy of competitive degree because this index is employed to assess the contribution extent of each individual in a population (competitive degree). According to HHI approach, the competitive extent will be classified as: $HHI < 0.01$ (perfectly competitive); $0.01 < HHI < 0.1$ (highly competitive); $0.1 < HHI < 0.18$ (medium competitive) and $HHI > 0.18$ (highly concentrated and tending to be monopolistic). In this study, the HHI index is to reflect concentration extent of loans (HHI_L) and calculated as follows: $HHI_L = \sum_{i=1}^k S_i^2$; where, S_i is calculated as market share of bank i on total loans of banks in the banking system.

Control variables

Control variables include bank-specific and macroeconomic conditions to control the net impact of competition variables on bank risk. Bank variables include: SIZE-the natural logarithm of total assets; TA_GRO-the growth rate of total assets value of the current year compared to the previous year and L_TA-the ratio of total loans to total assets. Macroeconomic characteristics contain: LN(GDP) - the natural logarithm of gross domestic product and INF- inflation rate.

2.2.4. Data

A set of secondary data is collected from audited financial statements, annual reports, prospectuses of Vietnam commercial banks in the period of time from 2006

to 2016 through banks' websites or stock exchanges and some other websites. Database employed for this research is unbalanced dynamic panel data because of the lack of data of a few merged and acquired banks. In order to avoid the adverse effects of insufficient data, banks with consecutive five-years or more are chosen. Finally, there are 27 banks selected with 207 observations. Moreover, we reduce the effect of outliers by winsorizing all ratios at the fifth and ninety-fifth percentiles.

3. Results and discussions

3.1. Descriptive statistics and correlations

Table 1 presents the summary statistics for the entire sample. On average, a bank in the entire sample has NPLs ratio of 0.022, being in the range of bad debt ratio. With respect to competition variables, the means of LERNER index and HHI are 34.3% and 0.132, respectively, indicating that the competition extent is extremely serious. An average bank in the sample has total asset logarithm of 18.025 million VND, a total asset growth speed of 39%, a loan to total asset ratio of 51.2%.

In terms of macroeconomic characteristics, the means of natural logarithm of GDP and inflation rate are 9.434 million VND and 8.5%, respectively.

Table 1. Descriptive statistics of variables

STT	Variable	Mean	Std. Error	Min	Max
1	NPL	0.022	0.016	0.000	0.096
2	LERNER	0.343	0.132	-0.049	0.624
3	HHI_L	0.132	0.032	0.104	0.223
4	SIZE	18.025	1.353	13.135	20.730
5	TA_GRO	0.390	0.709	-0.392	8.355
6	L_TA	0.512	0.138	0.041	0.808
7	LN(GDP)	9.434	0.186	9.026	9.654
8	INF	0.085	0.060	0.009	0.231

Source: Author's calculation

An important hypothesis is that there is no multicollinearity among the explanatory variables. All of the correlation coefficients in Table 2 are less than 0.8. Following Klein's rule of thumb, it can be concluded that the independent variables in the equation are not multicollinear. Additionally, we also test multi-collinearity via Variance Inflation Factor (VIF). However, these indices fluctuate from 1.09 to 3.79 (less than 5), proving that it is unlikely to have multicollinearity (to conserve space, these VIF indexes are unreported in the paper)

Table 2. Correlation matrix

	NPL	LER NER	HHI _L	SIZE	TA _GRO	L_TA	LN (GDP)	INF
NPL	1							
LERNER	-0.12	1						
HHI_L	-0.20	-0.08	1					
SIZE	0.00	0.38	-0.34	1				
TA_GRO	-0.2	-0.00	0.32	-0.31	1			
L_TA	0.00	0.22	0.05	0.17	-0.17	1		
LN(GDP)	0.14	0.14	-0.78	0.47	-0.41	0.04	1	
INF	0.06	-0.38	0.25	-0.21	0.03	-0.16	-0.44	1

Source: author's calculation

3.2. Results and discussion

The results in Table 3 indicate that the models are satisfactory in terms of serial correlation with the P-value of AR (1) less than 0.05 and the P-value of AR (2) not statistically significant. Therefore, there is no second order autocorrelation. Moreover, Hansen test's results record a high P-value value which is over 0.1, hence it is impossible to disprove the hypothesis that the instruments are appropriate. This demonstrates that the instruments solve the endogeneity. Therefore, the beta coefficients of the regression model can be used for analysis.

Table 3. Regression results

Dep. Variable	NPL			
	(1)	(2)	(3)	(4)
L.NPL	0.845***	0.555***	0.369**	0.390**
LERNER	0.041***		0.431***	
LERNER_2			-0.637***	
HHI_L		-0.058*		-2.747***
HHI_L_2				9.767***
SIZE	-0.018***	-0.026***	-0.019***	-0.017***
TA_GRO	0.001	0.001*	0.002	0.003***
L_TA	0.027***	0.041***	0.017*	0.033**
LN(GDP)	0.087***	0.109***	0.137***	0.094**
INF	0.144***	0.131***	0.109***	0.085***
_cons	-0.529***	-0.581***	-1.102***	-0.395***
No. instrument	23	23	23	23
Hansen test	0.238	0.307	0.310	0.472
AR1	0.015	0.007	0.024	0.011
AR2	0.970	0.691	0.356	0.259

Note: ***, **, * denote significance at 1%, 5%, 10%.

Source: author's calculation

Table 3 shows that the coefficient of the Lerner index is positive and highly significant at the 1% level with magnitude of 0.041. This result suggests that the competition is positively related to credit risk, implying that when banks diversify their products to compete, the bad debt ratio is larger, leading banks to become more unstable. The conclusion is to support the "competition - financial stability" opinion and, is consistent with our both predictions (H1) and earlier findings in the literature (Berger et al, 2009; Moch, 2013; Fiordelisi and Mare, 2014).

Turning to the impact of competition in lending operation on the possibility of loan repayment, the coefficient of HHI_L is negative and significant at the 10% level. This indicates that there is a negative effect of the expansion of lending operations on the proxies of credit risk. However, the competition is positively associated to credit risk because the proxy and the competitive extent have the same magnitudes but are opposite in sign. This finding suggests that the higher in outstanding loans, the more serious in bad debt ratio. The reason for this trend is that banks tend to lower evaluation standards, leading to take more risk in order to maximize their profits. The conclusion is consensus with the perspective of "competition - risk" and in line with both what we anticipate (H1) and Kasman and Kasman (2015). In fact, Vietnam commercial banks have competed mainly based on traditional interest rate-related activities such as loans, deposits. Basically, lending

operations account for a large proportion of total assets. Therefore, increased competitive degree is commonly attributed to strengthening loans. For this reason, riskier loans is followed by expanding lending activities in Vietnamese context because our banking system cannot control the effects of overheated loans development and the consequences of the 2008 financial crisis.

In particular, following Berger et al (2009), Martinez-Miera and Repullo (2010), Kasman and Kasman (2015), the nonlinear correlation (the U-sharp curve) between competition and credit risk is next investigated. The results in model 3 exhibit that the negative coefficient on the squared Lerner index is statistically significant at the 1% level. The new finding proves that the presence of the U-Shaped curve between competition and borrowers' affordability is practical, is in line with what we anticipate above (H3).

To arrive at a more complete picture, we continue to find consistent evidence of nonlinear influence of expanding in lending sectors on credit risk. Model 4 documents that the positive coefficient on the squared HHI is statistically significant at the 1% level. However, the relationship between the competitive extent and the proxy of this variable is opposite. Therefore, we further point out the nonlinear effect of loans competition on credit risk. In other words, the U-shaped is the most suitable curve to describe the nonlinear nexus, consistent with our expectation (H3).

In order to explain the non-linear relationship above in the context of Vietnam, we document that 2012 is the bottom of the U-sharped graph. The period 2010 - 2012 not only witnessed the most competitive period but also denoted that bad debt rose significantly. The reason could be explained is that the banks aggressively competed not based on internal forces in the worse macroeconomic conditions, leading to more NPL rates. Furthermore, the barriers in mobilization for foreign banks were removed and they started to participate in the more equal competition environment with domestic banks.

On the other hand, Vietnam commercial banks' inefficiency also led to an increase of competition and credit risk. In the period 2006-2010, many established banks generated the more competitive environment among banks along with the proliferation of Vietnam economy. However, too many small-scaled banks existed because they started from rural commercial banks and were converted into urban commercial banks which had a rapid growth of assets and loan portfolios. As a result, the bad debt increased in the next phase and destabilized banking system. In addition, the application of the maximum lending rate makes competitiveness among banks more stressful. The reason is that Vietnam commercial banks have developed by focusing on two main traditional products namely deposit and loans activities. Hence, banks mainly compete with one another for interest.

Realizing the repercussions of extremely quick development in lending sector, a series of policies was established to be contributive to address NPLs. In the meanwhile, competition extent remained even fiercer, generating the greater credit risk in the period of time from 2013-2016. (In order to conserve space the effects of

control variables are not reported in this paper)

4. Conclusions and implications

This study provides empirical evidence that the less fierce the competition is, the greater the credit risk is in Vietnam commercial bank sector. To arrive at a more complete picture, we also further find that the more intense the banks is in lending sector, the poorer the credit risk is. Overall, this indicates that expanding comprehensive or lending operations to compete is one of the main sources of increasing credit risk. In other words, enhancing competitiveness in whole or lending operations will boost credit risk. In the meanwhile, this research also points out that the correlation between competition and credit risk is non-linear with U-Shaped curve, implying that the positive and negative impact only happen at the right or left of the bottom, respectively.

Based on the research results, some implications are proposed to alleviate credit worthiness when Vietnam commercial banks tend to be more competitive as follows:

Firstly, although the expansion of products is considered as one of the main reasons of increasing loan-related risks, this does not mean that banks have to stop competitive strategies. In sharp contrast, banks need to be encouraged to compete to other both domestic and foreign banks more aggressively because competition is the dispensable trend to obtain the ultimate goal of value maximization. This requires each bank to have appropriate strategies, including: not lowering lending evaluation standards, promoting quality and applying cutting-edge technologies. In addition, Vietnam commercial banks need controls lending operation-related risks in order to partially alleviate NPLs, take measures to detect and address the threat of lending activities.

Secondly, the aftermath of the financial crisis of 2008 in Vietnam banking system is that NPL rate surges, exhibiting that debt loans is influenced by macroeconomic conditions. Therefore, in order to ensure the safe range of bad debts, macroeconomic factors such as inflation, unemployment, and economic growth must be maintained. To obtain this, the state bank of Vietnam plays a role in framing the most appropriate policies for the government. More specifically, the monetary policies must be suitable with the context of Vietnam in each period to control inflation but ensure high economic growth for the ultimate purposes of increased competition and decreased NPLs.

Thirdly, the determination of the U-curve bottom is an extremely essential intermediate step because this is a background to consider the possible implications for competition in each period of time. Specifically, the competitive strategies should be enhanced in short term in order to improve credit risk. However, this trend will not be encouraged if credit risk reaches the bottom because of the serious repercussion of competition.

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