



## IMPACT OF CREDIT RISK MANAGEMENT ON THE FINANCIAL STABILITY OF VIETNAMESE COMMERCIAL BANKS

Nguyen Quoc Anh<sup>1\*</sup>

<sup>1</sup>University of Economics Ho Chi Minh City

ARTICLE INFO	ABSTRACT
<p>DOI: 10.52932/jfm.vi3.373</p> <p><i>Received:</i> March 10, 2023</p> <p><i>Accepted:</i> June 22, 2023</p> <p><i>Published:</i> June 25, 2023</p> <p><b>Keywords:</b> Bank credit risk; Financial stability; Profitability.</p>	<p>The research was conducted to understand the impact of credit risk management on the financial stability of 27 Vietnamese commercial banks. From the research results, the authors proposed some implications for credit risk management and solutions to promote financial stability for banks. The study used secondary data obtained from audited financial statements of banks in the period 2006 - 2020. Because the research model had intermediate variables, we used SEM to analyze and the data was processed by Stata. Research results show that non-performing loans and loan loss provisions had a direct effect on profitability and financial stability. Besides, there was an indirect relationship between credit risk management, profitability, and financial stability. The research proved whether the characteristics of Vietnam's banking system and the obtained results are compatible with the theory and previous studies.</p>

### 1. Introduction

Risk management was considered a key factor for financial stability (Matey, 2021), so credit risk management was the key to increasing financial stability. When credit risk management was poor, and serious financial risk occurs, customers will no longer trust and come to withdraw money in bulk, leading to liquidity loss for banks. Besides, inefficient credit risk management also made banks unable to recover capital, leading to changes

in interest rates (Ghenimi et al., 2017). The credit risk associated with non-payment occurs from the borrower's side, leading to the risk of loss, thereby making the bank's financial problems no longer stable (Ozili, 2018). Credit risk management of the banking system had a significant and possibly long-lasting impact on the global economy and financial markets, as evidenced by the 2008 financial crisis and global recession in 2012, along with policymakers' reactions to these events (Davies et al., 2011).

Most of the previous studies had identified a linear relationship between credit risk management, profitability, and bank stability,

\*Corresponding author:

Email: [quocanh@ueh.edu.vn](mailto:quocanh@ueh.edu.vn)

but a few recent studies had shown between these three factors have an intermediate relationship. In Vietnam, this relationship showed a linear relationship, there were no published studies in a non-linear direction. This paper is made to fill this gap and contribute to the existing literature by studying the nonlinear relationship between credit risk management, profitability, and bank stability using the SEM approach. Unlike other works, this research aims to find out whether the relationships between credit, profitability, and financial stability are non-linear. Besides, it can be seen that the level of complexity in the implementation of credit risk management of each bank is different, and the regulations on credit risk management for the banking system are also different in different countries, which leads to different results of the impact of credit risk management on financial stability. Therefore, it is necessary to have more new studies to contribute to clarifying these relationships and understanding the groups of solutions that can help increase the effectiveness of credit risk management by the risk appetite for Vietnamese commercial banks.

## 2. Literature review

Credit risk management was defined as “the provision and management of the bank’s credit limit” (Akomeah et al., 2020), which was “a combination of credit strategy and policy but also must maintain an appropriate credit risk scenario to protect and improve loan quality”. Credit risk management was also understood as “identifying, measuring, monitoring and controlling risk arising from the default”. This was a reduction or elimination to avoid financial loss in lending (Ghenimi et al., 2017).

Bank profitability is an indicator of a bank’s ability to earn profits, which is the ratio of the bank’s remaining profit after deducting taxes on its total capital or total assets. Recent empirical literature used various measures of profitability including ROA and ROE (Kohlscheen et al., 2018); (Hasan et al., 2020). ROA is defined as the ratio of net income to total assets. This ratio

reflects the ability of the bank to use assets to earn a net profit. A lower ROA ratio indicates that the bank has persistent lending and investment policies or high operating costs. ROE reflects a bank’s ability to generate income using shareholders’ equity, which is calculated by dividing the bank’s net income by equity. A higher ratio reflected the bank’s efficient use of capital (Dietrich & Wanzenried, 2011). ROE is not the best ratio because banks with higher equity have higher ROA and lower ROE. ROE ignored risk if leverage was high, and the effect of regulation on leverage was not taken into account (Dietrich & Wanzenried, 2011).

In recent years, financial stability has become an important key in building the economic system and determining the international trade of any country (Alshubiri, 2017). The concept of banking stability is approached from two perspectives, the first one is the stability approach, and the second one is unstable. Moretti et al. (2020) defined financial stability as a steady state in which commercial banks effectively perform their main economic functions, such as resource allocation and risk distribution as well as payment, on the contrary, banks are in an unstable financial situation. Lee et al. (2013) defined financial stability as the ability of the most important banks in the system to perform their main functions. They also further argued that the stabilization of the financial system must satisfy two conditions. First, key institutions in the financial system were less vulnerable, providing a high degree of confidence that they can meet their contractual obligations without interruption or outside support. Second, market participants confidently trade with the bank at market prices and do not change significantly in the short term when there was no fundamental change. Thakor (2000) believed that financial stability is what banks do to maintain prestige and competitive position in the market to maximize market value and increase return on investment. Financial stability can be considered as the ability of banks to efficiently allocate resources in space and time as well as

assess and manage financial risks through their self-regulating mechanisms (Diaconu & Oanea, 2015). Jahn & Kick (2012) believed that financial instability of commercial banks may arise when banks operate inefficiently, adversely affecting the solvency of each bank or the system. From the above concepts, it can be seen that financial stability was a state in which the bank has a stable financial base and can maintain its competitive position, profit, and reputation in the system. Banks with stable finance would effectively perform basic functions of capital allocation in the system. In contrast, financial instability occurred when shocks to the financial system impede efficient information flows so that the financial system can no longer perform its primary function of transferring money to the financial system which had good investment opportunities.

Financial stability can be calculated by two commonly used methods including the bankruptcy index and the accounting index. The bankruptcy index method suggests that the crisis of the banking system accurately reflects the stability of banks. However, this index is influenced by many factors, including the understanding of the banking crisis. Central banks generally did not declare bankruptcy of a bank for administrative reasons, as the definition varied from country to country, and central banks were also reluctant to declare bankruptcy (Uhde & Heimeshoff, 2009). To determine the probability of bankruptcy, a random method was used. This method had the advantage that all information and market variables were displayed unaffected by accounting principles.

The accounting index risk predicted the probability of a crisis for different banks. This method used financial indicators such as Zscore (Beck et al., 2013), CAPM, and Zrisk to measure. Due to the advantages of this indicator, Zscore was the most commonly used. Zscore was used to measure resilience, thereby determining the stability of commercial banks. A low Z score indicated that banks are prone to bankruptcy, financial distress, and instability. A high Zscore indicated low tolerance and financial stability.

In addition, the accounting-based model also uses financial parameters to assess a bank's stability, such as non-performing loans, asset quality, liquidity, capital, costs, and asset return.

$$Z\text{-score} = [E(\text{ROAA}) + E_{bq}/A_{bq}] / \sigma(\text{ROAA})$$

Where,

ROAA: Average return on total assets of the bank. This is an important indicator for banks to evaluate the process of using their assets to make a profit. High ROAA indicates efficient use of assets and vice versa.

$E_{bq} / A_{bq}$ : The ratio of the bank's average equity to total assets. The size of the bank's capital indicates whether the bank can afford to cover it if the risk becomes apparent. This high ratio shows that this capital can manage its risk at an acceptable level and vice versa.

$\sigma$  (ROAA): standard deviation of ROAA. This ratio shows return volatility and reflects past risk management and control. Banks with low volatility and high financial stability have higher Z scores than banks with unpredictable returns and high volatility.

### 3. Research model and hypothesis

A bank with poor credit risk management will have a high level of non-performing loans, exceeding the standards of the Central Bank, and profitability will be quickly reduced. High levels of non-performing loans are often associated with low credit quality. A bank with a big loss in business had a low income (Atahau & Cronje, 2019). According to risk management theory, the risk is created for many different reasons, including objective and subjective reasons, so the administrator must have many different solutions for effective risk management. In addition, agency theory also suggests that managers may conflict with the interests of shareholders, so the operation of commercial banks always has credit risk. The agency problem can occur in many different ways such as loosening the quality of loans and colluding with credit officers to make a profit, leading to bad debt. When the problem is serious, the bank can lose capital. Therefore,

the risk cannot be excluded, and can only be reduced to a minimum.

Previous studies had shown two trends in the impact of credit risk management on bank profitability. *Firstly*, credit risk management had a positive impact on profitability. When credit risk management was good, non-performing loans decreased, and the profitability of banks increased. This result was obtained from the majority of previous studies (Serwadda, 2018), (Merhbene, 2021), (Mavrakana Maria, 2019), (Li et al., 2020). *Secondly*, credit risk management had a negative impact on the profitability of banks, which means that credit risk management was weak, non-performing loans tend to increase but profitability increases, this result was found in the study by Alshubiri (2017), and Cheng et al. (2020).

*Hypothesis 1. Non-performing loans affect profitability.*

When credit risk management is not effective, leading to non-performing loans, commercial banks must make provisions. The higher this provision, compared to the size of total loans, shows that the credit risk of banks is increasingly difficult to decrease. The immediate consequences of non-performing loans are reduced profitability of banks and this arises from handling costs such as provision for credit risk, and direct write-off of non-performing loans. Empirical studies in some countries had shown that when the provision for credit risk increases, the profitability of banks decreases (Ghenimi et al., 2017), (Lalon & Morshada, 2020), (Fred Nelson, 2020). Research results of Collins et al. (1995) on 167 banks showed that banks had a decrease in profit when their provision for credit risk is relatively low, thus the provision for credit risk and profitability had the same effect. So, the provision for credit risk had a positive or negative impact on the profitability of the bank.

*Hypothesis 2. Loan loss provisions affect the profitability*

High NPL showed that the bank was pursuing high risk in lending activities. A non-

performing loan was characterized by the unpaid principal and/or interest that had not been resolved before being classified. Agency theory argued that it is difficult to distinguish between good and bad borrowers, which could lead to adverse selection and moral hazard problems. Because credit risk was an unavoidable risk in the bank's operations, credit risk management was essential. Agency theory also argued on the assumption that banks were uncertain in selecting worthy borrowers because they had different levels of credit risk. As a result, financial intermediaries were more likely to lend to high-risk borrowers who are unconcerned with harsh lending conditions and were prone to default (Lalon & Morshada, 2020). Pagano & Jappelli (1993) suggested that information sharing reduced adverse selection problems by enhancing information about loan applicants. Fred Nelson (2020) studied and found the role of loan growth in banks' acceptance of risk and leading to financial instability.

In addition, high NPLs easily lead to a loss of depositors' confidence, leading to withdrawals and contagion when depositors were imperfectly informed about the type of shock to banks and the associated risk (Cheng et al., 2020). A high volume of impaired lending had been shown to amplify the negative impact of private credit on growth, whereas a sufficiently high Z-score, indicating a healthy banking system, is likely to eliminate the negative impact of private credit on growth. High NPL easily lead to loss of depositors' confidence, leading to withdrawals and contagion when depositors are imperfectly informed about the type of shock to banks and about interbank risk. Demetriades et al. (2017) found that a large amount of non-performing loans increases the negative impact of private credit on growth, whereas a high z-score indicated a healthy banking system, which eliminated the negative impact of private credit on growth.

*Hypothesis 3. Non-performing loan effect on financial stability*

The bank's credit risk provision policy was very important in assessing the financial



instability of the financial system, as it was a key factor for fluctuations in the profitability and capital position of banks (Beatty & Liao, 2014). In principle, provisions for credit risk allow banks to recognize in their profit and loss statements an estimated loss from a particular loan portfolio, even before the actual loss can be reliably measured and as certain as the events that have occurred and have been erased. In other words, provision for credit risk tends to be reversed during the upward phases of the business cycle. When these expected loan losses occur, banks can then use these reserves, thereby absorbing the losses without diluting their capital and preserving their capacity in the future.

Ozili (2018) conducted a review of the study on credit risk provision in banks and found that credit risk provision in the banking system plays an important role in financial stability and soundness. Therefore, the central bank frequently requires banks to maintain optimal credit risk provisions to reduce expected losses. Tan & Floros (2013) studied Chinese commercial banks and using the association between efficiency, risk, and capital found that there was a statistically significant association between management credit risk value, which is measured by credit risk provision, and banking efficiency.

*Hypothesis 4. Credit risk provision has a positive effect on financial stability*

The view on the impact of profitability on financial stability was not clear. Pessarossi et al. (2020) emphasized this and said that there are two different views, the view that profitable banks not only had to invest less risk because they had a safety net, but they were also more sensitive to these investments risk. The authors argued that this view contradicts the risk-off theory because investors must accept the possibility of greater losses if they aim for higher returns. This variable was believed to have a negative impact on the failure of banks. Pessarossi et al. (2020) indicated that high profitability had no significant effect on financial stability, but had a

short-term negative effect on European banks. On the other hand, Ghosh (2015) found that for US banks, bank profitability reduces non-repayment loans, which increases the bank's stability.

*Hypothesis 5. Profitability effect on financial stability*

Credit risk management has also been shown to have a relationship with bank profitability (Ekinici & Poyraz, 2019; Serwadda, 2018). Several researchers have shown that profitability is primarily influenced by the outcomes of credit risk management (Akomeah et al., 2020; Ali & Dhiman, 2019). Besides the trend of direct impact of credit risk management on profitability and financial stability, according to current published works, a number of researchers around the world have begun to conduct research to understand and determine non-linear relationship related to the stability of the financial system.

*Hypothesis 6. Profitability is an intermediate variable of credit risk management and stability*

The research model is based on studies by Serwadda (2018), Tan & Anchor (2016), Goetz (2018), Serwadda (2018), and Alshubiri (2017). However, since the purpose of this study is to understand the impact of bad debts on bank stability, profitability is an intermediate variable. According to the research of Tan & Anchor (2016), credit risk management not only directly but also indirectly affects financial stability. A recent study by Djebali & Zaghdoudi (2020) found that the relationships between both bank stability-credit risk and bank stability-liquidity risk are non-linear. There are also studies showing that credit risk management has an impact on financial stability through profitability (Tan & Anchor, 2016). Other authors support the positive effect of credit and liquidity risks on the stability of banks, since profitability and risks are tightly linked. Risk taking could adversely affect their profitability (Djebali & Zaghdoudi, 2020).

Therefore, research model (1) examines the impact of bad debts, loan loss provisions, and profitability on bank financial stability; model (2) examines the impact of bad debts and credit risk on bank profitability.

Then, we proposed a research model as follows:

$$Zscore_{it} = \alpha_1 + \beta_1 NPL_{it} + \beta_2 LLR_{it} + \beta_3 ROA_{it} + \varepsilon_1 \quad (1)$$

$$ROA_{it} = \alpha_2 + \beta_4 NPL_{it} + \beta_2 LLR_{it} + \varepsilon_2 \quad (2)$$

Where:  $i$  represents the number of observations,  $i$  has a value from 1 to  $n$ , are intercepted, are slope coefficients, and are model residuals.

In model (1), Z-score is the dependent variable, showing financial stability. The remaining variables include NPL, LLR, and ROA which are independent variables showing credit risk management and profitability of banks.

In model (2), ROA is the dependent variable that measures a bank's profitability. Non-performing loans and credit risk provision are the remaining credit risk management variables. The sources of variables in the research model are shown in Table 1.

**Table 1.** Variables in the model

No	Variables	Calculate	Sources
1	Financial stability (Z-score)	$[E(ROAA) + Ebq/Abq] / \sigma(ROAA)$	Serwadda (2018); Alshubiri (2017); Tan & Anchor (2016); Kasman & Kasman (2015); Tan & Floros (2013)
2	Bank profitability (ROA)	Return/ Total asset	Serwadda (2018); Tan & Anchor (2016)
3	Non-performing loan (NPL)	Non-performing loan / Total loan	Goetz (2018); Serwadda (2018)
4	Loan loss provision (LLR)	Loan loss provision / Total loan	Goetz (2018); Serwadda (2018); Alshubiri (2017)

### 3. Methodology

Data collected from the Bank's Balance Sheet and Income Statement in the period 2006 - 2020, the reports have been audited and published on the website of 27 Vietnamese commercial banks. All these data are taken by the year. Due to the limitation of published data, especially in the period before 2010, some banks do not fully show information in their financial statements, so this research is limited and incomplete for the bank system. The secondary data is unbalanced panel data.

To process the model, the author uses a multi-indicator approach and estimates the settlement paths by SEM. Since the data to be processed is secondary data, the data processing will be done on Stata software. The method of

secondary data processing by SEM has been used by Suyanto (2021) capital adequacy has a strong effect on credit distribution. Agency theory says that the owner of the fund (the savers of saving account, current account, deposit account and Widagdo et al. (2020).

The first step of data processing is to perform descriptive statistics. This step provides summary information and describes the sample data set, and provides information about the number of observations, the mean, the minimum, the maximum, and the standard deviation. The second step is CFA analysis, this step will evaluate the fit of the model (Model Goodness of Fit), and evaluate the reliability of the scale. The third step is to perform SEM analysis.

## 4. Results and discussion

*Descriptive Statistics***Table 2.** Results of Descriptive Statistics

Variable	Numbers of Observation	Mean	Standard deviation	Min	Max
ROA	398	0.009	0.010	0.001	0.131
ZSCORE	390	1.253	0.637	0.001	2.284
LLR	383	191.999	110.708	0.701	383
NPL	391	187.053	108.959	0.786	375

The results show that the bank's profitability has 398 observations, financial stability has 390 observations, credit risk provision has 383 observations, and non-performing loans have 391 observations. The results in Table 2 show that the standard deviation of profitability and financial stability of Vietnamese commercial banks is relatively small, while the standard deviation of non-performing loans and provision for credit risk is very large.

*CFA analysis*

The results of the CFA analysis show that all outer weights are greater than 0.5. The p-values of all these variables are statistically significant.

**Table 3.** Results of CFA analysis

	Coefficient	OIM Standard error	z	P >	Confidence interval at 95%	
Structural roa <-						
LLR	1.105	0.178	6.18	0.000	0.754	1.455
NPL	0.328	0.184	1.78	0.075	-0.033	0.689
-cons	16.181	2.697	6.00	0.000	10.894	21.469
zscore <-						
llr	1.130	0.188	5.99	0.000	0.760	1.500
npl	0.580	0.194	2.98	0.003	0.198	0.962
_cons	55.016	2.846	19.32	0.000	49.436	60.596
Variance						
e.roa	59.506	5.020			50.437	70.206
e.zscore	66.264	5.590			56.165	78.179
Covariance						
e.roa						
e.zscore	28.910	4.123	7.01	0.000	20.827	36.993
LR test of model vs. saturated: chi2(0) = 0,00, Prob > chi2 = .						

*Model fit evaluation*

This step will process the data and compare the indicators of the actual data and the threshold to evaluate whether the model fits or not. Indicators to be considered in this

step include SRMR (Standardized Root Mean Square Residual),  $\chi^2_{ms}$  (Likelihood Ratio Chi-squared Test), AIC (Akaike's Information Criterion), RMSEA (Root Mean Square Error of Approximation), CFI (Comparative Fit Index), TLI (Tucker-Lewis Index).

The results of data processing show that the model's SRMR coefficient is 0.466 with a significance level of 0.0000. The results show lower than 0.8. The chi-squared index is 0.000, which is less than 3 (Chin & Todd, 1995). The CFI and TLI are equal to 1.000, greater than 0.9 (Segars & Grover, 1993). The RMSEA index is 0.000, less than or equal to 0.05. All indicators meet the threshold, the research model is suitable.

### **Structural model analysis**

The results calculated from the SEM model using Stata show that NPL has a positive effect on the profitability of banks with a level of 0.333 and  $p = 0.000$ . This result shows that when non-performing loan increases, Vietnamese commercial banks' profitability is increasing. This result agrees with hypothesis 1 and is equivalent to Alshubiri's study (2017).

**Table 4.** Results of path analysis

Relationship	Path Coefficient	p-value
NPL → ROA	0.333	0.000
LLR → ROA	0.446	0.000
NPL → ZSCORE	2.022	0.000
LLR → ZSCORE	1.900	0.000
ROA → ZSCORE	1.324	0.000

Provision for credit risk has a positive effect on the bank's profitability with a level of 0.446 and  $p = 0.000$ . This result shows that when the provision for credit risk increases, profitability increases. The result is compatible with hypothesis 2 and is equivalent to the study of Pessarossi et al. (2020).

Non-performing loans affect stability with a level of 2.022 and  $p = 0.000$ . This result shows that when the bank's credit risk provision increases, the profitability increases, or vice versa. The result is compatible with hypothesis 3 and is consistent with the study of Demetriades et al. (2017).

Provision for credit risk has a positive effect on the stability of financial institutions with a level of 1.900 and  $p = 0.000$ . The profitability

of banks has an influence on the stability of financial institutions with a level of 1.324 and  $p = 0.000$ . This result shows that when the credit risk provision increases, the financial stability increases. The result is compatible with hypothesis 4 and similar to the study of Tan & Floros (2013). Profitability has a positive effect on financial stability with an impact of 1.324 and  $p = 0.000$ . This shows that when ROA increases, the stability of the financial sector tends to increase, the result is compatible with hypothesis 5 and similar to the study of Pessarossi et al. (2020). The results show that the direct impact of NPLs on the stability of financial institutions is the strongest, the second strongest influence is the provision for credit risk, and finally the profitability.

**Table 5.** The effect between variables

	The level of effect	p-value	z - value
<b>Indirect effect</b>			
NPL → ROA → ZSCORE	0.442	0.000	5.57
LLR → ROA → ZSCORE	0.591	0.000	5.98



	The level of effect	p-value	z - value
<b>Total effect</b>			
NPL → ROA → ZSCORE	0.446	0.000	9.13
LLR → ROA → ZSCORE	0.333	0.000	7.84

The results in Table 6 (*and see Appendix online 1*) show that the level of the indirect effect of non-performing loans on financial stability is 1.32, which is highly significant. The indirect

effect on the direct effect of non-performing loans is 0.22, which is larger than the direct effect. The total impact level is about 0.16 times the direct effect level.

**Table 6.** The results of the total effect

Relationship		Results
<b>Non-performing loan (NPL)</b>		
1	Intermediate effect	0.442/ 0.446 = 1.32
2	Indirect effect/direct effect	0.442 / 2.022 = 0.22
3	Direct effect	0.333/ 2.022 = 0.16
<b>Loan loss provision (LLR)</b>		
1	Intermediate effect	0.591/ 0.333 = 1.77
2	Indirect effect/direct effect	0.591/ 1.900 = 0.31
3	Direct effect	0.446/ 1.900 = 0.23

Besides, the indirect effect of credit risk provision on financial stability is 1.77, a significant effect level. The indirect effect on the direct effect of credit risk provision is 0.31, which is larger than the direct level. The total effect level is about 0.23 times higher than the direct effect level. In addition, the level of the indirect effect of credit risk provision on financial stability is 1.77, a significant effect level. The indirect effect on the direct effect of credit risk provision is 0.31, which is larger than the direct level. The total effect level is about 0.23 times higher than the direct effect level.

## 5. Conclusions and management implications

### 5.1. Conclusions

NPLs and provision for credit risks have a direct effect on the bank's profitability and financial stability. Besides, the indirect relationship between credit risk management, profitability, and financial stability is also found

in the case of Vietnam, where the banking system operates under the strict control of the State Bank and is a bank model under the Government. Thus, in terms of the operating principles of banks, no matter what model the bank belongs to and how the institution operates, credit risk management is also a strong determinant of profitability and financial stability. So, the principles of credit risk management cannot escape from the general frameworks of the world banking system.

### 5.2. Management Implications

Banks need to improve credit risk management policies: Although Vietnam has its characteristics in terms of economy and operating institutions of the banking industry, in essence, banking operations have characteristics that cannot be different, especially credit activities. Similar to other countries, Vietnam is also pursuing credit risk management principles according to Basel

standards. Currently, Vietnamese commercial banks are starting to implement credit risk management principles according to Basel 2's recommendations and on a roadmap to meet Basel 3's governance principles. It requires full understanding, careful preparation, and careful consideration of the bank's profits. Whether a bank has good credit risk management or not depends greatly on the credit risk management framework offered by the bank. Effective credit risk management starts with avoiding volatile transactions in the first place. Credit risk management needs to be proactive and start from the very beginning. Transactions must match the profile and expertise of the bank and the bank needs to do business on a risk-adjusted basis. Transactions, where the organization lacks the expertise and knowledge to be able to analyze and monitor them effectively, should be avoided. Banks need to develop and complete the credit risk management process:

- Building and perfecting the credit risk management process plays an especially important role for the bank because it will help the bank improve credit quality, reduce credit risk and be the basis for decentralizing responsibilities in credit operations.
- Implement and strictly manage the credit management process, thereby helping the bank avoid the risks of bad debts arising and promptly correct mistakes and shortcomings in credit activities.
- Develop a credit risk management strategy suitable to each period of economic development.
- Completing the credit risk management apparatus from the Head Office to the branches with a clear decentralization of judgment levels, functions, and duties of each department, and at the same time developing credit risk management policies, distribution policies credit allocation, customer policy, portfolio building with the diversification of products to spread risks.
- Improve the quality of credit appraisal and analysis. Review and edit internal processes. Focus on collecting and updating information about customers in a timely and accurate manner, analyzing the risks of the loan plan to provide the expected risks and the bank's controllability. Develop appropriate appraisal procedures and standards for each different type of project.
- The Bank needs to focus on training, fostering, and improving the quality of human resources to ensure that they have sufficient qualifications, and professional ethics to perform professional activities, have an authorization mechanism and regulations for officers in charge, and clear operations.
- Completing the internal credit rating system. A rating system must be full of criteria on business size, industry environment, financial situation, and many other influencing factors. The qualitative criteria are maximally quantified to limit subjectivity when ranking, helping to increase the relevance and accuracy of the ranking results. The internal credit system plays an important role in credit quality management to develop credit risk provisions at credit institutions.

Strengthening financial stability: non-interest income sources will help banks increase profits and reduce credit risk because these revenues are mostly from service fees such as fees from payment services, insurance sales, etc. Therefore, increasing non-interest income will help banks become more financially stable, this is also the trend in the world banking industry. To increase this revenue, banks need a long-term strategy and initial investment. Vietnam is one of the countries that still use large amounts of cash, so the market for the payment segment is still very large. However, to increase this business segment, Vietnamese commercial banks need to create a sense of convenience, usefulness, and ease of use for customers. Therefore, banks need to invest in technology

and apply advanced technology applications to save and protect customer information. In addition, banks can research, build and deploy bank Ezone services, and customers will serve their own needs to improve their experience. In addition, banks also need to have a strategy to increase revenue from cross-selling services such as insurance services to increase fee income.

In addition, banks should consider, perfect, and invest in information technology systems. The modern credit risk management model under the Basel accord can only succeed when the information is transparent, and clear and there is a separation of functional parts to specialize in operations, improve objectivity, and control information of the credit risk management department. IT system development should be closely linked with the credit risk management strategy. In addition to credit analysis results and internal credit rating results, it is necessary to have more information and credit rating results of CIC and reliable independent credit rating companies so that banks can have more facilities before issuing credit approval. The data information system is a prerequisite for the bank to successfully apply the Basel accord. Therefore, it is necessary to comply and strictly implement the preparation of standardized data sets to be able to comply with Basel requirements. The data needs to be aggregated, collected, analyzed, processed, and archived for a period of 3-5 years, bad debt data must be stored for 5-7 years.

To succeed in implementing Basel, commercial banks in Vietnam can rely on the support of consulting partners. Banks should choose consulting partners who are knowledgeable and experienced in the credit risk management system. Besides, it is necessary to learn from the experiences of banks that have successfully applied to Basel at home and abroad. The process of selecting a consultant will be conducted in a transparent, fair, and accurate manner and in compliance with relevant laws to ensure the highest efficiency and compliance with Basel standards.

After achieving the standards of the Basel 2 treaty, according to the roadmap, banks will comply with the criteria of Basel 3. This requires banks to:

*First*, have the plan to ensure the quality and safety of capital. Therefore, banks need to restructure the optimal asset portfolio to orient their business to areas and assets with low-risk coefficients. Allocate the Bank's capital down to the Business Divisions to manage, and assign KPIs according to RAROC and capital use ratio, to ensure efficient use of capital by business divisions. Provide loan interest rate policies based on the customer's risk to ensure that the customer's profit is enough to compensate for the correspondingly allocated capital. Developing products according to combos to diversify services, increase service fee revenue, and offset customer risks while still being competitive with the market. Implement credit risk management by portfolio, to diversify credit portfolio and promote lending activities for standard products within predetermined risk limits;

*Second*, Develop scenarios to ensure capital adequacy ratio: Regularly monitor the supply and availability of capital when needed. Continually evaluate the capital against the risk that the bank may face. Develop capital management plans and objectives based on the bank's risk management strategy to ensure that the bank is always well capitalized through economic cycles in normal economic conditions as well as other conditions. Estimate of capital needed over the next 3 years: This estimate takes into account business projections for different business units under different scenarios and converts them into equity and operating capital. Thereby, the bank will have a view into the capital structure - including tier 1 and tier 2 capital instruments and the adjustment of different types of capital by Basel regulations. Calculate capital surplus or capital deficit during the planning period. Internal audit regularly monitors and corrects to improve the sense of responsibility at work and is ready to strictly handle violations.

Finally, banks need to strengthen inspection and supervision. Enhance the responsibility and role of internal inspection and control to prevent potential risks that may occur. Through control activities, it is possible to detect, prevent and correct errors in the process of performing credit operations, and prevent moral risks caused by credit officers. Improve the ability to analyze and forecast the market, business administration capacity, and risk management in banking activities to gradually remove barriers hindering the sustainable operation of commercial banks. Strengthening international cooperation relationships to take advantage of learning experiences from foreign partners, taking advantage of absorbing modern banking business technology. Improve the qualifications of the staff, step by step standardize their

business activities according to international standards. To implement risk management for each credit and the entire credit portfolio, there must be a quality monitoring system for the entire credit portfolio appropriate to the size and complexity of the portfolio. In addition, to strengthen credit risk management, banks should improve the quality of financial analysis and build an early warning system of potential risks in credit activities to improve risk management quality.

### 5.3. Limitations

The study has not been compared with other countries in Southeast Asia, nor has it compared the level of stability in the two periods of pre-crisis and post-crisis.

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