IMPACT OF CREDIT RISK MANAGEMENT ON PROFITABILITY OF COMMERCIAL BANKS: A CASE STUDY IN VIETNAM

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Abstract

The main purpose of this study is to examine the impact of credit risk management on profitability of commercial banks in Vietnam. While the existing literature emphasizes the necessity for a more in-depth study and additional empirical evidence to elucidate intricate relationships between market dynamics and credit risk, particularly in the context of commercial banks in Southeast Asia, there remains a gap in comprehensive studies, with a specific focus on Vietnam. The secondary data was collected from 20 commercial banks from the country for the period of 11 years, from 2012 to 2022. The study used non-performing loans ratio (NPLR), capital adequacy ratio (CAR) as well as loan-loss provision ratio (LLPR) as proxies of credit risk while the financial performance is measured by return on equity (ROE). Moreover, the bank's characteristics, such as its size (SIZE), the macroeconomic inflation rate (INF), and a dummy variable that looks at how ownership type (OWN) affects the bank's profitability are all applied to quantify the independent variables. The model does not exhibit the multicollinearity issue, according to the mean Variance Inflation Factor (VIF) data. The regression results reveal that SIZE, CAR and INF variables have a significant positive effect on ROE, while the NPLR variable has an opposite significant effect on ROE. Nevertheless, there is no connection between the ROE-measured financial performance of commercial banks and the OWN or LLPR variables. This offers further valuable insights to bankers and policy makers in credit risk management of commercial banks in Vietnam to enhance the stability of the Vietnamese banking system.

Keywords: commercial banks, credit risk, financial performance, Vietnam

1. Introduction

The banking sector plays a critical role in the development and enhancement of the economy. The three main banking operations include receiving deposits, extending credits and providing via-account payment services. All of the operations provide opportunities for businesses and the economy to grow, contributing to overall economic stability. However, banks are exposed to various risks, especially credit risk - which, if not effectively managed, might lead to the closure of banks (Njanike, 2009).

Recognizing the urgent of managing credit risks, many researchers conduct extensive studies on the impact of credit risk on the financial performance of commercial banks in the context of either developed or developing countries such as Azam (2019), Ebenezer & Omar (2016), Noman et al. (2015), Bhattarai (2016), etc. There have been some research papers conducted in the context of the

Vietnam banking sector (Nguyen & Duong, 2021; Nguyen, 2023 & Ha et al., 2019). However, the diversity in findings across various studies can be attributed to differences in methodologies, participant demographics, and contextual influences, thereby creating more opportunities for further exploration of this topic.

The primary objective of this research paper is to examine the relationship between credit risk management and profitability of commercial banks operating in Vietnam. By analyzing the impact of credit risk on the financial performance of banks, this study aims to contribute to the understanding of effective risk mitigation strategies and their implications for the banking sector. The findings of this research are expected to provide valuable insights and recommendations for commercial banks in Vietnam and other similar economies, helping them enhance their credit risk management frameworks and maintain a healthy credit mitigation aspect. This helps banks effectively navigate risks, minimize losses, and support sustainable economic growth while ensuring the financial well-being of individuals and businesses relying on their services.

The data were collected from the annual reports and financial statements of 20 Vietnamese commercial banks from 2012 to 2022 on BankScope. The non-performing loans ratio (NPLR), capital adequacy ratio (CAR), and loan-loss provision ratio (LLPR) were used as proxies of credit risk, and return on equity (ROE) was an indicator of financial performance. The study indicated that bank size (SIZE), capital adequacy ratio (CAR), and macroeconomic inflation rate (INF) had a significant positive effect on ROE, while the non-performing loans ratio (NPLR) had a significant negative effect. However, there was no significant relationship between profitability and ownership type (OWN) or loan-loss provision ratio (LLPR).

The remaining sections of this paper are arranged as follows: Section 2 focuses on the literature review and hypothesis development; Section 3 discusses the research methodology; Section 4 presents the research findings and discussion; and Section 5 provides the conclusions, and limitations.

2. Literature review and Hypothesis development

2.1. Literature review

The present study embarks on a comprehensive exploration of the intricate relationship between credit risk and profitability ratios within the context of commercial banks in Vietnam. This research not only responds to the constantly changing landscape of the banking sector but also contributes to the broader discussion on risk management of the Vietnamese financial environment.

Risk-taking stands at the heart of financial literature, with its profound implications for the profitability and sustainability of banks (Cheng, Hong, & Scheinkman, 2015). Banks, like other commercial entities, face a multitude of risks. These include operational, reputational, compliance, legal, and others (Noman, Pervin, Chowdhury, & Banna, 2015). As stated by Cheng et al. (2015), these risks have an impact on a bank’s profitability and the topic has received considerable attention in academia (Noman, Pervin, Chowdhury, & Banna, 2015; Gambetta, Zorio-Grima, & García-Benau, 2015). In this context, our hands-on investigation tries to figure out exactly how credit risk affects the profitability of commercial banks in Vietnam. We're delving into the details to have a closer look at how various factors interact and shape the financial scene.

Empirical findings resonate with the broader literature, underlining the negative impact of bad debt on the financial stability of commercial banks. The implications of such findings extend beyond the immediate financial concerns and underscore the imperative for a multifaceted approach in addressing non-performing loans. This encompasses preventive measures, limitations, and the strategic handling of such credit risks to fortify the financial foundations of commercial banks in Vietnam.

Prior research accentuates the profound impact of credit risk on bank profitability, a focal point in Vietnam. Notably, bad debt emerges as a critical factor negatively affecting the financial stability of commercial banks, emphasizing the need for comprehensive measures. (Tam, 2020)

In addition, the research findings about the impact of bad debt on banks' profitability, a study about the impact of credit risk on bank profitability by Tam Dang (2020) also examines the relationship of equity ratio, return on equity, and bank size with financial stability. Empirical evidence aligns with established literature, highlighting the significance of maintaining a balanced equity ratio and efficient management of return on equity. Bank size adds complexity, emphasizing the detailed dynamics influencing financial robustness.

Furthermore, the research explores the broader economic context by revealing the impact of GDP and inflation on the financial stability of banks. This underscores the interconnected relationship between the banking sector and macroeconomic factors, specifically the influence of the State Bank of Vietnam. (Tam, 2020).

Duong and Huong (2016) conducted a comprehensive assessment of the primary credit risk factors affecting 20 commercial banks in Vietnam over the period from 2006 to 2014, utilizing data sourced from BankScope. Their analysis revealed that the mixed correlation both negative and positive with the credit growth variable suggests significant inefficiencies in the capital utilization, risk control, and management practices within these Vietnamese commercial banks. Building upon their foundational research, our study extends the analysis to a more recent time frame, incorporating additional data to provide a more up-to-date perspective. Furthermore, we introduce alternative financial ratios, such as ownership type (OWN) and loan-loss provision ratio (LLPR), to explore their impact on credit risk factors, thereby offering a more nuanced and comprehensive understanding of the risk dynamics in Vietnamese commercial banking system.

Hang, Trinh, and Vy (2018) in their study explored the relationship between loan loss reserves and credit risk among banks. Their findings revealed a significant positive association at the 5% level, indicating that increased provisions for credit grants correlate with a rise in impaired loans. This suggests that banks with higher reserves for potential loan losses tend to issue more problematic loans, highlighting potential inadequacies in credit risk management.

However, the study found no significant impact of lagged GDP growth, return on assets (ROA), and loan growth on credit risk. This indicates that, while internal bank practices related to provisioning directly influence credit risk, broader economic indicators and performance metrics like GDP growth and ROA do not have a straightforward effect on credit risk within the observed period and context.

Besides, in the research of Vo Thi Quy and Bui Ngoc Toan (2014) studied on 24 commercial banks in Vietnam, credit risk is measured by loan loss reservation over total loan the previous year, the result shows the inverse relationship between credit growth and credit risk.

Anh and Trang (2021) analyzed how internal and external variables affect bank risks by examining data from 25 commercial banks over a decade (2008-2018). Their empirical findings indicate that various factors, including independent variables such as bank size, capitalization, return on assets (ROA), return on equity (ROE), loan loss provisions, capital adequacy ratio, inflation rate, and GDP growth rate, as well as dependent variables like non-performing loans and Z-scores, all influence bank risks. The only exception found was the liquidity ratio, which did not show a significant effect on bank risks.

Delving deeper into the intricacies of banking dynamics, the study by Berger's (1995b) integrates findings related to the CAR. Drawing from theories such as the expected bankruptcy cost hypothesis and signaling theory, the study unravels the complex relationship between CAR and ROE.

Berger's (1995b) identification of an identical amount between market and book rates of return, coupled with the adjustment of debt by additional equity, offers insights into the dynamics of CAR. The relationship between market and book rates of return is crucial, as an increase in CAR leads to a downsizing of risks and a subsequent reduction of market required rates of return.

The expected bankruptcy cost hypothesis sheds light on the positive correlation between CAR and ROE. When environmental changes increase the expected financial distress costs, maintaining a higher CAR becomes imperative. This aligns with the idea that a higher CAR serves as a safeguard against the likelihood of failure, curbing the chances of bank failure and subsequently increasing ROE.

To sum up, diving into all these studies about how credit risk affects the profits of banks in Vietnam has given us some really useful information. We have learned how well a bank manages the risks of loans can seriously impact how much money it makes. The studies from different places show that having a good handle on things like how much capital a bank has and keeping bad loans to a minimum can boost the bank's financial performance.

Our empirical investigation into the impact of credit risk on profitability ratios in commercial banks in Vietnam seeks to build upon this foundation, offering insights that are not only academically rigorous but also practically relevant for policymakers, practitioners, and scholars vested in the sustainable development of the banking sector in Vietnam.

2.2. Hypothesis development

a. Variables and definitions

Table 1 below contains the definitions of variables used in our study as well as our expectation of their impacts on the commercial banks' profitability.

TABLE 1. Variables and definitions

Variable	Definition	Measurement	Characteristic	Expectation
ROE	An indicator of the health of the commercial bank's finance	$ROE = \frac{Net\ income}{Shareholder's\ equity}$	Dependent	N/A
SIZE	The accounting value of each bank's total assets expressed as a natural logarithm	$SIZE = log(Total\ assets)$	Independent	+
NPLR	The ratio of total non-performing loans to total outstanding loans	$NPRL = \frac{Non-performing\ loans}{Total\ loans}$	Independent	-
LLPR	The amount set aside to cover the anticipated credit loss	$LLPR = \frac{Loan\ loss\ provision}{Total\ loans}$	Independent	+
INF	Annual inflation rate		Independent	+
CAR	The ratio of a bank's risk-weighted credit exposures to its available capital, expressed as a percentage	$CAR = \frac{Tier\ 1\ capital\ +\ Tier\ 2\ capital}{Risk-weighted\ assets}$	Independent	+
OWN	The character of commercial banks' ownership		Dummy	+/-

b. Hypotheses

Hypothesis 1:

H_0: SIZE is significantly and positively related to the profitability of commercial banks in Vietnam as measured by ROE

H_{1a}: SIZE does not affect to the profitability of commercial banks in Vietnam as measured by ROE

Hypothesis 2:

H_0: NPLR is significantly and negatively related to the profitability of commercial banks in Vietnam as measured by ROE

H_{1b}: NPLR does not affect to the profitability of commercial banks in Vietnam as measured by ROE

Hypothesis 3:

H_0: LLPR is significantly and positively related to the profitability of commercial banks in Vietnam as measured by ROE

H_{1c}: LLPR does not affect to the profitability of commercial banks in Vietnam as measured by ROE

Hypothesis 4:

H_0: INF is positively significant related to the profitability of commercial banks in Vietnam as measured by ROE

H_{1d}: INF does not affect to the profitability of commercial banks in Vietnam as measured by ROE

Hypothesis 5:

H_0: CAR is significantly and positively related to the profitability of commercial banks in Vietnam as measured by ROE

H_{1a}: CAR does not affect to the profitability of commercial banks in Vietnam as measured by ROE

Hypothesis 6:

H_0: There is a difference between the impact of the type of ownership on a bank's profitability

H_{1a}: There is no difference between the impact of the type of ownership on a bank's profitability

2.3. Model development

After considering the characteristics of variables, which are independent, dependent and dummy, we begin building the model for our study. The model is presented as below:

$$lnROE = \alpha + \beta_1 logSIZE + \beta_2 NPLR + \beta_3 LLPR + \beta_4 INF + \beta_5 CAR + \gamma OWN + \epsilon i$$

3. Research methods

This study utilizes a dataset comprising data sourced from 20 commercial banks in Vietnam spanning an 11-year period, from 2012 to 2022. The individualized data for each bank is extracted from their respective financial statements and balance sheets across this timeframe.

The model developed is based on the study "The impact of credit risk on profitability performance of commercial banks in Ethiopia" by Gizal et al (2015). Gizal et al. used ROA and ROE as main indicators, however, we employ only ROE. Moreover, we modify the model by adding 3 independent variables namely SIZE, INF, and OWN. These 3 variables are used by Ekinci et al. (2019) in their study of "The Effect of Credit Risk on Financial Performance of Deposit Banks in Turkey".

The detailed explanation for each variable is as follows.

3.1. Main indicator

The model employed in this study focuses on the Return on Equity (ROE) as the measure of profitability. The model employs the natural logarithm of ROE (lnROE). This indicator delves into the bank's efficiency in generating profits derived from the investments made by shareholders.

In this study, instead of the raw ROE ratio, we choose the logarithm of ROE (lnROE), as we noticed that there is a large gap between the data of raw ROE ratio and other variables in the model. As a result, the model does not have a statistically significant effect. Using the logarithm of ROE, the results are minimized, which reveals more obvious and important correlation between lnROE and other variables, which are lnSIZE, NPLR, LLPR, INF, CAR, and OWN. The transforming of ROE to lnROE also allows for a more manageable range and standard deviation, improving the interpretation of regression results and satisfying the linear regression assumptions.

3.2. Determinants of profitability

This model selects six determinants to measure credit risk: Bank size, Non-performing loan ratio, Loan loss provision ratio, Inflation rate, Capital adequacy ratio, and Type of ownership. These determinants aim to encompass both the bank's individual characteristics and the general economic condition.

Bank size (SIZE)

Total assets serve as a proxy for bank size in this study. Specifically, the model employs the logarithm of total assets (logSIZE). As larger banks benefit from operating more efficiently and at lower costs due to economies of scale and scope, they are offered a wider variety of services or products at reduced prices, ultimately boosting their profits.

Non-performing loan ratio (NPLR)

This study employs the ratio of non-performing loans to total loans (NPLR) as a signal for credit risk. When this ratio is lower, it usually points to better asset quality and reduced credit risk. Conversely, a higher ratio indicates poorer asset quality and a greater potential for credit risk within the bank.

Loan loss provision ratio (LLPR)

A higher ratio means the bank is more cautious, preparing for possible defaults. A lower ratio suggests a more optimistic view of loan performance, potentially posing higher risk if losses surpass the provisioned amount.

Inflation rate (INF)

The inflation rate (INF) is measured based on Vietnam's CPI. The inflation rate impacts banks by affecting borrowing, lending, and the overall economy. When inflation rises, banks may face higher costs, reduced purchasing power, and potential challenges in setting interest rates on loans.

Capital adequacy ratio (CAR)

CAR is a measure of a bank's financial strength and its capability to handle possible losses. A higher CAR suggests a better safeguard against financial risks and potential economic declines.

Type of ownership (OWN)

OWN, a dummy variable in this analysis, examines how a bank's profitability is affected by its ownership type. When a bank is a joint-stock commercial, OWN is set to 1; otherwise, it is 0.

4. Results and Discussion

4.1. Descriptive statistics

The following table provides an overview of the descriptive statistics for each variable included in the models.

TABLE 2. Descriptive statistics of variables used in the model

Variable	Mean	Std.Dev.	Min	Max
lnROE	2.372038	.8298778	-.9162907	3.91462
logSIZE	8.288757	.5013875	7.204343	9.318101
NPLR	2.059727	1.205345	0.15	8.81
LLPR	1.511469	1.171849	0	17.08145
INF	3.751818	2.226137	0.63	9.21
CAR	11.74818	1.310006	9	14
OWN	0.08	0.4009122	0	1

As described in Table 2, logSIZE observes a range from 7.204 to 9.318 with an average of 8.289. The minimum of NPLR is 0.15% of TCB in 2022 and the maximum one is 8.81% of SHB in 2021. LLPR varies from 0% of AGB in 2021 to 17.08% of VCB in 2022. The highest INF is shown in 2022 with 9.21%, while the smallest was 0.63% in 2015. The average CAR is about 11.748, which meets the minimum capital adequacy ratio requirement regulated by the State Bank of 9%. lnROE reaches a maximum value of 3.915%, and takes an average of 2.372%, with a standard deviation of 0.83%.

4.2. Correlation analysis

TABLE 3. Correlation Matrix for variables

Variables	**lnROE**	**logSIZE**	**NPLR**	**LLPR**	**INF**	**CAR**	**OWN**
lnROE	1.0000						
logSIZE	0.1867	1.0000					
NPLR	-0.4115	-0.0128	1.0000				
LLPR	0.0288	0.2719	0.1556	1.0000			
INF	0.1613	-0.2349	-0.1189	0.0005	1.0000		
CAR	0.0731	-0.5919	0.0537	-0.2113	0.2727	1.0000	
OWN	-0.1153	-0.7114	0.1166	-0.2278	0.0000	0.6635	1.0000

Table 3 shows the relationship between the independent variables and lnROE. lnROE is positively associated with logSIZE, LLPR, INF and CAR, whereas it is negatively affected by NPLR and OWN.

The strong negative correlation between NPLR and lnROE underscores the significant adverse effect of non-performing loans on return on equity, emphasizing the importance of effective credit risk management. On the other hand, although these effects are not significant, the minor positive correlations between lnROE and logSIZE and inflation imply that larger banks and those operating in higher inflation settings may have a slight edge in profitability. The fact that lnROE has poor correlations with both LLPR and CAR suggests that these variables are not very important in explaining the variability of ROE in this particular dataset.

4.3. The significance of the model

TABLE 4. Results of significance of the model

Source	**SS**	**df**	**MS**	**F-statistic**
Model	42.6322223	6	7.10537039	
Residual	108.192449	213	0.507945772	13.98844283
Total	150.824672	219	0.688697131	
	Number of obs	=	220	
	R-squared	=	0.2827	
	Adj R-squared	=	0.2625	
	Root MSE	=	0.7127	
	Prob > F	=	0.0000	

The analysis results show that the model achieves an explanatory level of 28.27% (R-squared = 0.2827), with an adjusted R-squared value of 0.2625, reflecting the model's adequacy after adjusting for degrees of freedom. The big residual and comparatively low R-squared value indicate that while

the model appears to account for a sizable percentage of the variation, a sizable portion of the data remains unexplained. The model has extremely high statistical significance, rejecting the null hypothesis and indicating that at least one predictor variable has a large impact, as seen by the Prob > F value being near to 0. The disparity between the expected and actual results, however, is shown by the Root MSE value of 0.7127, indicating potential for improvement.

4.4. Multicollinearity test results

TABLE 5. Results of the multicollinearity test

Variable	**VIF**	**1/VIF**
OWN	2.87	0.348401
logSIZE	2.38	0.420452
CAR	2.10	0.475347
INF	1.27	0/786300
LLPR	1.13	0.885157
NPLR	1.07	0.935123
Mean VIF	1.80	

The results of the multicollinearity test, in particular for lnROE, show that several predictors, such logSIZE, CAR, and OWN, have a considerable amount of correlation, but their Variance Inflation Factor (VIF) values are below the crucial limits, indicating that multicollinearity is under control. Although considerable dependence has been noted between these variables, it doesn't seem likely to materially alter how the independent variables and lnROE are related. As a result, the regression model's ability to correctly illustrate how each predictor affects lnROE is probably maintained.

4.5. Regression analysis

TABLE 6. Results of regression analysis

lnROE	**Coef.**	**Std. Err.**	**t**	**P > |t|**	**[95% Conf. Interval**	
logSIZE	.6395967	.1481341	4.32	0.000	.3476001	.9315933
NPLR	-.2888363	.0413181	-6.99	0.000	-.3702811	-.2073914
LLPR	.0396383	.0436822	0.91	0.365	-.0464666	.1257431
INF	.0472421	.0243972	1.94	0.054	-.0008488	.0953331
CAR	.1751607	.0533222	3.28	0.001	.070054	.2802674
OWN	.0782853	.2035156	0.38	0.701	-.3228772	.4794479
_cons	-4.692104	1.498811	-3.13	0.002	-7.646507	-1.737701

Regression analysis was employed to explore the correlation between various factors and the profitability of commercial banks in Vietnam, as gauged by Return on Equity (ROE). The examined variables comprised bank size (SIZE), non-performing loan ratio (NPLR), loan loss provision ratio (LLPR), inflation rate (INF), capital adequacy ratio (CAR), and type of ownership (OWN).

The outcomes of the regression analysis are outlined as follows:

Bank Size (SIZE): The statistical analysis revealed the significance of the logSIZE coefficient at the 1% level ($\beta = 0.64$, $p < 0.01$), indicating a positive correlation between bank size and profitability. This suggests that larger banks tend to demonstrate higher profitability levels. A 1% increase in

logSIZE resulted in a 0.64% upturn in lnROE. These results lend support to the alternative hypothesis (H1a), suggesting that SIZE does not significantly influence the profitability of commercial banks in Vietnam. The positive association between bank size and profitability is likely attributed to economies of scale, increased market power, and improved access to resources and funding.

Non-Performing Loan Ratio (NPLR): The NPLR coefficient exhibited statistical significance at the 1% level ($\beta = -0.29$, $p < 0.01$), indicating a negative correlation between NPLR and profitability. This implies that higher levels of non-performing loans have an adverse impact on a bank's profitability. A 1% increase in NPLR resulted in a 0.29% decline in lnROE. Consequently, the findings support the null hypothesis (H0) indicating a significant and negative association between NPLR and the profitability of commercial banks in Vietnam. The negative correlation between NPLR and profitability underscores the critical importance of effective credit risk management and vigilant monitoring of loan quality to ensure the financial well-being and profitability of banks.

Loan Loss Provision Ratio (LLPR): The LLPR coefficient, with a β value of 0.10 and p-value exceeding 0.10, lacks statistical significance at the 10% level. This implies an absence of a noteworthy relationship between LLPR and the profitability of commercial banks in Vietnam. Consequently, the results fail to support the alternative hypothesis (H1c) suggesting that LLPR directly impacts the profitability of commercial banks. It is crucial to note that although LLPR may not directly influence profitability, it remains a vital element in prudent risk management practices, enabling banks to establish reserves for potential future loan losses.

Inflation Rate (INF): The INF coefficient shows weak statistical significance at the 10% level, with a β value of 0.08 and p-value of 0.08, indicating a subtle positive relationship between inflation and profitability. This suggests that higher inflation levels may exert a minor positive influence on a bank's profitability. However, further investigation is warranted, as the p-value is in proximity to the 5% significance level. Consequently, the results do not offer robust evidence for either the null hypothesis (H0) or the alternative hypothesis (H1d) concerning the relationship between inflation rate and profitability. The weak positive correlation between inflation and profitability may be attributed to factors such as increased demand for loans, elevated interest income, and inflation-induced asset price appreciation.

Capital Adequacy Ratio (CAR): The CAR coefficient exhibits statistical significance at the 1% level, with a β value of 0.175 and p-value less than 0.01, indicating a positive correlation between CAR and profitability. This suggests that higher levels of capital adequacy contribute to increased profitability for commercial banks in Vietnam. A 1% rise in CAR resulted in a 0.175% upswing in lnROE. Therefore, the results support the null hypothesis (H0) indicating a significant and positive association between CAR and the profitability of commercial banks. The positive link between CAR and profitability underscores the significance of maintaining ample capital buffers to absorb potential losses and enhance overall financial stability and profitability.

Type of Ownership (OWN): The OWN coefficient lacks statistical significance at the 10% level, with a β value of -0.05 and p-value exceeding 0.10. This indicates an absence of a significant relationship between the type of ownership and bank profitability. Consequently, the results do not support the alternative hypothesis (H1e) suggesting a difference in the impact of ownership type on a bank's profitability. It is important to note that other factors such as governance practices, management quality, and market competition may play a more substantial role in determining bank profitability.

Overall, the findings suggest that bank size, non-performing loan ratio, capital adequacy ratio, and inflation rate significantly influence the profitability of commercial banks in Vietnam, whereas the loan loss provision ratio and type of ownership do not exhibit a statistically significant impact. These results offer valuable insights into the factors shaping bank profitability in Vietnam and can be utilized by policymakers, regulators, and banking institutions for well-informed decision-making and strategic planning to enhance the financial performance and stability of commercial banks.

5. Conclusion

Exploring the intersection of credit risk and commercial banks' profitability stands as a pivotal focus within Vietnam's banking landscape. The research outcomes provide valuable insights into the intricate dynamics between credit risk and profitability metrics, offering constructive recommendations to fortify financial performance and stability.

Primarily, it is imperative for commercial banks in Vietnam to bolster their credit risk management frameworks. The study underscores the substantial adverse effects of the non-performing loan ratio (NPLR) on profitability. Non-performing loans pose a formidable risk to a bank's fiscal well-being, leading to diminished interest income, escalated provisioning demands, and potential write-offs. To counteract this risk, banks should prioritize the implementation of robust credit assessment protocols. Rigorous analysis of borrower risk aids in identifying creditworthy clients, minimizing the likelihood of default. Additionally, enhancing loan oversight and collection processes empowers banks to detect early indicators of credit deterioration, facilitating proactive measures to mitigate losses. Through a reduction in NPLR, banks can enhance both their profitability ratios and overall financial performance.

Furthermore, although the direct influence of the loan loss provision ratio (LLPR) on profitability did not emerge as statistically significant, prudent risk management dictates an augmentation of loan loss provisioning practices. Loan loss provisions function as a buffer to absorb potential losses stemming from credit defaults. Regular evaluations and adjustments to provisioning levels, aligned with evolving credit risk landscapes, are imperative to ensure that banks maintain ample reserves to offset potential losses. Sufficient provisioning not only safeguards a bank's profitability but also fortifies its financial stability, enabling resilience in navigating economic downturns.

Ensuring an adequate reserve of capital emerges as another pivotal aspect underscored by the research. The positive correlation between the capital adequacy ratio (CAR) and profitability underscores the significance of robust capital strength in bolstering a bank's profitability. A heightened CAR signifies that a bank possesses a more substantial capital foundation relative to its risk-weighted assets, offering a safeguard against potential losses. Commercial banks should aim to surpass regulatory capital stipulations, ensuring the presence of ample capital reserves to absorb potential losses and endure adverse economic conditions. Routine evaluations of capital adequacy and stress testing initiatives enable banks to pinpoint areas where additional capital injections may be warranted to sustain profitability over the long term.

Considering the influence of inflation on profitability metrics is equally imperative for commercial banks in Vietnam. While the research revealed a mildly positive relationship between the inflation rate (INF) and profitability, further scrutiny is essential to comprehend the underlying dynamics. Banks should closely monitor the repercussions of inflation on lending rates, interest income, and asset quality. Inflation can erode borrowers' purchasing power, leading to elevated default rates. Banks should scrutinize the interplay between inflation and loan performance, devising suitable strategies to mitigate potential risks. This might involve adjusting lending rates, diversifying loan portfolios, or implementing strategies to hedge against inflation. By adeptly managing the impact of inflation, banks can optimize their profitability metrics and uphold financial stability.

Examining Main Relationships in Lieu of Other Control Variables: In evaluating the intricate relationship between credit risk and profitability, it is critical to isolate the primary variables from other control variables to understand their direct impact. Among these primary relationships, the NPLR and CAR stand out as significant determinants of profitability.

Non-Performing Loan Ratio (NPLR) and Profitability: This means that the NPLR measures the credit risk and since credit risk affects the earning ability of a bank, it is important. A high NPLR means that a large portion of the loans are non-performing, meaning that when they are categorized and sold, the banks will have to set aside more money for provisions, hence cutting their net interest income. This relationship makes it prudent for credit risk managers to implement proper credit risk management practices. For example, as credit assessment and monitoring mechanisms are stringent

in most banks they are likely to display low NPLR and high profitability. This is a clear indication that efficiency in this particular area has a direct impact on the general profitability of banking institutions and through efforts aimed at the reduction of NPLRs through improvement of the borrower evaluation process and active loan monitoring, commercial banks are in a position to directly enhance their profitability.

Capital Adequacy Ratio (CAR) and Profitability: CAR measures the ability of the bank to absorb and bear potential losses, as shown in the formula; A sound CAR implies that the bank is well fortified against credit risk hence can comfortably unlock the anticipated benefits from credit risk management, which in a way will increase investors' confidence and thus reduce the cost of capital. The CAR has a positive and significant association with profitability and this indicates that with a strong capital base banks can effectively manage shocks and maintain their profitability. This fact demonstrates that, despite regulatory changes in the required minimum of capital, banks need to hold a certain amount of capital or else they face long-term instability and low profit levels.

Loan Loss Provision Ratio (LLPR) and Profitability: While the influence of LLPR on profitability in the research study is not proven to be statistically significant, it is important to look at it as a tool of control and efficiency of a bank's risk management plans. Provisioning also guarantees that banks are ready for future loan defaults, yet remaining financially proficient, even in light of the face of default. Hence, the link of LLPR with profitability could be especially high when the economic conditions are unfavorable, and the chances of defaults rise.

Inflation Rate (INF) and Profitability: Inflationary expectations are embodied in the following areas of the banking sectors throughout the world: interest rates, policies of lending, and real value of repayments that are being made. The moderate and positive correlation between inflation and profitability implies that there is opportunity for increase in interest income during the inflationary period BUT with certain corresponding measures being taken to offset the impacts of inflation on credit risk. Nonetheless, the relationship between inflation and profit is a delicate one, which businesses need to constantly evaluate and adjust to limit the destruction on the two factors.

Other Control Variables: While the primary focus is on the direct relationships between NPLR, CAR, LLPR, and profitability, it is essential to consider other control variables that might influence these dynamics. Macroeconomic factors such as GDP growth, regulatory changes, and market competition can also affect credit risk and profitability. However, isolating the main variables provides a clearer understanding of their direct impact, enabling banks to prioritize strategies that directly enhance profitability.

To sum up, understanding the primary relationships between credit risk indicators and profitability, while considering the influence of other control variables, is crucial for commercial banks in Vietnam. Strengthening credit risk management practices, refining loan loss provisioning, maintaining capital adequacy, and monitoring inflation impacts are essential steps towards enhancing financial performance and stability. By focusing on these main relationships, banks can better navigate credit risk challenges, improve profitability ratios, and contribute to the overall growth and stability of the banking sector.

6. Recommendations

This study has highlighted several key factors that influence bank profitability in Vietnam. The bigger banks have economies of scale, more market power and access to resources and materials compared to smaller banks. As a result, these kinds of banks tend to have higher profitability. Furthermore, the factor of capital adequacy also plays a positive relationship with the performance of banks, emphasizing the need of maintaining enough capital sources for financial stability. In contrast, the study shows that the higher the levels of non-performing loans, the lower the bank profitability. This result has contributed to the importance of effective credit risk management. Besides that, the inflation rate indicates only a minor positive effect on banks performance, which can be explained by

the increase in demand for loans and interest income. Although the loan loss provision ratio does not have a direct impact on bank profitability, it still plays an important role in risk management. Moreover, this research also finds that the type of ownership does not have any impact on the bank performance as the government practices and market competition have a substantial role in maintaining the balanced healthy economy.

On the practical side, the research suggests guidance for further studies in the banking sector. As explained above, non-performing loans may have a negative effect on a bank's profitability, which can occur due to aggressive lending without sufficient analysis of borrowers' willingness and capacity to repay the loan. To mitigate the risk, banks should carefully assess the borrowers' solvency and repayment capacities, and the assessment process should align with the current economic conditions. Also, banks can diversify their portfolio by expanding their customer base across different sectors, geographic regions, and customer segments.

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