

# Relationship Between the Profitability from Credit Activity and the Non-Performing Loan Ratio of Commercial Bank in Vietnam During Covid-19 Period

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**Abstract** – Based on the regression method according to the fixed and random effect models on the basis of the balance sheet data, the article studies the relationship between the profitability of credit activity and the non-performing loan ratio (NPL ratio) of Vietnamese commercial banks in the period from 2015 to 2021, the period affected by the Covid-19 epidemic. To achieve the research objective, the authors utilized the data of 15 commercial banks, ranging in size from small to large banks and the data account for about 70% of total assets, 70% of total charter capital and 85% of total outstanding loans of Vietnamese commercial banks. On that basis, the study shows that the net interest margin has a positive and statistically significant impact on NPL ratio in the context of covid-19. Meanwhile, a few other factors such as asset size and loan growth rate of commercial banks have a negative relationship and are statistically significant with the NPL ratio.

**Keywords** – Asset Size, Covid-19, Net Interest Margin, Non-Performing Loan Ratio.

## I. INTRODUCTION

All risks that banks face such as credit risks, interest rate risks, exchange rate risks, operational risks, liquidity risks, etc... can cause the bank to fall into bankruptcy. However, both theoretically and experimentally, the credit risk is always the type of risk that has the strongest influence. The non-performing loan ratio is an important indicator for assessing credit quality or measuring the credit risk of commercial banks. Looking at the non-performing loan ratio, we can see the financial health, and risk management skills of a commercial bank. The high NPL ratio can lead to loss of profit and even loss of capital and decrease the confidence of depositors, seriously affecting the reputation of commercial banks. If this situation prolongs, it will lead to the bankruptcy of commercial banks, causing serious consequences for the economy in general and the financial system in particular. Therefore, non-performing loan identification and non-performing loan handling is one of the important issues in the current period.

Currently, in order to solve the high rate of non-performing loans at Vietnamese commercial banks, the non-performing loan trading activity of Vietnam Asset Management Company (VAMC) is only a temporary solution, to deal with the current situation. In fact, VAMC only “holds” non-performing loans for banks through a special ticket called “special bonds”, not a buy-and-sell relationship. Therefore, the risk of non-performing loans may return and still stalk banks. Therefore, the study of micro and macro factors affecting the non-performing loan ratio of commercial banks plays an extremely important role, which can solve the problem of

non-performing loans at the root. In particular, the study of the relationship between profitability from credit activities and NPL should be of primary concern because profits are often accompanied by risks. Therefore, through the research results, the bank managers, executives, and policy makers can have appropriate policies and solutions to control NPL.

In the current post-Covid-19 context, the State Bank of Vietnam is forced to increase operating interest rates, commercial banks are struggling to cope with the increase in non-performing loans caused by the pandemic; therefore, more research papers are needed to study more clearly the relationship between profitability from credit activities and NPL for more policy implications. All of the above reasons are the motivation for the authors to carry out the research project: “Relationship between profitability from credit activities and non-performing loan ratio of Vietnamese commercial banks”.

## II. THEORETICAL BASIS AND THE RELATIONSHIP BETWEEN THE PROFITABILITY FROM CREDIT ACTIVITY AND THE NON-PERFORMING LOAN RATIO OF VIETNAMESE COMMERCIAL BANKS

### 2.1. *Theoretical Basis*

Profitability from credit activities is assessed through Net Interest Margin (NIM). This ratio represents the difference between interest income and interest expenses that a bank can achieve through tight control of assets and the pursuit of the lowest-cost sources of capital. This ratio means: When a bank increases by 1 unit of profitable assets, the net interest income from interest income activities will increase by corresponding units. Therefore, it is possible to adjust and strictly control profitable assets, look for low-cost capital sources, and have a reasonable policy of increasing and decreasing interest rates. They show the effectiveness in maintaining the growth of revenue sources (mainly from loans, documentary discounting fee, finance leasing fees, guarantee fees, etc.) compared to the increase in costs (mainly from interest expenses for deposits and from lending activities on money market). Meanwhile, according to IMF, non-performing loan is defined as: “non-performing loan is loan with interest and/or principal overdue 90 days or more than 90 days, interests overdue 90 days or more than 90 days are capitalized to refinance or defer repayment as agreed, or less than 90 days past due but there are other indications that the borrower is unable to make full payments of principal and interest.” However, non-performing loan is an unavoidable problem in the credit activities of banks, so it is important for commercial banks to maintain the non-performing loan ratio at an acceptable level. According to the World Bank, the rate of below 5% is acceptable and good at 1-3%.

Theoretical and experimental studies show that NIM and NPL have a positive relationship with each other. The first case occurs when NPL increases, leading to an increase in NIM. In detail, high NPL leads the bank to make a lot of provisions for credit risks which are accounted into operating expenses to provide for possible losses to the debts held by the bank. Therefore, banks will have to calculate higher profits to offset the expected risks. In other words, banks will require a higher risk premium. In particular, this higher risk premium is reflected in the application of a higher lending rate (Maudos and Fernandez de Guevara, 2004) and a lower deposit rate (Angbazo, 1997, Barajas, Steiner, 2004), and Salazar, 1999). This activity has the effect of increasing loan interest income and reducing interest expenses. Interest expenses decreased because banks often apply low deposit rates to customers who showed signs of early withdrawal. In order to compensate for this

early withdrawal of mobilized capital, the bank must sell its assets to create a liquidity supply or cover the costs incurred because the bank has to raise new capital from outside to meet the liquidity demand. As a result, the NIM of banks increases in condition of other things being unchanged.

The second possible case is that an increase in NIM leads to an increase in NPL ratio. This is explained as follows: high lending interest rate means that high NIM can cause an increase in non-performing loans of the bank. Due to the borrower's failure to fulfill the terms committed in the loan contract or part of the principal and interest to fail to be paid on time, especially in uncertain economic conditions, the enterprise's profitability rate is lower than the bank lending rate. Therefore, when net interest income is high, it proves that the bank lends a lot, leading to high credit risk, and the non-performing loan is one of the main causes of credit risk and then the bank has to set aside lots of provisions. The empirical studies of the authors Macit, F. (2012), Laryea et al. (2016), Panta (2018), and Kumar et al (2018) confirm the existence of a significant positive relationship between the net interest margin and the non-performing loan ratio of commercial banks.

## *2.2. Factors Affecting the Non-performing Loan Ratio of Commercial Banks*

In addition to the studies on the relationship between NIM and NPL ratio, domestic and foreign authors have conducted further research on specific micro-factors and macro-factors affecting NPL ratio of commercial banks. The first factor is NIM: see above analysis.

The second factor is the size of the bank. Research by Rajan and Dhal (2003), Ghosh (2015), and Do and Nguyen (2013) showed that the bank size factor has a positive impact on the NPL ratio. Meanwhile, the negative correlation between size and non-performing loan ratio is also found in research by Salas and Suarina (2002), Hu et al. (2004), Espinoza and Prasad (2010), and Swamy (2012).

The third factor is capital adequacy ratio, the research work of Mugahed Mahyoub, showed a positive relationship of CAR and NPL ratio. However, the authors Fajar Afriyanto, Hilda Purnamawati, Iyan Sukiman (2021) studied the relationship of those two factors and gave the results that CAR did not affect NPL ratio.

The fourth factor is loan to deposit ratio. This ratio has a positive relationship with NPL ratio in the studies of Klein, N. (2013) and Louzis, D.P., Vouldis, A.T., and V.L. Metaxas (2010).

The fifth factor is credit risk. The positive effect of this factor on the NPL ratio is found in the articles of Ozili (2019), and Jimenez and Saurina (2006).

The six factor is loan growth. Most of the studies that the authors investigated showed a positive relationship between loan growth and NPL ratio Sinkey and Greenwalt (1991), Keeton (1999), Salas and Saurina (2002) and Jimenez and Saurina (2006).

The seventh factor is the ratio of non-interest income. While the studies of Winton (1999) and Templeton and Severiens (1992) concluded that the ratio of non-interest income has a negative effect on NPL ratio, Stiroh (2006) did not find a relationship between this factor and NPL ratio.

The eight factor is macro factors such as GDP growth was shown negative impact on NPL ratio in studies Salas and Suarina (2002), De Bock and Demyanets (2012), Fofack (2005), Pasha and Khemraj (2009), Azeem et al. (2012). The inflation factor had no effect according to Fofack's pseudo panel data model (2005) but has a positive effect in the paper of Pasha and Khemraj (2009).

### III. RESEARCH METHODS

#### 3.1. Research Data

This study was conducted with the data collected in the period 2015-2021 of 15 Vietnamese commercial banks: An Binh Commercial Bank Joint Stock (ABBank), Asia Commercial Joint Stock Bank (ACB), Joint Stock Commercial Bank for Investment and Development of Vietnam (BIDV), Vietnam Joint Stock Commercial Bank for Industry and Trade (Vietinbank), Vietnam Export and Import Commercial Joint Stock Bank (EIB), Nam A Commercial Joint Stock Bank, Military Commercial Joint Stock Bank (MBB), LienViet Post Joint Stock Commercial Bank, Vietnam Bank for Agriculture and Rural Development (Agribank), Petrolimex Group Commercial Joint Stock Bank (PGBank), Technological and Commercial Joint stock Bank (Techcombank), Joint Stock Commercial Bank for Foreign Trade of Vietnam (VCB), Vietnam Prosperity Joint Stock Commercial Bank (VPBank), Kien Long Commercial Joint Stock Bank, National Citizen Commercial Bank Joint Stock. These are 15 banks with relatively accurate data, ranging in size from small to large and accounting for 69% of the total assets of the commercial banking system, almost representing the overall. The database is collected from annual financial statements of banks, reports of the State Bank for the period 2015-2021, the General Statistics Office and the World Bank to form a detailed data table.

#### 3.2. Research Model and Hypothesis

##### 3.2.1. Model Building

Based on the theoretical basis and the above arguments, the research team has built the following equation:  

$$NPLratio_{it} = \beta_0 + \beta_1 * NIM_{it} + \beta_2 * Size + \beta_3 * CAR_{it} + \beta_4 LDR + \beta_5 creditrisk + \beta_6 loangrowth + \beta_7 NII + \beta_8 GDP + \beta_9 INF + \epsilon_{it}$$

##### 3.2.2. Variables and Research Hypothesis

Table 3.1. Summary of the model's Independent Variables and Expectations.

Variable		Indicator	Expected Sign	Source
Dependent variable				
Non-performing loans rate	NPL ratio	Non-performing loans/Total loans		Financial statements of commercial banks
Independent variables				
Net interest margin	NIM	Interest incomes-Interest expenses /Average profitable assets	+	Financial statements of commercial banks
Bank Assets	Size	Logarit of asset	-	Financial statements of commercial banks
Capital adequacy ratio	CAR	Tier 1 Capital + Tier 2 Capital /Risk Weighted Assets	-	Financial statements of commercial banks
Loan to deposit rate	LDR	Loan to deposit ratio	-	Financial statements of commercial banks
Credit risk	CREDITRISK	Credit risk provision/total loans	+	Financial statements of

Variable		Indicator	Expected Sign	Source
				commercial banks
Loans growth	Loangrowth	An increase in loans year t compared to t-1	+	Financial statements of commercial banks
Non-interest margin	NII	Net Non - interest income/Total asset	+	Financial statements of commercial banks
GDP growth	GDP	An increase in GDP year t compared to t-1	-	World Bank
Inflation	INF	Average inflation rate per year	-	World Bank

Source: Author's compilation from previous studies.

### *Research Hypothesis*

In order to find out the relationship between the factors to the NPL ratio, the authors put forward the following hypotheses:

Hypothesis 1: The net interest margin significantly affects NPL ratio of Vietnamese commercial banks (NIM).

Hypothesis 2: Bank size significantly affects NPL ratio of Vietnamese commercial banks (SIZE).

Hypothesis 3: Capital adequacy ratio significantly affects NPL ratio of Vietnamese commercial banks (CAR).

Hypothesis 4: The loans to deposit ratio significantly affects NPL ratio of Vietnamese commercial banks (LDR).

Hypothesis 5: Credit risk significantly affects NPL ratio of Vietnamese commercial banks (CREDITRISK).

Hypothesis 6: The loan growth rate significantly affects NPL ratio of Vietnamese commercial banks (LOANGROWTH).

Hypothesis 7: The ratio of non-interest income significantly affects to NPL ratio of Vietnamese commercial banks (NII).

Hypothesis 8: GDP growth rate significantly affects NPL ratio of Vietnamese commercial banks (GDP).

Hypothesis 9: The inflation rate significantly affects NPL ratio of Vietnamese commercial banks (INF).

### *3.3. Research Methods*

The data used in the model is demonstrated as panel data. During the research, the data is processed and analyzed with the support of STATA 16 software. Before conducting regression analysis, PURT test (panel unit root test) is performed with the aim of ensuring the data possessing certain trends. Then, Fisher, Chow and Hausman tests are used to find the estimate that fits the model and the sample. Next, the authors conduct the test of the defects of the selected model, including multicollinearity, variable variance and autocorrelation. The solution to deal with multicollinearity is to remove the variable whose VIF is greater than or equal to 10. For variable variance and autocorrelation, appropriate corrections are made to obtain the best estimated result.

## **IV. RESEARCH RESULTS**

### *4.1. Descriptive Statistics*

Table 4.1. Summary of Descriptive Statistics.

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
NPL ratio	105	1.820866	0.9165737	0.4666945	6.363242
Nim	105	3.262095	1.497581	0.22	8.77
SIZE	105	19.28042	1.246555	17.02156	21.28952
CAR	105	12.1541	2.791273	8.34	21.35
LDR	105	83.24418	10.89966	53.98727	109.949
CREDITRISK	105	1.361753	0.4294946	0.7978564	2.783974
Loangrowth	105	0.1728196	0.0952658	-0.1102592	0.5119223
incomediver	105	0.0172033	0.0120645	0.0029837	0.0715825
GDP	105	5.542224	1.963393	2.09	7.075789
INFLATION	105	2.603594	0.9773904	0.6312009	3.539628

(Data Source: Stata 16 output).

#### 4.2. Unit Root Test (PURT)

Research by Gujarati (2003) has shown that panel data are often nonstationary, and using these data to perform regression will not give accurate results. To avoid this problem, all variables used in the study must be unit root tested. Since the data in the study are balanced data, the unit root test method of Levin, Lin & Chu (2002) will be used.

The unit root test results show that the data of the independent and dependent variables are stationary, so the data is suitable for the next research step.

#### 4.3. Correlation Analysis

Table 4.2. Correlation matrix between variables.

TLNX	TLNX	Nim	SIZE	CAR	LDR	CREDITRISK	Loangrowth	Incomediver	GDP	INFLATION
TLNX	1.0000									
Nim	0.3018	1.0000								
	0.0018									
SIZE	-0.2493	0.2411	1.0000							
	0.0103	0.0132								
CAR	0.1227	0.0624	-0.5277	1.0000						
	0.2125	0.5271	0.0000							
LDR	0.0567	0.3265	0.3440	-0.0284	1.0000					
	0.5658	0.0007	0.0003	0.7737						

TLNX	TLNX	Nim	SIZE	CAR	LDR	CREDITRISK	Loangrowth	Incomediver	GDP	INFLATION
CREDITRISK	0.1496	0.2811	0.5186	-0.2870	0.0412	1.0000				
	0.1277	0.0037	0.0000	0.0030	0.6767					
Loangrowth	-0.1998	0.2261	-0.0393	0.1187	0.0731	0.0375	1.0000			
	0.0410	0.0204	0.6904	0.2278	0.4588	0.7040				
incomediver	0.2115	0.4220	0.1301	0.0071	0.0030	0.0818	-0.1806	1.0000		
	0.0303	0.0000	0.1858	0.9429	0.9757	0.4067	0.0653			
GDP	-0.0337	-0.0258	-0.1546	0.1672	-0.0777	-0.2669	0.2426	-0.2306	1.0000	
	0.7328	0.7937	0.1154	0.0882	0.4308	0.0059	0.0126	0.0180		
INFLATION	-0.0171	0.0346	0.0759	-0.1739	0.2292	-0.1202	-0.0661	0.0024	0.1256	1.0000
	0.8625	0.7261	0.4416	0.0760	0.0187	0.2219	0.5030	0.9809	0.2018	

(Data Source: Stata 16 output).

Based on the Pearson correlation coefficient on the correlation coefficient matrix table, it shows that NPL ratio has a statistically significant positive relationship with NIM, Incomediver, but has a negative correlation relationship, and has statistical significance with the variables Size and Loangrowth.

#### 4.4. Checking for Multicollinearity

To ensure the accuracy of the estimates in the model, the multicollinearity test was performed using the variance exaggeration factor VIF.

Table 4.3. Checking for Multicollinearity.

Variable	VIF	1/VIF
GDP	2.18	0.457758
SIZE	1.76	0.56678
Nim	1.67	0.598335
CREDITRISK	1.6	0.625653
CAR	1.49	0.67206
Incomediver	1.48	0.673926
LDR	1.28	0.78167
INFLATION	1.24	0.808813
Loangrowth	1.17	0.854539
VIF trung bình	1.54	

(Data Source: Stata 16 output).

The results of the calculation of the variance exaggeration coefficient show that the variables in the regression equation satisfy the rule of thumb in which the variance exaggeration factor VIF is less than 10. Therefore, these variables will be used to run the regression model.

#### 4.5. Regression Results

Table 4.5. Regression results.

Variables	(1)	(2)	(3)	(4)
	Pool OLS	FEM	REM	Robust
Nim	0.1580997**	-0.2138598	0.1580997**	0.1580997**
	0.0767588	0.1533407	0.0767588	0.0933873
SIZE	-0.4610409***	-0.3199274	-0.4610409***	-0.4610409***
	0.1066017	0.4016283	0.1066017	0.1109423
CAR	-0.0321601	-0.0389633	-0.0321601	-0.0321601
	0.0348856	0.0414126	0.0348856	0.0408991
LDR	0.0132727	0.002107	0.0132727	0.0132727
	0.0090804	0.0117305	0.0090804	0.0157253
CREDITRISK	0.787659***	0.7020292***	0.787659***	0.787659***
	0.2230408	0.2365452	0.2230408	0.3604724
Loangrowth	-2.422917***	-1.451337	-2.422917	-2.422917***
	0.8714368	0.9744552	0.8714368	0.6169712
Incomediver	6.789002	0.1756214	6.789002	6.789002
	7.758184	9.515245	7.758184	6.877788
GDP	0.0405102	0.0155612	0.0405102	0.0405102
	0.0401849	0.0521035	0.0401849	0.0498143
INFLATION	-0.0141059	0.0253269	-0.0141059	-0.0141059
	0.0761731	0.0823946	0.0761731	0.057626
_cons	8.521734	8.124626	8.521734	8.521734
	2.066485	7.517536	2.066485	1.82083
Observations	105	105	105	105
R-squared	<i>within</i> = 0.0865 <i>between</i> = 0.7371 <i>overall</i> = 0.4002	<i>within</i> = 0.1523 <i>between</i> = 0.0001 <i>overall</i> = 0.0160	<i>within</i> = 0.0865 <i>between</i> = 0.7371 <i>overall</i> = 0.4002	<i>within</i> = 0.0865 <i>between</i> = 0.7371 <i>overall</i> = 0.4002
Number of name		15	15	15

(Data Source: Stata 16 output)

(\*\*\*, \*\*, \* are symbols of statistically significant factors < 0.01, < 0.05, < 0.1, respectively).

The test results show that the random effects model (REM) is the most suitable for the research sample, and there is a phenomenon of variable variance. Therefore, in the study, the standard error estimate is used to obtain reliable results as follows:

NIM shows a statistically significant positive relationship with the NPL ratio of Vietnamese commercial banks in the 2015-2021 period. This shows that the larger the bank's NIM is, the higher the non-performing loan ratio of the bank is.

The variables Size and Loangrowth have a negative and statistically significant relationship with the non-performing loan ratio in Vietnamese commercial banks in the 2015-2021 period. Meanwhile, Creditrisk has a statistically significant positive relationship with NPL ratio. This shows that the higher the Creditrisk is, the higher the non-performing loan ratio of the bank is. The remaining variables in the model do not show a statistically significant relationship with the non-performing loan ratio.

## **V. SOME RECOMMENDATIONS TO CONTROL THE NON-PERFORMING LOAN RATIO OF VIETNAMESE COMMERCIAL BANKS**

From the results of the regression, it shows that the non-performing loan ratio has a positive and statistically significant relationship with NIM and credit risk, but has a negative relationship with asset size and loan growth rate of Vietnamese commercial banks. On that basis, the authors propose some specific recommendations and solutions as follows:

The first solution is controlling NIM well, adjusting it from time to time and suitably for each context of the domestic economy because according to the above research model, increasing NIM will increase NPL ratio. In detail, when the lending interest rate is high, the high NIM may cause the borrower to fail to fulfill the terms committed in the loan contract or to fail to pay part of the principal and interest on time under the terms of the loan agreement. Besides, under volatile economic conditions, corporate profitability is lower than bank lending rates. When net interest income is high, it proves that the bank lends to a large extent, leading to high risk, and non-performing loan is one of the main causes of credit risk and then the bank has to make provision. However, the decrease in NIM of Vietnamese commercial banks may lead to lower profits as most of the bank's income comes from lending activities. Therefore, some experts of banks affirm that each bank has its own point of view in the plan to build and develop NIM targets to match the complicated situation of the epidemic. At the same time, commercial banks always pay attention to the issue of credit risk expressed through non-performing loan ratio, thereby adjusting lending and deposit interest rates accordingly. Another important basis for determining the net interest margin is that according to the recommendations of international credit rating agencies - NIM in the range of 3% to 5% is appropriate. Therefore, commercial banks that currently have a NIM of less than 3% and a low NPL ratio can give more loans to increase NIM but still ensure a non-performing loan ratio below 3% because non-performing loan is still low. In addition, the determination of loan growth rate, deposit interest rate and lending rate in order to determine the specific NIM depends on the strategy and credit policy of each bank and each specific context of the economy. Solutions are given for each specific group of commercial banks as follows:

Firstly, the group of commercial banks with NIM in the range of 3%-5% will maintain the NIM ratio in that range, if it is reduced, it should be reduced to at least 3% but must ensure that the non-performing loan ratio does not exceed 3%. In order to keep the net interest margin unchanged, managers may consider holding more liquid assets including cash, gold, silver, gems; Deposits at the State Bank; Money and gold deposited at other credit institutions and lending to other credit institutions; Securities trading; Investment securities because when

liquid assets held by banks increase, banks will not be pressured to mobilize external capital to maintain capital adequacy ratios as prescribed by the State Bank of Vietnam and accordingly may have lower funding costs than banks with illiquid assets and pressure to raise capital from outside. Therefore, although banks have reduced lending interest rates for old and new loans to reduce financial costs for businesses and individuals, the NIM is still the same due to interest expense, interest on deposits, interest on loans, issuance of valuable papers, etc.

Secondly, the small-sized banks such as NamABank, PGbank, Eximbank, and ABBank with NIM lower than the average and higher lending and deposit interest rates compared to large-sized ones can adopt the following suggestion. In the view of managers, if the non-performing loan ratio is still in the allowable level of less than 3%, these banks can still increase NIM by reducing lending rates, but adjust the decreasing speed of margin of lending rates slower than those of deposit interest rate. In fact, banks in this group have a non-performing loan ratio of less than 3%, based on the non-performing loan situation in the future, the bank can adjust the ratio to increase or decrease the NIM respectively. Those banks are also banks with low consumer loan balances and have not penetrated deeply into the retail segment. Therefore, the expansion of consumer loans with higher interest rates will help improve the profit margin due to the high rate of return on assets. Besides, the bank managers also try to find other opportunities of low-cost mobilized capital such as payment deposits, and demand deposits to save interest expenses, ready for NIM growth. In addition, this group of banks may consider increasing equity through different methods to amplify the bank's net interest margin. Because when the bank has a larger equity, there will be no pressure to mobilize external capital to maintain the capital adequacy ratio as prescribed by the SBV. Therefore, expenses for deposits will be lower than those of other banks.

Thirdly, Vietcombank, Vietinbank and BIDV are 3 state-owned joint stock commercial banks, but for many years, they have kept their net interest margin below 3% because these banks are diversifying income from many different sources and limit too much dependence on credit activities whose risk level of this activity is the highest. In fact, because these banks all have low risk appetites, non-performing loan grows slowly. NIM will be less affected during difficult times. Therefore, it is not difficult for the state-owned joint stock commercial bank group to increase NIM to over 3% during the Covid-19 epidemic period but the solution depends on credit strategy and policy as well as the development orientation of lending activities in the overall development orientation of the banks.

The second solution is strengthening credit risk management. In the above regression model, the risk provision has a positive impact on the non-performing loan ratio of commercial banks. This is completely consistent with the reality in Vietnam because loans account for most of the bank's assets, but the control of the loan portfolio is not good, leading to the formation of non-performing loans in recent years. According to the coefficients in the model to minimize credit risk, commercial banks need to manage their loan portfolio, be more active in making provisions and dealing with non-performing loans. For loan portfolio management, banks need to apply science and technology with goals and action strategies to assess the macroeconomic situation to help allocate the proportion of the loan portfolio in accordance with each group of customers and geographies. Each commercial bank needs to improve its credit rating by improving techniques and technology, and operate independently between the credit department and the credit rating department. In addition, commercial banks need to carefully consider the business plan before lending and monitor and evaluate the use of loan portfolios in accordance with the initial commitment and to flexibly adjust the provisioning level according to regulations

of the Law. In addition, commercial banks must make provisions for risks in accordance with regulations.

## VI. CONCLUSION

Research results according to the regression model show that the NPL ratio has a positive and statistically significant relationship with the net interest margin and credit risk but has a negative relationship with the loan growth rate and asset size. Therefore, commercial banks have drawn solutions to control NPL ratio by controlling the net interest margin and limiting loan growth, especially limiting loans to industries. risky business, leading the bank to increase the provision for credit risks to offset the credit risks that may occur. In addition, state management agencies need to continue to inspect and review the credit system, be careful in loosening the safety regulations of the credit system.

## REFERENCES

- [1] Angbazo, L. (1997). Commercial bank net interest margins, default risk, interest-rate risk and off-balance sheet banking. *Journal of Banking and Finance*, 21, 55-8.
- [2] Apawuza, A. S. (2019). Effect of capital requirement on profitability and lending behavior of banks in Ghana. Thesis of the university of Ghana business school.
- [3] Aziz, S.E. (2021). The Case of COVID-19 impact on the level of non-performing loans of conventional commercial banks in Indonesia. *Banks and Bank Systems*, 16(1), 62-68.
- [4] Afriyanto, Fajar and Purnamawati, Hilda and Sukiman, Iyan. (2021). The effect of capital adequacy ratio (car) and loan to deposit ratio (LDR) on non performing loan (NPL) (Case study on conventional commercial banks in Indonesia on 2016-2020. Seminar Social Politik (Politics), Bisnis, Akunatansi dan Teknik (Business, Accounting and Engineering). Indonesia: Bandung.
- [5] Bessis, J. (. (1998). Risk management in banking. NY: Willey.
- [6] Christian Bluhm, Ludger Overbeck, Christoph Wagner . (2010). Introduction to Credit Risk Modeling. Taylor & Francis.
- [7] Darrell Duffie , Kenneth J. Singleton . (2003). Credit Risk: Pricing, Measurement, and Management. Princeton University Press.
- [8] De Bock, R., and A. Demyanets. ( 2012). Bank Asset Quality in Emerging Markets: Determinants and Spillovers. IMF Working Paper, 12/71.
- [9] Debock, R. and Demyanets, A. . (2012). Bank Asset Quality in Emerging Markets: Determinants and Spillovers. IMF Working Papers, 1-27.
- [10] Do and Nguyen (2013). Fractal analysis of factors to non-performing loans of vietnamese commercial banks.
- [11] Espinoza, R., and A. Prasad . (2010). 2010. Nonperforming Loans in the GCC Banking Systems and their Macroeconomic Effects. IMF Working Paper, 10/224. .
- [12] Fofack, H. (2005). Non-performing loans in sub-Saharan Africa: Causal Analysis and Macroeconomic Implications . World Bank Policy Research Working, 3769.
- [13] Ghosh, A. (2015). Banking-Industry specific and regional economic determinants of non-performing loans: Evidence from US States. *Journal of Financial Stability*, 20, 93-104.
- [14] Ines Ghazouani Ben Ameer, Sonia Moussa Mhiri . (2013). Explanatory Factors of Bank
- [15] Jimenez, G., Salas, V. and Saurina, J. . (2006). Determinants of Collateral. *Journal of Financial Economics*, 81, 255-281.
- [16] Jimenez, Gabriel and Jesus Saurina. (2005). Credit cycles, credit risk, and prudential regulation. Banco de Espana (Bank of Spain).
- [17] Keeton, W. a. (1987). Why Do Banks' Loan Losses Differ? Federal Reserve Bank of Kansas City. *Economic Review*, 3-21.
- [18] Khafid, M., F. & Anisykurlillah, I . (2020). Investigating the determinants of non-performing loan: Loan monitoring as a moderating Variable. *KnE Social Sciences*, 4(6), 126-136. .
- [19] Klein, N. (2013). Non-performing Loans in CESEE: Determinants and Impact on Macroeconomic Performance. IMF Working Paper, WP/13/72.
- [20] Khemraj, T., & Pasha, S. (2009). The determinants of non-performing loans: An econometric case study of Guyana. MPRA Paper, University Library of Munich.
- [21] Louzis, D.P., Vouldis, A.T., and V.L. Metaxas . (2010). Macroeconomic and bank-specific determinants of non-performing loans in Greece: A comparative study of mortgage, business and consumer loan portfolios. Bank of Greece, Working Paper, 118.
- [22] Laryea, E., Ntow-Gyamfi, M., & Alu, A.A. (2016). Nonperforming loans and bank profitability: evidence from an emerging market. *African Journal of Economic and Management Studies*, 7(4), 462-481.
- [23] Macit, F. (2012). What determines the non-performing loans ratio: Evidence from Turkish Commercial Banks. *CEA Journal of Economics*, 33-40.
- [24] Maudos, J., & De Guevara, J. F. . (2004). Factors explaining the interest margin in the banking sectors of the European Union. *Journal of Banking & Finance*, 28(9), 2259-2281.
- [25] Muhammad Azeem, Irum Saba, Rehana Kouser . (2012). Determinants of non-performing loans: case of US banking sector. *The Romanian Economic Journal*, 141-151.
- [26] Mugahed Mahyoub , Rasidah Mohd Said . (2021). Factors influencing non-performing loans: empirical evidence from commercial banks in Malaysia. *Pressacademic RJB*, 8(3), p.160-166.
- [27] Ozili, P.K. (2019). Impact of Digital Finance on Financial Inclusion and Stability. *Borsa Istanbul Review* , 18(4), 329-340.
- [28] Panta, B. (2018). Non-Performing Loans & Bank Profitability: Study of Joint Venture Banks in Nepal. *International Journal of Sciences: Basic and Applied Research*, 42(1), 151-165.
- [29] Puspitasari, E. ., Sudiyatno, B, Aini, N. ., & Anindiansyah, G . (2021). The Relationship Between Net Interest Margin and Return on Asset: Empirical Study of Conventional Banking in Indonesia. *Academic Journal of Interdisciplinary Studies*, , 10(3), 362. .
- [30] Ronald Ravinesh Kumar, Peter Josef Stauvermann, Arvind Patel, Selvin Sanil Prasad. (2018). Determinants of non-performing loans in banking sector in small developing island states: A study of Fiji". *Accounting Research Journal*. Emerald Group Publishing.
- [31] Rajan, Rajiv and Sarat C. Dhal, . (2003). Non-performing loans and terms of credit of Public Sector Banks in India: An Empirical Assessment. *Occasional Papers*, 24(3), 81-121.
- [32] Salas, Vincente and Jesus Saurina. (2002). 2002. Credit risk in Two Institutional Regimes: Spanish Commercial and Savings Banks.

- Journal of Financial Services Research, 22(3), 203-224. .
- [33] Sinkey, Joseph. F. and Mary B. Greenwalt. (1991). Loan-loss experience and risk taking behavior at large Commercial Banks. Journal of Financial Services Research, 5, 43-59.
- [34] Swamy, V. (2012). Impact of Macroeconomic and Endogenous factors on non-performing Bank Assets. <https://doi.org/10.2139/ssrn.2060753>.
- [35] Templeton, WK, & Severiens, J. (1992). The effect of nonbank diversification on bank holding companies. Quarterly Journal of Business and Economics, 31 (4), 3-16.
- [36] Winton, A. (1999). Don't put all your eggs in one basket: Diversification and specialization in lending. University of Minnesota.

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