



## The Impact of Credit Diversification on Credit Risk and Performance of Indonesian Banks

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**Abstract:** This study aims to identify the effect of credit diversification in the economic sector on credit risk and performance of commercial banks in Indonesia. Multiple linear regression is used to determine the effect of credit diversification on credit risk and banking performance. The data used in this study is the aggregated financial statements of commercial banks in Indonesia during the 2015-2018. The results indicate that credit diversification based on the economic sector has a significant effect on increasing the profitability of commercial banks in Indonesia. The credit diversification based on the economic sector also has a significant effect in reducing credit risk. Two control variables, namely company size and banking liquidity have a significant negative effect on profitability respectively. In the case of credit risk, the company size has a positive effect, while the banking liquidity has no effect. These findings support the traditional banking theory which states that banks that diversify their credit portfolios can reduce the credit risk and increase profitability.

**Keywords:** *Credit Diversification, Credit Risk, and Bank Performance.*

### Article History

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## Introduction

Credit distribution activities are important in the banking world. Maximum banking profitability is precisely derived from the banking credit distribution strategy (Widyatini, 2015). The success and failure of banks in managing credit will affect the company's soundness. Thus, the accuracy of lending has always been an important banking evaluation material.

Credit diversification based on economic sectors is a banking activity in equalizing credit distribution to various economic sectors. Diversification of credit in the economic sector is one of the strategies chosen by banks in increasing profitability and reducing the risk of bad loans. In general, bank credit diversification strategies are carried out to control credit risk and avoid the risk of bank failure (Christianti, 2011).

Some traditional theories about diversification state that credit diversification will maximize banking performance by reducing various risks (Diamond, 1984; Boyd & Prescott, 1986). While other theories state that the concentration of lending to several sectors is more appropriate than credit diversification (Jensen, 1986; Denis et al., 1997; Rajan et al., 2000; Hayden et al., 2006; Simpasa & Pla, 2017).

Credit diversification strategies can reduce credit risk that can be influenced by other variables such as differences in total banking assets, liquidity levels, implementation of monitoring in the form of Good Corporate Governance (GCG) implementation and many other factors (Widyatini, 2015; Rossi et al., 2009). Diversification will be appropriate in certain situations. But in other situations, diversification can be the opposite, which can cause profitability to decline. Many factors affect it.

Based on Figure 1, Indonesian banking non-performing loan (NPL) continued to increase during 2013-2018. The high level of banking NPLs requires efforts to increase the monitoring of bank lending. Besides, the latest management strategy for lending needs to be pursued to reduce the ratio of bad loans. This study wants to prove that the banking credit diversification strategy can control credit risk and avoid the risk of bank failure. Besides, this study also wants to test statistically whether credit diversification can increase the profitability of banks in Indonesia.

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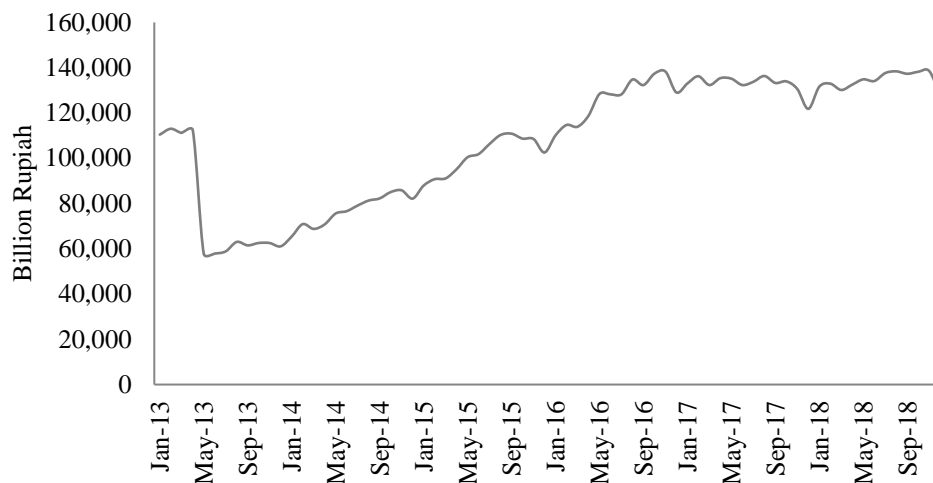


Figure 1. Non-Performing Loan of Commercial Banks in Indonesia  
Source: Indonesian Banking Statistics (Processed, 2019).

## Theoretical and Literature Review

### Profitability

Weygandt et. al (2009) concluded that profitability ratios are ratios used to measure the effectiveness of overall company management as indicated by the number of profits earned by the company, in this case, is a sharia reproduction. In this study, the ratio used to measure the performance of a company is a return on assets (ROA). Kuncoro and Suhardjono (2002) stated that ROA shows management's ability to manage available assets to get net income, while Siamat (2005) argues that ROA is a ratio that provides information on how efficient a company is in conducting its business activities because this ratio indicates how much profit that can be obtained on an average of each rupiah of its assets. The greater ROA shows the company's performance that is getting better because of the greater return.

ROA is often referred to as return on investment (ROI). The return on investment or better known as return on investment or return on total assets is a ratio that shows the return on the total assets used in the company. ROI is also a measure used on the effectiveness of management in managing its investments.

The higher ROA produced by a company, the better the company in improving the company's financial performance. The way to measure ROA is as follows:

$$ROA = \frac{\text{Net profit}}{\text{Total assets}} \times 100\% \quad (1)$$

Financial ratios are said to be useful if they can be used to assist in decision making. The benefits of financial ratios in predicting earnings growth can be measured by the significant relationship between financial ratios at the individual level and at the level of the construct (capital, assets, earnings, and liquidity) with profit growth. If the relationship of financial ratios with earnings growth has a significant effect, then it can be said that financial ratios are beneficial, if otherwise, it is said to be useless.

### Credit Risk

Bank lending is done as one of the main sources of bank revenue. Lending by banks is not merely going to always benefit, sometimes banks face bad credit installments. A large amount of credit a bank will cause a large amount of risk borne by the bank concerned. Bank credit risk is still the focus of Bank Indonesia (BI) today in maintaining the Indonesian financial stability system.

According to Astrini et al. (2018), the level of occurrence of non-performing loans is usually reflected by the ratio of non-performing loans (NPLs) that occur at banks. The NPL ratio is used as a ratio to measure the ability of banks to overcome the risk of default on loans by debtors. According to Kuncoro and Suhardjono (2002), bad credit or NPL is a condition where the customer is unable to pay part or all of his obligations to the bank as he promised.

### ***Credit Diversification by Economic Sector***

Credit diversification is an effort to reduce the potential for bank business failure as a result of the concentration of funding provision. The classification of financing based on the economic sector is based on the need to determine the direction of the bank financing policy qualitatively and emphasizes the economic sector that is prioritized in financing with bank financing. In this study, the classification of financing by the economic sector is classified as follows.

- 1) Agriculture, hunting, and forestry.
- 2) Mining and quarrying.
- 3) Processing industry.
- 4) Electricity, gas, and water.
- 5) Construction.
- 6) Wholesale and retail trade.
- 7) Transportation, warehousing, and communication.
- 8) Educational services.
- 9) Health services and social activities.
- 10) Community, social, cultural, entertainment, and other individual services.
- 11) Individual services serving households.
- 12) International bodies and other extra-international bodies.
- 13) Activities whose boundaries are not yet clear.

### ***Literature Review***

There are two theories about diversification policy, that are traditional theories about diversification that state that credit diversification will maximize banking performance by reducing various risks (Diamond, 1984; Boyd & Prescott, 1986). While other theories state that the concentration of lending to several sectors is more appropriate than credit diversification (Jensen, 1986; Denis et al., 1997; Rajan et al., 2000; Hayden et al., 2006; Simpasa & Pla, 2017).

Previous research showed that diversification strategies influence increasing bank profitability. Christianti (2011) researched the effect of credit diversification on profitability and the risk of failure in the banking industry in Indonesia. This research is a quantitative study using panel data using the fixed-effect model approach. Profitability and the probability of failure in this study are dependent variables, whereas diversification and credit risk are independent variables. The data used are secondary in the form of bank annual financial statements, financial statement records, Indonesian Stock Market Directory (ISMD), and Indonesian Capital Market Directory (ICMD) during 2004-2009. The results of the study indicate that diversification based on economic sectors influences bank profitability, while credit diversification based on the type of use has a positive effect on the probability of bank failure. Research by Chen et al. (2018) indicates that diversifying credit portfolios in 16 commercial banks in China can reduce credit risk. Credit diversification is the right strategy in this research.

However, there is also a diversification strategy that is not the right thing to reduce bank profitability. Mulwa (2018) studied the effect of diversification of economic sector financing on the financial performance of the East African banking industry and asset quality. Banking profitability in East Africa in this study is a dependent variable, while financing diversification based on economic sectors is an independent variable. The results showed that credit diversification based on the economic sector has a negative and significant effect on the increasing profitability of banks in East Africa. Credit diversification based on economic sectors has a negative and significant effect on the quality of the banking industry assets. Low asset quality which indicates low non-performing loans indicates the effectiveness of more efficient bank monitoring, and therefore, diversification of sectoral credit increases the effectiveness of monitoring the banking industry in East Africa.

Belguith and Bellouma (2018) studied the effect of economic diversification of credit on profitability and bank credit risk in Tunisia in 2000-2015. This study found that the focus of lending to several economic sectors is more profitable than diversifying to various sectors. It means that the diversification strategy is not the right thing for banks in Tunisia. Credit diversification can reduce profitability and increase bank credit risk at that time.

Simpasa and Pla (2017) studied whether the higher concentration of Zambian bank credit distribution has an impact on improving banking performance. The performance is proxied by the NPL ratio. The results indicate that the concentration of bank credit is inversely proportional to risk. The more banks concentrate loans on several sectors, the lower the credit risk faced by banks in Zambia. It seems that for Zambian banks, a strategy of credit concentration to a particular sector or the parable of 'putting all eggs in one basket' is the optimal strategy. It can be explained that by lending more controlled lending, banks in Zambia can reduce monitoring costs and hence risk which in turn increases overall profitability.

Singh (2014) examined the effect of credit diversification on credit risk and profitability. The research found that diversification does not help banks in Punjab to increase profits, but on the contrary, it has a negative effect on profits. This research also found that diversification has no significant effect on credit risk. It means that it cannot help banks to reduce credit risk. Therefore, it suggests that banks in Punjab should check their policy on credit diversification because it does not help in increasing profitability nor in reducing credit risk.

Hayden et al. (2006) examined whether banks that diversify based on geographical areas, industrial sectors, and economic sectors can improve banking performance in Germany. This study takes banking data in Germany in 1996-2002. The findings indicate that diversification tends to reduce the profitability of banks in Germany. This research confirms that banks that focus on certain sectors are more profitable.

Research by Tabak et al. (2011) showed that banks in Brazil in distributing concentrated loan portfolios to several sectors further increased the profitability of banks in Brazil. This means that banks in Brazil are low in diversifying credit portfolios to various sectors. The effect of the concentration of the banking credit portfolio in Brazil on the risk proxied by NPLs results in the finding that the concentration of the loan portfolio implies a lower risk.

Based on the description above, this research hypothesis is prepared whether the credit diversification based on the economic sector of commercial banks in Indonesia has a positive impact on profitability and credit risk or otherwise. Referring to the theory of credit diversification, whether diversification can be the right strategy of commercial banks in Indonesia, then it becomes interesting to do further research. Thus, it is considered necessary to examine more deeply the effect of credit diversification on the profitability and credit risk of commercial banks in Indonesia, so this research hypothesis is as follows.

H<sub>1</sub>: The credit diversification based on the economic sector of commercial banks in Indonesia has a positive effect on profitability.

H<sub>2</sub>: The credit diversification based on the economic sector of commercial banks in Indonesia has a positive effect on credit risk.

## Method

The variables in this study are credit diversification based on the economic sector (Hirschman Herfindal index based on economic sector or HHIE), company size (Ln\_Size), banking liquidity (LDR), credit risk (NPL), and profitability (ROA). Diversification of financing based on economic sectors is classified into 13 sectors, namely: (1) agriculture, hunting, and forestry; (2) mining and quarrying; (3) processing industry; (4) electricity, gas, and water; (5) construction; (6) wholesale and retail trade; (7) transportation, warehousing, and communication; (8) educational services; (9) health services and social activities; (10) community, socio-cultural, entertainment, and other individual services; (11) individual services serving households; (12) international bodies and other extra-international bodies; and (13) activities whose boundaries are not yet clear.

The population in this study is commercial banks in Indonesia. The sample in this study is the data of aggregated commercial banks in Indonesia (the summation of sharia banks and conventional banks) for the period of January 2015 - December 2018. The analytical method used in this study is the multiple linear regression analysis. Systematically the regression equation can be made as follows:

$$\text{Model 1: } ROA_t = \alpha_0 + \beta_1 HHIE_t + \beta_2 Ln\_Size_t + \beta_3 LDR_t + \varepsilon_t \quad (2)$$

$$\text{Model 2: } NPL_t = \alpha_0 + \beta_1 HHIE_t + \beta_2 Ln\_Size_t + \beta_3 LDR_t + \varepsilon_t \quad (3)$$

where,

<i>ROA</i> :	Return on asset
<i>NPL</i> :	Non-performing loan
<i>HHIE</i> :	Credit concentration based on economic sectors (Hirschman Herfindahl index)
<i>Ln_Size</i> :	Bank size in logarithmic form
<i>LDR</i> :	Loan to deposit ratio
$\beta_1, \beta_2$ , and $\beta_3$ :	The regression coefficients of each independent variable
$\alpha_0$ :	Constant
$\varepsilon$ :	Error term

The method of measuring diversification variables and financing risks is to use the Hirschman Herfindahl index (HHI). HHI is an indicator of market concentration that is valued between 0 to 1. If HHI is close to 1, the diversification of financing by the economic sector tends to be low, meaning that banks are more specialized and concentrated in just a few sectors and vice versa (Simpasa & Pla, 2017). HHI can be calculated using the following formula.

$$HHI = \sum_{i=1}^n \left( \frac{X_i}{Q} \right)^2 \quad (4)$$

where HHI is the Hirschman Herfindahl index,  $n$  is the number of groups measured,  $i$  is group measured,  $X_i$  is the amount of group financing, and  $Q$  is the total amount of financing provided by the bank.

## Results and Discussion

Before proceeding to the analysis of multiple linear regression, the data are tested on classic assumptions first so they are not biased. The classic assumption test results are presented in Table 1 and Table 2. Based on the results displayed by those tables, the regression Model 1 and Model 2 pass the classic assumption test and can proceed to hypothesis testing.

### Determination Coefficient (Adjusted $R^2$ )

The coefficient of determination obtained from multiple linear regression is presented in Table 3. Adjusted R-squared shows how the dependent variable variation can be explained by the independent variables. The adjusted R-squared of Model 1 is 26.1%. It means that 26.1% of the variation of the profitability can be explained by the credit diversification based on economic sectors (HHIE), company size (Ln\_Size), and liquidity (LDR), while the remaining 73.9% is explained by other variables outside the model. The adjusted R-squared of Model 2 is 67.7%. It means that 67.7% of the variation of the credit risk can be explained by the credit diversification based on economic sectors (HHIE), company size (Ln\_Size), and liquidity (LDR), while the remaining 32.3% is explained by other variables outside the model.

### T-Test or Partial Hypothesis Test Result

T-test result of credit diversification to profitability is presented in Table 4. The result shows that the credit diversification based on economic sectors has a significant influence on bank profitability because of the probability is  $0.000 < 0.05$ . The regression equation produced in this study is as follows.

$$ROA_t = 12.334 - 1.312 HHIE_t - 0.740 Ln\_Size_t - 0.441 LDR_t \quad (5)$$

From Table 4, it is known that the impact arising from the effect of credit diversification based on the economic sector is 1.312 with a negative direction on the profitability of commercial banks in Indonesia. This has increasingly focused the banking sector on lending to many sectors. The results of this study indicate that credit diversification is the right strategy in increasing profitability proxied by the ROA ratio in banks in Indonesia. As for the control variable, the size of the company, which is proxied by the size of the banking assets and liquidity, both have a significant effect on the profitability of banks in Indonesia.

The results of this study support the theory that credit diversification based on the economic sector will maximize banking performance by reducing various risks (Diamond, 1984; Boyd & Prescott,

1986). The results of this study also support previous research conducted by [Mulwa \(2018\)](#) and [Christianti \(2011\)](#) which states that the more banks diversify their loans to various sectors, the more they increase bank profitability. However, the results of this study differ from those of [Tabak et al. \(2011\)](#), [Belguith and Bellouma \(2018\)](#), [Singh \(2014\)](#), and [Hayden et al. \(2006\)](#) which states that credit diversification based on high economic sectors, reduce the profitability of Islamic banks.

Table 1. Classical Assumption Test Results of Regression Model 1: The Impact of Credit Diversification on Performance (ROA)

Classic Assumption Test	Result	Description
Normality test (Kolmogorov Smirnov test)	Asymp. sig. (2-tailed) shows $0.200 > 0.05$	Data is normally distributed or passes the normality test
Autocorrelation test (DW test)	DW value 1.368 where $-2 < 1.368 < 2$	No autocorrelation
Multicollinearity test (VIF test)	VIF value of diversification in the economic sector; company size; and liquidity are 6.927, 6.130, and 1.877 respectively $< 10$	Multicollinearity does not occur
Heteroscedasticity test (scatter plot test)	The points do not form a particular pattern and spread	Heteroscedasticity does not occur
Linearity test (F test)	Sig. value showing $0.001 < 0.05$	Linear regression model or passing the linearity test

Table 2. Classical Assumption Test Results of Regression Model 2: The Impact of Credit Diversification on Credit Risk (NPL)

Classic Assumption Test	Result	Description
Normality test (Kolmogorov Smirnov test)	Asymp. sig. (2-tailed) shows $0.057 > 0.05$	Data is normally distributed or passes the normality test
Autocorrelation test (DW test)	DW value of 0.554 where $-2 < 0.554 < 2$	No autocorrelation
Multicollinearity test (VIF test)	VIF value of diversification in the economic sector, company size, and liquidity are 6.927, 6.130, and 1.877 respectively $< 10$	Multicollinearity does not occur
Heteroscedasticity test (scatter plot test)	The points do not form a particular pattern and spread	Heteroscedasticity does not occur
Linearity test (F test)	Sig. value showing $0.000 < 0.05$	Linear regression model or passing the linearity test

Table 3. Adjusted R-Squared

Regression Model 1	26.1 %
Regression Model 2	67.7%

Table 4. T-Test Results of the Effect of Credit Diversification on Performance (ROA)

Variables	Standardized Coefficients Beta	t-Statistic	Sig.
Constant	12.334		
Credit diversification (HHIE)	-1.312	-3.974	0.000
Company size (Ln_Size)	-0.740	-2.383	0.022
Liquidity (LDR)	-0.441	-2.567	0.014

The results of the t-test of the regression Model 2 are presented in [Table 5](#). It shows that the credit diversification based on economic sectors has a significant influence on bank credit risk due to the probability generated at  $0.001 < 0.05$ . The regression equation produced in this study is as follows.

$$NPL_t = -668.000 + 0.740 HHIE_t + 1.408 Ln\_Size_t + 0.086 LDR_t \quad (6)$$



Table 5. T-Test Results of the Effect of Credit Diversification on Credit Risk (NPL)

Variables	Standardized Coefficients Beta	t-Statistic	Sig.
Constant	-668.000		
Credit diversification (HHIE)	0.740	3.394	0.001
Company size (Ln_Size)	1.408	6.866	0.000
Liquidity (LDR)	0.086	0.762	0.450

From Table 5, it is known that the impact arising from the influence of credit diversification based on the economic sector is 0.740 with a positive direction on the credit risk of the commercial banks in Indonesia. This means that the more banks focus on lending to only a few economic sectors, the more credit risk increases. These results support the first regression equation, namely the diversification strategy of economic sector lending is the right step in reducing credit risk. The reduced credit risk has an impact on improving the performance of Indonesian banks.

The results of the second study support the theory that credit diversification based on economic sectors can reduce credit risk. The results of this study also support previous research conducted by Mulwa (2018) which states that the more banks diversify credit to various sectors, can reduce credit risk. However, the results of this study differ from those of Tabak et al. (2011), Belguith and Bellouma (2018), Simpasa and Pla (2017), and Singh (2014) which states that the credit diversification strategy is not the right thing. Distribution of economic sector credit to several sectors is more appropriate in reducing credit risk.

The results of the two regression equations above can be explained by the results of the HHI index of credit diversification based on the economic sector, as captured in Figure 2. It shows the average value of HHI diversification of credit based on economic sectors is 0.21. This value is close to 0, meaning that diversification tends to be high, which means that both Islamic banks and conventional banks extend credit to various economic sectors, not just focus on a few sectors. The policy of bank lending in Indonesia tends to spread and diversify into several economic sectors which have an impact on increasing the profitability of the commercial banks in Indonesia. Diversification strategy policy is the right thing to implement in Indonesia.

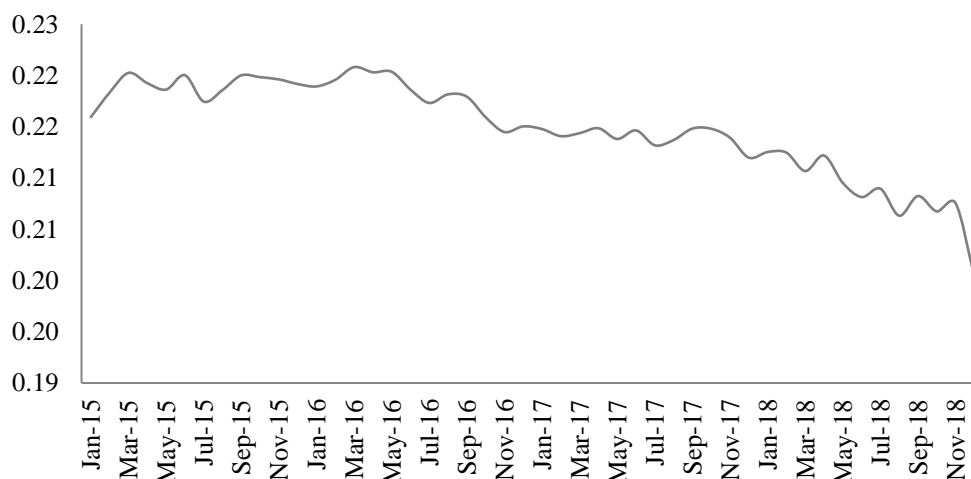


Figure 2. Value of HHI Credit Diversification based on the Economic Sector of Commercial Banks in Indonesia

Source: Indonesian Banking Statistics (Processed, 2019).

Based on the results of this study, banks in Indonesia are right in applying credit diversification to various economic sectors. Based on the results of this study, credit diversification can reduce credit risk and increase profitability. The diversification strategy needs to be accompanied by credit monitoring measures. The monitoring process is a series of activities to find out and monitor the progress of the credit granting process, credit travel, and business development from the time credit is given until it is paid off.

According to Prastiwi and Anik (2020), although the cost of conducting monitoring will reduce bank profitability, at the same time, credit diversification accompanied by supervision and monitoring will help offset credit risk to be lower. The selection of the right credit customers will save the cost of financing monitoring. This can maximize banking profitability.

## Conclusion

This study is to examine the effect of credit diversification based on the economic sector on profitability and credit risk of commercial banks in Indonesia. The first result in this study is that credit diversification based on high economic sectors has an impact on increasing the profitability of commercial banks in Indonesia. It supports the traditional theory that credit diversification will maximize banking performance by reducing various risks (Diamond, 1984; Boyd & Prescott, 1986). The second research result is that credit diversification based on high economic sectors has an impact on reducing the credit risk of commercial banks in Indonesia. This means that the results of this study also support the traditional theory of diversification.

Based on the results of this study, credit diversification is the right strategy applied to banks in Indonesia. The government needs to implement further policies that support the implementation of credit diversification, such as conducting credit analysis, monitoring, and evaluation.

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