



## Research Article

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# The Relationship Between Net Interest Margin and Return on Asset: Empirical Study of Conventional Banking in Indonesia

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## Abstract

*Purpose of this study is to examine the relationship between net interest margin and return on assets by placing the net interest margin as the mediating variables. This study uses a sample of banks listed on the Indonesia Stock Exchange for the period 2015 to 2018. Data used is panel data, with data analysis using path analysis. Results showed that the capital adequacy ratio and non-performing loan do not have effect with NIM. We find a statistically significant negative effect between operating cost/operating income ratio and loan to deposit ratio for the NIM. NPL do not have effect with ROA, while CAR, BOPO, and LDR have a negative effect with ROA. However, NIM is positively related to ROA. The important things from this paper that from sobel test results shown that the NIM mediates the relationship between BOPO and LDR to ROA.*

**Keywords:** net interest margin, return on asset, Indonesia Stock Exchange

## 1. Introduction

Since the trade war between the United States and China, the condition of the Indonesian banking industry has continued to experience uncertain fluctuations. This condition was affected by slowing trade and manufacturing production which led to an economic slowdown, both globally and nationally. According to the quarterly report data from the OJK in 2019, slowing domestic economic growth of 5.02% (y-o-y) in the 3rd quarter of 2019 from the previous quarter's 5.05% (y-o-y) an effect on slowing credit which grew by 7.89% (y-o-y) compared to the previous year's 12.69% (y-o-y), however, liquidity conditions increased from 6.60% (y-o-y) to 7.47% (y-o-y).

Throughout 2015, the national banking sector only recorded credit growth at the level of 10.1% on an annual basis. Credit in December 2015 grew by 10.1% on an annual basis (y-o-y) from 9.5% (y-o-y) in November 2015. Deputy Governor of Bank Indonesia (BI) said that banking intermediation as a whole until the end of 2016 was recorded well. Therefore, these conditions helped to boost bank credit growth.

BI reported that credit growth in 2016 reached 9 percent. This figure is in line with the central bank's target of pegging credit growth in the range of 7 to 9 percent in 2016. When compared to 2015, in 2016 there was a decline in credit by 1.1%. Therefore, during January to December 2016, the performance of national banking credit growth was not very encouraging. In 2017, banking credit growth only reached 8.1 percent, a decrease of 0.95 from 2016. While in 2018, banking industry lending grew by 11.7%, an increase of 3.6% compared to 2017.

Based on the development of bank credit during 2015 to 2018, there will be fluctuations in credit growth which can have an impact on bank performance. Banks operating under the financial system should properly be framed by regulations designed primarily for the public interest. Therefore, regulations and policies need to be considered so that banks can run according to their function as financial intermediaries. Banking regulations are a motivation for economic growth and at the same time maintain financial system stability. Banks in Indonesia are required to maintain positive performance and be able to maintain company stability with the aim of maintaining public trust in an increasingly competitive market competition.

Bank performance is important, because it is a reflection of a bank's ability to manage the aspects of capital and assets in obtaining profit, as well as the implications of the bank's function as an intermediary where bank liquidity is measured based on loans extended to the public compared to funds provided by third parties. To determine the soundness level of a bank's financial performance, it is measured by the net interest margin (NIM) and return on assets (ROA) generated during a certain period, 1 year. NIM is one of the actions taken by banks so that banks can become more professional and better than before, so that banks become healthier. While, ROA is a measure of a bank's ability to generate profits from the use of all its resources or assets. ROA is used to assess the quality and performance of a bank in generating net income from the utilization of its assets.

Net Interest Margin (NIM) is the ratio used to analyze how much net interest income is compared to its earning assets. Where net interest income is the difference between total loan interest and total interest on deposits. Therefore, NIM is calculated from the difference between total loan interest and total deposit interest compared to the total earning assets of the bank (Claeys & Vander Vennet, 2008; Dumitic & Rizdak, 2013; Hoang & Vu, 2015; Kalluci, 2010; Tarus et al., 2012).

Several previous research results found that capital adequacy ratio (CAR) and loan to deposit ratio (LDR) have a positive effect on NIM, while operating costs (BOPO) have a negative effect, non-performing loans (NPL) and loans have no effect on NIM (L. R. Sidabalok, 2013). Other research conducted by Moussa & Majouj (2016) found that NPL and capital CAR do not effect on NIM, while LDR has a positive effect, and BOPO has a negative effect.

Previous research related to return on assets (ROA) conducted by Lartey et al. (2013) found that NIM has a positive effect on ROA. Silaban (2017) found that NIM has a positive effect on ROA, NPL has a negative effect, while the CAR not effect to ROA. However, Islam & Rana (2017) found that NPL has a negative effect on ROA, while LDR does not significant effect on the profitability in the private commercial banks of Bangladesh.

Based on the results of previous studies related to net interest margins (NIM) and return on assets (ROA), the problem in this study is that there is no clarity on the factors that determine of ROA. Therefore, the aim of this study is to examine the relationship between NIM and ROA, and the factors that determine it.

## **2. Literature Review and Hypotheses Development**

There is an interesting literature review on bank performance, related to the bank's net interest margin (NIM) and return on assets (ROA) which is still interesting to discuss. Several previous research variables used to determine the net interest margin (NIM) and return on assets (ROA), such as capital adequacy ratio (CAR), non-performance loan (NPL), operating costs/operating income ratio (BOPO), and loan to deposit ratio (LDR).

Net interest margin (NIM) is one of the important actions that bank management must take to

create a quality bank. NIM is the ratio used to determine the ability of bank management to manage earning assets, so that they can generate net income. This ratio is needed in bank management, because with this ratio problematic banks can be reduced. NIM can be calculated by subtracting interest income from interest expense. The ability of bank management in managing bank earning assets is a very important part of determining the amount of bank net interest income.

Return on Assets (ROA) according to experts is a ratio that shows the return on the total assets used in firm operations. ROA is calculated by dividing the company's net profit after tax by the assets used for the firm's operations. Management can use this ratio to measure its business, while investors can use it to make wise and careful decisions in choosing which stocks have the potential to benefit.

Research on net interest margin (NIM) which are placing NIM as the dependent variable and as an independent variable, has also been widely carried out, although it still different result findings. These different findings indicate an interesting empirical phenomenon to revisit regarding these differences in findings, by examining the relationship between NIM and ROA as a bank performance variable that is determined by many factors.

Capital is one of the important elements in managing a business, without capital it is impossible for a business to run. Capital in the banking sector cannot be separated from the capital adequacy ratio (CAR). CAR is a ratio that represents the ability of a bank to provide funds that are used as reserves to overcome the possibility of the risk of loss. Given that the banking business has a high risk of loss, to anticipate this risk, bank management must always pay attention to and maintain its capital to reduce the risks.

Capital adequacy ratio (CAR) has a positive effect on net interest margin (NIM) proven by Sidabalok (2013) and Ahmad & Matemilola, (2013). While Durguti & Aliu (2014) found that CAR has a negative effect on NIM in the Kosovo Banks. Related with ROA, Hoang & Vu, (2015) and Batten & Vo (2019) found that CAR has a positive effect. Elshaday et al. (2018) also proven that CAR has a positive effect with ROA on private commercial banks in Ethiopia However, Chouikh & Blagui (2017) found that CAR has not affecting on ROA.

H<sub>1</sub>: CAR has a positive and significant effect on NIM.

H<sub>2</sub>: CAR has a positive and significant effect on ROA.

Non-performance loans (NPL's) occur due there are non-performing loans, and can have an impact on reducing bank capital. If this is allowed to do so, it will have an impact on lending in the next period, because of the decline in bank capital. Therefore, the NPL can be used as an indicator of measurement the quality of bank assets. This indicator will provide information on the condition of capital, profitability, credit risk, market risk and liquidation.

Non-performing loan (NPL) have a negative effect on NIM proven by Ahmad & Matemilola (2013). While, Raharjo et al. (2014), Sidabalok (2013), and Moussa & Majouj (2016) found that NPL have not effect on NIM. Related with ROA, Yolanda & Sumarni (2018) found that NPL has a negative effect on ROA. However, Puspitasari et al., (2019) proved the opposite where NPL had not effect on ROA in Indonesian commercial banks.

H<sub>3</sub>: NPL has a negative and significant effect on NIM.

H<sub>4</sub>: NPL has a negative and significant effect on ROA.

Bank operational costs arise due to operational activities at the bank, without this cost bank activities will not run. Bank operating costs will be related to bank operating income, this relationship occurs in relation to the activities of the bank as an institution that collects and channels funds from and to the customers. Operational costs to the operating income (BOPO) play a major role in measuring the level of efficiency and ability of a bank in carrying out its operational activities.

Operating cost/operating income ratio in this paper called BOPO have a negative effect on on NIM proven by Sidabalok & Viverita (2011). However, the research from Raharjo et al. (2014) found that BOPO has a positive effect on net interest margin (NIM). Related with ROA, BOPO have a negative effect on ROA, it has been proven by Arimi & Mahfud (2012) and Sudiyatno & Fatmawati (2013). On the other hand, Hardiyanti & Febriatmoko (2016) did not find the effect of BOPO on ROA.

H<sub>5</sub>: BOPO has a negative and significant effect on NIM.

H<sub>6</sub>: BOPO has a negative and significant effect on ROA.

Loan to Deposit Ratio (LDR) is the ratio between the total volume of credit extended by banks to the customer and the amount received from various sources. This ratio is closely related to the liquidity aspect of the bank, so it is necessary to get special attention from bank management so that the bank does not experience liquidity problems, which can result in an increase in liquidity risk, which is due to disrupted bank operational. LDR as a traditional measure, which shows time deposits, current accounts, savings, etc. used in fulfilling customer loan applications. A high LDR indicates that banks lend most of their funds, this condition can have an impact on increasing liquidity risk.

Loan to deposit ratio (LDR) had a positive effect on net interest margin (NIM), it has been proven Sidabalok & Viverita (2011), Sidabalok (2013), Ahmad & Matemilola (2013), and Moussa & Majouj (2016). However, different finding were obtained from Hardiyanti & Febriatmoko (2016) whose found that LDR had a negative effect on NIM. Related with ROA, Hardiyanti & Febriatmoko (2016) found that the LDR has a positive effect on ROA. However, Arimi & Mahfud (2012) states that LDR has not effect to ROA.

H<sub>7</sub>: LDR has a positive and significant effect on NIM.

H<sub>8</sub>: LDR has a positive and significant effect on ROA.

Results of research by Hardiyanti & Febriatmoko (2016) found that NIM had a positive effect and significant on profitability. In other hand, the results of research from Soares & Yunanto (2018) found that NIM had positive and not significant effect to ROA. It means NIM has not effect to ROA.

H<sub>9</sub>: NIM has a positive and significant effect on ROA.

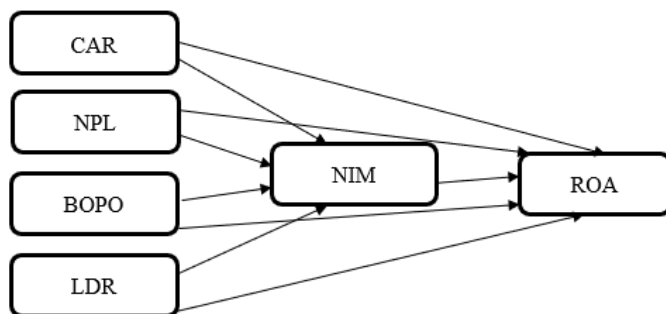


Figure 1: Empirical Model

### 3. Research design

#### 3.1 Population and Sample

Population of this research is banking companies that go public on the Indonesia Stock Exchange (IDX) for the period 2015-2018. Sampling was done by using purposive sampling method, which is selected based on certain criteria made by the researcher. There are 36 banks listed on the Indonesia Stock Exchange (IDX), with a total sample of 108.

#### 3.2 Research model and variables measurement

Data analysis used path analysis, and the mediation test used the Sobel-test. Technique of analysis uses 2 (two) multiple regression equation models.

Regression Equation 1 as follows:

$$\text{NIM} = a_{11} + b_{11}\text{CAR} + b_{12}\text{NPL} + b_{13}\text{BOPO} + b_{14}\text{LDR} + e_1 \quad (1)$$

Regression Equation 2 as follows:

$$\text{ROA} = a_{22} + b_{21}\text{CAR} + b_{22}\text{NPL} + b_{23}\text{BOPO} + b_{24}\text{LDR} + b_{25}\text{NIM} + e_{22} \quad (2)$$

Note:

ROA	= Return on asset
NIM	= Net interest margin
CAR	= Capital adequacy ratio
NPL	= Non-performance loan
BOPO	= Operating cost/Operating income
LDR	= Loan to deposit ratio

**Table 1:** Variables measurement

Variables	Definitions
ROA	Net income over total assets
NIM	(Total interest income – Total interest expenses)/Total assets
CAR	(Tier 1 capital + Tier 2 capital)/Risk weighted assets
NPL	Total nonperformance loan/Total credit
BOPO	Operating cost/Gross income
LDR	Average net loans/Average deposits

### 3.3 Sobel Test

In this research, the mediating variable is NIM which mediates CAR, NPL, BOPO, and LDR in influencing ROA. NIM can be placing as a mediating variable, if the z value of the test is  $z > 1.96$  with a significance of 5%, and Sobel-test is used.

## 4. Results and Analysis

### 4.1 Description Analysis

This research conducted on a sample of 108 n samples of banks listed on the Indonesia Stock Exchange based on the requirements according to the research purposes.

**Table 2:** Statistical description

Variable	N	Minimum	Maximum	Mean	Std. Deviation
CAR	108	6.80	66.40	21.40	7.39
NPL	108	.00	8.50	2.73	1.52
BOPO	108	58.60	99.00	85.97	9.11
LDR	108	51.60	145.30	86.75	13.25
NIM	108	.00	9.30	4.81	1.64
ROA	108	.10	4.00	1.44	0.92

Real conditions of CAR, NPL, BOPO, LDR, NIM and ROA can be seen in Table 2, and can be explained as follows:

Position of the average CAR is 21.40%, with the lowest position being 6.80% and the highest position is 66.40%. When compared with countries in the Southeast Asia region, practically the average CAR for banks in Indonesia is the highest. Standard & Poor's (S&P) research shows that ASEAN countries such as Thailand, Philippines, Singapore and Malaysia only have CAR in the range of 13.6% -15.8%. Meanwhile, CAR in China and India was much lower, namely 11% and 10.8% respectively at the end of 2018.

The average of NPL is 2.73%. Bank Indonesia has determined that a reasonable NPL level is  $\leq 5\%$  of its total loan portfolio. In this case, the average NPL shown in the descriptive statistics is 2.73%, indicating that this figure is still far from the limit of non-performing credit risk.

The average BOPO is 85.97% with a range of 58% - 99%. Like NPL, which must be watched

carefully. The possibility of an increase in BOPO could occur. Currently, banking in Indonesia is in an expansion stage, thus requiring significant operational costs to expand the provision of payment systems and networks.

Average LDR is 86.75%, which is considered a fairly good position, because it is still between the lower limit (78%) and the upper limit (100%), although there are still some banks whose positions are below the lower limit and above the upper limit.

The average of NIM is 4.81%, with a range between 0.00% - 9.30%. For that position of average NIM still classified in the category of excellent to measure net interest income after taxes compared to average earning assets.

Average ROA is 1.44%, with the lowest position 0.10% and the highest 4.00%. In general, profitability can be said to be good if the ROA is > 1.5%. The decrease in ROA that occurs is due to the increase in assets that is greater than the increase in profit.

## 4.2 Model analysis and hypotheses test

### 4.2.1 Test of significance of F regression equation 1

Table 2 for the F significance test is carried out to determine whether the regression model used meets the goodness of fit requirements as required in the regression. Result of the F significance test shows that the value of F = 35.105 with a significance of 0.000 or less than 1%. Thus, the regression equation 1 fulfills the goodness of fit requirements to be used to predict the factors that affect NIM.

**Table 3:** ANOVA regression equation 1

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	79.980	4			
1 Residual	55.249	97	19.995	35.105	.000 <sup>b</sup>
Total	135.229	101	.570		

### 4.2.2 Coefficient of determination of regression equations 1

Result of the coefficient of determination is the value of R Square 59.10% with Adjusted R Square of 57.5%. These results indicate that 57.5% of NIM is influenced by CAR, NPL, BOPO, and LDR, while 42.5% is influenced by other factors.

**Table 4:** Coefficient of determination of regression equations 1

R	R Square	Adjusted R Square	Std Error the Estimate
.769 <sup>a</sup>	.591	.575	.75471

### 4.2.3 Hypothesis test of regression equations 1

Based on the results of the t test for regression equation 1 in Table 5, BOPO and LDR a negative effect on NIM, while CAR and NPL do no effect.

**Table 5:** Significance Test of t Regression Equation 1

Variable	Unstandardized Coefficients	t	Sig	Conclusion
CAR	.004	.399	.691	Rejected
NPL	.039	.659	.511	Rejected
BOPO	-.088	-11.060	.000	Accepted
LDR	-.024	-3.768	.000	Rejected

Dependent variable: NIM

#### 4.2.4 The effect of CAR on NIM

Significance test results show that the value of  $t = 0.399$  with a significance of  $t = 0.691$ , thus hypothesis 1 ( $H_1$ ) is rejected. The results of this study are not in accordance with the concept of bank capital theory that banks with large capital will bring large profits to banks.

Results of this study found that CAR do not affect to NIM (Hamadi & Awdeh, 2012; Moussa & Majouj, 2016; Raharjo et al., 2014). However, contrary to the results of research of this study is the research conducted by Sidabalok (2013) and Ahmad & Matemilola (2013), whose found CAR has a positive effect to NIM. Meanwhile, Durguti & Aliu (2014) proved that CAR has a negative effect to NIM.

#### 4.2.5 The effect of NPL on NIM

Significance of  $t$  test of the effect of NPL on NIM shows the value of  $t = 0.659$  with a significance of  $t = 0.511$ , thus the hypothesis 3 ( $H_3$ ) is rejected. NPL has not affect to NIM. Results of this study supported the research from Sidabalok & Viverita (2011), Azeez & Gamage (2013), Moussa & Majou (2016), Căpraru & Ihnatov (2014) whose did not find any effect of NPL on NIM. However, the results of this study do not support the research of Ahmad & Matemilola (2013), which found a negative effect of NPL to NIM.

#### 4.2.6 The effect of Operating Cost to Operating Income (BOPO) on NIM

Operating costs to operating income (BOPO) have a negative effect on NIM. This result is shown by the  $t$  test which the value of  $t = -11.060$  with a significance of  $t = 0.000$ . This shows that a bank with low operating costs will generate a high NIM. Thus, the hypothesis 5 ( $H_5$ ) is accepted.

The result of this study support Sidabalok & Viverita (2011), Hamadi & Awdeh (2012), Ahmad & Matemilola (2013) and Căpraru & Ihnatov (2014), which show that BOPO has a negative effect on NIM. However, the results of this study are different from research by Raharjo et al. (2014), which found that BOPO a positive effect on NIM. As well, research from Hardiyanti & Febriatmoko (2016), which did not find any effect of BOPO on NIM.

#### 4.2.7 The effect of LDR on NIM

LDR has a negative effect with a significance of less than 1%, so that there is a statistically significant effect of LDR on NIM. Thus, the hypothesis 7 ( $H_7$ ) is rejected. This result is not in accordance with the concept of risk, where banks with high liquidity risk will also generate high profitability, because there is an increase in loans extended to the customers. Banks with high LDR will face high liquidity risk, because banks are short of funds due to high loans extended to customers.

The result of this study support the research results from Hardiyanti & Febriatmoko (2016), which show that LDR has a negative effect on NIM. However, the results of this study are not consistent with research conducted by Sidabalok & Viverita (2011) and Moussa & Majouj (2016), whose found that LDR has a positive effect on NIM. Banks liquidity have a positive effect on NIM (Ahmad & Matemilola, 2013), while the results from Căpraru & Ihnatov (2014) did not find any effect of LDR on NIM.

#### 4.2.8 Significance Test of F Regression Equation 2

The results of the F significance test show that the value of  $F = 730.957$  with a significance of  $F = 0.000$  (Table 6). This means that the regression equation model 2 is good and can be used to predict the factors that effect to ROA.

**Table 6:** ANOVA regression equation 2

Model	Sum of Squares	df	Mean Square	F	Sig
1 Regression	87.339	5	17.468	730.957	.000 <sup>b</sup>
Residual	2.438	102	.024		
Total	89.777	107			

#### 4.2.9 Coefficient of determination of regression equations 2

Table 7 shows that the value of R Square = 97.2% with an Adjusted R Square of 97.2%. The regression model of equation 2 is very good for predicting, because the level of accuracy reaches 97.2%. The variables used in the model are able to provide an effect of 97.2%, and only 2.8% of the variables come from outside the model.

**Table 7:** Coefficient of determination of regression equations 2

R	R Square	Adjusted R Square	Std Error the Estimate
.769a	.986a	.972	.75471

#### 4.2.10 Hypothesis test of regression equations 2

Results of the t significance test regression equation 2 as in Table 8 show that CAR, BOPO, and LDR have a negative effect on ROA at a significance of less than 1%. While NIM a positive effect on the significance of less than 1%, and only that has no effect on ROA.

**Table 8:** Significance Test of t regression equation 2

Variable	Unstandardized Coefficients	t	Sig	Conclusion
CAR	-.007	-3.201	.002	Rejected
NPL	.001	.132	.895	Rejected
BOPO	-.095	-48.610	.000	Accepted
LDR	-.003	-2.771	.007	Rejected
NIM	.072	7.057	.000	Accepted

#### 4.2.11 The effect of CAR on ROA

CAR as shown in Table 7 a negative effect at a significance of less than 1%. Therefore, if the CAR value is high, then the bank's ability to get ROA will increase, because the bank has sufficiently large capital to be channeled in the form of credit. However, the opposite happens, then hypothesis 2 ( $H_2$ ) is rejected. The increase in CAR is not able to increase profitability.

Results of this study support research from Puspitasari et al. (2019), which states that CAR has a negative effect on ROA. Different findings from this study, conducted by Elshaday et al. (2018) and Batten & Vo (2019) and Batten and Vo, XV (2019) found that CAR has a positive effect on ROA. While research from Chouikh & Blagui (2017) proved that CAR do not effect on ROA.

#### 4.2.12 The effect of NPL on ROA

Table 7 shows that the t value of 0.132 ( $t = 0.132$ ) with a significance of  $t = 0.895$ .  $H_4$  is rejected. Banks in the operational activities of channeling credit are required to establish an allowance for impairment losses, as a reserve to cover the risk of possible losses due to earning assets (loans). Banks also have non-interest income sources - fee based income, such as collection of payment (namely, real time gross

settlement), transfers, and credit cards, which also have a relatively high impact on the level of profitability, so this may not affect NPLs on NIM and ROA.

Results of this study support the findings of Puspitasari et al. (2019) which did not find any effect of NPL on ROA. However, Căpraru & Ilnatov (2014), Silaban (2017), and Yolanda, & Sumarni (2018) found that NPL have a negative effect to ROA.

#### 4.2.13 The effect of BOPO on ROA

BOPO have a negative effect on ROA with a level of significance of less than 1%, thus the hypothesis 6 ( $H_6$ ) is accepted. A decrease in BOPO will have an impact on an increasing ROA. This study proves that BOPO has a negative and significant effect on ROA as well as the research results obtained by Sudiyatno & Fatmawati (2013) and Căpraru & Ilnatov (2014), whose found that BOPO a negative effect on ROA. However, it is different from research from Hardiyanti & Febriatmoko (2016), which did not find any effect from BOPO to ROA.

#### 4.2.14 The effect of LDR on ROA

Result of t significance test in Table 7 shows the value of  $t = -2,771$  with a significance  $t$  ( $\text{sig-t}$ ) = 0.007, then can be stated that LDR have a negative effect on ROA. Although it is statistically significant, but the hypothesis 8 ( $H_8$ ) is rejected, because it is not in accordance with the concept of risk. The higher of the liquidity risk, then the higher on the profitability.

The results of this study do not support research from Hardiyanti & Febriatmoko (2016), which states that LDR has a positive effect on ROA, and research from Sudiyatno & Fatmawati (2013), Căpraru & Ilnatov (2014), Islam & Rana (2017), and Zainuddin et al. (2017), which did not find the effect of LDR to ROA.

#### 4.2.15 The effect of NIM on ROA

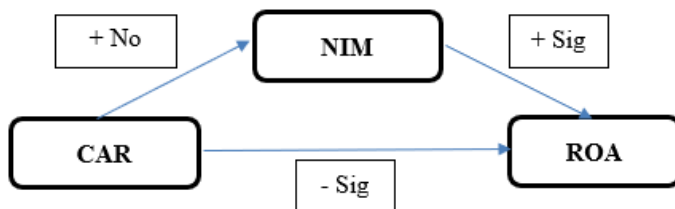
NIM has a positive effect on ROA at a significance level of less than 1%. This is shown from the t significance test in Table 7. The value of  $t = 7.057$  with a significance  $t$  ( $\text{sig-t}$ ) = 0.000. Therefore, the hypothesis 9 ( $H_9$ ) is accepted. Higher of NIM, higher ROA. It is a proven. The results of this study indicate that any increase in NIM at the bank, ROA also in increase position. For this point, the result of this study are supported by research from Lartey et al. (2013), Hardiyanti & Febriatmoko (2016), Silaban (2017), Yudha et al. (2018), Pranowo et al. (2020).

#### 4.3 Sobel Test

Sobel-test used to find out whether NIM as a mediating variable or not.

##### 4.3.1 The Effect of CAR on NIM and ROA

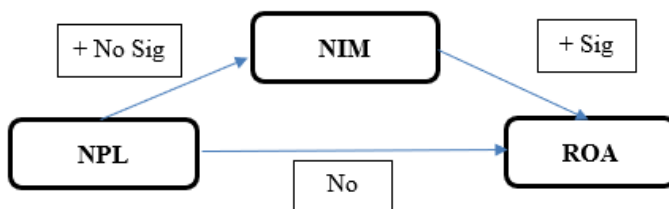
Sobel test results show the value of  $z = 2,634 > 1.96$ , which is statistically significant, so that there is an indirect effect between CAR and ROA. However, from path analysis, using regression analysis techniques shows that CAR do not affect to NIM. Therefore, NIM does not mediate the relationship between CAR and ROA, this relationship is a direct relationship (according to the results of the t test, CAR to ROA  $\text{sig-t} = 0.000$ ), so that CAR a direct effect on ROA, not through or mediated by NIM.



**Figure 2:** Relationship Between CAR, NIM and ROA

#### 4.3.2 The effect of NPL on NIM and ROA

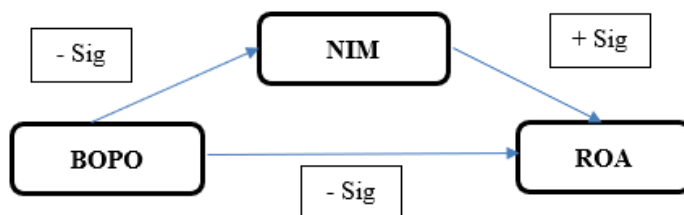
Sobel test result shows the value of  $z = 0.759 > 1.96$ , so it is not statistically significant, so there is not indirect effect of NPL on ROA. Therefore, there is no mediating effect between NPL and ROA, so NIM does not mediate the effect of NPL on ROA.



**Figure 3:** Relationship Between NPL, NIM and ROA

#### 4.3.3 The effect of BOPO on NIM and ROA

Z value from the Sobel test results is  $-12.6890 < -1.96$ , that is statistically significant, so there is an indirect effect of BOPO on ROA. Therefore, the effect of BOPO on ROA is mediated by NIM, so that NIM acts as a mediating variable in determining the relationship between BOPO and ROA. However, BOPO can also have a direct effect on ROA, so this mediation relationship can be called a quasi-mediation relationship.

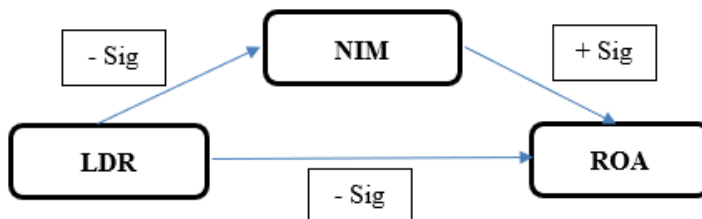


**Figure 4:** Relationship Between BOPO, NIM and ROA

#### 4.3.4 The effect of LDR on NIM and ROA

Based on the results of the Sobel test, that the value of  $z = -12.27 < -1.96$ , so it is statistically significant, the point of view is NIM has a mediation effect to LDR on ROA. NIM mediates the effect of LDR on ROA. If the LDR increases, the bank risk will increase, and the increase in bank risk will have an impact

on increasing NIM and ROA. In this case, the effect of increasing LDR on ROA is greater through NIM than the direct effect. So, if the LDR rises, then the credit interest income will increase, and the increase in credit interest income will have an impact on an increase in NIM, and with an increase in NIM, it will increase ROA.



**Figure 5:** Relationship Between LDR, NIM and ROA

## 5. Practical Implication

Based on the conclusions from the results of the analysis above, the effort that can be made by bank management to increase their profitability, especially ROA is to increasing also their NIM. ROA shows the ability of the capital invested in the total assets (average earning assets) to generate profits, where the percentage is derived from the profit before tax divided by average total assets. In fact, the intense competition for interest in the banking industry has begun to cut their NIM. A number of large banks also recorded a decrease in NIM. This decrease was due to the high growth in interest expense. The decline in NIM was also due to changes in the company's credit segment from corporations to small segments such as SMEs.

Therefore, banks must be wise in managing their cost of funds.

Management of bank capital adequacy needs to be improved, because from the results of the t-significance test and the Sobel test, CAR tends to have a positive effect on increasing NIM and ROA. On the other hand, bank management also needs to improve credit management properly in order to minimize the risk of loss and increase their ROA's.

## 6. Conclusion

This study aims to examine the relationship between NIM and ROA. From the regression analysis, it can be concluded that NIM is positively related to ROA, so that NIM can placing as a role as a mediating variable in influencing to ROA. CAR is not on NIM, but has a negative effect to ROA. Therefore, CAR does not determine NIM, but determines to ROA. The higher the CAR, the lower the bank is able to generate ROA, so that the bank's ability to bear the risk of any credit or earning assets at risk decreases.

NPL is not affecting to NIM and ROA. Increasing NPL do not impact on a decrease in NIM and ROA. This means that the quality of assets and the adequacy of bank credit risk management is good, so that it does not cause problems with NIM and ROA. BOPO have a negative effect on NIM and ROA. Decreasing BOPO has an impact on an increasing NIM and ROA. This condition shows that the bank is able to control its operating costs, so that the bank's income increases. The increase in income bank an impact on the increase in NIM and ROA.

LDR has a negative effect on NIM and ROA. Increasing LDR has an impact on decreasing liquidity and will increasing liquidity risk. This condition shows that although bank management can expand credit, but the credit expansion is not able to generate income that is higher than interest costs, so that the increase in LDR is not followed by an increase in NIM and ROA, and vice versa.

NIM has a positive effect on ROA. Increasing NIM would impact on an increasing ROA. This condition indicates that bank management is able to manage earning assets properly, so it will increase

net income. The increase in net income an impact on the increase in ROA. From Sobel test, NIM placing as a role in mediating the effect of BOPO and LDR on ROA. So, the effect of BOPO and LDR on ROA is more effective or greater through NIM than the direct effect.

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