Effect of CAR, NPL, and BOPO on NIM with ROE as a Moderating Variable

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Abstract

This study aims to obtain empirical evidence about the effect of CAR, NPL and BOPO on NIM and examine the role of ROE in moderating the effect of CAR, NPL, and BOPO on NIM. This study uses purposive sampling method. The data used is secondary data obtained from the financial statements of banking companies listed on the Indonesia Stock Exchange in the 2015-2019 period. Data analysis techniques using moderated regression analysis (MRA) test. The result of the analysis shows that CAR has a positive effect on NIM. NPL and BOPO has a negative effect on NIM. The moderating variable ROE strengthens the effect of CAR on NIM but weakens the effect of NPL and BOPO on NIM.

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1 Introduction

Banking has an important role in supporting a country's economy. Banking is an intermediary institution or liaison between parties who have funds and parties who need funds, so that its management and development is under the spotlight of many parties. The bank functions as an intermediary institution, namely channeling funds from the debtor to the creditor. Banks in collecting funds from the public must gain the trust of the people who want to invest in the bank. The public must feel confident that the funds given will not be lost and can be managed by the bank properly.

Customer trust depends on the ability of a bank to manage funds properly. Banks as intermediary institutions must have good financial performance, because financial performance is an indicator of all activities that occur in a bank. Bank performance is reflected in the financial statements of each bank or in general banking financial reports issued by Bank Indonesia (BI) and the Financial Services Authority (OJK). Banks as a driver of the national economy of a country are required to be in a healthy condition in order to carry out their functions properly. Bank health can be defined as the ability of a bank to carry out normal banking operations and fulfill its obligations properly in accordance with banking regulations. Assessment of the level of performance and health of a bank cannot be separated from the use of financial ratios which are used as indicators or parameters in assessing whether a bank is healthy or not. Financial ratios are useful for analyzing financial reports and financial analysis can be used to assess bank performance and health. According to Wijayanto (2016) and Dewi & Triaryati (2017), the NIM ratio can be used to measure financial performance because banks rely on loan interest in their operations. According to the Bank Indonesia Codification Regulation (2014) concerning the assessment of bank soundness, NIM is a comparison of net interest income and average asset income. A high NIM ratio will indicate high interest income, high interest income shows that the bank is running well and efficiently.

Table 1
Comparison of NIMs between ASEAN Countries

Country	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average
Indonesia	5,61	6,60	6,77	6,33	5,87	5,18	5,86	5,82	6,39	6.03	6,05
Cambodia	6,47	5,32	4,93	5,29	5,18	5,05	7,10	5,92	6,15	5,54	5,70
Brunei Darussalam	6,67	5,95	6,18	5,45	5,66	5,15	5,49	4,24	2,60	3,72	5,11
Laos	8,48	4,37	1,62	3,82	5,01	4,94	2,94	2,31	3,33	3,64	4,05
Philippines	3,56	3,89	4,07	3,73	3,49	3,24	3,70	3,58	3,31	4,06	3,66
Vietnam	3,65	3,16	3,36	3,99	3,62	3,07	2,86	2,93	2,99	3,62	3,33
Thailand	3,49	3,24	3,25	2,89	2,94	2,80	3,26	3,07	2,94	3,49	3,14
Malaysia	2,31	2,59	2,84	4,94	2,89	2,59	1,99	1,72	1,93	2,26	2,61
Myanmar	1,79	0,26	7,92	3,91	4,07	0,07	0,67	1,59	1,85	2,91	2,50
Singapore	2,23	1,94	1,77	1,61	1,65	1,59	1,74	1,59	1,39	1,88	1,74

Source: *The World Bank*, 2019

Table 1 above describes the NIMs in ASEAN countries. When viewed as a whole, NIM in Indonesia is the highest compared to NIM in other ASEAN countries. The high NIM in Indonesia is due to the wide interest rate spread, the spread is the difference between the interest received from the customer and the interest paid to the customer. The amount of this spread varies, depending on the volume of credit extended. Bank Indonesia continuously advises banks to continue to increase fee base income, namely bank income obtained from transactions in bank services other than interest differences (Indonesia Economic Report, 2012).

The high NIM in Indonesia has led the government through the Financial Services Authority (OJK) to make a policy to reduce net interest margins to increase efficiency in order to be able to compete in the ASEAN Economic Community. To encourage efficiency, OJK provides incentives in the form of reducing core capital allocation for banks that can meet NIMs lower than 4.5%. With the policies of the Financial Services Authority (OJK), banks must find the right way and strategy in order to fulfill the policies set by the OJK with the aim of increasing efficiency. In the theory of managerial efficiency theory of profits emphasizes that companies that are managed efficiently will earn profits above the average normal profit (Salvatore, 2011; Kashdan & Breen, 2008; Munce et al., 2006). Bank efficiency is an important indicator for analyzing the performance of a bank and also as a means to further improve the effectiveness of monetary policy. For this reason, banks need to know in detail the factors that affect NIM, both internal factors such

as capital adequacy, credit risk, and level of efficiency as well as external factors such as inflation, exchange rates and BI interest rates so that banks can reduce NIM to a certain level in accordance with the policies of the Financial Services Authority (OJK).

The NIM generated by a bank may be influenced by factors, one of which is the capital adequacy ratio. The capital adequacy ratio is an important factor for banks to operate to provide credit to borrowers. Banks must also pay attention to the capital adequacy ratio to anticipate possible risks, such as risks caused by lending. Allocating funds for bank loans requires a lot of financing, because otherwise it will damage bank liquidity. Any credit expansion plan that will affect an increase in interest income must be supported by additional capital, otherwise credit expansion will reduce the bank's capital adequacy ratio.

Banks in Indonesia generally rely on loan interest income as the main income in financing their operations. Of course, in carrying out business activities, a bank is inseparable from the name of the risk, and the name of this risk can at any time cause losses to employees, customers, shareholders and other related parties. The high complexity of the banking business can also cause banks to face high risks. One of these risks can come from the main activity of banks in extending credit to customers, namely credit risk. Credit risk is the risk that occurs when the debtor fails to pay off the credit given to him by the bank. The proxy that can be used to measure credit risk is the Non-Performing Loan, which is the ratio between the number of non-performing loans and the amount of credit extended by banks to debtors.

Non-Performing Loan (NPL) is a financial ratio that reflects credit risk. Credit risk that is accepted by the bank is one of the bank's business risks, which results from uncertainty in its repayment or that results from non-repayment of credit given by the bank to the debtor. The higher the NPL ratio, the worse the quality of bank credit which causes the number of non-performing loans to increase and cause losses, conversely, if the lower the NPL, the bank's income will increase. Research results by Dewi & Triaryati (2017), Zainab et al. (2017), show that NPL has no effect on NIM, while the results of Khanh & Tra's (2015) research show different results, where NPL has a positive effect on NIM, Purba & Triaryati (2018) show that NPL has a negative effect on NIM.

The final goal a company wants to achieve is to make a profit. The profit obtained from the activities carried out reflects the company's results in carrying out business profitability. The company's profitability will also influence investors' investment policies. The company's ability to generate profits will be able to attract investors to invest their funds to develop the business, while the low level of profitability will cause investors to withdraw their funds. As one of the benchmarks in measuring the amount of profit, it is very important to know whether the company is running its business efficiently (Afifah et al., 2015; Manurung et al., 2015).

In other words, by calculating profitability by comparing the profits generated with the assets or capital that generate profits, efficiency can be found. Maintaining profitability is very important for banks, because high profitability is the goal of every bank. From the development point of view, the profitability ratio shows an increase which indicates that the bank's performance is effective. Therefore, the bank must pay close attention to its profitability because it will have an impact on many things such as investment decisions and policies to be made. Researches on NIM have been conducted before in various countries and have obtained different research results, resulting in a research gap between one research and another. Based on the phenomena and differences in the results of previous studies that have been described above, the researchers are interested in re-examining the effect of CAR, NPL and BOPO on NIM with ROE as a moderating variable. Based on this background, a conceptual framework and formulation of hypotheses can be formulated that can be formulated:
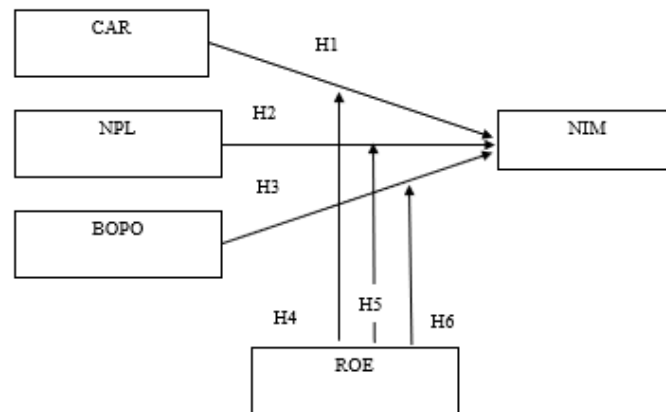
Figure 1 Research Concept

H1: CAR has a positive effect on NIM.
H2: NPL has a negative effect on NIM.
H3: BOPO has a negative effect on NIM.
H4: ROE strengthens the positive effect of CAR on NIM
H5: ROE weakens the negative effect of NPLs on NIM.
H6: ROE weakens the negative effect of BOPO on NIM.

2 Materials and Methods

This research was conducted at banks listed on the Indonesia Stock Exchange (IDX) from 2015 to 2019. Data was obtained by accessing the Indonesia Stock Exchange website and the official website of BI. This study uses secondary data. Sources of data used in this study are financial report data and annual reports on commercial banks in Indonesia and inflation data published by Bank Indonesia as of December 31 from 2015 to 2019. The sample selection process uses a purposive sampling method. The sample selection criteria in this study consisted of several requirements, namely banking companies that were registered consecutively in the 2015-2019 period. This research instrument uses secondary data collected using the non-participant observation method. Data analysis in this study used descriptive analysis and MRA

3 Results and Discussions

The results of the descriptive statistical test of the research variables can be shown in Table 2 as follows:

Table 2
Descriptive Statistics Results

	N	Score Min	Score Max	Average Score	Std. Dev
CAR	200	8,02	148,28	23,49	16,96
NPL	200	-3,30	9,92	1,97	1,50
BOPO	200	58,20	258,09	94,11	26,85
ROE	200	-94,01	83,79	4,02	18,58
NIM	200	0,39	19,30	5,10	2,51

Source: Data Processed, 2020

Based on Table 2, there are 200 observational data, then the results of descriptive statistical analysis can be explained as follows CAR is an indicator of a bank's ability to cover the decline in its assets as a result of bank losses caused by risky assets. The CAR value can show the bank's ability to bear the risk of each credit or earning asset owned. The CAR variable has a minimum value of 8.02 and a maximum value of 148.28. According to PBI No. 10/14 / PBI / 2008 Article 2 Banks are required to provide a minimum capital of 8% of the RWA. This means that the companies used as research samples have a good ability to bear risks that occur due to productive assets with their own assets. The average value of 23.49 means that the sample banking companies have an average bank capital per risk-weighted asset of 23.49%. The standard deviation value of 16.96 indicates that there is a difference in the value of the studied CAR against the average value of 16.96. The standard deviation value which is lower than the average value indicates that the data used in the CAR variable has a small distribution.

This NPL ratio reflects credit risk, where the smaller the NPL, the smaller the credit risk borne by the bank and the bank's performance and functions of the bank have worked well and vice versa. The NPL variable has a minimum value of -3.30. This shows that the sample companies have a good performance which according to the Codification Regulation of Bank Indonesia (2014) companies that have an NPL value below 2% are categorized into very good criteria. Meanwhile, the maximum value of 9.92 indicates that the sample companies have underperformed, in the Codification Regulation of Bank Indonesia (2014) the company is categorized as poor when it has an NPL value of less than 12% to 8%. The average value of 1.97 indicates that the sample banking companies have an average non-performing loan per total credit of 1.97%. The standard deviation value of 1.50 which is smaller than the average value indicates the distribution of small data variables or the absence of a large enough gap from the lowest and highest NPL ratios.

BOPO is the ratio between Operational Costs and Variable Operating Income. According to the Bank Indonesia Codification Regulation (2014) operational efficiency is measured by BOPO with a maximum limit of 93.52%. BOPO has a minimum value of 58.20 which indicates that the company is performing well because it has relatively low operating expenses compared to its operating income. While the maximum value of 258.09 indicates that the company is less efficient, a high BOPO value indicates that the company has too high an operating expense that has not been able to be balanced with its operating income. The average value of 94.11 shows that bank management has not been efficient in maximizing its operating income in financing its operating expenses. The standard deviation value of 26.85 which is smaller than the average value indicates the distribution of small data variables or the absence of a large enough gap from the lowest and highest BOPO ratios (Zarefar & Zarefar, 2016).

ROE is a ratio to measure the company's net income with its own capital. The ROE variable has a minimum value of -94.01. This indicates that the company is performing poorly because it cannot use its capital to generate profits. While the maximum value is 83.79, this indicates that the company is good at using funds to obtain a high rate of return. The average value of 4.02 means that for every IDR. 1 capital of the sample companies can generate an average of IDR. 0.0402 profit (equal to 4.02% of total equity) and a standard deviation value of 18.58 which is more. The size of the average value indicates that the data used in the ROE variable has a large distribution so that the deviation of data on this ROE can be said to be not good. This also shows that ROE has a high level of data variation.

NIM is the ratio used to measure the amount of net interest income earned by banks in using assets. NIM is a comparison between net interest income and average earning assets. The NIM variable has a minimum value of 0.39 indicating that the company is performing poorly or can be categorized as poor because it has a NIM of less than 2%. The maximum value of 19.30 indicates that the company has a good performance because it has an NIM of above 2%. The average value of 5.10 means that the sample banking companies have an average net interest income per productive asset of 5.10%. The standard deviation value of 2.51 which is smaller than the average value indicates the distribution of small data variables or the absence of a large enough gap from the lowest and highest NIM ratios. To determine the ability of ROE to moderate the effect of CAR, NPL, and BOPO on NIM, the MRA interaction testing model is used. Table 5.6 below shows the results of the Moderated Regression Analysis (MRA) test.

Table 3
Moderated Regression Analysis Result

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.591	0,906		2,862	0,005

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https://doi.org/10.21744/irjmis.v8n3.1469

CAR	0.077	0,010		0,522	7,839	0,000
NPL	-0,373	0,113		-0,223	-3,290	0,001
BOPO	-0.011	0,004		-0,113	-2,472	0,028
ROE	0,114	0,026		0,846	4,318	0,000
CAR*ROE	0,000	0,000		0,156	2,599	0,022
NPL*ROE	0,025	0,006		0,647	4,401	0,000
BOPO*ROE	5,157	2,049		0,032	2,517	0,026
R Square			0,428			
Adjusted R Square			0,407			
F			20,496			
Sig. F			0,000			

Source: Data Processed, 2020

Based on Table 3, the regression equation can be drawn up as follows:

$$Y=2{,}591+0{,}077CAR-0{,}0373NPL-0{,}011BOPO+0{,}114ROE+0{,}025NPL.ROE+5{,}157BOPO.ROE \quad.....(1)$$

Equation (1) shows a constant value of 2.591. This value means that if CAR, NPL, OEOI, the interaction between CAR and ROE, the interaction between NPL and ROE and the interaction between ROE and ROE is zero, it will result in an NIM of 5,526 units. The interaction coefficient between CAR and ROE shows a value of 0,000. This value means that if the interaction between CAR and ROE increases by one percent, then NIM will not increase or decrease, assuming other factors are constant. The interaction coefficient between NPL and ROE shows a value of 0.025. This value means, if the interaction between NPL and ROE increases by one percent, NIM will increase by 0.025 percent, assuming that other factors are constant. The interaction coefficient between BOPO and ROE shows a value of 5.157. This value means, if the interaction between BOPO and ROE increases by one percent, the NIM will increase by 5.157 percent, assuming other factors are constant.

The coefficient of determination analysis is used to measure how far the ability of all independent variables is in explaining the variation of the dependent variable (Ghozali et al., 2016). The coefficient of determination is seen through the adjusted R square value. The coefficient of determination (Adjusted R Square) of 0.407 means that 40.7 percent (40.7%) of the variance of NIM is influenced by CAR, NPL, BOPO and ROE, while 59.3 percent (59.3%) is influenced by other factors. outside the research model. F Test aims to assess the feasibility of the regression model formed. If the significance value is ≤ 0.05, the independent variable and moderating variable can be used to predict the dependent variable. The result of the F test calculation shows the significance is smaller than 0.05 ($0.000 \leq 0.05$). This means that the model is said to be able to predict observations because it fits the data used.

The Effect of CAR on NIM

Hypothesis 1 (H1) states that CAR has a positive effect on NIM. Based on the results of data analysis, CAR has a positive effect on NIM so that H1 is accepted. This shows that the higher the CAR, the higher the NIM. A high CAR ratio means that banks have high capital available to support operations and also as a safety fund in case of an unexpected situation. Banks as financial institutions operate in collecting funds from the public and channeling funds to the public. The existence of high capital adequacy will later affect the amount of lending funds so that it will increase the NIM as shown by the increase in net interest income received by banks. The results of this study reinforce the results of research conducted by Purba & Triaryati (2018) and Million et al. (2017) which states that CAR has a positive effect on NIM. This is in line with the Managerial Efficiency Theory of Profits, which emphasizes that an efficiently managed company will earn a profit above the average normal profit. Banks can achieve above normal returns if they succeed in performing efficiency in various fields, one of which is the provision of capital in operational activities. The higher the Capital Adequacy Ratio (CAR) means the stronger the monitoring of management on the use of capital owned. High CAR will make the bank more optimal in collecting and channel funds to the public so that they can generate high interest income.

The effect of NPL on NIM

Hypothesis 2 (H2) states that NPL has a negative effect on NIM. Based on the results of data analysis, NPL has a negative effect on NIM so that H2 is accepted. This shows that the higher the NPL, the lower the NIM. NPL reflects credit risk, the more non-performing loans a bank receives, the lower the bank's interest income will be. This is due to the tendency of debtors to fail or unable to pay interest obligations, thus impacting on the decreasing net interest income of the bank. The results of this study reinforce the research conducted by Koostanto et al. (2016), Dewi & Triaryati (2017), and Purba & Triaryati (2018) which state that NPL has a negative effect on NIM. The results of this study support the Managerial Efficiency Theory of Profits, where bad credit management can lead to the risk of non-collection or bad credit which will affect bank profitability. Banks in providing credit must analyze the debtor's ability to repay their obligations.

The Effect of BOPO on NIM

Hypothesis 3 (H3) states that BOPO has a negative effect on NIM. Based on the results of data analysis, BOPO has a negative effect on NIM so that H3 is accepted. This shows that the higher the BOPO, the lower the NIM. The BOPO ratio is used to measure the level of efficiency and ability of a bank in carrying out its operational activities. Banks that are inefficient in their business activities will result in an inability to compete in attracting funds from the public and channeling these funds to the public, so that the bank will experience a decrease in income and will cause the BOPO ratio to increase. The results of this study reinforce the results of research conducted by Million et al. (2017), Zainab et al. (2017) and Koostanto et al. (2016) which state that OEOI has a negative effect on NIM. This study supports the Managerial Efficiency Theory of Profits, where this theory states that if the company is managed efficiently, it will get a profit above normal profit. The BOPO ratio is used to measure the level of efficiency and ability of a bank in carrying out its operational activities. So that if the bank can be efficient in its operations, especially in channeling funds to the public, the bank will increase its income which will cause the BOPO ratio to decrease and the NIM ratio to increase.

The effect of CAR on NIM with ROE as moderator

Hypothesis 4 (H4) states that ROE strengthens the positive effect of CAR on NIM. Based on the results of data analysis, the CAR coefficient value is positive and the interaction variable between CAR and ROE is also positive, it means that ROE strengthens the positive effect of CAR on NIM so that H4 is accepted. These results indicate that the higher the CAR value, the higher the NIM, especially when the ROE of banks is high. ROE shows the ability of banks to seek profit using their capital. A high ROE value in banks can reflect a good level of management effectiveness and the bank's ability to generate good profits compared to banks with low ROE values. This will also have an impact on investor confidence in the bank, so that the capital from the bank will increase which can be used to carry out its business activities and then increase profits.

The effect of NPL on NIM with ROE as moderator

Hypothesis 5 (H5) states that ROE weakens the negative effect of NPL on NIM. Based on the results of data analysis, the value of the NPL coefficient is negative and the value of the interaction variable between NPL and ROE is positive. This means that ROE weakens the negative effect of NPLs on NIM so that H5 is accepted. This means that a high risk of credit or bad credit will cause the bank's NIM to decrease, but with a high ROE value it will cause the NIM to increase. These results indicate that the higher the NPL value, the lower the NIM, but these results indicate that if the ROE value is high, the emerging credit risk can be managed properly so as to maximize profit revenue. A high ROE value in banks can reflect a good level of management effectiveness. The effectiveness of good management will have an impact on the management of banking assets and capital, if the assets and capital of the bank are well managed, it will automatically increase the value and reduce the company's problematic situation.

The Effect of BOPO on NIM with ROE as moderator

Hypothesis 6 (H6) states that ROE weakens the negative effect of BOPO on NIM. Based on the results of data analysis, the value of the BOPO coefficient is negative and the interaction variable between BOPO and ROE is positive, it means

that ROE weakens the negative effect of BOPO on NIM so that H6 is accepted. These results indicate that the higher the BOPO, the lower the NIM. The more inefficient use of company resources will cause a decrease in the company's NIM but with a high ROE value it will cause an increase in NIM. These results indicate that the higher the BOPO value, the lower the NIM, but these results indicate that if the ROE value is high, inefficient resource management can be resolved properly so that it can cause profits to increase again. ROE can also be used as an indicator to assess the effectiveness of management performance. If the ROE ratio shows a high number, it can illustrate the success of management in managing the bank. Good bank management can indicate that management is able to use company resources properly so that the company can maximize profit.

4 Conclusion

This study aims to test and obtain empirical evidence of the effect of CAR, NPL and OEOI on NIM with ROE as a moderating variable. This study uses banks listed on the IDX during 2015-2019 as samples obtained using purposive sampling technique. Based on data analysis and discussion of the results of the research that has been done, it can be concluded that CAR has a positive effect on NIM. This shows that if the CAR is higher, it will increase the NIM of banks, the NPL will have a negative effect on the NIM. This shows that if the NPL is higher, it will result in a decrease in the NIM of banks. BOPO has a negative effect on NIM. This shows that if the BOPO ratio is high it will cause the NIM of banks to decrease. ROE strengthens the positive influence of CAR on NIM. This means that the higher the CAR, the higher the NIM, especially when the ROE value of banks is high. ROE weakens the negative effect of NPLs on NIM. This means that the higher the NPL, the lower the banking NIM and the higher the NIM when the ROE value is high. ROE weakens the negative effect of BOPO on NIM. This means that the higher the OEOI, the lower the banking NIM and the higher the NIM when the ROE value is high. Based on theoretical and empirical studies as well as the results of data analysis that have been carried out, the researchers provide suggestions for further research, namely that this research is limited to only paying attention to the internal factors of banking that affect NIM. We recommend that further research use or pay attention to external factors that affect NIM. For banks to consider more about NIM regulations and pay attention to the growth or development of NIM so that it continues to increase. Banks are advised to be more efficient in managing company resources and credit risk because this has an impact on the NIMs obtained.

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