

THE EFFECTS OF CAR, OPERATING COSTS TO OPERATING INCOME (BOPO), LDR AND NIM RATIOS ON ROA: CASE STUDY IN COMMERCIAL BANKS LISTED ON THE INDONESIAN STOCK EXCHANGE (IDX), 2016-2020

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Abstract

Banks are required to improve their financial performance both to survive in the face of global competition and to become the best bank. Specifically, banks can function as agents of trust, agent of development, and agent of service. Furthermore, the Bank must be able to maintain public trust to become good bank performance. Therefore, the purpose of this study is to determine and analyze the effect of Capital Adequacy Ratio (CAR), Operating Cost to Operating Income (BOPO), Loan to Deposit Ratio (LDR), and Net Interest Margin (NIM) to Return on Asset (ROA). The population of this study are 96 Commercial Bank which is listed at Indonesia Stock Exchange period 2016 – 2020. 25 banks selected by purposive sampling. The analysis technique used in this study is panel data regression. The choose one is fixed effect model. The result of this research using t-test shows CAR and LDR has insignificant effect to the ROA, BOPO has negative and significant effect to ROA and finally NIM has positive and significant to ROA. Simultaneously CAR, BOPO, LDR, and NIM have a significant effect to ROA.

Keywords: CAR, BOPO, LDR, NIM, ROA, Bank Performance

Based on UU No 10/1998 associated with amendment UU No.7/1992, Bank is a business entity that collects funds from the public (*third party funds*) and distributes them to the public through lending and or other forms in order to improve the standard of living of the community.

Specifically, the bank has the function as *agents of trust, agent of development, and agent of service* (Purnamawati, 2014). Meanwhile, banks must maintain credibility so that they can be trusted by the public through good bank performance. To maintain good bank performance, it is necessary to maintain bank liquidity so that the bank can fulfill its obligations and maintain its performance so that the bank can always be trusted by the public (Anastasia, 2018).

Furthermore, Commercial Banks must maintain their performance through assesment level namely: *Risk Profile, Good Corporate Governance (GCG), Earnings, and Capitals/RGEC* (Prastyananta et.al, 2016). However, this study only uses three of the four existing factors, namely *Risk Profile, Earnings and Capital*. Meanwhile, financial ratio is an analysis that is often used in assessing bank performance. One of the financial ratios used as a benchmark for the success key of financial performance is the profitability ratio. The determinants of profitability are very important for bank to maintain stability of the banking system itself as contributor to the economic development in the country. To measure bank performance is examined from how the bank creates profit. So that the bank will always strive to always get a high profit. Thus, it is expected to overcome the vulnerability of banking actors in anticipating global macro shock and systemic risk caused by imbalanced conditions, including complexity related to industrial concentration so that it can adjust to the economic cycle (pro-cyclicality). Finally, the risks arising from poor credit growth (net credit expansion) can be minimized and anticipate the growth of NPLs or problem loans in the future (Mada, B. Andreas et.al, 2019).

In this study, to determine of profits, we used *Return on Assets* (ROA). ROA reflects the company's ability to earn revenue in the company's overall operations, so the greater the ROA, the better because it shows a greater rate of return. Profitability assessment with ROA is superior in measuring the level of bank profitability than Return on Equity (ROE) because it prioritizes the profitability value of a bank as measured by assets whose funds mostly come from public deposit funds, while ROE only measures the return obtained from the owner's investment.

Capital Adequacy Ratio (CAR) is a ratio that shows how much total assets in banks that contain risk are also financed by capital at the bank. The higher the CAR, the better the condition of the bank because it is able to finance operational activities and make a large contribution to profitability.

Operating Costs to Operating Income (BOPO) is the ratio between Operating Costs to Operating Income, so that if the BOPO ratio at a bank is getting smaller, the bank is also more efficient in carrying out its operational activities and can provide a sizeable contribution to profitability.

Loan to Deposit Ratio (LDR) is one of the liquidity ratios which can be calculated from the total volume of loans disbursed by the bank to the total receipt of funds (*third party funds*). The higher LDR ratio has an impact on increasing bank profits so it can be assumed that the bank can channel credit well and will lead to an increase in bank profitability.

Net Interest Margin (NIM) is a ratio used to measure a bank's ability to generate net interest income on its average earning assets. The higher NIM ratio means that the bank's performance is good in obtaining interest income so that the bank's profitability also increases.

The explanation as above is not fully in line with the reality that occurs in banking operational activities as the data published by OJK in Indonesian Banking Statistics shows that there is an inappropriate relationship between CAR, BOPO, LDR, NIM, and ROA (IBS, 2020).

As for the purpose of this research are (a) to understand and examine the effect of the Capital Adequacy Ratio (CAR) on Return on Assets (ROA) in Commercial Bank listed on Indonesian Stock Exchange (IDX) in 2016-2020; (b) to understand and examine the effect of Operating Costs to Operating Income (BOPO) on Return on Assets (ROA) in Commercial Bank listed on Indonesian Stock Exchange (IDX) in 2016-2020; (c) to find out and analyze the impact of Loan to Deposit Ratio (LDR) on Return on Assets (ROA) in Commercial Bank listed on Indonesian Stock Exchange (IDX) in 2016-2020; (d) to find and examine the effect of Net Interest Margin (NIM) on Return On Assets (ROA) in Commercial Bank listed on Indonesian Stock Exchange (IDX) in 2016-2020.

Literature Review and Hypotheses Development

Bank Performance

According to the Financial Services Authority (OJK) through POJK No.4/POJK.03/2016, the bank's performance is the result of an assessment of the Bank's condition carried out on the risks and performance of the Bank. Banks are required to assess the Bank's performance using a risk approach (*Risk Based Bank Rating*) both individually and in a consolidated manner (Hamolun & Nuzula, 2018). Banks are required to conduct self-assessment to measure the level of soundness and take corrective steps effectively by using the approach as *Corporate Governance* (GCG), *Earnings*, and *Capital* or called as RGEK. One of the important parameters used as the basis for the assessment is the related financial statements. Based on these financial statements, it can be calculated the value of financial ratios which are generally used as indicators of the bank performance.

Return on Assets (ROA) is a ratio that describes the productivity of banks in managing funds so as to generate profits. The greater the ROA, the higher the level of profit that can be achieved by the Bank and the better the position of the Bank in terms of asset use (Kasmir, 2014). Meanwhile, according to Fahmi (2012), ROA is seeing the extent to which the investments that have been invested are able to provide a return of profits as expected and the investment is actually the same as the company's assets invested. Companies that have a high ROA indicate that the profits earned during the period are also getting bigger and the company's valuation is getting better when viewed from the aspect of asset utilization. Based on several definitions regarding the ROA, the authors conclude that the ROA is one of the indicators in seeing the success of banks in obtaining profits through their assets. The higher the ROA value, the higher the rate of return obtained will also be. A high ROA value can indicate a bank's financial performance is getting better and the bank's performance to high. This will affect the level of profit that will be obtained by the shareholders. This large profit will attract investors because the company has a higher rate of return. That is, every 0.1 or 1% ROA ratio illustrates that the bank's management is able to generate a profit of 1% on the use of the bank's assets. The greater the value of the ROA ratio, the greater the funds that can be returned from the company's total assets into profit. The author will use the ROA ratio in this study because in addition to being a measure of bank profitability, ROA also indicates the ability of bank management to manage its assets to generate profits. Large profits can attract investors' interest so that ROA is most often highlighted by investors because it is able to assess the results of management's overall performance in the past so that it can project profitability in the future.

According to Mudrajat and Suhardjono (2011), *Capital Adequacy Ratio (CAR)* is an aspect of capital adequacy that shows the ability to maintain sufficient capital and the ability of bank management to identify, supervise and control several risks that arise that can affect the amount of bank capital. In this aspect what is assessed is the capital owned by the bank which is based on the minimum capital requirement of the bank. One of these CAR calculations is based on the principle that every investment that contains risk must be provided with a certain percentage of capital to the total investment. According to POJK No.11/POJK.03/2016, the minimum capital requirement for commercial banks is 8% of *Risk Weighted Assets (ATMR)*. The higher the CAR ratio owned by the bank, the better the condition of the bank's capital. In general, banks with high capital are safer than banks with low capital (Dietrich & Wanzenried, 2014).

Operating Costs to Operating Income (BOPO) is a comparison between operating expenses and operating income in measuring the level of efficiency and ability of banks to carry out their operations (Rivai, 2013). This BOPO ratio is used to measure the efficiency level of bank management in controlling operating expenses against operating income. The smaller the BOPO ratio, the better, because the bank concerned can cover operating expenses with operating income.

Loan to Deposit Ratio (LDR) is a ratio used to measure the composition of the amount of credit given compared to the amount of public funds own capital used (Kasmir, 2014). Liquidity assessment is an assessment of a bank's ability to maintain an adequate level of liquidity and the adequacy of liquidity ratio management. LDR is most often used by financial analysts in assessing a bank's performance, especially from the total amount of credit granted by the bank to the funds received by the bank.

Net Interest Margin (NIM) shows how much bank management is able to manage its productive assets to obtain net interest income. Based SEOJK No.14/SEOJK.03/2017 dated March 17, 2017, the NIM ratio is a comparison between NIM and average earning assets. The NIM ratio can show how bank management works. If the NIM ratio is high, it means

that the performance of bank management is working well, and vice versa. According to Simbolon (2017), the higher the NIM value, the higher the interest income that will be received. If the difference between interest income and interest expense is large, the level of profitability that will be obtained is also large.

This research was made to provide an overview and clarify the framework of the discussion. In addition, it also aims to obtain comparison and reference material. So, the authors include the results of previous relevant studies regarding the effect of CAR, BOPO, LDR and NIM on ROA. Here are some relevant studies.

Agustiningrum (2013), stated that CAR has no significant effect on profitability (ROA). NPL has a negative and significant effect on ROA, whereas LDR has a positive and significant effect on ROA. Prasanjaya and Ramantha (2013), showed that LDR had a significant positive effect and BOPO had a significant negative effect on profitability, but CAR and firm size showed no significant effect on profitability. Gyamerah and Benjamin Amoah, (2015), conducted a study to examine the relationship between profitability and a series of bank-specific characteristics and macroeconomic factors in foreign and local banks in Ghana. between 1999 and 2010. This study uses the dependent variables in the form of ROA and ROE, with the independent variables in the form of *credit risk, size, liquidity, listed, expenses, ownership, productivity, capital adequacy, macroeconomic* using the regression method. The research result stated that cost management has an inverse relationship with profitability, bank size and credit risk show a positive relationship with profitability. Buchory (2016), conducted a study to analyze the determinants of banking profitability in Indonesia using secondary data from 26 financial statements. Based on this research, it was found that LDR, CAR, and NIM had no effect on ROA while BOPO and NPL had a significant effect on ROA. Khoirun Nisa (2019), in this research stated that study uses board size as a control variable. The data used is secondary data, namely 26 banks in Indonesia which were selected by purposive sampling. The result of the research is that CAR has no significant effect on ROA. Meanwhile, LDR, BOPO and NPL have a negative and significant effect on ROA. NIM has a positive and significant relationship to ROA. If the board size variable is entered as a control variable, the results do not change. Sudarmanta (2016), aims to examine the effect of NIM, BOPO, LDR, CAR, and NPL on ROA at 30 banks listed on the IDX. The results of this study indicate that NIM and CAR have a significant positive effect on ROA, NPL and BOPO have a significant negative effect on ROA, while LDR has no significant effect on ROA. Vernanda and Widyarti (2016), this study aims to examine the effect of CAR, LDR, NPL, BOPO, and size on ROA at 25 Conventional Commercial Banks listed on the IDX in 2010-2015. The results of this study are that CAR has a significant positive effect on ROA and BOPO has a significant negative effect on ROA. Unlike the previous two variables, LDR, NPL, and size have no significant effect on ROA. Pinasti and Mustikawati (2018), this study aims to examine the effect of CAR, BOPO, NPL, NIM, and LDR on ROA in a sample of 25 companies. The results showed that CAR, NPL, and LDR had no significant effect on ROA. BOPO has a significant negative effect on ROA and NIM has a significant positive effect on ROA.

Framework of Research

The framework of research in this paper is presented as follows: *Firstly, effect of Capital Adequacy Ratio (CAR) to Return on Assets (ROA)*. CAR is a capital ratio used as a measure of the adequacy of capital owned by banks in order to support assets that contain risk. The higher the CAR, the better the bank's ability to deal with the possible risk of loss from any risky credit or productive asset. The greater the CAR, the better the bank's ability to meet capital requirements. *Secondly, effect of Operating Costs to Operating Income (BOPO) on Return on Assets (ROA)*. Operating costs are used to see how efficient the bank's

management is in carrying out its operational activities. Operating costs are costs incurred by banks in carrying out their main business activities (*such as interest costs including commissions/loan provisions, expenses for writing off productive assets, expenses for estimated losses and contingencies, and other operating costs*). Bank can be categorizing efficiently if they are able to reduce their operating costs so as to increase their income in order to minimize the adverse effects of bank management inefficiency in managing their operations. The smaller the BOPO, the more efficient the bank in doing business, so it indicates the bank can be categorized as healthy. BOPO is useful for assessing how efficient a bank is in carrying out its daily operational activities. The low BOPO ratio indicates that the bank's management can run its operational activities efficiently, and vice versa. The low BOPO value indicates that the bank's management can work well and it is hoped that the bank's profitability will increase. *Thirdly, effect of Loan to Deposit Ratio (LDR) on Return on Assets (ROA)*. LDR is one of the liquidity indicators that describes the role of a bank in fulfilling its maturing obligations or short-term debt. Based on Bank Indonesia regulations, the recommended LDR ratio is between 78% to 92% with the aim that banks continue to function as intermediary institutions, not just relying on income from SBI, bond interest, recapitalization, or other investment instruments. The increase in LDR shows that the bank's credit expansion is getting higher and balanced with the amount of third-party funds collected, so that the third-party funds can be used by banks to generate profits through their operational activities. With the increase in credit that can be disbursed by banks, it will affect the bank's profitability and show that the performance of bank management is getting better. *Fourthly, effect of Net Interest Margin (NIM) on Return on Assets (ROA)*. Net Interest Margin (NIM) is a profitability ratio used to measure the performance in generating net interest income from its average productive activity. The greater the NIM ratio, the greater the interest income generated during a certain period. The greater the interest income obtained indicates that the bank performance is getting better. Therefore, the conceptual framework in this study is described as follows:

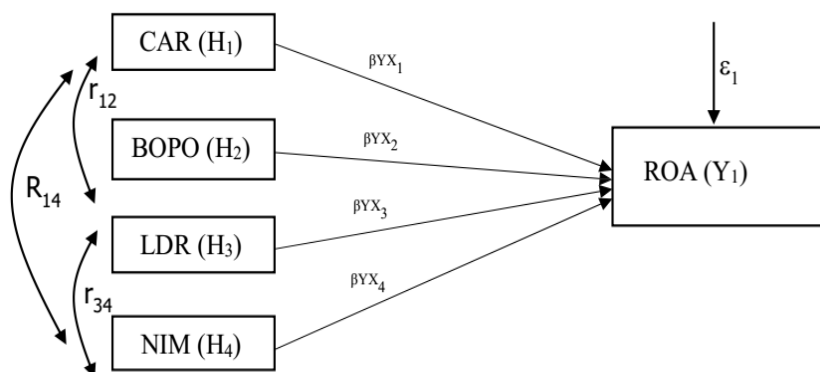


Figure.1 Research Framework

Sources: From various sources, 2013-2019

Hypotheses Development

Based on literature study, research framework, and several previous research, we summarize into several hypotheses are presented as follows:

H₁: Capital Adequacy Ratio (CAR) has a significant effect on Return On Assets (ROA)

H₂: Operating Costs to Operating Income (BOPO) have a significant effect on Return On Assets (ROA)

H₃: Loan Deposit Ratio (LDR) has a significant effect on Return On Assets (ROA)

H₄: Net Interest Margin (NIM) has a significant effect on Return On Assets (ROA)

Method

Research Design

This study uses a *quantitative approach* because the observed symptoms are converted into numbers that are analyzed using statistics. Quantitative research requires researchers to explain how one variable affects other variables (Creswell, 2012). The type of research is *associative* research. The purpose of associative research are the relationship and influence between the independent variable and the dependent variable in research (Sugiyono, 2012). By using this type of associative research, it can describe the causal relationship between the influencing variable or **independent variable** (X) and the affected variable or **dependent variable** (Y). In this study, the dependent variable used is *Return on Assets* (ROA) while the independent variables used in this study are *Capital Adequacy Ratio* (CAR), *Operating Costs to Operating Income* (BOPO), *Loan to Deposit Ratio* (LDR), and *Net Interest Margin* (NIM). The unit of analysis in this study is commercial bank that has submitted its financial statements for 2016 - 2020 to the Financial Services Authority (OJK) and listed on the Indonesia Stock Exchange (IDX).

Variable Measurement

The dependent variable (Y) is the variable that is influenced or occurs due to the independent variable. ROA is a dependent variable and is represented by symbol Y_1 . ROA is used to measure management's ability to obtain overall profitability and managerial efficient.

Independent Variable (X), The independent variable is the variable that influences or becomes the cause of the dependent variable as follows: (a) *Capital Adequacy Ratio* (CAR) is the first independent variable and is given the symbol X_1 . Capital Adequacy Ratio (CAR) is a financial ratio related to banking capital where the amount of a bank's capital will affect the ability of a bank to run its activities efficiently; (b) *Operating Cost to Operating Income* (BOPO) is the second independent variable and represented by symbol X_2 . BOPO is a comparison section that is used to measure how influential the bank is in carrying out its operations. BOPO is a comparison between the ratio of operating costs in the last 12 months with operating income in the same period; (c) *Loan to Deposit Ratio* (LDR) is the third independent variable and represented by symbol X_3 . LDR is a ratio used to measure the amount of credit given to the amount of public funds and own capital used. This ratio describes how much the bank is able to make payments or returns to depositors by relying on disbursed credit which is the source of its liquidity; *Net Interest Margin* (NIM) is the fourth independent variable and represented by symbol X_4 . Net Interest Margin (NIM) is a ratio used to measure the ability of bank management to manage their productive assets to generate net interest income. The higher the NIM ratio indicates an increase in interest income earned by banks on productive assets managed by banks so that profits can increase, it can be concluded that the greater the NIM ratio in a bank, the greater the ROA value.

Population and Sample Technique

The sample from this paper has the following criteria: (a) Commercial banks that have been registered with the Financial Services Authority (OJK) in 2016-2020; (b) Commercial Banks that have listed on the Indonesia Stock Exchange (IDX) in 2016-2020; (c) Banks that have a positive ROA ratio during 2016-2020; (d) Commercial banks that have been registered with the Financial Services Authority (OJK) in 2016-2020; (e) Commercial banks that have listed on the Indonesia Stock Exchange (IDX) in 2016-2020; (f) Banks that have a positive ROA ratio during 2016-2020. The object of research as follows:

Table. 1 Object of Research (*Commercial Banks*)

No	Bank Code (IDX)	Bank Name
1.	BBRI	PT. Bank Rakyat Indonesia (Persero), Tbk
2.	BMRI	PT. Bank Mandiri (Persero), Tbk
3.	BBNI	PT. Bank Negara Indonesia (Persero), Tbk
4.	BBTN	PT. Bank Tabungan Negara (Persero), Tbk
5.	BJBR	PT. BPD Jawa Barat Dan Banten, Tbk
6.	BJTM	PT. BPD Jawa Timur, Tbk
7.	BDMN	PT. Bank Danamon Indonesia, Tbk
8.	BBCA	PT. Bank Central Asia, Tbk
9.	BNII	PT. Bank Maybank Indonesia, Tbk
10.	PNBN	PT. Bank Pan Indonesia, Tbk
11.	BNGA	PT. Bank CIMB Niaga, Tbk
12.	NISP	PT. Bank OCBC NISP, Tbk
13.	MCOR	PT. Bank China Construction Bank Indonesia, Tbk
14.	BACA	PT. Bank Capital Indonesia, Tbk
15.	BNBA	PT. Bank Bumi Arta, Tbk
16.	MAYA	PT. Bank Mayapada International, Tbk
17.	BBMD	PT. Bank Mestika Dharma, Tbk
18.	BSIM	PT. Bank Sinarmas, Tbk
19.	BMAS	PT. Bank Maspion Indonesia, Tbk
20.	SDRA	PT. Bank Woori Saudara Indonesia 1906, Tbk
21.	BTPN	PT. Bank Tabungan Pensiunan Nasional, Tbk
22.	MEGA	PT. Bank Mega, Tbk
23.	AGRO	PT. Bank Rakyat Indonesia Agroniaga, Tbk
24.	NOBU	PT. Bank Nationalnobu, Tbk
25.	BINA	PT. Bank Ina Perdana, Tbk

Source : Financial Services Authority (OJK), 2020 (processed)

FINDINGS AND DISCUSSION

Processing and analysis of data

In this study, the data analysis technique used is by using *panel data regression test*. Panel data is data on several variables, such as in cross section data, but also has an element of sequence, such as in period series data (Winarno, 2015). In this study, the data analysis technique used is by using panel data regression test. Panel data is data on several variables, such as in cross section data, but also has an element of sequence, such as in period series data (Winarno, 2015). According to Gujarati (2012) the use of panel data can provide many advantages statistically and in economic theory. Panel data regression is a form of development of the linear regression method with the Ordinary Least Square (OLS) approach. In this study using panel data regression to see and test whether there is an influence between the independent variables consisting of CAR, BOPO, LDR, NIM on the dependent variable ROA. Then the model that will be used in this study is as follows:

$$Y = \alpha + \beta_1CAR + \beta_2BOPO + \beta_3LDR + \beta_4NIM + \varepsilon$$

According to Widarjono (2013) the mode estimation method, regression using panel data can be done through three approaches: (a) *Common Effect Model* (CEM), is the simplest method of estimating the panel data regression model because it only combines cross section data with time series; (b) *Fixed Effect Model* (FEM), is a panel data estimation method that uses a dummy variable to capture differences in intercepts. According to Gujarati (2012), the fixed effect model is a research model with different intercepts for each subject but the slope of each subject does not change over time. The weakness of this method is the lack of degrees of freedom which will ultimately reduce efficiency (Widarjono, 2013); (c) *Random Effect*

Model (REM), is a model that will estimate panel data where the disturbance variables may be interrelated over time and between individuals.

The right model used to estimate the Random Effect is *Generalized Least Square* (GLS) as the estimator, because it can increase the efficiency of least square (Windarjono, 2013). The advantage of using this model is that it can eliminate research data affected by heteroscedasticity problems. In the Selection of Panel Data Estimation Techniques, there are several stages of testing carried out to choose which model is appropriate for panel data processing (Widarjono, 2013) as follows: (a) *Chow test*, is a test that is carried out to select the best model between the common effect or fixed effect models that will be used in panel data regression. In this study, the following formulation is carried out, **H₀: Common effect model** and **H_a: Fixed effect model**. The basis for rejecting this hypothesis is by looking at the probability value (Prob.) for Cross-section F used on Eviews ver 10, if the alpha value is less than 5% or 0.05 then H₀ is rejected and H_a accepts so that the model chosen is the fix effect model. If the alpha value is more than 0.05 then H₀ is accepted so that the more appropriate model to use is the common effect; (b) Hausman test, is a statistical test to choose between fixed effect or random effect models that are appropriate to be used in panel data regression in this study. In this test, the hypothesis is carried out as follows, H₀: *Random Effect Model* (REM) and H_a: *Fixed Effect Model* (FEM). The basis for making the decision is to look at the chi square value used Eviews ver.10. The basis for rejection of the Hausman test hypothesis can be seen from the results of the Correlated Random Effect- Hausman test. If the chi square probability is less than 5% alpha or 0.05 then H₀ is rejected and the most appropriate model used for panel data regression is the fixed effect model, but on the contrary if the chi square probability value is more than 5% alpha or 0.05 then the model used is match is random effect.

Classical assumption test includes *normality, multicollinearity, autocorrelation*, and heteroscedasticity tests. Multiple linear regression model is good if the model can meet the BLUE (*Best Linear Unbiased Estimator*) criteria. However, not all classical assumption tests must be performed on regression using the OLS (*Ordinary Least Square*) method (Basuki and Prawoto, 2017).

Data Analysis

Data analysis is a stage in a series of research that aims to answer research questions. The questions contained in this study focus on whether there is an influence between one variable and another. This study uses panel data, namely data that has the combined characteristics of cross section and time series. The cross section is shown by the large number of samples of Commercial Banks which are more than one, namely 25 banks. The time series is shown by the sample period from each sample of Commercial Banks which is more than one, namely from 2016 to 2020. The method used in answering research questions is regression. One method that can be used in panel data is panel data regression. Before performing the regression, it is possible to select the model and fulfill the classical assumption test. The last stage is to test the feasibility of the regression model which consists of the F test, t test, and the coefficient of determination test. *Panel Data Estimation Model* There are three models that can be formed in estimating panel data, namely the common effect model, the fixed effect model, and the random effect model. The following is a description of the results of testing each estimation model

Table 2 *Common Effect Model*

Dependent Variable: ROA
Method: Panel Least Squares
Date: 08/18/21 Time: 09:15
Sample: 2016 2020
Periods included: 5
Cross-sections included: 25
Total panel (balanced) observations: 125

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	18.53372	1.569918	11.80553	0.0000
CAR	-0.078514	0.123728	-0.634569	0.5269
BOPO	-4.539723	0.261424	-17.36537	0.0000
LDR	0.250343	0.141398	1.770483	0.0792
NIM	0.587027	0.094476	6.213519	0.0000
R-squared	0.822930	Mean dependent var		0.323413
Adjusted R-squared	0.817027	S.D. dependent var		0.792361
S.E. of regression	0.338935	Akaike info criterion		0.713161
Sum squared resid	13.78523	Schwarz criterion		0.826294
Log likelihood	-39.57256	Hannan-Quinn criter.		0.759121
F-statistic	139.4241	Durbin-Watson stat		1.743592
Prob(F-statistic)	0.000000			

Based on Table-2 above, using the common effect model approach, it can be concluded that each independent variable, namely BOPO and NIM, has a significant effect on ROA with a probability value of <0.05 , which is 0.0000 while CAR and LDR have no significant effect on ROA because it has a probability value > 0.05 , namely 0.5269 and 0.0792. The result of Adjusted R-Square is 0.817027 so that the independent variable can affect the dependent variable by 81.70%.

Fixed Effect Model (FEM)

Table 3 Fixed Effect Model

Dependent Variable: ROA
Method: Panel Least Squares
Date: 08/19/21 Time: 16:28
Sample: 2016 2020
Periods included: 5
Cross-sections included: 25
Total panel (balanced) observations: 125

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	24.78811	2.935340	8.444716	0.0000
CAR	0.079787	0.227670	0.350452	0.7268
BOPO	-5.552294	0.499089	-11.12485	0.0000
LDR	-0.282673	0.248432	-1.137831	0.2580
NIM	0.639604	0.114662	5.578187	0.0000
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.890965	Mean dependent var		0.323413
Adjusted R-squared	0.859163	S.D. dependent var		0.792361
S.E. of regression	0.297359	Akaike info criterion		0.612280
Sum squared resid	8.488541	Schwarz criterion		1.268449
Log likelihood	-9.267528	Hannan-Quinn criter.		0.878847
F-statistic	28.01617	Durbin-Watson stat		2.547470
Prob(F-statistic)	0.000000			

Based on Table-3 above, using the fixed effect model approach, it can be concluded that each independent variable, namely BOPO and NIM, has a significant effect on ROA with a probability value of <0.05 , which is 0.0000 while CAR and LDR have no significant effect on ROA because it has a probability value > 0.05 , namely 0.7268 and 0.2580. The result of Adjusted R-Square is 0.859163 so that the independent variable can affect the dependent variable by 85.92%.

Random Effect Model (REM)

Tabel 4 Random Effect Model

Dependent Variable: ROA
Method: Panel EGLS (Cross-section random effects)
Date: 08/18/21 Time: 09:16
Sample: 2016 2020
Periods included: 5
Cross-sections included: 25
Total panel (balanced) observations: 125
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	19.87984	1.853222	10.72718	0.0000
CAR	-0.052458	0.145563	-0.360381	0.7192
BOPO	-4.742188	0.309234	-15.33529	0.0000
LDR	0.122978	0.164921	0.745677	0.4573
NIM	0.606394	0.097140	6.242506	0.0000

Effects Specification		S.D.	Rho
Cross-section random		0.156365	0.2166
Idiosyncratic random		0.297359	0.7834

Weighted Statistics			
R-squared	0.773323	Mean dependent var	0.209524
Adjusted R-squared	0.765767	S.D. dependent var	0.628397
S.E. of regression	0.304129	Sum squared resid	11.09937
F-statistic	102.3467	Durbin-Watson stat	2.099304
Prob(F-statistic)	0.000000		

Unweighted Statistics			
R-squared	0.820334	Mean dependent var	0.323413
Sum squared resid	13.98727	Durbin-Watson stat	1.665868

Based on Table-4 above, using the random effects model approach, it can be concluded that each of the independent variables, namely BOPO and NIM, has a significant effect on ROA with a probability value of <0.05 , which is 0.0000 while CAR and LDR have no significant effect on ROA because it has a probability value > 0.05 , namely 0.7192 and 0.4573. The result of Adjusted R-Square is 0.765767 which is a value that shows the effect of the independent variable on the dependent variable, namely ROA.

Panel Data Estimation Model Selection

The three models that have been estimated will be chosen which model is suitable for testing research data. The purpose of selecting the model is to determine which model is the most appropriate to be used in answering research questions. There are 2 kinds of estimation techniques for selecting the model estimation that will be used, namely the Chow test and the Hausman test. The following are the results of model testing to determine which regression model is the most appropriate.

Table 5 *Chow Test*

Redundant Fixed Effects Tests
Equation: MODEL_FEM
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	2.495924	(24,96)	0.0009
Cross-section Chi-square	60.610069	24	0.0001

Based on the results of the Chow test in Table-5, it can be seen that the cross-section value of F and Chi-square is <0.05 so it can be concluded that H_0 is rejected and H_a is accepted. This indicates that this study is more suitable to use the fixed effect model.

Table 6 Hausman Test

Correlated Random Effects - Hausman Test

Equation: MODEL_REM

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	9.526796	4	0.0492

Based on the results of the Hausman test in table-6, it can be seen that the random cross-section value <0.05 is 0.0492 so it can be concluded that H_0 is rejected and H_a is accepted. It can be concluded that this research is better to use the fixed effect model.

Table 7 Panel Data Estimation Model Selection Results

Metode	Pengujian	Hasil
Uji Chow	<i>Common Effect vs Fixed Effect</i>	<i>Fixed Effect</i>
Uji Hausman	<i>Fixed Effect vs Random Effect</i>	<i>Fixed Effect</i>

Based on the results of the estimation model selection in Table-7, it can be concluded that each test produces a fixed effect model, so that the model will be used to test the panel data regression in this study.

Table 8 Multicollinearity Test

	CAR	BOPO	LDR	NIM
CAR	1.000000	-0.163315	-0.205443	0.138286
BOPO	-0.163315	1.000000	-0.161920	-0.424303
LDR	-0.205443	-0.161920	1.000000	0.129962
NIM	0.138286	-0.424303	0.129962	1.000000

Based on Table-8, we can see that the correlation between each independent variable, namely CAR, BOPO, LDR, and NIM does not occur as indicated by the correlation result above 0.80.

Table 9 Autocorrelation Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.481660	Prob. F(2,118)	0.0880
Obs*R-squared	5.045529	Prob. Chi-Square(2)	0.0802

Based on Table-9, we can see that the Chi-Square Probability value shows the number 0.0802 or greater than the 0.05 level of significance so that this study does not have an autocorrelation problem.

Table 10 Heteroscedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.215590	Prob. F(4,120)	0.0713
Obs*R-squared	8.596731	Prob. Chi-Square(4)	0.0720
Scaled explained SS	25.84543	Prob. Chi-Square(4)	0.0000

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 08/20/21 Time: 09:14

Sample: 1 125

Included observations: 125

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.354216	1.285066	-0.275640	0.7833
CAR	-0.140286	0.101279	-1.385149	0.1686
BOPO	0.339368	0.213990	1.585904	0.1154
LDR	-0.120511	0.115742	-1.041202	0.2999
NIM	-0.039174	0.077334	-0.506554	0.6134

Based on Table-10, we can see that the Chi-Square Probability value shows the number 0.0720 or greater than the 0.05 significance level, so that this study did not find heteroscedasticity problems.

Hypothesis testing is used to test whether the regression coefficient obtained is significant or not. In this study, the fixed effect model was selected to be used in the significance test. There are three types of hypothesis testing on the regression coefficients that can be done, namely t-Test, F-Test and Coefficient of Determination Test.

This t-test was conducted to determine how much each independent variable significantly affects the dependent variable (Ghozali, 2011). This study uses a degree of error of 5% or with a confidence level of 95%. So that the significance level used in this study is 0.05 or 5%, if the significance value of the independent variable is below 0.05, it can be concluded that the independent variable has a significant effect on the dependent variable. The following are the results of the t-statistical test:

Table 11 t-Test

Dependent Variable: ROA

Method: Panel Least Squares

Date: 08/19/21 Time: 16:28

Sample: 2016 2020

Periods included: 5

Cross-sections included: 25

Total panel (balanced) observations: 125

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	24.78811	2.935340	8.444716	0.0000
CAR	0.079787	0.227670	0.350452	0.7268
BOPO	-5.552294	0.499089	-11.12485	0.0000
LDR	-0.282673	0.248432	-1.137831	0.2580
NIM	0.639604	0.114662	5.578187	0.0000

Based on the output in Table-11, it can be explained as follows: (a) The probability value (p-value) of the CAR variable is 0.7268 where the value is greater than the significance value of 0.05 so it can be concluded that H_0 is accepted and H_0 is rejected, which means that the CAR variable has no significant effect on ROA; The probability value (p-value) of the BOPO variable is 0.0000 or less than the 0.05 significance value, so it can be concluded that H_0 is rejected and H_a is accepted, which means that the ROA variable has a significant effect on ROA; (c) The probability value (p-value) of the LDR variable is 0.2580 or greater than the significance value of 0.05 so it can be concluded that H_0 is accepted and H_a is rejected, which means that the LDR variable has no significant effect on ROA; (d) The probability value (p-value) of the NIM variable shows a value of 0.0000 or less than a significance value of 0.05 so it can be concluded that H_0 is rejected and H_a is accepted, which means that the NIM variable has a significant effect on ROA.

F Test/Simultaneous Test is used to determine whether the independent variables in the model have an influence on the dependent variable (Ghozali, 2011). If the probability (sig. F) is less than 0.05 or 5%, it means that there is a significant influence between the

independent variables on the dependent variable. The following are the results of the simultaneous significance test (F test) with evIEWS ver.10:

Table 12 F-Test

Periods included: 5
Cross-sections included: 25
Total panel (balanced) observations: 125

R-squared	0.890965	Mean dependent var	0.323413
Adjusted R-squared	0.859163	S.D. dependent var	0.792361
S.E. of regression	0.297359	Akaike info criterion	0.612280
Sum squared resid	8.488541	Schwarz criterion	1.268449
Log likelihood	-9.267528	Hannan-Quinn criter.	0.878847
F-statistic	28.01617	Durbin-Watson stat	2.547470
Prob(F-statistic)	0.000000		

Based on the results of the F test in Table-12, it can be seen that the results of the Prob (F-statistic) are 0.000000. With a significance level of 0.05 or 5%, it can be concluded that H_0 is rejected and H_a accepts that all independent variables, namely CAR, BOPO, LDR, and NIM, have a significant effect on the dependent variable, namely ROA.

Coefficient of Determination Test (R^2) was carried out to find out how much influence the independent variable had on the dependent variable (Ghozali, 2011). The greater the value (R^2) indicates that the greater the independent variable in explaining the dependent variable and vice versa. Here are the results of the coefficient of determination test using EViews 10.

Table 13 Coefficient of Determination Test (R^2)

R-squared	0.890965	Mean dependent var	0.323413
Adjusted R-squared	0.859163	S.D. dependent var	0.792361

Based on the results of the R^2 test in Table-13, it can be seen that the value of the Adjusted R-squared is 0.859163. This shows that the ability of the independent variables (CAR, BOPO, LDR, NIM) in explaining the dependent variable, namely (ROA) at Commercial Banks that Go Public on the IDX in 2016-2020 is 85.92%, the rest is 14.08 % is explained by other variables not included in this study.

Panel data regression in this study is used to determine whether there is an influence between the independent variables, namely CAR, BOPO, LDR, and NIM on the dependent variable (ROA). Based on the output of the *Fixed Effect Model*, the following multiple regression equation can be obtained:

$$ROA = 24.78811 + 0.079787CAR - 5.552294BOPO - 0.282673LDR + 0.639604 NIM + \epsilon$$

Based on the regression equation above, it can be interpreted as follows: (a) The constant value is 24.78811, meaning that if the independent variable consisting of CAR, BOPO, LDR, and NIM is zero, then ROA is equal to the constant, which is 24.78811, which is significant at 5%; (b) The CAR regression coefficient is 0.079787 and is positive, it states that each addition of one unit to the CAR variable will increase 0.079787 in the ROA variable assuming the value of the other independent variables is considered constant; (c) The BOPO regression coefficient is 5.552294 but is negative, it states that for every addition of one unit to the BOPO variable, the value of the ROA variable will decrease by 5.552294 assuming the value of the other independent variables is considered constant; (d) The LDR regression coefficient is 0.282673 and is negative, it states that each addition of one unit to the LDR variable, the ROA variable value will decrease by 0.282673 assuming the value of other independent variables is considered constant; (e) The NIM regression coefficient is 0.639604 and is positive, it states that each addition of one unit to the NIM variable will increase 0.639604 in the ROA variable assuming the value of the other independent variables is considered constant.

Furthermore, we will discuss several hypotheses that have been tested using panel data regression as follows: *Firstly, effect of Capital Adequacy Ratio (CAR) on Return on Assets (ROA)*. The first hypothesis (H_1) in this study states that the Capital Adequacy Ratio

(CAR) has a significant effect on Return on Assets ROA, but this hypothesis is rejected as evidenced in the t-test which shows the p-value of the CAR variable of 0.7268 where this value greater than the level of 0.05 so that the CAR variable has no significant effect on ROA. This result is supported by research conducted by Pinasti and Mustikawati (2018) and Buchory (2016) which states that CAR has no significant effect on ROA, but this result is different from research conducted by Sudarmanta (2016) and Fahmy (2013) that CAR has an effect on ROA. significant to ROA. *Secondly, effect of Operating Costs to Operating Income (BOPO) on Return on Assets (ROA).* The second hypothesis (H_2) states that Operating Costs to Operating Income (BOPO) have a significant effect on Return on Assets (ROA). This hypothesis is accepted because the t-test shows the p-value of the BOPO variable of 0.0000 where the value is smaller than the 0.05 level so that the BOPO variable has a significant effect on ROA. BOPO regression coefficient value is -5.552294 so it can be interpreted that BOPO has a significant negative effect on ROA. The negative results indicate that if the BOPO increases, it results in a decrease in ROA in line with the results of research conducted by Fahmy (2013), Vernanda and Widyarti (2016), and Setiani, Gagah, and Fathoni (2018). *Thirdly, effect of Loan to Deposit Ratio (LDR) on Return on Assets (ROA).* The second hypothesis (H_3) states that the Loan to Deposit Ratio (LDR) has a significant effect on Return on Assets (ROA). This hypothesis is rejected because the t-test shows the p-value of the LDR variable is 0.2580 where the value is greater than the 0.05 level so that the LDR variable has no significant effect on ROA. This result is not in accordance with research conducted by Agustiningrum (2013) and Setyarini (2020) which states that LDR has a positive effect on ROA. *Fourthly, Effect of Net Interest Margin (NIM) to Return on Assets (ROA).* The fourth hypothesis (H_4) states that Net Interest Margin (NIM) has a significant effect to Return on Assets (ROA). This hypothesis is accepted because the t-test shows the p-value of the NIM variable is 0.0000 where the value is greater than the 0.05 level and the NIM regression coefficient is 5.578187 so that the NIM variable has a significant positive effect on ROA. These results are in accordance with research conducted by Nisa (2019) which states that LDR has a positive effect on ROA. Meanwhile, research conducted by Buchory (2016) states that NIM does not have a positive but not significant effect.

Conslusions and Suggestions

Conclusions

Based on the results of the above there are some recommendations as follows:

1. Capital Adequacy Ratio (CAR) has no effect on Return on Assets (ROA) in Commercial Bank listed on Indonesian Stock Exchange (IDX) in 2016-2020;
2. Operating Costs to Operating Income (BOPO) have an influence on the Return on Assets (ROA) in Commercial Bank listed on Indonesian Stock Exchange (IDX) in 2016-2020;
3. Loan to Deposit Ratio (LDR) has no effect on Return on Assets (ROA) in Commercial Bank listed on Indonesian Stock Exchange (IDX) in 2016-2020;
4. Net Interest Margin (NIM) has an influence on the Return on Assets (ROA) in Commercial Bank listed on Indonesian Stock Exchange (IDX) in 2016-2020;

Suggestions

Based on the results of the above research there are some suggestions as follows:

1. For investors who want to invest in the banking sector, it is necessary to watch the factors that can affect the bank profitability. For customers, it is better to choose a bank with good performance in order to avoid liquidity risk in the future and can provide benefits because the bank has good profitability.

2. It is recommended that in future research use other variables such as Non-Performing Loans (NPLs), increase the number of research samples, and other analytical methods so that they will provide new information/research.

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