

The Impact of Covid-19 on the Performance of Banking Sector in Indonesia Stock Exchange

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Abstract - COVID-19 pandemic has made Indonesia's economy deteriorate, represented by the decline in Gross Domestic Product and Jakarta Composite Index. One of the affected industries is the banking industry, which plays vital role in country's economy. To understand how the industry withstands, this research is conducted to examine the effects of the declining economy due to COVID-19 on the performance of banking sector in Indonesia Stock Exchange, represented by ability to obtain earnings using assets and equity. The calculation uses Multiple Linear Regression with dependent variables of ROA and ROE, and independent variables of CAR, LDR, BOPO, Bank Ownership, and BUKU. The data is quarterly financial report with period of June 2019 – September 2020, divided into two groups: pre-COVID and post-COVID. The results show that there has been a decline of ROA and ROE on average after the pandemic occurs. BOPO is found to have significant negative relation with ROA and ROE, while LDR is found to have positive relation with both dependent variables. CAR and OWN appear to have significant relation only with ROE. Lastly, there is no significant relation between ROA and ROE with BUKU.

Keywords – COVID-19 pandemic, financial performance, listed banks, Multiple Linear Regression

I. INTRODUCTION

The existence of COVID-19 pandemic has made the world's economic condition to fall. The International Monetary Fund (IMF), stated that in June 2020, the global economy growth reached the number -4.9%, which is 1.9% lower than the forecast conducted by World Economic Outlook (WEO) in April 2020. WEO also projected that the global growth this year is at -4.4% [1]. This economic decline is also said to be the deepest recession since the World War II and even there is a possibility that COVID-19 would hit the world economy as hard as the largest global crisis known as The Great Trade Collapse that occurred between the third quarter of 2008 and the second quarter of 2009 [2]. COVID-19 is a contagious disease caused by newly discovered coronavirus, initially informed by the World Health Organization (WHO) on 31 December 2019 where there was a cluster of novel human pneumonia in Wuhan City, Hubei Province, China. The disease spread across China and expand until it reached the whole world. It is declared by the WHO as a global pandemic on 11 March 2020. By 22 November 2020, the disease has reached 57,882,183 confirmed cases and 1,377,395 deaths [3].

Apparently, beside the public health impacts generated by the disease, there lays wider social and economic effects that are often not considered in risk assessment [4]. The uncertainty caused by the disease affects the economy in demand-side in addition to supply-side such as supply chain disruptions and labor shortages [5]. This creates decline in economic, which means that there is decline in people's amount of consumption, hence leading to the decrease of both company and individual's income. They may experience liquidity stress, including limited access to credit, and it increases the probability of default [6]. The global debt is reported to reach the largest quarterly increase on record, which is 331% of GDP (\$258 trillion) in the first quarter of 2020. In this quarter, there is a rapid rise in corporate debt, where it accounts for over 65% of the rise in the global debt-to-GDP ratio, and it is expected to continue rising at an accelerated pace [7].

In response to the existing problem, central banks around the world have proactively taken actions to maintain the stability of the markets. The response taken is mainly focusing on easing the financial stress and ensuring a smooth flow of credit to the private non-financial sector [8]. For example, several central banks have taken actions such as funding-for-lending schemes, increasing asset purchase to inject liquidity, and corporate bonds purchase programs during this pandemic [9]. Reference [10] also claimed that the banks are now being 'good citizen' by extending loan facilities and donating facemasks in order to help corporate clients and at the same time smoothing their corporate and social credentials. For example, Australia's banks are supporting by extending loan deferrals, because they are aware that their customers are struggling financially in paying back their loans. The banks are assuring that if their borrowers are not able to meet their loan repayments in full by the deadline will be given extra four months for settling their debts [11].

Apparently, besides having its positive impact on economic growth of a country, at the same time it is also being 'blamed' for being a source instability during crisis period [12]. It is because banks help businesses to grow and increase people consumption through lending, but if banks are disrupted, it will leave depositors and creditors with losses, thus reducing the spending as a result of wealth effect [13]. During this crisis, the negative economic growth rate occurring in Indonesia will reduce the ability of individuals or corporates to repay their debts, hence rising the number of bad debts for banks. This risk of bad debts may disrupt the performance of

banks, and it is critical to measure the banks' performance due to its importance in the country's economic, where banks create new capital formation through collecting savings and distribute them in form of working capital for businesses.

This study aims to analyze the effects of declining economic due to COVID-19 on the performance of 40 chosen listed banks in Indonesia that is reflected by Return on Assets (ROA) and Return on Equity (ROE). These proxies are considered as proper measurement because they have been widely-used in past research. Listed banks are chosen due to its availability of information, as *Otoritas Jasa Keuangan* (OJK) requires every listed bank to routinely publish their financial statements as well as its contribution for economic growth through providing loans and eliminating capital deficiency. The objectives of this study also involve understanding the factors that affect ROA and ROE, as well as comparing the performance based on the bank ownership, which are state-owned and private-owned, and based on category of Commercial Banks based on Business Activities (BUKU).

As we have already known, Indonesian economy, reflected by GDP, has started to decline significantly in the first quarter of 2020, and gets more deteriorated in the second quarter. Apparently, the same condition happens to the Indonesia Stock Exchange.

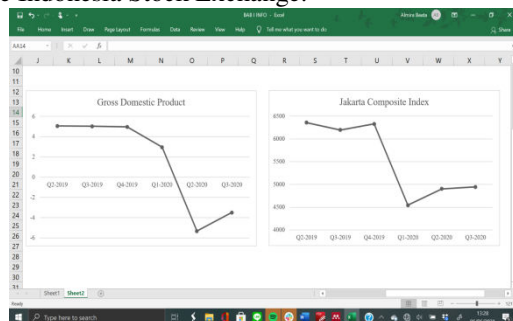


Figure 1 : The Movement of GDP in Indonesia

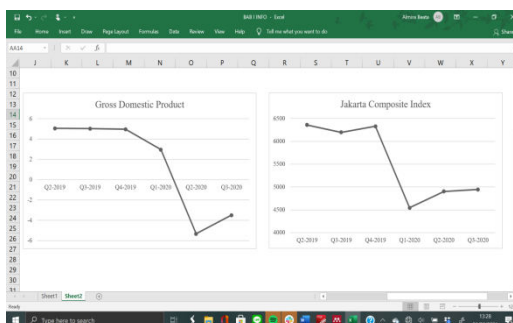


Figure 2 : The Movement of JCI in Indonesia

There has been a significant decline on both GDP and Jakarta Composite Index (JCI) that is started in the first quarter of 2020. From this condition, this paper will analyze whether there is difference between the performance of listed banks due to COVID-19, with first quarter of 2020 as the comparison point. Thus, there will be two time-frames to be studied: pre-COVID (Q2-Q4 2019) and post-COVID (Q1-Q3 2020).

The null hypothesis tested for this research is there is no significant relation between dependent variable (ROA and ROE) and independent variables (CAR, LDR, BOPO, OWN, and BUKU).

II. METHODOLOGY

There are 40 listed banks in Indonesia Stock Market that are being observed, which consists of 4 state-owned banks, 2 regional development banks, 25 foreign exchange national private banks, 9 non-foreign exchange national private banks. The data is in form of secondary data collected from official websites of *Otoritas Jasa Keuangan* (OJK), Indonesia Stock Exchange, and the chosen banks' websites. The timespan for this research would be 6 quarters starting from June 2019 until September 2020. The analysis is divided into two groups consisting 3 quarters each, namely pre-COVID and post-COVID. The data used will be averaged per 3 quarters, resulting in 40 observations for each group and 80 observations in total.

The performance of the banks will be assessed using Multiple Linear Regression using IBM SPSS Statistics 26, with dependent variables of Return on Assets (ROA) and Return on Equity (ROE). The regression model use predictor variables of Capital Adequacy Ratio (CAR), Loan to Deposit Ratio (LDR), Operating Expense to Operating Income Ratio (BOPO), and dummy variables of Bank Ownership (OWN) and Commercial Banks based on Business Activities (BUKU).

ROA can be used as a proxy for bank performance because it provides indicator about bank profitability through showing how efficient the management of bank is in using its assets to generate earnings. It is calculated by dividing net income with total assets [14]. Reference [15] explained that higher ROA indicates more efficient a company is when using its assets to generate income. The Central Bank of Indonesia has made a regulation stated in Central Bank of Indonesia Circular Letter Number 6/23/DPNP Year 2004 that a bank is considered to have healthy financial performance if the ROA is more than 1.25%.

Another proxy is ROE, a financial ratio that shows how bank generate income using the shareholder equity invested or the equity found on the balance [15]. This ratio is what the shareholders look as return of their investment. This is calculated by Net Income after Taxes divided by Total Equity Capital, which will show the rate of return earned on the funds invested by shareholders in the bank. The higher this ratio shows the better and more effective the management in generating income using shareholders equity [16]. Central Bank of Indonesia states in the Circular Letter Number 6/23/DPNP Year 2004 that the healthy bank has ROE of more than 12.5%.

CAR is used in solvency ratio as it is defined to be the amount of owned fund available to support the bank's business and becomes the buffer in case of dangerous situation. Capital adequacy shows the level of capital required by the bank to allow them withstanding risks

they are exposed to in order to absorb potential losses and protect the bank's debtors [17]. Reference [14] states that the adequacy of capital is calculated using Capital to Risk-weighted Assets Ratio and the ratio of capital to asset which will show the internal strength of the bank when faced with crisis. It can also be calculated by dividing the total equity with the *Asset Tertimbang Menurut Risiko* (ATMR). The higher the ratio shows higher profitability of bank. Central Bank of Indonesia regulates in Circular Letter Number 6/23/DPNP Year 2004 that CAR more than 8% is categorized as healthy.

Operating efficiency ratio is reflected by Operating Expense to Operating Income ratio or *Biaya Operasional terhadap Pendapatan Operasional* (BOPO). This ratio shows the ability of bank management to control its operating expenses efficiently. It should be noted that the main activity of bank is being the intermediary that gather and distribute funds of people, so their expenses and income in operation is dominated by interest income [18]. Efficient operational activities is argued to give assurance of increment in profitability [19]. A bank can be said to be healthy if it has BOPO of not more than 95%, according to Central Bank of Indonesia Circular Letter Number 6/23/DPNP Year 2004.

Liquidity shows the ability of the bank to fulfil its obligations, primarily to its depositors. It is the amount of short-term responsibilities that could be met with the amount of liquid assets [20]. Reference [14] argues that sufficient amount of liquidity is positively related with bank profitability. Assessing bank liquidity can be done using Loan to Deposit Ratio (LDR), which is done by dividing the bank's total loans by its total deposits. This ratio will show the percentage of bank's loans that are funded by deposits. However, high loan to deposit ratio may indicate a potential source of illiquidity and insolvency, because this means that there is less number of deposits which is the less risky source of funding while loans have more risk because of the low market liquidity [21]. According to Central Bank of Indonesia Circular Letter Number 6/23/DPNP Year 2004, a bank is said to be healthy if its LDR is between 75%-95%.

Banks can be categorized based on the ownership structure and core capital. The categorization based on ownership are divided into two: state-owned and private-owned. State-owned bank is defined as a bank which the deed and capital are owned and from the government, hence the profit of the bank belongs to the government as well. Another form of state-owned banks is local government-owned banks that are located in Level I and Level II areas in each province. Meanwhile, the shares of private banks are owned by the national private sector and the deed of incorporation is also established by the private sector. The profit of this type of bank belongs to the private sector [22]. Based on the core capital, the commercial banks are grouped based on the business activities, namely *Bank Umum berdasarkan Kegiatan Usaha* (BUKU). According to the Circular Letter Number 15/6/DPNP by Central Bank of Indonesia, there are 4 categories of BUKU, where the higher the core capital,

the higher number of BUKU and the wider authority and range of activities that can be done by the banks.

The variables explained above are constructed into regression models, where the models based on bank ownership are shown in (1) and (2), and the models based on BUKU are shown in (3) and (4).

$$ROA = \beta_0 + \beta_1(CAR) + \beta_2(LDR) + \beta_3(BOPO) + \beta_4(OWN) \quad (1)$$

$$ROE = \beta_0 + \beta_1(CAR) + \beta_2(LDR) + \beta_3(BOPO) + \beta_4(OWN) \quad (2)$$

$$ROA = \beta_0 + \beta_1(CAR) + \beta_2(LDR) + \beta_3(BOPO) + \beta_4(IND1) + \beta_5(IND2) + \beta_6(IND3) \quad (3)$$

$$ROE = \beta_0 + \beta_1(CAR) + \beta_2(LDR) + \beta_3(BOPO) + \beta_4(IND1) + \beta_5(IND2) + \beta_6(IND3) \quad (4)$$

For the OWN variable, state-owned banks are coded 0 and private-owned banks are coded 1. On the other side, for BUKU variable, BUKU IV is coded 0 0 0, BUKU III is coded 1 0 0, BUKU II is coded 0 1 0, and lastly BUKU I is coded 0 0 1.

Besides conducting Multiple Linear Regression, the author will also perform descriptive statistics, classical assumption test (normality test, heteroscedasticity test, and multicollinearity test), and correlation analysis using Pearson Correlation.

III. RESULTS

A. Descriptive Statistics

TABLE I
DESCRIPTIVE STATISTICS

Pre-COVID				
	Mean	Min.	Max.	Std. Dev.
ROA	0.9645	-7.90	3.90	1.9464
ROE	4.5772	-48.21	19.76	10.8376
CAR	24.7818	0.21	62.55	13.0937
LDR	86.9503	0.95	135.91	22.3216
BOPO	88.1433	0.82	187.52	25.7747
Post-COVID				
	Mean	Min.	Max.	Std. Dev.
ROA	0.7092	-7.97	3.50	2.1140
ROE	3.9450	-25.34	19.93	10.4760
CAR	27.4753	7.09	154.88	23.6337
LDR	88.7710	28.57	158.62	25.0667
BOPO	93.7075	29.77	219.81	29.9870

The descriptive statistics above show that mean value of Return on Assets (ROA) in pre-COVID period is 0.97%, while in the post-COVID period is only around 0.71%. As the Central Bank of Indonesia has regulated that ROA of more than 1.25% is categorized as healthy, this result shows that there has been a declining performance of the management of 40 listed banks in Indonesia in generating earnings using its assets and the banks are getting unhealthier, though this case does not happen to all banks. Some banks are still able to generate ROA more than 3%, but at the same time there is a bank that has a negative ROA, with the lowest number of around -7.9%.

For Return on Equity (ROE), it is stated by Central Bank of Indonesia that ROE of more than 12.5% is categorized as healthy. As demonstrated above, the mean value of ROE is quite low, and becomes lower after the pandemic occurs. Though so, it appears that the minimum value of ROE has increased after the pandemic occurs, while the maximum value has a slight increase. This indicates that the banks are actually having a good performance in obtaining earnings using equity, even though the disparity slightly rise, indicating that there is different performance between large-scale banks and small-scale banks.

As the formula for ROA and ROE involves net income which is divided by total assets and shareholders equity respectively, the decreasing number of ROA and ROE happens because there has been a decline in the net income. This decline is not always associated with the decline in the gross income, but also because of losses due to the decrease in fair value of financial assets, spot and derivative losses, increase in operating and non-operating expenses, as well as increase in labor expense and other expenses.

The Central Bank has also stated that the Capital Adequacy Ratio (CAR) of more than 8% is categorized as healthy. We can see that according to the data, the mean value of CAR of observed banks is increasing from 24.78% into 27.48% after COVID-19 pandemic occurs. However, it also seems that there are still some banks that do not meet the requirement, with the lowest number of 0.21 before the pandemic. Though so, the minimum number of CAR among the observed banks increase into 7.09, which is close to the requirement by the Central Bank of Indonesia. Apparently, the maximum number of CAR also increases sharply after the pandemic occurs. This means that the banks are ready in withstanding the financial downturn or other unpredicted losses, which is likely to happen during the pandemic. As the formula of CAR is total capital divided by risk-weighted assets (RWA), the increase in CAR indicates that there has been a decrease in the RWA. The RWA itself is dominated with loans as it is the assets with highest risk. This means that most banks have decreased loans issuance and reserve more amount of capital. A high CAR may signal a less bank risk-taking behavior and competitiveness in the market because it issues less loans as bank's critical source of income, hence may reduce the profitability of the bank.

The mean value of Loan-to-Deposit Ratio (LDR) also increases from 86.95% in pre-COVID period into 88.77% in post-COVID period. As stated by Central Bank of Indonesia, bank with LDR of between 75-95% is categorized as healthy. We can also see that both the minimum and maximum number of LDR increase after the pandemic occurs, indicating that some banks are getting healthier. Though it seems like a good increase, it must be taken into account that a too-high LDR means that banks may not have enough liquidity to cover any unanticipated fund requirements. In the observation, it is revealed that 27 banks are decreasing the LDR after the

pandemic occurs, indicating that there is a greater number of deposits compared to amount of loans. The banks are reducing loans issuance because they are considering the increase of bad debts in result from the economic decline due to the pandemic. Issuing more loans can jeopardize the banks' profitability because there is higher possibility of bad debts which hinder the banks from getting return from the interest associated with loans.

Lastly, we can observe the Operating Expense to Operating Income Ratio (BOPO) of the banks where there is an increase from 88.14% pre-COVID to 93.71% post-COVID. According to Circular Letter by Central Bank of Indonesia, a bank is said to be healthy if they have maximum ratio of 94-96%. This means that after COVID-19 pandemic, the observed banks are having more concern towards operating efficiency. The minimum value increases after the pandemic, which indicates that banks can still develop in term of operating efficiency. Nevertheless, there are 13 banks that have BOPO of more than 96% in the post-COVID period, which indicates operating inefficiency because the banks are allocating more expenses but obtaining less income. The example of the cause of situation is due to the inefficient job distribution, where the labor expenses are high but they are not able to generate favorable income for the banks.

B. Return on Assets

Before performing the regression analysis, the classical assumption tests are conducted. It appears that heteroscedasticity is found in LDR for pre-COVID period and the data is not normally distributed for post-COVID period.

The model summary and ANOVA for this regression is shown in Table II, where the analysis show the overall model fit in predicting the dependent variable.

TABLE II
MODEL SUMMARY AND ANOVA FOR ROA

Model Summary		
	Pre-COVID	Post-COVID
R	0.858 ^a	0.932 ^a
Adjusted R ²	0.706	0.854
SEE	1.05476	0.80829
ANOVA		
	Pre-COVID	Post-COVID
F	24.451	57.943
Sig.	0.000	0.000

The R value of 0.858 in the pre-COVID period shows that the correlation between ROA and the independent variables, which are CAR, LDR, BOPO, and OWN, are very strong (categorized as strong if it is more than 0.5). The correlation intensifies after the pandemic occurs where the value becomes 0.932, indicating that ROA has a stronger correlation with the independent variables.

The adjusted R square (R²) value is used because it is a more suitable measurement for independent

variables more than 2. It shows that in the period before COVID-19 pandemic occurs, 70.6% variance of ROA can be explained by the variance of the other independent variables, while the rest are being explained by other things. In the subsequent period, the number increases into 85.4%, where it means that the variance of other independent variables can explain the variance of ROA more accurately, while the rest are explained by other things.

The Standard Error of the Estimate (SEE) pre-COVID is 1.06, or 1.06% on average during 3 quarters, and it decreases into 0.81% on average during 3 quarters. This measurement depicts the accuracy of the model prediction. If the error is higher, it means that the model will have higher error in predicting the dependent variable. The comparison of SEE shows that after the pandemic occurs, the error lessens. In other words, the actual value of ROA, given the samples, has a decrease of dispersion from the model predicted value.

From Model Summary, we have seen that the correlation between ROA and the chosen independent variables are getting stronger, the model can predict more accurately, and the error in the estimation decreases.

Additionally, the F ratio for pre-COVID has a value of 24.451, with significance score of 0.000 which is lower than $\alpha = 0.05$. It is also shown that the F ratio for post-COVID is 57.943 with significance score of 0.000. These results indicates that all of the independent variables, jointly affect the ROA significantly. This also can be interpreted as the model has at least one regression coefficient that is not equal to zero, which means that at least one independent variable affects ROA.

The regression model for ROA pre-COVID is constructed below.

$$ROA = 3.827 + 0.008(CAR) + 0.031(LDR) - 0.058(BOPO) - 0.777(OWN) \quad (5)$$

The constant of 3.827 shows that if there are no other independent variables, the ROA would be 3.827% on average during 3 quarters. The regression coefficient of 0.031 for LDR means that for every increase of 1% of LDR will increase the ROA by 0.031%. The regression coefficient of -0.058 for BOPO means that for every increase of 1% of BOPO will decrease the ROA by 0.058%. Lastly, the regression coefficient of -0.777 means that private banks (coded 1) have 0.777% less ROA than state-owned banks (coded 0).

Next, the model for post-COVID is demonstrated.

$$ROA = 6.051 + 0.000(CAR) + 0.012(LDR) - 0.064(BOPO) - 0.473(OWN) \quad (6)$$

As illustrated, the constant for the post-COVID model is 6.051, and it means that if there are no predictor variables in the model, the ROA would be 6.051% on average during 3 quarters. The regression coefficient of

0.012 for LDR means that for every increase of 1% of LDR will increase the ROA by 0.012%. The regression coefficient of -0.064 for BOPO means that for every increase of 1% of BOPO will decrease the ROA by 0.064%. Finally, the regression coefficient of -0.473 means that private banks (coded 1) have 0.473% less ROA than state-owned banks (coded 0).

The t and Sig. column are used to test the null hypothesis, where if the coefficients in the Sig. is less than or equal to $\alpha = 0.05$, it is said to be statistically significant. As shown from the result, the constant or the intercept (β_0) are significant in both period, which means that there is enough evidence that the intercept is not equal to 0. It appears that both periods have the same independent variables that have significant relation with ROA, which are LDR and BOPO. Thence, we reject the null hypothesis for LDR and BOPO, where *there is significant relation between Return on Assets and Loan to Deposit Ratio and Operating Expense to Operating Income Ratio*. We also find insignificant relation between ROA and both CAR and OWN. This means that we have to accept the null hypothesis that state, *there is no significant relation between Return on Assets and Capital Adequacy Ratio and Bank Ownership*.

If compared with the pre-COVID period, the post-COVID LDR becomes less sensitive in predicting ROA, seen from how the significance increases and the coefficients decreases. Meanwhile, BOPO consistently has significance of 0.000 in both periods, but the increase in the coefficients after the pandemic indicates that BOPO becomes more sensitive in predicting ROA. This demonstrates that banks become more concerned and focusing on the operational efficiency during pandemic, though working on generating income through issuing interest-bearing loans is also crucial. The role of Bank Ownership in ROA, though insignificant, appears to be more sensitive in the pre-COVID period and becomes less sensitive in the post-COVID period. This informs that the dependency of financial performance of banks in terms of ROA in the structure of ownership is not strong.

LDR appears to have positive significant relation with ROA because loans bring income to the banks. The more loans issued by the banks mean the more earnings for banks because they obtain return from the interest-bearing loans. But it must be remembered to ensure the loans must have the level of Collectability 1 or Collectability 2 at worst, because if not, it will become bad debts and reduce the profitability of the banks. Meanwhile, BOPO has a negative significant relation with ROA because if the BOPO is high, ROA will become low due to the operating inefficiency where it means more expense are allocated but less income obtained. In other words, the operating activities which need expenses are not able to generate favorable amount of income to the bank in return.

The next analysis is to do correlation analysis using Pearson Correlation. Pearson Correlation test aims to identify the correlation between two variables, as well as assessing the significance of the correlation. A positive Pearson Correlation score indicates that the variables

move in the similar direction, while negative score reflects that the variables move in the opposing direction. The null hypothesis for this test is *there is no correlation between two variables*.

In the pre-COVID period, it is demonstrated that ROA has significant correlation with LDR, BOPO, and OWN, with strongest correlation is found with BOPO with Pearson Correlation score of -0.750 and significancy score of 0.000. LDR positively and significantly influence ROA, while the rest of the variables have negative correlation with ROA. This aligns with the findings in Coefficients table, where the higher number of LDR meaning higher profitability in term of ROA because it means more interest-bearing loans are being issued. Maintaining healthy amount of LDR as regulated by the Central Bank of Indonesia must be taken into account, since a too-high LDR means that the bank has distributed its funds from deposits to for loans, which means the bank will not have enough liquidity to meet unexpected funds withdrawal. Meanwhile, BOPO and OWN are found to have significant negative relation with ROA, which means every increase of those variables will lead to a decrease in ROA. BOPO has negative correlation with ROA, meaning that the increase of operating expenses that is not followed with increase in operating income will reduce the income gained by the banks. Additionally, the higher number of OWN decreases ROA, where if translated indicating that private-owned banks (coded 1) is less profitable if compared to state-owned banks (coded 0).

The observation on post-COVID period shows that ROA has a significant negative correlation with CAR, with Pearson Correlation score of -0.506 and significancy score or 0.001. A stronger negative correlation is found between ROA and BOPO, with significancy score of 0.000 and Pearson Correlation score of -0.917. This means that the higher number of CAR and BOPO will result in the lower number of ROA, and vice versa. To interpret, a high CAR brings less profitability in context of ROA because there are number of RWA, meaning the loans issued are low, hence making bank having less income from the interest. Meanwhile, BOPO has the identical interpretation as the previous period, but the correlation intensifies. This indicates how operating efficiency plays more crucial role in bringing profitability for the banks. LDR has positive but insignificant correlation with ROA, where it has Pearson Correlation score of 0.048 and significancy score of 0.771. This means that higher number of LDR will not significantly affect the increase in ROA. In practice, increasing the number of loans during the pandemic will not bring significant profit for the banks, indicating that there has been a concerning bad debts that hinder loans in generating income for the banks. Lastly, OWN has an insignificant negative correlation with ROA, with Pearson Correlation score of -0.285 and significancy score of 0.074. This informs that though private-owned banks (coded 1) is less profitable than state-owned banks (coded 0), the bank ownership does not become critical during

the pandemic, indicating regardless the ownership, the banks are still encountering the same situation in term of ROA.

Beside analyzing the differences between state-owned banks and private-owned banks in generating ROA, the assessment of bank performance based on BUKU is also performed. It appears that in both periods, BUKU has a statistically insignificant relation with ROA, where the variables IND1, IND2, and IND3 point out Sig. score of more than $\alpha = 0.05$. Therefore, based on the findings, the null hypothesis for this analysis is accepted, thus *there is no significant relation between Return on Assets and Commercial Banks based on Business Activities (BUKU)*.

The pre-COVID period regression model is written below.

$$ROA = 2.886 + 0.013(CAR) + 0.034(LDR) - 0.055(BOPO) - 0.298(IND1) - 0.204(IND2) - 1.504(IND3) \quad (7)$$

Thereafter, the model construction for post-COVID model is conducted and written below.

$$ROA = 5.779 + 0.000(CAR) + 0.011(LDR) - 0.066(BOPO) + 0.194(IND1) + 0.020(IND2) + 0.103(IND3) \quad (8)$$

Additionally, if we use the coefficients results based on Bank Ownership, LDR and BOPO is found to be significant in determining ROA. However, if we use BUKU as the dummy variable, LDR and BOPO is found to be statistically significant only in the pre-COVID period, while in the post-COVID period it is only BOPO that is significant in predicting ROA. This finding informs us that for all categories of BUKU, increasing ROA before the pandemic occurs can be done by increasing the interest-bearing loans that will generate income to banks and decreasing the operational expense to reach operational efficiency. However, after the pandemic occurs, it is critical for all categories of BUKU to focus on increasing operational efficiency in order to withstand during the pandemic.

C. Return on Equity

Prior to the regression analysis, the classical assumption tests are being conducted. It appears that heteroscedasticity is found in CAR and LDR for pre-COVID period. Meanwhile, the post-COVID model fulfils all of the classical assumption tests.

Table III presents the model summary and ANOVA for the regression of ROE. These analyses display the overall model fit in predicting the dependent variable.

TABLE III
 MODEL SUMMARY AND ANOVA FOR ROE

Model Summary		
	Pre-COVID	Post-COVID
R	0.858 ^a	0.824 ^a
Adjusted R ²	0.706	0.643
SEE	5.88075	6.25974
ANOVA		
	Pre-COVID	Post-COVID
F	24.364	18.558
Sig.	0.000	0.000

As illustrated in Table III, the R value in pre-COVID period is 0.858, which shows that the correlation between ROE and the predictor variables are very strong because it is more than 0.5. However, the correlation slightly declines in the post-COVID period, as the number becomes 0.824. This finding indicates that the correlation between the dependent and independent variables faintly decreases.

Aforementioned in the previous section that a suitable measurement for independent variables of more than 2 is the adjusted R square (R²). It is presented that prior to COVID-19 pandemic, the variance of independent variables can explain 70.6% variance of ROE, and the rest are explained by other things. After the pandemic occurs, the ability of the variance of independent variables in explaining the variance of ROE weakens into 64.3%, while the rest are explained by other things.

The Standard Error of the Estimate (SEE) in pre-COVID period is 5.89, or 5.89% on average during 3 quarters. The number appears to increase to 6.26 after the pandemic occurs, indicating that the error for post-COVID model in predicting the dependent variable is higher and the model becomes less accurate compared to the preceding period.

From the Model Summary, we discover that unlike the model for ROA, ROE's regression model is having less correlation with the independent variables after the pandemic occurs. The model gets slightly more inaccurate and the error in the prediction increases.

In addition, prior to COVID-19 pandemic, the F ratio value is 24.364 with significance score of 0.000. In the post-COVID period, the number decreases into 18.558 with similar significance score. This informs us that although there is a decline in the correlation between dependent and independent variables after the pandemic takes place, all of the independent variables still jointly affect the ROE significantly. We can also say that there is at least one independent variable that affects ROE.

The regression model for ROE pre-COVID is written below.

$$ROE = 22.542 - 0.151(CAR) + 0.172(LDR) - 0.274(BOPO) - 6.076(OWN) \quad (9)$$

The constant of 22.542 informs us that if the independent variables are absent, the ROE would be

22.542% on average during 3 quarters. The regression coefficient of 0.172 for LDR means that for every increase of 1% of LDR will increase the ROE by 0.172%. The regression coefficients of -0.274 for BOPO means that for every increase of 1% of BOPO will decrease the ROE by 0.274%. Lastly, the regression coefficient of -6.076 means that private banks (coded 1) have 6.076% less ROE than state-owned banks (coded 0).

The next is to construct the model for post-COVID period.

$$ROE = 32.058 + 0.126(CAR) + 0.028(LDR) - 0.295(BOPO) - 7.784(OWN) \quad (10)$$

We can see that the constant for the post-COVID period model is 32.058, informing us that when the independent variables are absent, the ROE would be 32.058% on average during 3 quarters. The regression coefficient of CAR of 0.126 means that for every increase of 1% of CAR will increase the ROE by 0.000%. The regression coefficient of -0.295 for BOPO means that for every increase of 1% of BOPO will decrease the ROA by 0.295%. Finally, the regression coefficient of -7.784 means that private banks (coded 1) have 7.784% less ROE than state-owned banks (coded 0).

Under the similar assumption mentioned in the previous section, we can see that the constants (β_0) are significant in both period, which means that there is enough evidence that the intercept is not equal to 0. Prior to the pandemic, the independent variables that have statistically significant relation with the dependent variable are LDR, BOPO, and OWN. CAR, on the other side, has an insignificant relation with ROE because its significance score is slightly more than $\alpha = 0.50$, which is 0.077. Henceforth, we reject the null hypothesis so *there is significant relation between Return on Equity and Loan to Deposit Ratio, Operating Expense to Operating Income Ratio, and Bank Ownership*. We also accept the null hypothesis where *there is no significant relation between Return on Equity and Capital Adequacy Ratio*. Apparently, in the post-COVID period, CAR has a significant relation with ROE and LDR becomes insignificant. Meanwhile, BOPO and OWN remains to have significant relation with ROE. This means that we reject the null hypothesis thus *there is significant relation between Return on Equity and Capital Adequacy Ratio, Operating Expense to Operating Income Ratio, and Bank Ownership*. We also accept the null hypothesis for LDR, thence *there is no significant relation between Return on Equity and Loan to Deposit Ratio*.

Comparing both periods, the variables that consistently have significant relation with ROE are BOPO and OWN, where both variables experience increase in sensitivity after the pandemic occurs. On the other hand, CAR appears to be insignificant before the pandemic occurs but becomes significant afterwards. It has a positive relation with ROE, indicating that increasing CAR may lead to increase in ROE. On the contrary, LDR

that used to be significantly impacting ROE before the pandemic become insignificant.

BOPO that has negative significant relation with ROE indicating that if the expenses for operation exceeds the income, it will reduce the profitability of the banks. It is because the expenses allocated are not able to pay back in form of income. OWN is also found to have negative significant relation with ROE, indicating how the action taken by the bank management to fulfil shareholders' interest plays a critical role. LDR has positive significant relation with ROE before the pandemic occurs, which happens due to the more loans bring more income to the banks. However, in the post-COVID period, LDR becomes insignificant, demonstrating that issuing banks' deposits in form of interest-bearing loans during the pandemic becomes more trivial. But still, when issuing loans, the collectability level must be highly considered. On the other contrary, CAR which becomes significant only after the pandemic occurs. CAR is also found to add the value of ROE in post-COVID period, after it reduces the ROE value before pandemic. It exhibits how reserving the capital and reducing number of RWA or loans decreases the profitability of banks in term of ROE, but then those activities actually increase profitability, revealing that reserving more capital during the pandemic will make the banks become more prepared in facing unexpected losses, which are more likely to happen during the economic disruption due to the pandemic.

The Pearson Correlation analysis shows that ROE has statistically significant negative correlation with CAR, BOPO, and OWN prior to the occurrence of COVID-19 pandemic. The strongest correlation is found on BOPO with Pearson Correlation score of -0.742 and significancy score of 0.000. This conveys that every increase that happens on CAR, BOPO, and OWN will lead to the decrease of ROE, and vice versa. In terms of CAR, this happens because the more capital being reserved, the less loans are issued, hence reducing the interest income from the borrowers. For BOPO, this occurs because if the ratio increases, where more expenses are allocated but it does not generate income in return, it will reduce the profitability of banks due to the inefficiency. The bank ownership itself has a significant role because they are associated with the utilization of shareholders' equity to generate return to the banks. A positive but weak correlation is found between ROE and LDR, where the Pearson Correlation score is 0.265 and significant at 0.098. It means that every increase in LDR will increase the ROE, though it is not significant. This indicates that capital adequacy management is more crucial compared to liquidity management in generating ROE. But still, it is still very important to increase the LDR by issuing more loans but still in an appropriate level of collectability.

In the subsequent period, ROE is found to have statistically significant negative correlation with BOPO and OWN, with the strongest correlation is found on BOPO with Pearson Correlation score of -0.736 and significancy score of 0.000. It is interpreted that every increase in BOPO and OWN will lead to significant

decrease in ROE. The findings reveal that maintaining expenses low to generate satisfactory amount of income still becomes critical in determining bank's profitability. The role of bank ownership of maximizing profitability by making critical decision about banks' activities and policies is also still crucial. A weak correlation is found between ROE and both CAR and LDR, where the correlation with CAR is negative and correlation with LDR is positive. This means that an increase in CAR leads to a slight decrease in ROE, vice versa. It happens because decreasing loans issuance by reserving more amount of capital will reduce the bank's income. LDR also has weak positive correlation with ROE, with Pearson Correlation score of 0.036 and significancy score of 0.827, indicating that every increase in LDR, will lead to slight increase in ROE. It reveals that issuing loans using banks' deposits during the pandemic becomes more trivial and must be careful due to the rising possibility of bad debts.

After assessing the differences between state-owned banks and private-owned banks in generating ROE before and after COVID-19 pandemic, the examination of the differences among BUKU is executed. Similar to ROA, the condition where the variables for BUKU which are IND1, IND2, and IND3 are statistically insignificant also applies to ROE. It is seen from the values of Sig. are more than $\alpha = 0.05$ in both periods. Hence, we accept the null hypothesis for this analysis, which means that *there is no significant relation between Return on Assets and Commercial Banks based on Business Activities (BUKU)*.

The regression model for pre-COVID period is demonstrated below.

$$ROE = 15.510 - 0.095(CAR) + 0.181(LDR) - 0.264(BOPO) + 0.375(IND1) - 0.605(IND2) - 9.197(IND3) \quad (11)$$

Furthermore, the model for post-COVID is created and demonstrated below.

$$ROE = 28.024 + 0.123(CAR) + 0.005(LDR) - 0.289(BOPO) + 2.578(IND1) - 3.997(IND2) - 0.510(IND3) \quad (12)$$

In addition, we understand that in the coefficients results with Bank Ownership as the dummy variable, the independent variables that have significant relation with ROE are LDR, BOPO, and OWN in pre-COVID period and CAR, BOPO, and OWN in post-COVID period. If Commercial Banks based on Business Activities is used as the dummy variable, the coefficients results show that LDR and BOPO have statistically significant relation with ROE pre-COVID, while for post-COVID, only BOPO that can significantly affect ROE. This conveys that increasing the ROE before the pandemic occurs by issuing loans and maintaining good operational performance are found to be effective. Nevertheless, after

the pandemic occurs, it is critical for all categories of BUKU to focus on maintaining operational efficiency in order to have a decent financial performance during this financial crisis.

IV. DISCUSSION

A. Return on Assets

From the results explained in the previous chapter, it can be seen that both of models only meet 2 out of 3 classical assumption tests. The pre-COVID model does not seem to fulfil the heteroscedasticity test where it is found on LDR, while the post-COVID model does fulfil the normality test. This finding unveils that the model is only valid on the observed banks.

It is also discovered that the average number of ROA generated by the 40 banks during 3 quarters have experienced a decline from 0.9645 in pre-COVID into 0.7092 post-COVID. There has also been decline in both the minimum and maximum value, supporting the statement that there has been a decrease in the performance of 40 listed banks in Indonesia Stock Exchange in generating earnings using its assets.

In order to understand the factors that influence the movement of ROA, a multiple linear regression is performed, with ROA as the dependent variables, and CAR, LDR, BOPO, OWN, and BUKU as the independent variables. The overall model has a good fit, where the values of Multiple R and Adjusted R² are above 0.5. This means that all of the independent variables are reliable enough for predicting ROA. These findings are also supported by the values in ANOVA that shows the model significantly affect the dependent variables, shown by the Sig. values of 0.000.

Evidently, both periods have the same predictor variables that significantly affect the dependent variable, which are LDR and BOPO. We can see that LDR has a positive coefficient, while BOPO has a negative coefficient. This reveals that if the banks are about to increase the ROA, they would have to focus on those two variables, either by increasing the LDR or reducing the BOPO. It is also demonstrated that CAR, Bank Ownership, and Commercial Banks based on Business Activities is (BUKU) has an insignificant relation with ROA.

Last but not least, before COVID-19 pandemic occurs, a strong negative correlation is found between ROA with BOPO and OWN. This means that the lower number of BOPO and OWN (in this case, state-owned bank is lower because it is coded 0) leads to higher ROA. There is also a strong positive correlation between ROA and LDR, indicating that if banks want to increase its performance, they can focus on increasing the LDR. CAR is also found to have correlation with other variables, where it has a weak negative correlation with ROA and strong positive correlation with LDR and BOPO. After

the pandemic, ROA seems to have statistically significant negative correlation with CAR and BOPO, and an insignificant negative correlation with OWN. In this period, the correlation between ROA and LDR weakens. This informs us that bank ownership does not matter after the pandemic, meaning that whoever owns the bank are still getting affected with the other variables. To withstand during the pandemic and keep generating healthy earnings, banks can reduce their CAR and BOPO with considering the amount determined by the Central Bank of Indonesia.

B. Return on Equity

First and foremost, it is identified that for the classical assumption test, the model for pre-COVID does not fulfil the heteroscedasticity test, where it is found in CAR and LDR. It is obvious that only post-COVID model for ROE that fulfils all of the classical assumption test for this study. This indicates that the pre-COVID model is only valid when applied to the observed banks.

It is exhibited that there is also a decrease in the mean value of ROE generated by 40 listed banks during 3 quarters. But unlike ROA, the minimum and maximum value for ROE increase, where the minimum increases from -48.21% to -25.34%, while the maximum rises from 19.76% to 19.93%. This conveys that though the average of ROE declines, some banks are still able to maintain good performance in generating earnings using available equity.

Multiple linear regression is performed to comprehend the factors that affect the movement of ROE. The dependent variable is ROE and using the similar independent variables as ROA. The overall model is in a good fit as it appears to have numbers of more than 0.5. Though so, there has been a slight decrease of the models' ability to predict the dependent variable from pre-COVID period to the post-COVID period. As can be seen from the model summary result, the Multiple R and Adjusted R² happen to have a decrease and more errors occur in the post-COVID period. Nevertheless, the model is still considered as reliable, supported by the Sig. value in ANOVA that shows 0.000 for both periods. This suggests that at least there is one independent variable that is significantly affecting the dependent variable.

As displayed, BOPO and OWN consistently have statistically significant negative relation with ROE, and the relation appears to strengthen in the post-COVID period. LDR has a significant relation with ROE in the pre-COVID period, but it becomes insignificant in the subsequent period. Conversely, CAR has an insignificant relation with ROE, but the relation becomes significant after the pandemic occurs. This has the similar interpretation as ROA, where in order to increase the performance in generating earnings using existing equity, banks have to reduce the number of BOPO. Before the pandemic occurs, banks can generate high ROE if they reduce the number of CAR, meaning that banks have

to allocate the capital for transaction instead of for being reserved. However, the correlation becomes positive after the pandemic, meaning that to withstand during the pandemic, they have to reserve more capital to face possibility of unexpected events due to financial crisis. The Commercial Banks based on Business Activities (BUKU) is also found to be insignificant in the case of ROE.

Ultimately, ROE is found to have a statistically significant negative correlation with BOPO and OWN on both periods, where this is the similar condition that applies in ROA. In other words, state-owned banks with lower BOPO tend to have higher ROE if compared to banks that do not fulfil those characteristics. A weak positive correlation is found between ROE and LDR, showing that banks can improve its performance by increasing LDR, but should not put the focus mainly on it. Finally, the negative correlation between ROE and CAR is found to weaken after the pandemic occurs.

V. CONCLUSION

To conclude, this research will answer the research objectives which involve analyzing the impact of COVID-19 pandemic on the performance of 40 listed banks in Indonesia, assessing the relationship between the dependent and independent variables, comparing the performance based on Bank Ownership and Commercial Banks based on Business Activities before and after the pandemic occurs.

So as to obtain the answers, the data from quarterly financial reports of the chosen banks are gathered, divided into two time-frames, pre-COVID and post-COVID period. The data used are Return on Assets and Return on Equity as the dependent variables, predicted by independent variables of Capital Adequacy Ratio, Loan to Deposit Ratio, Operating Expense to Operating Income Ratio, and dummy variables of Bank Ownership and Commercial Banks based on Business Activities. The obtained data is then calculated using Multiple Linear Regression, supported by other calculation such as Descriptive Statistics and Pearson Correlation. The research findings are concluded as follows:

1. There has been a decline in the average of both Return on Assets and Return on Equity after the COVID-19 pandemic occurs. Though so, there are still some banks that can thrive during the pandemic. This signifies that though a financial crisis happens in Indonesia, it does not rule out the possibility that some banks can still withstand and even grow during the pandemic. This happens because the formula of ROA and ROE involve net income as the numerator, thus the decline is caused by the decline in net income. This decline is not always associated with the decline in gross income, but also due to other losses in financial assets, increase in

operating and non-operating expenses, as well as increase in labor expense and other expenses.

2. Operating Expense to Operating Income Ratio has a significant negative relation with both Return on Assets and Return on Equity, meaning that banks can improve their performance in by enhancing operational efficiency. It can be done by reducing expense and/or increasing income, which is done by reducing cycle time, cutting labor and advertising expense, and balance the employee into multiple locations so that the operation will be more effective. If the ratio is low, the banks should take more risk and allocate more expenses to ensure the cash owned is being utilized to generate more income to the bank.
3. Loan to Deposit Ratio has positive relation with both Return on Assets and Return on Equity, which supports the study conducted by Reference [14], meaning that banks have to improve this ratio to have better performance. For banks with low LDR, improving this ratio can be done by issuing interest-bearing loans. It is also critical for the banks to ensure the loans collectability level is not higher than level 2, otherwise it would increase bad debts for the banks hence reducing the profitability. Meanwhile, banks with high LDR, which indicates the loans issued are excessive, can improve by liquidating some assets of the banks. Another strategy is by securitization, an activity of converting portfolio of mortgages (which are illiquid) into cash.
4. Capital Adequacy Ratio only has significant relation with Return on Equity after the pandemic, conveying that retaining more amount of capital during a financial crisis to meet unexpected loss is critical to improve the Return on Equity. Enhancing this ratio can be done by raising more equity through stock offerings and dividend reinvestment plans. The banks can also decrease the levels of risk-weighted assets and sell some unneeded assets. If the ratio is too high where the banks reserve more capital, banks can take more risk by increasing more risk-weighted assets which is done by issuing loans.
5. Bank Ownership appears to significantly affect the Return on Equity of banks, indicating that the role of bank management in utilizing the shareholders' equity to generate return is very crucial. Therefore, ensuring that a bank has an effective and actively-involved board of management will lead to bank's growth, regardless the circumstances throughout the pandemic. On the other hand, Commercial Banks based on Business Activities is found to have statistically insignificant relation with both Return on Assets and Return on Equity, meaning that the core capital owned by the banks does not affect the financial performance.

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