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THE IMPACT OF COVID-19 ON THE PROFITABILITY OF PUBLIC BANKS LISTED IN INDONESIA

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Abstract: Covid-19 has had a significant impact on the economy, especially the financial industry in developing countries such as Indonesia. This study attempted to investigate the effect of the Covivirus-19 pandemic on the profitability of Indonesian public banks. The sample consists of 41 banks registered on the Indonesian stock exchange between January 1, 2019 and December 31, 2021. The profitability of a bank is reflected by Return On Assets (ROA), Return On Equity (ROE), Net Interest Margin (NIM), and TOBINs' Q. Return On Assets (ROA), Return On Equity (ROE), Net Interest Margin (NIM), and TOBINs'Q are used as dependent variables in this study. The independent variables are asset size, deposits, and leverage from bank determinant factors, and exchange rates, interest rates, Gross Domestic Product (GDP), and new cases of Covid-19 per month from macroeconomic variables. The analysis revealed that Covid-19 has a negative impact on bank profitability, but only profitability as evaluated by NIM has a statistically significant negative impact. This study demonstrates that bank size or asset size, as well as interest rate, have a significant positive effect on the profitability of Indonesian banks that are publicly listed.

Keywords: *Bank Profitability, ROA, ROE, NIM, Tobin's Q, Covid-19*

1. Introduction

In late 2019, a deadly virus began spreading over the world, particularly in Asia. This virus was known as 2019nCov Virus, or subsequently referred to as Covid-19 which was responsible for the deaths of over a hundred thousand people worldwide. The World Health Organization (WHO) declared Covid-19 a global pandemic on March 11, 2020. Meanwhile, according to data from the World Health Organization Covid-19 was identified in Indonesia for the first time on March 2, 2020.

The emergence of Corona Virus Disease (Covid-19) has introduced new difficulties and consequences. The outbreak has also impacted economic activity in a number of nations and generated major market moves (Romadhon, 2022). Significant global economic shocks have been formed by the Covid-19 pandemic, resulting in the largest global economic recession in the last century (OECD, 2020). Even if the global economy is on the road to recovery, the rate of recovery is not projected to be fairly spread across nations, with developed countries experiencing robust development while many developing countries fall apart.

Asia's financial industry was not immune to the pandemic, which caused exceptional operational and financial difficulties for financial institutions. The Asia Development Bank (ADB) estimates that pandemic losses could range between $5.8 and $8.8 trillion (approximately 6.4% to 9.7% of global GDP) (Park et al., 2020). Adding insult to injury, this unprecedented incidence rattled the macroeconomic and health systems and had a significant influence on the financial systems of each nation. As a result of the pandemic, aggregate demand, output, commerce, and economic activity slowed, while unemployment rose, and all financial institutions (FIs) in nearly every country feared an increased danger of collapse without government backing (Barua & Barua, 2021). The Covid-19 outbreak contributed to a sharp surge in defaults on business and household debt, and had a severe impact on the bank's financial performance and its capacity to mediate credit and revive the economy (Barua & Barua, 2021; Sudja'i & Mardikaningsih, 2021).

Since the beginning of the pandemic, policymakers have taken actions to ensure financial stability and mitigate risks to the banking sector. Considering the effects of the Covid-19 pandemic on bank profitability in emerging nations is crucial, recognizing the vital role banks play in the Asian economic recovery process. Taking account of the pandemic on banks requires careful case-by-case examination (Barua & Barua, 2021).

In addition to having an effect on the health crisis, the Covid-19 pandemic also has an effect on the worldwide economic crisis, including in Indonesia. The economic crisis during the Covid-19 pandemic was distinct from the economic crisis of 1998 (Cakranegara, 2020; Stievany & Jalunggono, 2022). However, the current economic crisis differs from the 2008 economic crisis. The 1998 crisis was sparked by the decline of the rupiah against the U.S. dollar, which has had a greater impact on the huge and indebted business sector. The 2008 financial crisis was driven by the existence of bad loans in the property sector made by Lehman Brothers in the United States. Consequently, during the Covid-19 pandemic, the health virus caused a concern. The Covid-19 pandemic has the potential to increase the danger of insolvency in a number of industries, notably banking (Hadiwardoyo, 2020).

Based on the findings of prior research, the occurrence of a financial crisis can lead to a deterioration in the performance of enterprises in Indonesia (Istiningrum, 2014). The financial industry is one of the sectors whose performance has deteriorated the most as a result of the pandemic crisis (Devi et al., 2020). However, bank resilience in the event of the Covid-19 pandemic rests heavily on internal governance prior to the pandemic (R. Ghosh & Saima, 2021). Therefore, the greater the quality of governance, the greater the capacity to withstand the pandemic catastrophe (Ghosh & Saima, 2021). Before the Covid-19 outbreak, banks in Indonesia had better internal governance than during the financial crisis, and were therefore deemed capable of surviving the pandemic (Cakranegara, 2020). This suggests that external causes may contribute to a fall in financial performance. In this instance, the government must act immediately to mitigate the negative effects of the pandemic (Barua & Barua, 2021).

Prior to the Covid-19 pandemic, in the fourth quarter of 2019 domestic economic conditions slowed in tune with the global economic downturn, which was accompanied by bright spots in the United States and China's planned phase I trade deal. The domestic economy slowed due to a decline in investment, while government spending and export performance have yet to improve, while consumer spending remains robust. In 2019, the domestic economy expanded by 5,02 % (yoy), a decrease from 5,17 % (yoy) in 2018 (yoy). As a result of this slowdown, commercial

bank loans increased by 6,08 % (yoy), while Third Party Funds (also referred to as DPK) increased by 6,54 % (yoy). This made the liquidity situation of banks marginally better than the prior year. In fact, banking resilience is still maintained, underpinned by high levels of capital that are enough for absorbing any threats. The risk profile of the banking industry is maintained in accordance with credit risk, market risk, and the improvement of liquidity risk (OJK, 2019).

The condition of banking resilience in general in the fourth quarter of 2019 was still maintained, as reflected in the condition of bank capital which was quite solid with the Capital Adequacy Ratio (CAR) recorded at 23.31%. This shows the adequate ability of banks to absorb risk supported by profits that are still growing and the quality of bank credit is still relatively low. The banking intermediation function slightly decreased as seen from credit which grew by 6,08% (yoy) slowing from 11,75% (yoy) in the previous year, while deposits grew by 6,54% (yoy) higher than the previous year's 6,45% (yoy). In addition, banking ROA per position in December 2019 was 2,48% or decreased by 0,07% compared to December 2018 (2,.55%) and for NIM also decreased by 0,24% to 4,90% in December 2019 compared to 5,14% in December 2018 (OJK, 2019).

In light of the absence of empirical research on the influence of the Covid-19 pandemic on bank performance in Asian nations, this study will investigate the impact of the Covid-19 pandemic on the profitability of the banking industry listed on the Indonesia Stock Exchange. The control variables for this investigation into the impact of the Covid-19 pandemic on the profitability of the banking sector are bank-specific variables such as asset size, deposits, and leverage, as well as specific macroeconomic indicators such as exchange rates, interest rates, GDP, and new cases of Covid-19. The research was carried with regression panel data and data from January 1, 2019 through December 31, 2021. The return on assets (ROA), return on equity (ROE), net interest margin (NIM), and Tobin's Q are indicators of bank profitability. According to our investigation, no empirical studies in the Asian country have looked specifically at how the Covid-19 pandemic impacts bank profitability.

2. Literature Review

Given the significance of banks to the economic health, growth, and development of a nation, experts, policymakers, and researchers continue to focus on banking performance. The most frequent indicator of a bank's performance is its profitability, which is typically measured by ratios such as Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM) (Rahman et al., 2015; Sufian & Habibullah, 2009; Titko et al., 2015). In several academic papers, bank profitability is expressed as a function of internal (bank) and external (macroeconomic and industrial) elements (Rahman et al., 2015; Sufian & Habibullah, 2009; Titko et al., 2015). Nevertheless, the contribution of different factors to the profitability of banks in developing countries remains a debatable point due to varying or indeed completely contrary empirical findings.

The consistency of the factors of bank profitability, for example, is found to vary among nations and different metrics of bank profitability (Ozili, 2021). The study's comparative analysis reveals that the most stable determinants of bank profitability in Nigeria are the ratio of overhead costs to total assets and the ratio of cost efficiency, while in South Africa the most stable determinants of bank profitability are the ratio of capital adequacy and the ratio of overhead costs to total assets; and in the United States, none of the determinants of bank profitability have

a statistically significant effect on NIM, although the capital adequacy ratio and the ratio of cost efficiency do so. In addition, for the three countries together and of the three measures of bank profitability (ROA, ROE and NIM), the most stable determinants for bank profitability are efficiency costs, a measure of non-performing loans, and the ratio of overhead costs to total assets.

Moreover, inflation is an inconsistency determinant, since it is significant and negatively associated to NIM but not to ROA or ROE, whereas GDP growth is significant and positively related to ROA and ROE but not to NIM. The study also discovered that NIM and ROA were greater in Nigeria and lower in the United States, showing that Nigerian banking is more profitable than US banking (Ozili, 2021). Nonetheless, inflation and GDP growth in the United States were lower than in Nigeria, showing that the United States had stronger macroeconomic stability. As a conclusion, the study indicated that the causes of bank profitability differ each country due to the distinct characteristics such as the type of the banking system, the level of financial sector development, as well as banking policies and supervision.

Boateng's study is one of the research projects that highlights differences in the factors of bank profitability between countries (Boateng, 2018). When looking at bank-specific and macroeconomic factors that affect bank profitability in Ghana and India, the study reveals that credit risk, NIM, capital adequacy, and inflation all have a significant impact on bank profitability as assessed by ROA. Liquidity risk and GDP growth, on the other hand, have no significant impact on bank profitability in both countries, whereas cost-to-income ratio and bank size have no effect on bank profitability in India but are significantly significant in Ghana. Likewise, Almaqtari et al. (2019) discovered that bank size, number of branches, asset management ratio, operational efficiency, and leverage ratio are the main bank-specific factors in explaining the profitability of Indian commercial banks as measured by ROA, while asset quality ratios, asset management ratios, bank size, and liquidity ratios are positively and significantly influenced by ROE. Furthermore, GDP, inflation, interest rates, the financial crisis, and exchange rates have a substantial impact on ROE, whereas demonization, interest rates, exchange rates, as well as inflation rates have a significant impact on ROA.

Furthermore, the determinants of bank profitability differ considerably from country to country across time. Sufian and Habibullah (2009) and Rahman et al. (2015), for example, investigated the factors that determine bank profitability in Bangladesh, as measured by ROA, ROE, and NIM, and both studies discovered that loan levels had a positive and significant effect on bank profitability. Non-interest income, credit risk, and costs are also found to have a significant impact on the three measures of bank profitability by Sufian and Habibullah (2009), while Rahman et al. (2015) discovered that capital strength (either regulatory capital or equity capital), cost efficiency, and off-balance-sheet activities have a significant impact on the three measures of bank profitability. Furthermore, Sufian and Habibullah (2009) discover that the impact of non-uniform size across all bank profitability measures used, as well as macroeconomic determinants, do not significantly affect bank profitability, with the exception of inflation, which has a negative relationship with bank profitability in Bangladesh, as represented by NIM. Rahman et al. (2015) revealed inconsistencies in the effects of other variables used in their research, such as non-interest income, credit risk, and GDP, which are the main determinants of NIM, while size has a positive and significant impact on ROA and ROE and inflation has a negative and significant impact on ROA and ROE.

The behavior of the factors of bank profitability in the Economic Community of West African Countries is also investigated (Adelopo et al., 2018) in the period before the global financial crisis, during the global financial crisis, and after the global financial crisis. The findings of this study reveal that cost management, liquidity, and company size all had a significant impact on return on assets (ROA) before, during, and after the financial crisis (Adelopo et al., 2018). The influence of bank-specific factors such as market dynamics, credit risk, and capital strength as well as macroeconomic factors such as GDP and inflation, on the other hand, is sensitive to the time period under consideration and the measurements of bank profitability used. The researchers came to the conclusion that, the financial crisis had little impact on the relationship between a number of bank-specific factors and bank profitability.

Furthermore, Le & Ngo (2020) highlighted that increasing the number of ATM machines, point of sale (POS) terminals, and bank cards issued could boost bank profitability in the 23 nations that were the subject of their investigation. The market forces have a negative impact on bank profitability, which may be an indication that competition has a good impact on banking profits.

In particular, this study demonstrates that higher financial development can boost bank profitability, highlighting the significance of financial market development for banking sector profitability. Moreover, the banking sector is associated with greater credit risk as a result of the higher interest rates it charges to compensate for the related default risk. Likewise, the global financial crisis and economic expansion had a substantial impact on bank profitability. Kohlscheen et al. (2018) analyzed the primary determinants of bank profitability in 19 developing countries and identified a downward trend in profitability following higher short-term rates resulting from increased funding costs, whereas higher long-term interest rates are correlated with increased profitability. In addition, during normal periods, loan expansion appears to be more crucial to bank profitability than GDP growth, while growing country risk premiums dramatically diminish bank profits, underscoring the necessity for a credible monetary and fiscal framework to preserve overall financial stability.

Although the pandemic is expected to have a worse impact on the banking system in low-income countries, especially where banks are the main providers of financial services, the existing literature on the impact of the Covid-19 pandemic on the banking sector is still largely focused on developed countries (Barua & Barua, 2021; Damak et al., 2020). Among the few studies available in the context of developing countries are Elnahass et al. (2021) and Barua & Barua (2020). Elnahass et al. (2021) investigated the impact of the current Covid-19 pandemic on global banking stability and discovered that the outbreak impacted both financial stability and financial performance. The findings were consistent throughout the global banking sector's varied regions and countries, as well as different amounts of state income and bank characteristics. Furthermore, the study discovered that the pandemic had significant differences in its impact on conventional and Islamic banking systems, despite the fact that bank stability signals for recovery in the second quarter of 2020 were identified through trend analysis based on financial stability over the quarterly period and average bank performance.

Barua and Barua (2020), focusing on the banking sector in Bangladesh, explore the possible impact of the Covid-19 pandemic on firm valuations, capital adequacy, and interest income under various NPL shock scenarios and conclude that the pandemic is likely to have a negative impact on all equity ratios. At the sectoral and bank levels, bank capital, interest income, and

asset value are risk-weighted, while larger banks are more likely to be affected. In addition, the drop in company valuation, capital adequacy, and interest income will increase correspondingly if the NPL shock is bigger. Even more worrisome is the fact that the capital adequacy of all banks can go below the BASEL-III minimum requirement in the event of a 10% NPL shock, with a shock of 13% or more causing a decline in the bank's capital to zero or negative at the sectoral level. In order to prevent the possibility of a large-scale banking collapse in Bangladesh, the authors propose implementing immediate steps to address the current issue.

Furthermore, Katusiime (2021) analyzed the effect of the Covid-19 pandemic on the profitability of the Ugandan banking sector. The profitability of a bank is represented by ROA, ROE, and NIM. This research showed that the Covid-19 pandemic had a negative impact on the long-term profitability of banks. In general, the explanatory variables utilized in this analysis have both short- and long-term effects on bank profitability, even though the effect is not consistent across all bank profitability metrics. The ratio of non-performing loans, liquidity ratios, and market sensitivity risk have a negative and significant impact on the profitability of banks over the short term. Moreover, the loan rate and interest rate specified by the Treasury Law have a significant positive impact on bank profitability. In particular, this analysis demonstrates that bank profitability has a moderate tendency to endure over the near term, but that the Ugandan banking industry does not deviate significantly from the competitive market structure. Long-term bank profitability is significantly and positively impacted by the ratio of nonperforming loans, GDP, borrowing rates, and interest rates specified by the Treasury Act. Instead, market sensitivity risk and exchange rate have a large and negative impact on the profitability of bank. Even so, this study reveals that inflation seems to have no significance on the short- and long-term profitability of banks.

This paper contributes to the current research by giving empirical information regarding the impact of the Covid-19 pandemic on bank performance in Indonesia, considering the shortage of literature on Asian countries. This study examines the influence of the Covid-19 pandemic on bank profitability, while evaluating bank-specific indicators such as asset size and market sensitivity, as well as macroeconomic-specific data such as currency rates and new cases of Covid-19.

3. Research Method

3.1 Data and Sample Collection

This study uses secondary data in the form of panel data for the period 2019-2021. Data collection in the form of banks listed on the Indonesia Stock Exchange in 2019-2021 was obtained using data from S&P Capital IQ. The population used for this research is all banking companies listed on IDX with sample selection by purposive sampling method with several criteria in Table 1.

Table 1. Sample selection criteria

Criteria	Total
Population: banking companies listed on IDX during the period 2019 - 2021	49
Companies that do not meet the sample selection criteria:	
The company has completed financial statements during the observation period	41
Observation period	41
Total Sample	41

The total data obtained regarding the number of banking companies listed on the IDX in 2019-2021 are 49 companies. The results of the data were then observed regarding the completeness of the data for 3 years, namely 2019 - 2021, so that 41 companies were obtained that had complete data.

The dependent variable used in this study is Profitability = f (Bank - specific variable; macroeconomic variable). The majority of existing profitability studies usually use two main proxies to measure profitability, namely ROA and ROE (Athanasoglou et al., 2008; Garcia & Guerreiro, 2016; B. N. Ghosh et al., 2016; Narwal & Pathneja, 2016; Zampara et al., 2017).

However, in this study, ROA, ROE, and NIM are used as proxies for bank profitability. ROA is measured as a percentage of one year's net income to total assets in the same year (table 2). Similarly, ROE is calculated as a percentage of one year's net income to total equity in the same year. Furthermore, NIM is measured by net interest income divided by total assets (Lee & Kim, 2013; Rani & Zergaw, 2017). Furthermore, Tobin's Q ratio is also used which is a generally accepted measure of market performance (Brainard & Tobin, 1968; Gregory, 2021; Yang & Gan, 2021).

Meanwhile, the independent variables of the bank consist of asset size, leverage and deposits (third party funds). Previous studies used total assets as a proxy to measure bank size (asset size). More specifically, they use the natural logarithm of total assets as the asset size (AL-Omar & AL-Mutairi, 2008; Anbar & Alper, 2011; Chowdhury & Rasid, 2016; Masood & Ashraf, 2012). Anbar & Alper (2011 and Masood & Ashraf (2012) noted that the positive effect of bank size (asset size) on bank profitability. Meanwhile, Gul et al. (2011) found a negative effect on bank profitability.

Then the second independent variable is Deposits (DEP) or Third Party Funds, which is the ratio of total deposits to total assets generally used by previous studies as a measure of the deposit ratio (Menicucci & Paolucci, 2016; Zampara et al., 2017). Gul et al. (2011) concluded that there is a negative relationship between bank profitability and deposit ratio. Meanwhile, the third independent variable is Leverage (LEV). Bose et al. (2017) defines the leverage ratio as the

percentage of total debt divided by total assets. Likewise, Athanasoglou et al. (2008) argue that lower leverage (higher equity) leads to greater ROA but lower ROE.

Meanwhile, the independent variables of macroeconomics consist of exchange rate, interest rate and Gross Domestic Product (GDP). The average exchange rate for a fiscal year is used as a measure of the exchange rate. Chowdhury & Rasid (2017) and Menicucci & Paolucci (2016) suggest that foreign exchange rates should be used as an important factor for bank profitability. The interest rate reflects the interest rate on loans obtained by the bank. The combined evidence reported by previous research on the effect of interest rates on bank profitability. Rashid & Jabeen (2016) reported the negative effect of interest rates on bank performance, while Tabash et al. (2017) found a positive effect. A number of studies have used GDP as a macroeconomic factor and a general measure used to measure aggregate economic activity in an economy (Masood & Ashraf, 2012; Ongore & Kusa, 2013; Pasiouras & Kosmidou, 2007). The independent variable that is also used is Covid-19 by using the number of new cases infected with Covid-19 per month. This variable has never been used as empirical evidence as a factor affecting bank profitability.

Thus, the basic model used to detect the effect of Covid-19 on bank profitability can be written as follows:

$$ROAit=\alpha\text{it} + \beta 1 Log\ \text{AS}it + \beta 2\text{DEP}it + \beta 3\text{LEV}it + \beta 4\text{EXCH}it + \beta 5\text{INTR}it + \beta 6\text{GDP}it + \beta 7 COVIDit + \mathcal{E}it \text{..(1)}$$

$$ROEit=\alpha\text{it} + \beta 1 Log\ \text{AS}it + \beta 2\text{DEP}it + \beta 3\text{LEV}it + \beta 4\text{EXCH}it + \beta 5\text{INTR}it + \beta 6\text{GDP}it + \beta 7 COVIDit + \mathcal{E}it \text{..(2)}$$

$$NIMit= \alpha\text{it} + \beta 1 Log\ \text{AS}it + \beta 2\text{DEP}it + \beta 3\text{LEV}it + \beta 4\text{EXCH}it + \beta 5\text{INTR}it + \beta 6\text{GDP}it + \beta 7 COVIDit + \mathcal{E}it \text{..(3)}$$

$$TOBIN's\ Qit=\alpha\text{it} + \beta 1 Log\ \text{AS}it + \beta 2\text{DEP}it + \beta 3\text{LEV}it + \beta 4\text{EXCH}it + \beta 5\text{INTR}it + \beta 6\text{GDP}it + \beta 7 COVIDit + \mathcal{E}it \text{.....(4)}$$

Where i indicates individual bank; t refers to the monthly time; $\beta 1$: $\beta 4$ is the coefficient of the determinant variable and ε is the error; $Log\ \text{AS}it$ is asset size, $\text{DEP}it$ is deposits (third party funds), LEV is the ratio of Leverage, $\text{EXCH}it$ is the exchange rate, INTR is interest rate, GDP is gross domestic product and COVID is monthly new Covid-19 cases. The equation model controls a number of other variables which in previous research (Masood & Ashraf, 2012) have explained the economic performance of the company. In order to perform the robustness test, the regression was again carried out with the Tobin's Q ratio which is a generally accepted measure of market performance (Brainard & Tobin, 1968; Gregory, 2021; Yang & Gan, 2021).

Table 2. Research Variables

Dependent Variable: Bank Profitability			
Variable	**acronym**	**Equation**	**Evidence from Prior Studies**
Profitability	ROA	$\frac{Net\ Profit}{Total\ Assets}$	(Albulescu, 2015; Chowdhury & Rasid, 2016; Garcia & Guerreiro, 2016; Masood & Ashraf, 2012; Menicucci & Paolucci, 2016; Narwal & Pathneja, 2016; Rani & Zergaw, 2017; Zampara et al., 2017)
	ROE	$\frac{Net\ Profit}{Total\ Equity}$	
	NIM	$\frac{Net\ Interest\ Income}{Total\ Assets}$	(Lee & Kim, 2013; Tarus et al., 2012)
	TOBIN's Q	$\frac{Market\ Value}{Book\ Value}$	(Brainard & Tobin, 1968; Gregory, 2021; Yang & Gan, 2021)
Independent Variable (independent): Bank-Specific Determinant Factor			
Assets Size	LNAS	Natural logarithm of total assets	(Chowdhury & Rasid, 2016; Narwal & Pathneja, 2016)
Deposit	DEP	$\frac{Deposits}{Total\ Asset}$	(Acaravci & Çalim, 2013; Anbar & Alper, 2011; Menicucci & Paolucci, 2016; Zampara et al., 2017)
Leverage	LEV	$\frac{Total\ Debt}{Total\ Asset}$	(Athanasoglou et al., 2008)
Independent Variables (independent): Macroeconomic Determinants			
Exchange Rate	LNEXCH	Natural logarithm of exchange rates	(Acaravci & Çalim, 2013; Rani & Zergaw, 2017)
COVID-19	COVID_19	The number of new cases infected with Covid-19 per month.	
Interest Rate	INTR	*Lending interest*	(Acaravci & Çalim, 2013;

			Almaqtari et al., 2019; Anbar & Alper, 2011)
Economic Activity	GDP	GDP Growth Rate per month	(Anbar & Alper, 2011; Curak et al., 2012; Garcia & Guerreiro, 2016; Ongore & Kusa, 2013; Zampara et al., 2017)

Furthermore, the determination of Covid-19 as a global pandemic is based on the determination by WHO, namely March 11, 2021. The following is a graph of active cases of Covid-19 in Indonesia at the end of each month:

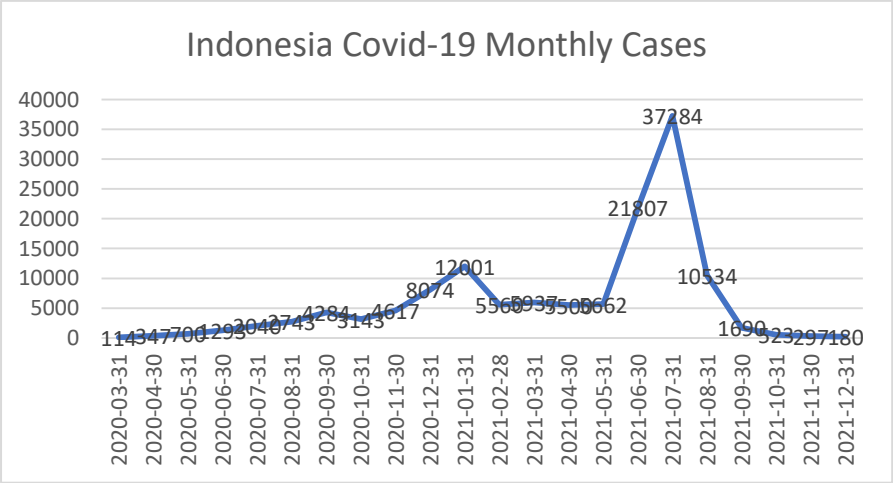

Figure 1. Indonesia Covid-19 Monthly Cases
Source: WHO

Most previous research investigating bank profitability have employed panel data in order to compare the sample used in this study with the sample used by numerous other studies. Abid et al. (2014) used 16 Tunisian banks between 2003 and 2012, Chowdhury & Rasid (2017) used 29 GCC banks between 2005 and 2013, Curak et al. (2012) examined 16 Macedonian banks between 2005 and 2010, Tan et al. (2016) sampled 101 Chinese banks between 2003 and 2009, Bose et al. (2017) used 30 Bangladeshi banks between 2009 and 2014, Chowdhury and Rasid (2015) Over a 10-year period from 2008 to 2017, Growe et al. (2014) used data from 105 banks in the United States, de de Mendonça & Silva (2018) used data from 18 Brazilian banks, Al-Homaidi et al. (2018) used data from 69 commercial banks in India, and Ramlan & Adnan (2016) studied five Malaysian commercial banks from 2006 to 2011. But in Asia, there have never been any studies looking at how Covid-19 affects profitability of the bank.

3.2 Panel Data Regression Model

This study uses a research sample in the form of panel data which is a combination of time series and cross-company data or cross sections (Basuki & Yuliadi, 2015). In conducting panel data regression, there are three approaches, namely: (Widarjono, 2007)

1. Common Effect Model (CEM)

The combination model of time series and cross section data is the simplest model since it does not take into account the flow of time or the dimensions of the data. As a result, in this model, it is expected that organizations have the same behavior data across several time periods. The following model can be used to estimate this model using the Ordinary Least Square (OLS) approach, which is described as follows: (Widarjono, 2007):

$$Y_{it} = \alpha + \beta' X'it + \mathcal{E}it \ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Description:

Y_{it} : the dependent variable of the i-th cross section unit for the t period
α : constant or unit cross section intercept
X_{it} : [$X1_{it}$, $X2_{it}$, … , Xk_{it}] independent variable of size (1 xk)
β : [$\beta 1, \beta 2, \ldots, \beta k$] regression coefficient of k independent variables
ε_{it} : error term unit cross section i for period of t ; $\varepsilon_{it} \sim N(0, \sigma_e^2)$

2. Fixed Effect Model (FEM)

This model is carried out by accommodating differences between cross-sectional units with differences in intercepts, but still assuming that the slope coefficient is constant (Gujarati & Porter, 2004). In this model it can be done with Least Square Dummy Variables (LSDV) and weighting or Generalized Least Square (GLS). The FEM model can be stated as follows:

$$Y_{it} = \alpha_i + \beta' X'_{it} + \mathcal{E}it \ldots\ldots\ldots..(5)$$

Description:

Y_{it} : the dependent variable of the i-th cross section unit for the t period
α_i : constant or intercept of the i-th cross section unit
X_{it} : [$X1_{it}$, $X2_{it}$, … , Xk_{it}] independent variable of size (1 xk)
β : [$\beta 1, \beta 2, \ldots, \beta k$] regression coefficient of k independent variables
ε_{it} : error term unit cross section i for period t ; it ~N(0,) σ_e^2

3. Random Effect Model (REM)

This model accommodates the different intercepts with the error terms of each cross section unit so that this model can overcome the problems that can be caused by the fixed effect model (FEM) approach. Where in the REM model, differences in object characteristics and time can be involved in the error term of the model (Jacob, 2014). In the REM model, $\alpha_i = \alpha_0 + \varepsilon_i$; where i is a random error or also called a latent variable which has an average of 0 and σ_e^2 variance. The equation of the REM model can be stated as follows: (Gujarati & Porter, 2004)

$$Y_{it} = \alpha_0 + + \beta' X'_{it} + w_{it} \ldots\ldots\ldots\ldots (6)$$

where $w_{it} = \varepsilon_i + u_{it}$; $w_{it} \sim N_{iid}\ (0, \sigma_w^2)$. The value of wit contains error terms for cross section (ε_i) and time series (u_{it}) data with the assumption that they are independent and identically distributed (IID) normally with a mean 0 and σ_e^2 variance (Gujarati & Porter, 2004).

3.3. Panel Data Regression Model Selection

In managing panel data, it is necessary to select the right model by carrying out several tests as follows ((Basuki & Yuliadi, 2015):

1. Test Chow

This is a test to determine the right model between the common effect model (CEM) and the fixed effect model (FEM) by comparing the cross-section F of p-value with a critical value of alpha 0,05. If the cross section F of p-value is greater than the critical alpha value of 0.05, the null hypothesis is accepted and vice versa. The hypothesis for the Chow Test is as follows:

H0 = common effect model

H1 = fixed effect model

If the CEM model is selected, then the test is continued to the Lagrange Multiplier Test. However, if the FEM model is selected, then the test is continued to the Hausman test.

2. Hausman test

This is a test to determine the right model between the fixed effect model (FEM) and the random effect model (REM) by comparing the p-value with a critical value of alpha 0,05. If the p-value is greater than the critical alpha value of 0,05 then the null hypothesis is accepted and vice versa. The hypothesis for the Hausman test is as follows:

H0 = random effect model

H1 = fixed effect model

If the FEM model is selected, then the test has been completed. However, if the REM model is selected, then the test is continued to the Lagrange Multiplier Test.

3. Lagrange Multiplier Test

This is a test to determine the right model between the common effect model (CEM) and the random effect model (REM) by comparing the Breusch-Pagan p-value with a critical value of alpha 0,05. If the Breusch-Pagan p-value is greater than the critical alpha value of 0.05, the null hypothesis is accepted and vice versa. The hypothesis for the Lagrange Multiplier Test is as follows:

H0 = common effect model

H1 = random effect model

The final result of the model selection from the Lagrange Multiplier Test is the best final model to use.

3.4. Panel Data Classic Assumption Test

According to Basuki & Yuliadi (2015), the classical assumption test used in linear regression with the ordinary least squared (OLS) approach consists of the Linearity Test, Autocorrelation Test, Multicollinearity Test, Heteroscedasticity Test, and Normality Test. However, in panel data regression not all tests are necessary because:

1. The model has been assumed to be linear so that the Linearity Test does not need to be carried out.
2. In the BLUE (Best Linear Unbiased Estimator) requirement, there is no normality test in it, so according to experts, there is no need for a normality test for panel data testing.
3. Autocorrelation problems will only occur in time series data, so the Autocorrelation Test on data that is not time series will not have a significant meaning.

Based on some of the explanations above, it can be concluded that the classical assumption test for the panel data regression model only needs to be carried out by the Multicollinearity Test, Heteroscedasticity Test and Cross-Section Dependence Test.

4. Results and Discussion

4.1. Descriptive Analysis

This study aims to see the effect of the determinants of the bank and macroeconomics on the probability of a bank.

Table 3. Descriptive statistics

Variables	Minimum	Maximum	Mean	Std. Dev.
Panel A: Profitability Measurement (Dependent Variable)				
ROA	−40.35	11.3	0.41	3.69
ROE	−216.76	51.27	2.75	18.89
NIM	−9.49	30.23	4.46	4.07
TOBIN'S Q	0.0000091	0.05	0.00064	0.003
Panel B: Bank Specific Determinants (Independent Variables)				
LNAS	10.74	18.61	14.89	1.75
DEP	0.10	0.89	0.72	0.11
LEV	0.00	0.49	0.06	0.07
Panel C: Macroeconomic Determinants (Independent Variables)				
LNEXCH	-9.67	-9.53	-9.57	0.03
COVID-19	0.00	37284	3731.39	7228.62
INTR	3.50	6.00	4.47	0.93
GDP	-2.07	5.06	2.26	2.79

The number of observations is 1476

Note: ROA is the ratio of the bank's net profit to total assets, ROE is the ratio of net income to shareholders' equity, LNAS is the natural logarithm of total assets, DEP is total deposits of total assets (%), LEV is financial risk, LNEXCH is the natural logarithm of the exchange rate, COVID-19 is Number of new cases per month, INTR is loan interest rate (%), GDP is real gross domestic product (%).

As shown in Table 3, the minimum, maximum, mean, and standard deviation values of each variable used in this study. The results show the trend of the profitability measurement; ROA, ROE, NIM and Tobin's Q during the period January 2019–December 2021. Likewise, the results show descriptive statistics for bank-specific and macroeconomic variables for the same period. The results showed that ROA, ROE, NIM and Tobin's Q ranged between the minimum values of −40.35, −216.76, −9.49 and 0.0000091, respectively owned by PT Bank Jago Tbk (ARTO), PT Bank Raya Indonesia Tbk (AGRO), PT Bank Capital Indonesia Tbk (BACA), and PT Bank KB Bukopin Tbk (BBKP). Meanwhile, the maximum value of each variable ranges between 11.3, 51.27, 30.23 and 0.05 which are respectively owned by PT Bank BTPN Syariah Tbk (BTPS), PT

Bank Syariah Indonesia Tbk (BRIS), PT Bank BTPN Syariah Tbk (BTPS), and PT Bank Jago Tbk (ARTO) with each mean value of 0.41, 2.75, 4.46 and 0.00064. Therefore, this indicates a negatively skewed distribution during 2019–2021.

The results in Table 3 also show that there is variation between the mean and standard deviation of bank-specific and macroeconomic variables for the same period. Bank-specific determinants have a mean value of 14.89 for LNAS, and the ratio of DEP and LEV is 0.72% and 0.06% with standard deviations of 1.75%, 0.11% and 0.07%, respectively. The variation between the mean values of all the variables indicates that there is considerable heterogeneity among the selected banks.

From the macroeconomic context, LNEXCH (Exchange Rate Log) ranges between a minimum value of -9.67 and a maximum value of -9.53 with an average value of -9.57. Covid-19 ranged between a minimum value of 3.89 and a maximum value of 10.26 with an average value of 7.33. Likewise, inflation fluctuated between a minimum value of 0 and a maximum value of 37284 with an average value of 3731.39. Specifically, the interest rate has an average value of 4.47 with a standard deviation of 0.93 and a minimum value of 3.50 and a maximum value of 6. GDP also has an average value of 2.26 with a standard deviation of 2.79 (Min. = -2.07, Max. = 5.06).

4.2. Panel Data Regression Model Estimation

1. Common Effect Model (CEM)

Table 4 is the result of the estimated effect Bank and Macroeconomic determinants of the measured bank probability based on ROA, ROE, NIM, and Tobin's Q with panel data regression model common effect model (CEM).

Table 4. Common Effect Model Results Summary

	ROA		ROE		NIM		TOBIN'S Q	
D.V.	Pooled		Pooled		Pooled		Pooled	
Variable	Coef.	Prob.	Coef.	Prob.	Variable	Coef.	Prob.	Coef.
C	−83.99	0.00***	−568.11	0.00***	C	−83.99	0.00***	−568.11
Bank's Determinants								
LNAS	0.56	0.00***	3.45	0.00***	0.58	0.00***	−0.00	0.00***
DEP	−0.07	0.93	4.26	0.31	−13.90	0.00***	−0.01	0.00***
LEV	−1.21	0.33	1.16	0.86	−17.67	0.00***	−0.00	0.00***
Macroeconomic Determinants								
LNEXCH	−7.90	0.00***	−53.63	0.00***	−2.62	0.50*	−0.00	0.95

COVID-19	-3.7e-06	0.73	6.2e-06	0.91	−5.5e-06	0.72	1.7e-09	0.81
INTR	0.13	0.19	0.63	0.23	0.16	0.25	−0.00	0.00***
GDP	0.07	0.03***	0.31	0.07*	0.07	0.10*	0.00	0.00***
Prob (F-statistic)		0.000		0.000		0.000		0.000
F-statistic		30.19		43.11		29.07		86.27
R-squared		0.13		0.17		0.12		0.29
Adj R-squared		0.12		0.17		0.12		0.29

Notes: significance at the level of ***1, **5, *10 percent.

2. Fixed Effect Model (FEM)

Table 5 is the result of the estimated effect of Bank and Macroeconomic determinants of the measured bank probability based on ROA, ROE, NIM, and Tobin's Q with the panel data regression model fixed effect model (FEM) with weighting or Generalized Least Square (GLS).

Table 5. Fixed Effect Model Results Summary

	ROA		ROE		NIM		TOBIN'S Q	
D.V.	Pooled		Pooled		Pooled		Pooled	
Variable	Coef.	Prob.	Coef.	Prob.	Variable	Coef.	Prob.	Coef.
C	−131.9	0.00***	-776.7	0.000***	C	−131.9	0.00***	-776.7
Bank's Determinants								
LNAS	2.15	0.00***	10.57	0.000***	1.09	0.00***	0.00	0.00***
DEP	2.17	0.03***	−2.77	0.63	-3.64	0.00***	−0.01	0.00***
LEV	4.07	0.00***	14.85	0.08	−2.44	0.00***	−0.004	0.00***
Macroeconomic Determinants								
LNEXCH	−10.11	0.00***	−64.24	0.000***	−3.37	0.00***	−0.004	0.00***
COVID-19	-6.2e-06	0.43	−4.7e-06	0.92	−6.9e-06	0.09*	−2.1e-09	0.64
INTR	0.39	0.00***	1.88	0.000***	0.25	0.00***	0.00	0.03***
GDP	0.074	0.12	0.17	0.22	0.07	0.00***	0.00	0.4

Prob (F-statistic)	0.000		0..000		0.000		0.000
F-statistic	33.83		21.07		478.05		56.96
R-squared Within	0.08		0.07		0.17		0.48
R-squared Between	0.20		0.33		0.03		0.07
R-squared Overall	0.12		0.17		0.04		0.004

Notes: significance at the level of ***1, **5, *10 percent.

3. Random Effect Model (REM)

Table 6 is the result of the estimated effect Bank and Macroeconomic determinants of the measured bank probability based on ROA, ROE, NIM, and Tobin's Q with panel data regression model random effect model (REM).

Table 6. Random Effect Model Results Summary

	ROA		ROE		NIM		TOBIN'S Q	
D.V.	Pooled		Pooled		Pooled		Pooled	
Variable	Coef.	Prob.	Coef.	Prob.	Variable	Coef.	Prob.	Coef.
C	−101.3	0.00***	-623.6	0.000***	C	−101.3	0.00***	-623.6
Bank's Determinants								
LNAS	1.07	0.00***	5.15	0.000***	1.00	0.00***	0.00	0.00***
DEP	1.15	0.22	−5.92	0.28	-3.77	0.00***	−0.01	0.00***
LEV	3.62	0.01***	12.81	0.12	−2.52	0.00***	−0.005	0.00***
Macroeconomic Determinants								
LNEXCH	−8.75	0.00***	−57.28	0.000***	−3.26	0.00***	−0.004	0.00***
COVID-19	-4.7e-06	0.55	2.9e-06	0.95	−6.8e-06	0.09*	−2.1e-09	0.64
INTR	0.24	0.00***	1.08	0.01***	0.24	0.00***	−0.001	0.01***
GDP	0.06	0.01***	0.29	0.04**	0.07	0.00***	0.00	0.00***
Prob (chi2)		0.000		0..000		0.000		0.000

Wald chi2	101.4		94.52		284.68		909.52
R-squared Within	0.08		0.06		0.17		0.43
R-squared Between	0.20		0.32		0.03		0.004
R-squared Overall	0.12		0.16		0.04		0.03

Notes: significance at the level of ***1, **5, *10 percent.

4.3. Panel Data Regression Model Determination

1. Chow Test

This test was conducted to determine the best model between the common effect model (CEM) and the fixed effect model (FEM). Based on the test results in Table 7, it is shown that the p-value for the two dependent variables ROA, ROE, NIM and Tobin's Q shows the number 0.000 and is smaller than the alpha value of 0.05, it can be said that it cannot accept H0. Thus, based on these tests it was decided that the best estimation model is the FEM model.

Table 7. Chow test

	ROA	ROE	NIM	Tobin's Q
Prob > F	0.0000	0.0000	0.0000	0.0000
F(40, 1428)	33.83	21.07	478.05	56.96

2. Hausman test

This test was conducted to determine the best model between the fixed effect model (FEM) and the random effect model (REM). Based on the results in Table 8 it is shown that the p-value for the ROA, ROE, NIM and Tobin's Q variables which shows the number 0.0000. Both p-values show a number smaller than the alpha value of 0.05, so it can be said that it cannot accept the H0. Hence, based on these tests it was decided that the best estimation model is the FEM model.

Table 9. Hausman test

	ROA	ROE	NIM	Tobin's Q
Pros > Chi2	0.0000	0.0002	0.0255	0.0000
Chi2	40.26	26.69	9.31	266.79

4.4. Classic Assumption Test

1. Multicollinearity Test

As shown in Table 9, the Pearson correlation matrix and multicollinearity diagnostics for measuring profitability, bank-specific and macroeconomic variables. For bank-specific variables, the results show that DEP and LEV have a negative relationship to NIM, but have a positive correlation to ROA and ROE. Meanwhile, LNAS has a positive correlation to the variables ROA, ROE and NIM but has a negative correlation to Tobin's Q, as well as DEP which has a negative correlation to Tobin's Q. This indicates that DEP has a negative relationship to the profitability of banks in Indonesia as measured by NIM and Tobin's Q. With regard to macroeconomic variables, the results show that LNEXCH has a negative correlation to ROA and

ROE but a positive correlation to NIM and Tobin's Q. COVID has a negative correlation with the three variables ROA, ROE and NIM but has a positive correlation with Tobin's Q. Meanwhile, INTR has a positive correlation with all variables except Tobin's Q. GDP has a positive correlation to ROA and NIM but negative to ROE and Tobin's Q. The results of this study also show that the highest correlation value shown between the two variables is 0.56 which is found in GDP and INTR which indicates that there is no problem of multicollinearity between variables. For a more in-depth analysis, a multicollinearity diagnostic was performed using the VIF and Tolerance values for all independent variables. VIF has a maximum value of 1.91 and the lowest tolerance value of 0,52 which shows that there is no multicollinearity problem between independent variables

2. Heteroscedasticity test

According to Table 10 below, the classical assumption of heteroscedasticity carried out by the Modified Wald Test, if (Prob>Chi2) <0.05, it indicates that there is heteroscedasticity. The results of the heteroscedasticity test using the Modified Wald Test show (Prob>Chi2) = 0.0000 or less than 0.05 on the ROA, ROE, NIM and Tobin's Q variables, then H0 is rejected. Thus, it can be concluded that there is a heteroscedasticity problem.

Table 10. Heteroscedasticity test

Variable	Pros > Chi2
ROA	0.0000
ROE	0.0000
NIM	0.0000
Tobin's Q	0.0000

3. Cross-Sectional Dependence Test

According to Table 11, it shows that the classical assumption of the cross-sectional dependence test using a test message, if the Pr value < 0,05 indicates a correlation between individuals. The results show the value of Pr = 0.0000 or less than 0.05 in each variable, then H0 is rejected. Thus, it can be concluded that there is a correlation problem between individuals.

Table 11. Test of Cross-Sectional Dependence

Variable	Pr
ROA	0.0000
ROE	0.0000
NIM	0.0000
Tobin's Q	0.0000

Table 10. Correlation Matrix and Multicollinearity Diagnostic

Panel A: Pearson Correlation Matrix

	Profitability Measures				Bank-Specific Determinants (Independent Variables)			Macro-Economic Determinants (Independent Variables)			
Variables	ROA	ROE	NIM	TOBIN'S Q	LNAS	DEP	LEV	LNEXCH	COVID-19	INTR	GDP
Profitability Measurement (Dependent Variable)											
ROA	1										
ROE	0.91	1									
NIM	0.56	0.39	1								
TOBIN'S Q	−0.14	−0.05	0.06	1							
Bank Specific Determinants (Independent Variables)											
LNAS	0.34	0.40	0.13	−0.20	1						
DEP	0.06	0.07	−0.18	−0.46	0.10	1					
LEV	0.06	0.10	−0.05	0.03	0.29	−0.53	1				
Macroeconomic Determinants (Independent Variables)											
LNEXCH	0.03	−0.03	−0.06	0.02	0.007	0.01	0.01	−0.01	1		
COVID-19	0.02	−0.02	−0.003	−0.03	0.07	0.04	−0.05	0.06	−0.07	1	
INTR	0.05	0.05	0.02	0.06	−0.13	−0.06	0.10	−0.11	0.26	−0.47	1
GDP	0.06	0.06	−0.04	0.07	−0.01	−0.003	0.06	−0.07	0.44	−0.15	0.56

Multicollinearity Diagnostic

VIF					1.21	1.54	1.66	1.24	1.33	1.91	1.72
Tolerance					0.83	0.65	0.60	0.81	0.76	0.52	0.58

Notes: ROA is the ratio of the bank's net profit to total assets, ROE is the ratio of net income to shareholders' equity, LNAS is the natural logarithm of total assets, DEP is total deposits to total assets (%), LEV is financial risk, GDP is gross domestic product real (%), COVID-19 is the number of new cases per month, INTR is the loan interest rate (%), and LNEXCH is the natural logarithm of the exchange rate.

4.5 Model Correction Procedure

Based on the findings of the tests conducted in this study, it was discovered that the classical assumptions, namely the presence of heteroscedasticity symptoms and the correlation between cross sections, had been rejected in this instance. In order to get a valid conclusion, the model utilized cannot be estimated using the general OLS approach; instead, it must be estimated using an estimator that is resilient to the problems of heteroscedasticity and correlation between individuals simultaneously.

The estimation method in the panel data regression model by Vogelsang (2012) is called "Heteroscedasticity Auto Correlation Spatial Correlation (HACSC) robust standard errors". This estimation method in econometrics is also known as the Driscoll-Kraay estimator which is taken from the name of its pioneers, namely John C. Driscoll and Aart C. Kraay. This estimation method was first introduced in their article entitled "Consistent Covariance Matrix Estimation with Spatial Dependent Panel Data" which was published in The Review of Economics and Statistics in 1998.

As the name implies, this Driscoll-Kraay estimator operates under the assumption of heteroscedasticity, autocorrelation and the possibility of correlation between individuals or spatial correlation in the panel data regression model used (Hoechle, 2007). This estimation method can be implemented in both fixed effect models and POLS or common effect models. The Driscoll-Kraay estimator is basically a correction method for violations of classical assumptions in the panel data regression model, namely violations of the homoscedasticity assumption and violations of the non-autocorrelation assumption, both serial correlation (temporal correlation) and correlation between individuals (cross sectional correlation).

The correction procedure in this estimator is limited to the estimation of standard errors as in the Panel Corrected Standard Errors (PCSE) method. The difference between the two lies in the correction approach used, where the correction procedure in PCSE uses a parametric approach, while the Driscoll-Kraay estimator uses a non-parametric approach. Therefore, the Driscoll-Kraay estimator is relatively easy to implement because the model correction procedure is carried out using a non-parametric method that does not require many requirements or assumptions.

Table 12 below presents the results of the calculation of the fixed effect model using the Driscoll-Kraay robust standard errors (HACSC) method. Estimation using the Driscoll-Kraay estimator can be implemented in Stata software using the "xtscc" syntax (command).

From the estimation results of the correction of the fixed effect regression model using the Driscoll-Kraay method in table 12, the F value for the ROA variable is 13.11, ROE is 12.84, NIM is 34.46 and Tobin's Q is 119.81 with a significant probability value or p-value F, that is equal to 0.000, respectively. Thus, the p-value of F is smaller than the specified test significance level (□α) which is 0,05. This shows that the calculated F value is in the H0 rejection area (F statistic > F table) namely ROA 13.11 > 2,015805921, ROE 13.11 > 2,015805921, NIM 34.46 > 2,015805921 and Tobin's Q 119.81 > 2,015805921, so H0 rejected and Ha accepted. Therefore, it can be concluded that the independent variable in the regression model is proven to have a significant effect on each dependent variable (ROA, ROE, NIM, and Tobin's Q) or the independent variable is proven to be able to explain the variation of the dependent variable at a significance level of 0,05.

4.6 Results Discussion

As shown in Table 13, the empirical results of the Fixed Effect model estimation have been corrected. The results provide estimates for each model and are presented in two categories;

bank-specific and macroeconomic determinants. Overall, the results show that the adjusted R Square for ROA, ROE, NIM and Tobin's Q are 0.084, 0.067, 0.17, and 0.48, respectively, indicating that bank-specific and macroeconomic determinants contribute 8.4% to the probability as measured by ROA, 6.7% to ROE, 17% to NIM and contributes 48% to probability as measured by Tobin's Q.

4.6.1 Bank-Specific Determinant Results

As illustrated in the fixed effects model in table 12 for ROA, among bank-specific factors, only LNAS and LEV ratios were found to have a statistically significant impact on ROA. LNAS has a significant effect at the 1% level (p-value = 0.00<0.01), while the LEV ratio has a significant effect at the 10% level (0.08<0.1). The LNAS and LEV coefficients were found to be positive, which means they have a statistically positive impact on ROA. This result is consistent with previous study (Al-Homaidi et al., 2018; Chowdhury & Rasid, 2016; Masood & Ashraf, 2012; Menicucci & Paolucci, 2016) who reported that banks with larger asset sizes large generate higher profitability, but differ with research from Athanasoglou et al. (2008) which revealed that bank size had no significant effect on bank profitability. However, the DEP ratio has a positive but not statistically significant coefficient which indicates that ROA is not significantly positively influenced by total deposits to total assets.

Regarding the impact of bank-specific determinants on ROE, the results show that LNAS has a statistically significant positive effect on ROE. This is consistent with previous studies such as Haron (1996) and Ktari et al. (2014) which found that bank size or asset size had a positive and statistically significant effect. This finding is also supported by other researchers such as (Ramlan & Adnan, 2016) and Laeven et al. (2016) who found that bank size is the main factor influencing the increase in the profitability of Islamic banks.

In regard with NIM, the results show that all bank-specific factors have a statistically significant impact on NIM. However, only LNAS has a positive coefficient indicating that LNAS has a statistically significant positive impact on NIM. Meanwhile, the negative coefficient on the ratio of DEP and LEV indicates a negative impact and a decline in bank profitability in Indonesia as measured by NIM.

Furthermore, on the dependent variable Tobin's Q, the results show that LNAS, DEP ratio, and LEV have a statistically significant impact on Tobin's Q but with a negative coefficient. This shows the negative impact and decline in bank profitability as measured by Tobin's Q

4.6.2 Macroeconomic Determinant Results

In respect with the effect of macroeconomic determinants on bank profitability in Indonesia, as shown in Table 12 below show that all macroeconomic determinants have a statistically significant effect on ROA. LNEXCH and INTR had a significant effect at the 1% level (p-value = 0.00<0.01), while COVID and GDP had a significant effect at the 10% level (0.097 and 0.062<0.1). Both LNEXCH and COVID values show a significant and negative effect on ROA. While the value of INTR and GDP showed a significant and positive effect on ROA. This is in line with research by Albulescu (2015) which reports that interest rates have a positive effect on bank profitability. However, this result also contradicts with the research result carried by Al-Homaidi et al (2018) which reports that interest rates have a negative effect on ROA. Furthermore, GDP shows a significant and positive influence on ROA, which is in line with (Saona,2016) which concluded that there is a positive relationship between bank profitability and foreign exchange.

Table 12. Fixed Effect Model Error Correction Estimation Results by Driscroll-Kraay Method (HACSC)

Regressors/ Variables	**ROA**			**ROE**			**NIM**			**TOBIN'S Q**		
	Coef.	Std.Err	P-value	Coef.	Std.Err	P-value	Coef.	Std.Err	P-value	Coef.	Std.Err	P-value
C	-131.89	21.18	0.000***	-776.65	157.33	0.000***	-42.45	10.59	0.000***	-0.062	0.010	0.000***
Bank's Determinants												
LNAS	2.15	0.26	0.000***	10.57	1.85	0.000***	1.09	0.13	0.000***	-0.002	0.0002	0.000***
DEP	2.17	1.89	0.258	-2.78	9.75	0.778	-3.64	0.81	0.000***	-0.013	0.001	0.000***
LEV	4.08	2.28	0.081*	14.85	12.74	0.251	-2.44	0.62	0.000***	-0.004	0.002	0.016**
Macroeconomic Determinants												
LNEXCH	-10.11	1.91	0.000***	-64.24	13.93	0.000***	-3.37	1.06	0.003***	-0.004	0.001	0.001***
COVID	-6.2e-06	3.6 e-06	0.097*	-4.7e-06	0.00002	0.834	-6.9e-06	3.11e-06	0.031**	-2.11e-09	5.2 e-09	0.689
INTR	0.39	0.08	0.000***	1.88	0.47	0.000***	0.25	0.03	0.000***	0.000	0.000	0.059*
GDP	0.04	0.02	0.062*	0.17	0.12	0.158	0.07	0.01	0.000***	0.000	0.000	0.487
Prob > F	0.000			0.000			0.000			0.000		
Fstat	13.11			12.84			34.46			119.81		
Within R-squared	0.0844			0.0667			0.1679			0.4759		

Notes: significance at the level of ***1, **5, *10 percent.

Only the LNEXCH and INTR values have a statistically significant relationship with ROE. A negative influence is indicated by the LNEXCH value. Foreign exchange rate risk arises when a bank has assets or liabilities denominated in a foreign currency, and exchange rate fluctuations affect the bank's revenue and capital. No one can anticipate what the exchange rate will be in the future period; it can go up or down regardless of forecasts and predictions. If indeed the movement is unexpected and unplanned, it poses a threat to bank income and capital (Maroof Hussain, 2011). INTR has a beneficial effect on ROE, which is consistent with previous research (Acaravci & Çalim, 2013).

Regarding NIM, each macroeconomic determinant variable has a statistically significant effect. LNEXCH, INTR, and GDP showed a statistically significant influence at the 1% level (p-value = 0.00<0.01), while COVID had a statistically significant effect at the 5% level (0.031<0.05). Conversely, LNEXCH and COVID possess the negative coefficient, which has a negative influence on NIM.

Furthermore, in Tobin's Q, only LNEXCH and INTR values showed a statistically significant effect on Tobin's Q. LNEXCH had a significant effect at the 1% level (p-value = 0.00<0.01), while INTR had a significant effect at the 10% level (0.059<0.1). However, LNEXCH has a statistically significant and negative effect on Tobin's Q with a coefficient value of -0.004.

Overall, LNEXCH scores show a statistically significant negative impact on all profitability measures; ROA, ROE, NIM and Tobin's Q. This can be attributed to the decline in the rupiah exchange rate against the US Dollar by 2.66% in 2020 due to the impact of the Covid-19 pandemic and by 1.97% in 2021 due to foreign capital outflows from Indonesia. On the other hand, the INTR value shows a statistically significant positive impact across all profitability measures; ROA, ROE, NIM and Tobin's Q. The value of interest rates affects the main activities of banking operations in financing and disbursing funds, where the main income of banks is still supported by interest income so that this will have an impact on banking profitability.

5. Conclusion

This study examines the impact of bank-specific and macroeconomic factors on the profitability of banks. The profitability of 41 commercial banks in Indonesia as assessed by ROA, ROE, NIM, and Tobin's Q from January 2019 to December 2021 is a function of bank-specific and macroeconomic factors. As independent variables, bank-specific variables are comprised of three variables: asset size, deposits, and leverage. Furthermore, macroeconomic determinants constitute the second type of independent variables, which consists of four variables: GDP, the monthly number of new Covid-19 cases, exchange rates, and interest rates.

In light of bank-specific determinants, the results reveal that the profitability of commercial banks in Indonesia as measured by ROA has a positive relationship with asset size, deposit ratio and leverage. Therefore, asset size and leverage ratio are the most significant bank-specific determinants that affect the profitability of commercial banks in Indonesia as measured by ROA. From a macroeconomic perspective, the results also show that interest rates and GDP have a positive relationship, while the exchange rate and COVID-19 have a negative relationship with the profitability of Indonesian commercial banks as measured by ROA.

Furthermore, the effect of bank-specific determinants on the profitability of Indonesian commercial banks as measured by ROE, resulting that asset size and leverage ratio have a

positive relationship and asset size is the most significant bank-specific determinant affecting bank profitability in Indonesia. Meanwhile, on macroeconomic determinants, the results show that interest rates and GDP have a positive relationship to ROE and interest rates are the macroeconomic determinants that most significantly affect bank profitability.

Moreover, bank profitability as measured by NIM, the results reveal that only asset size of bank-specific factors shows a significant and positive impact on profitability as measured by NIM. While the ratio of deposits and leverage that shows a significant and negative impact on NIM. On the other hand, macroeconomic variables such as interest rates and GDP show a significant positive effect on profitability as measured by NIM. However, the exchange rate and new cases of Covid-19 showed a statistically significant negative effect on the NIM.

Besides that, bank profitability as measured by Tobin's Q, the results reveal that all bank-specific determinants show a significant and negative impact on profitability as measured by Tobin's Q. Meanwhile, on macroeconomic variables only interest rates have a significant and positive impact.

By offering fresh empirical evidence, this study aims to address a significant gap in the existing literature on bank-specific and macroeconomic factors of the profitability of publicly listed banks in Indonesia. By completely defining and critically examining the current condition of bank profitability in Indonesia, the results of this study provide a considerable contribution to the existing base of information. This study also gives evidence regarding the issues that can affect the profitability of Indonesian banks between January 2019 and December 2021. During this time period, Indonesian banks have faced numerous obstacles, including a decline in financial performance and the March onset of the Covid-19 outbreak. In addition to providing empirical facts for bankers and policymakers, this makes the examination of this topic incredibly relevant and engaging.

It is advised that authorities and policymakers analyze macroeconomic determinants, particularly industry-specific aspects, in order to boost the profitability of banks in Indonesia. Consequently, bankers, bank managers, and other professionals must place a greater emphasis on bank-specific determinants for efficient utilization of bank resources, so that they can positively and significantly impact the financial performance of banks in Indonesia. This issue could be investigated in the future by adding bank-specific and other macroeconomic determinants. Comparing the bank-specific and macroeconomic profitability factors between private and public banks is also necessary.

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