THE EFFECT OF CREDIT RISK AND BANK SIZE ON BANK PROFITABILITY IN INDONESIA BEFORE AND DURING THE COVID-19 PANDEMIC

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Abstract

This study empirically examines the effect of credit risk using a new measure that is influenced by stimulus policy in Indonesia and bank size on the profitability of Indonesian banks during the Covid-19 pandemic. It employed the Generalized Method of Moments (GMM) Dynamic Model to obtain an overview of the effectiveness of the relaxation policy in maintaining the profitability of Indonesian banks. The stimulus policy by the regulator during the COVID-19 pandemic changed the credit risk calculation and this research contributed by using credit risk measurement adjusted to the stimulus policy by adding restructuring loans in current quality. The study found that credit risk negatively affected profitability in the period during the Covid-19 pandemic. This finding is probably due to the stimulus policy allowing banks to remain current on the credit quality with no addition to the provision. Bank profitability during the pandemic was not significantly affected by credit risk, allegedly among others, also influenced by the good adaptability of banks in Indonesia through additional services. Bank size has had a significant negative effect on profitability during the COVID-19 pandemic for small, medium, and large banks. The larger the size of the bank, the riskier it becomes due to the addition of reputation management including other operational costs.

Keywords: Credit Risk, Bank Size, Profitability, Pandemic Covid-19

INTRODUCTION

The role of banking in the national economy is very strategic, especially in carrying out its function as an intermediary institution. Banks are institutions that provide funds for economic activities to encourage economic growth through lending. Based on Indonesian banking statistics (SPI) until December 2022, the portion of credit in Indonesian banking assets reached 57.66%, which shows that lending activities are the main business of banks. However, the COVID-19 pandemic has increased uncertainty and this uncertainty has encouraged banks to act cautiously to prevent (Dang & Nguyen, 2022) so that the amount of credit disbursed has decreased. As shown in Table 1, loans in 2020 decreased by 2.91% compared to the period before the Covid-19 pandemic to IDR156.82 trillion so the share of loans in banking assets in 2020 decreased by 6.03%.

Table 1.
Banking Performance 2019-2022

	Unit	2019	2020	2021	2022
Total assets	Rp trillion	8.213	8,781	9,671	10,581
Credit	Rp trillion	5.392	5,235	5,512	6,101
Loan growth yoy	%	6.08	(2.91)	5.29	10.68
Current restructured loans	Rp trillion	131	870	714	501
Loan-to-asset ratio	%	65.65	59.62	57.00	57.66
Npl gros	%	2.5	3.06	3.02	2.44
Npl net	%	1.16	0.95	0.88	0.71
Lar	%	9.92	23.37	19.50	14.05
Roa	%	2.47	1.59	1.85	2.45
Nim	%	4.91	4.45	4.51	4.80
Bopo	%	79.39	86.58	83.58	78.70
Operating income	Rp trillion	1.146	1,202	1,234	1,334
Interest income	Rp trillion	828	794	774	811
Operating expenses	Rp trillion	950	1,065	1,060	1.087
Share of interest income to operating income	%	72.24	66.08	62.72	60.81
Profit before tax (EBT)	Rp trillion	201	140	174	252

Lending activities by banks will lead to credit risk or default risk from the borrower. Default risk is one of the consequences of adverse selection and moral hazard (Stiglitz & Weiss, 1981). The COVID-19 pandemic, which began in 2020, has increased credit risk so that the ratio of non-performing loans in Indonesian banks (Gross NPL) as shown in Table 1 increased by 0.36% to 3.06% in 2020. The relatively low increase in the Gross NPL of Indonesian banks is due to the rapid response by the Financial Services Authority (OJK) to the Covid-19 stimulus relaxation policy through the issuance of OJK Regulation (POJK) No.11/POJK.03/2020 dated March 13, 2020. One of the relaxations given to Indonesian banks is in the form of credit restructuring without reducing credit quality or still being considered current after restructuring (OJK press release, 2020). The policy continues to be implemented until 2022 and the policy is modified in 2023.

The implementation of this policy by banks has a direct impact on the increase in Loan at Risk from 9.92% in 2019 to 23.37% in 2020 and continues to be high both in 2021 which is still 19.50% and in 2022 still 14.05%. This condition mainly contributed to an increase in restructuring loans for debtors affected by COVID-19. Based on OJK data, the total restructuring credit as of March 2020 amounted to IDR127.92 trillion and as of December 2020 increased by more than 5X to IDR829.72 trillion. In connection with the implementation of this policy, the Gross NPL ratio cannot yet describe the potential credit risk of Indonesian banks as a whole. Thus, the measure of credit risk for Indonesian banks, especially during the Covid-19 pandemic, needs to be added with credit restructuring with current quality or called NPL (+), namely all non-performing loans with substandard credit quality (KL), Doubtful (D) and Bad Debt (M) as well as credit restructuring with Current quality (L).

Non-performing loans will affect the profitability of the bank through decreased revenue, eroded retained earnings, and capitalization (Kithinji, 2010). The transmission is done through the establishment of a loan loss provision (LLP) formed by banks in anticipation of increased banking risk to absorb credit losses as part of the credit risk management process (Handorf & Zhu, 2005). Under certain conditions, the level of risk faced by banks increases and results in increased costs, among others, due to the allocation of resources to monitor risk, thus significantly reducing profits (Fang et al., 2019). Based on

OJK data up to 2021, Indonesian banks have formed an Impairment Loss Provision (LLP) against their financial assets of IDR 344.77 trillion, a significant increase of more than 100% compared to before the Covid-19 pandemic in 2019, which only formed IDR 164.65 trillion. High LLP formation indicates low credit quality, therefore resulting in low profitability as well (Dietrich & Wanzenried, 2011). Profitability performance during the Covid-19 pandemic has decreased in line with the increase in LLP formation as shown in Table 1, namely a decrease in profit before tax, ROA, NIM, and BOPO although in 2022 it has started to increase again and even exceeded the achievement before the Covid-19 pandemic.

Credit risk as the dominant risk faced by banks, has a contribution to the financial performance of banks. The Covid-19 pandemic as an unexpected event that increases the credit risk faced by banks will have an influence on the margins earned. In Table 1, the contribution of interest income to operating income during the Covid-19 pandemic decreased by 6.16% compared to 2019 before the Covid-19 pandemic. Although the Indonesian banking market during the COVID-19 pandemic has not changed much, namely still controlled by large banks as shown in Table 2, 4 (four) large banks control 51.45%, and 20 large banks control 81.96%. CR4 and CR20 actually experienced a slight upward trend compared to the period before the COVID-19 pandemic both in 2020 and 2021 and began to decline in 2022.

Another factor that may affect profitability is bank size. Banks with large assets benefit from diversification of products and types of credit as well as economies of scale thus driving profitability although in certain periods (e.g. crisis), there can be a negative relationship between size and profitability due to higher loss formation, reputation-related matters and other operational costs (Dietrich & Wanzenried, 2011). Based on POJK No.6/POJK.03/2016 concerning Business Activities and Office Networks Based on Bank Tier 1 Capital, banks are grouped into 4 (four) BUKU, namely Commercial Banks based on Business Activities adjusted to the core capital owned. The larger the BUKU of the bank, the greater the core capital and the more varied the types of products and services. Bank size is an important factor in determining bank performance and its possible impact on profitability is nonlinear (Thi Thanh Tran & Phan, 2020). In connection with this, banks with large lending capabilities

will have a large credit risk exposure so bank size will affect the bank's ability to generate profits.

Table 2
Trend Concentration Ratio

			Year			
			2019	2020	2021	2022
Asset	CR 4	%	50.72	51.45	52.52	52.03
	CR 20		81.06	81.96	81.97	81.09

Source: OJK Banking Industry Profile Report

The problem formulation in this study focuses on the impact of the COVID-19 pandemic on credit risk and bank profitability in Indonesia. The pandemic increases the potential credit risk, encouraging banks to increase LLP/CKPN formation as an anticipatory measure. Regulators respond with stimulus policies in the form of restructuring loans that are considered to remain of current quality, affecting the measurement of non-performing loans (NPL+). This study aims to evaluate the effect of credit risk and bank size on bank profitability before and during the pandemic. Unlike previous studies, this study uses a measure of NPL+ that is relevant to the relaxation policy in Indonesia. In addition, the dominance of large banks in the banking industry in Indonesia is a reason to examine their impact on profitability during the pandemic. The question raised in this study is how credit risk and bank size affect profitability in the period before and during the COVID-19 pandemic.

REVIEW OF LITERATURE

Credit Risk and Size

Credit risk according to (Crouhy et al., 2006) is the risk of loss due to changes in factors that drive credit quality which includes adverse effects due to migration (changes) of credit grades including defaults and dynamics of recovery rates. Credit risk based on its source can be divided into 2 (two) types, namely firm-specific credit risk and systematic credit risk. Firm-specific credit risk is the risk of default by borrowers related to specific types of projects taken by the company, while systemic credit risk arises from factors that simultaneously increase the risk of default of all companies in an economy, for example, due to economic recession.

Bank size is generally measured using total assets, and total revenue and based on the market approach can be measured using market capitalization (Bhagat et al., 2015). However, bank size as stipulated by OJK in 2016 is categorized based on core capital and grouped into 4 (four) BUKU, BUKU 1 with core capital of less than Rp1 trillion, BUKU 2 with core capital of at least Rp1 trillion to less than Rp5 trillion, BUKU 3 with core capital of at least Rp5 trillion to less than Rp30 trillion and BUKU 4 with core capital of at least Rp30 trillion. The larger the BUKU of the bank, the more varied and differentiated its products and services will be so that its operations become larger and more complex.

Profitability

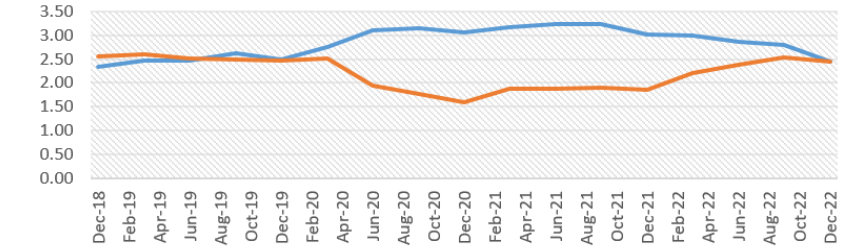
One of the financial objectives of a company including banks is to maximize profits. A well-managed bank will be reflected in its ability to generate profits which is measured using profitability ratios. Profitability is usually measured using profit margin ratios, return on assets (ROA), and return on equity (ROE). According to (Fang et al., 2019) who examined bank performance in China, especially in commercial banks, the ROA profitability ratio is more significant and positively related to the development of the banking business because there is an increase in demand for banking products, while the NIM ratio better describes profitability than the level of diversification in activities that generate higher interest.

Credit Risk and Profitability

Credit risk is the dominant risk faced by banks according to the characteristics of their business and can increase when borrowers cannot fulfil their obligations or default. In anticipation of a potential increase in credit risk, banks establish an allowance to absorb expected credit losses that affect the health of the bank and the banking system (Handorf & Zhu, 2005). In addition to considering historical experience, the allowance also needs to adjust to external changes in the economy, business, competition, and financial conditions (Handorf & Zhu, 2005). According to Telg et al. (2021), the COVID-19 pandemic from a risk management perspective represents a stress condition (episode) due to a significant and sudden decline in production growth due to Government intervention by implementing a lockdown (Indonesia with the Implementation of Restrictions on Community Activities /PPKM). In connection with this, external factors in the economy such as the COVID-19

pandemic will increase the formation of provisions, or in Indonesia, it is called the Reserve for Impairment Losses (CKPN).

A high LLP indicates low credit quality, therefore resulting in low profitability (Dietrich & Wanzenried, 2011). Under certain conditions, the level of risk faced by banks increases and results in increased costs, among others, due to the allocation of resources to monitor risk, thus significantly reducing profits (Fang et al., 2019). During the COVID-19 pandemic in Indonesian banking, as shown in Figure 1, the increase in non-performing loans (NPL ratio) will increase the gap with profitability (ROA). This shows that non-performing loans will increase the costs required to manage non-performing loans therefore bank profitability is disrupted or profitability becomes lower.



	Dec-18	Mar-19	Jun-19	Sep-19	Dec-19	Mar-20	Jun-20	Sep-20	Dec-20	Mar-21	Jun-21	Sep-21	Dec-21	Mar-22	Jun-22	Sep-22	Dec-22
NPL	2.33	2.47	2.47	2.63	2.50	2.74	3.10	3.14	3.06	3.17	3.24	3.22	3.02	3.00	2.87	2.79	2.44
ROA	2.55	2.60	2.51	2.48	2.47	2.51	1.94	1.76	1.59	1.88	1.88	1.91	1.85	2.20	2.38	2.53	2.45

Chart 1
Indonesian Banking NPL and ROA 2019-2022
Source: Banking Industry Profile Report, OJK

Uncertain conditions encourage banks to act cautiously with the motive to prevent higher losses due to credit risk and default risk considering uncertainty has hampered returns in banks (Dang & Nguyen, 2022). The results of (Dietrich & Wanzenried, 2011) research on 372 commercial banks in the period 1999 to 2009 showed that credit risk during the crisis (2007-2009) had a negative effect on profitability, while before the crisis (1999-2006) had no significant effect on profitability. Another study by (Thi Thanh Tran & Phan, 2020) on 31 commercial banks in Vietnam from 2009 to 2018 showed the same results, namely credit risk has a negative effect on profitability even though it does not distinguish between crisis periods or not. In connection with this, the hypothesis in this study will be developed as follows:

H1: There is a negative effect of credit risk on bank profitability.

Bank Size and Profitability

The larger the size of the bank based on its total assets provides benefits in the form of diversification of products and types of credit as well as economies of scale, thus encouraging profitability (Dietrich & Wanzenried, 2011). Bank size is an important factor in determining bank performance and its possible impact on profitability is nonlinear (Thi Thanh Tran & Phan, 2020). However, when banks are divided into 3 (three) types, namely large, medium, and smaller banks, it is found that banks with larger and smaller sizes are more profitable than medium banks before the crisis, but large banks are less profitable in 2-3 years during the crisis than small and medium banks. Research by (Fang et al., 2019) on commercial banks in China for the period 2003-2017 consisting of state-owned banks (SOE), city commercial banks (CCB), and joint stock commercial banks (JOCB) also shows that bank size has a negative and significant effect on profitability and is also influenced by banking industry and macroeconomic conditions. In banks in Indonesia, bank size (size) on profitability is inconsistent, meaning that it has no impact on bank profitability (Ghalib, 2018). Considering several different research results and the dominance of banks with large assets in lending activities in Indonesian banks, which in the conditions of the Covid-19 pandemic, their dominance has actually increased, the hypotheses to be developed are.

H2: Bank size affects the profitability of the Bank.

Bank size refer to POJK No.6/POJK.03/2016 concerning Business Activities and Office Network Based on Bank Tier 1 Capital, which is grouped into BUKU 1 to BUKU 4. The larger the BUKU of the bank, the more diversified the bank's business activities so that banks grouped in BUKU 4 can carry out all business activities.

Financial Services Authority (OJK) Covid-19 Stimulus Policy

Observing the Covid-19 pandemic that occurred in early March 2020, OJK took anticipatory steps to minimize its impact on banking performance, among others by issuing OJK Regulation (POJK) Number 11/POJK.03/2020 concerning National Economic Stimulus on March 13, 2020. The policy is carried out by considering the direct and indirect impacts that can increase credit risk because it affects the performance and capacity of debtors to fulfil payment obligations which in turn are carried out to maintain banking performance, capital resilience, and financial system stability.

Through this regulation, OJK asks the Bank to assess the ability of debtors affected by the spread of COVID-19, namely in the aspect of potential business growth and the ability of debtors to fulfil obligations according to the restructuring scheme. If the debtor is considered unable to survive, the Bank will assess the quality of the restructured credit according to the quality assessment standards and the formation of reserves, while debtors who are considered to be able to survive after obtaining a restructuring scheme are given a stimulus with Current quality.

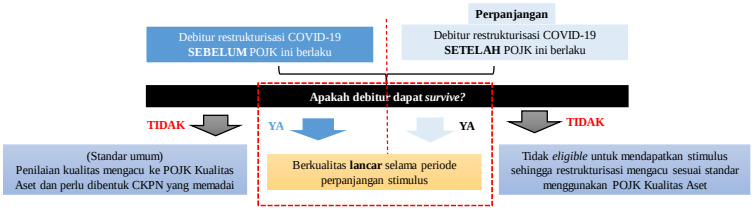


Figure 2
Asset Quality Assessment Mechanism in accordance with Covid-19 Stimulus
Source: processed by the author

Considering the continuing Covid-19 pandemic and maintaining the momentum of improvement and recovery of the performance of debtors affected by Covid-19, OJK decided to extend the implementation of the credit restructuring policy with the mechanism as shown in Figure 2 by issuing amendments to the POJK, namely POJK Number 48/POJK.03/2020 and POJK Number 17/POJK.03/2021. The COVID-19 stimulus policy was extended until 31 March 2023 with the same mechanism, especially for the assessment of current quality for debtors who obtained a credit restructuring scheme during the extension period.

The Covid-19 stimulus provided by OJK during the pandemic in addition to the credit restructuring scheme that allows banks to assess them as loans with Current quality with the formation of reserves according to general standards, namely adjustments to the implementation of several provisions in the relaxation period that took effect from the May 2020 period, among others in the form of:

a. the obligation to fulfill the Capital Conservation Buffer in the capital component of 2.5% of RWA for BUKU 3 and BUKU 4 banks is temporarily eliminated until March 31, 2022.
b. The obligation to fulfil the LCR and NSFR ratios for BUKU 3, BUKU 4, and adjusted foreign banks must be maintained by the Bank at a minimum of 85% until March 31, 2021.

c. The quality assessment of repossessed assets (AYDA) based on the period of ownership may be temporarily suspended until March 31, 2021.

RESEARCH METHOD

Data Collection Methods

The population in this study are all Conventional Banks except Regional Development (BPD) in Indonesia and registered with the Financial Services Authority (OJK) until 2022. The sample was selected using the purposive sampling method, the technique of determining the sample with certain considerations. The criteria must be met so that the population can be selected as a sample are as follows:

1. A bank that is registered with the Financial Services Authority until 2022.
2. If the bank in the research period (2016-2022) is a bank with corporate actions such as mergers and integration, banks that are not survivor banks are excluded from the sample.

Based on the criteria set, there are 65 banks selected as research samples, namely 62 Commercial Banks and 3 Foreign Bank Branch Offices (KCBLN). The bank data is observed for 7 (seven) years on a semesterly basis from 2016 to 2022. The type of data used is panel data which is divided into two parts, namely for 4 (four) years from 2016 to 2019 is data for observation of the period before the COVID-19 pandemic and 3 (three) years from 2020 to 2022 for the period during the COVID-19 pandemic. The data source comes from the Commercial Bank Monthly Report (LBU) submitted to OJK and the Financial Report Publication (Audited). Data processing in this study will use Microsoft Excel and STATA data processing software.

Research Variables

Profitability is a ratio used to determine the extent to which the company can return the investment that has been made by the company. The better the profitability ratio, the better it illustrates the company's high profit-making ability. One of the profitability ratios suitable for describing the rate of return on assets is Return on Asset (ROA). ROA is an indicator that

can describe the capacity of asset management to generate income (Dietrich & Wanzenried, 2011). Another ratio that will be used to measure profitability is Net Interest Margin (NIM).

Based on the banking performance indicator formula and risk profile assessment in Appendix 1 of the Banking Industry Profile Report, the ROA and NIM formulas that will be used are as follows:

$$\text{ROA} = \frac{\text{Profit Before Tax}}{\text{Average Total Assets}}$$

$$\text{NIM} = \frac{\text{Net Interest Income}}{\text{Average Earning Assets}}$$

Independent Variable

Credit Risk

Banks whose main business is lending will always face the risk of default. According to OJK Circular Letter No.42/SEOJK.03/2016, credit risk is the risk due to the failure of debtors and/or other parties to fulfil obligations to the Bank. Credit risk is the dominant risk faced by the Bank in accordance with the characteristics of its business so credit quality is an important indicator in determining the health level of the bank (Murtiyanti, 2015).

Loans can be categorized as performing and non-performing loans. Non-performing loans are better known as non-performing loans (NPL), which is a condition when the borrower (debtor) cannot pay its obligations in accordance with the initial agreement. The credit quality (collectability) included in non-performing loans is the quality of Substandard (KL), Doubtful (D) and Bad Debt (M), while performing loans are loans categorized as Current (L) and Special Attention (DPK).

The measure of credit risk in this study is carried out by adding restructured loans with Current quality in line with the stimulus policy carried out in order to overcome the COVID-19 pandemic. One of the relaxations given to Indonesian banks is in the form of credit restructuring without reducing credit quality or still being considered current after restructuring (OJK press release, 2020). Credit risk during the COVID-19 pandemic has increased even though the Gross NPL ratio as shown in Table 1 does not show a significant spike so it cannot yet describe the potential credit risk of Indonesian banks as a whole. Therefore, it is relevant to introduce a new measure of credit risk that is suitable for use

during the stimulus period. Thus, the credit risk measure for Indonesian banks, especially during the Covid-19 pandemic, needs to be added with the restructuring of loans with current quality or called NPL+, namely all non-performing loans with the credit quality of Substandard (KL), Doubtful (D) and Bad Debt (M) and restructuring of loans with Current quality (L). Considering this policy, credit risk will be measured using the following formula:

$$\text{NPL}(+) = \frac{\text{Non} - \text{performing Loans} + \text{Restructured Loans with Current Credit Quality}}{\text{Total Credit}}$$

Non-performing loans will affect profitability through loan loss provision (LLP). Banks need to manage sufficient provisions to anticipate loan losses and estimate the number of losses as a basis for determining the percentage of provisioning. A high LLP indicates low credit quality, therefore resulting in low profitability (Dietrich & Wanzenried, 2011). Credit risk measurement will use LLP or CKPN for robustness. The definition of CKPN according to OJK is an allowance formed when the carrying value of a loan after impairment is less than the initial carrying value with the following formula:

$$\text{LLP} = \frac{\text{LLP}}{\text{Total Assets}}$$

Bank Size

The size of the Bank will refer to POJK No.6/POJK.03/2016 concerning Business Activities and Office Network Based on Bank Tier 1 Capital. Based on the POJK, banks are grouped into 4 (four) BUKU s, namely BUKU 1 with core capital of less than Rp1 trillion, BUKU 2 with core capital of at least Rp1 trillion to less than Rp5 trillion, BUKU 3 with core capital of at least Rp5 trillion to less than Rp30 trillion and BUKU 4 with core capital of at least Rp30 trillion. The larger the BUKU of the bank, the more varied and differentiated its products and services will be. Bank size as an independent variable refers to the research of (Thi Thanh Tran & Phan, 2020), which uses dummy variables to distinguish banks based on BUKU, namely BUKU 1 using a value of 1, BUKU 2 using a value of 2, BUKU 3 with a value of 3 and BUKU 4 using a value of 4.

Table 3
Number of Banks by BUKU Category

	2016	2017	2018	2019	2020	2021	2022
BUKU 1	13	12	11	4	3	3	3
BUKU 2	29	28	29	34	33	33	33
BUKU 3	18	20	20	21	21	20	19
BUKU 4	5	5	5	6	8	9	10
Total	65	65	65	65	65	65	65

Source: processed by the author

Furthermore, for robustness purposes, bank size will be tested using the Natural Logarithm of Total Assets (LnTA) as used in (Dang & Nguyen, 2022).

Control Variables

The control variable used in this study is the leverage ratio. The leverage ratio will be measured using equity to total assets (ETA). ETA with a negative coefficient indicates that a bank with large equity leads to a reduction in debt so that it does not benefit from financial leverage (Thi Thanh Tran & Phan, 2020).

Table 4
List of Research Variables

Variable	Description	sign	Ref.
Dependent Variable			
ROA	$ROA = \frac{Profit\ Before\ Tax}{Average\ Total\ Assets}$		OJK
Dependent Variable			
NPL+	$NPL(+) = \frac{Non-performing\ Loans + Restructured\ Curre}{Total\ Credit}$	−	OJK
Size Dummy	Book 1, D=1 Book 2, D=2 Book 3, D=3 Book 4, D=4	+/−	OJK, (Thi Thanh Tran & Phan, 2020)
Control Variables			
Leverage	$ETA = \frac{Equity}{Total\ Assets}$	+/−	(Thi Thanh Tran & Phan, 2020)
Robustness			

Variable	Description	sign	Ref.
Dependent Variable			
NIM	$NIM = \frac{Net\ Interest\ Income}{Average\ Earning\ Assets}$		OJK
Size	Ln Total Assets		(Thi Thanh Tran & Phan, 2020)
Dependent Variable			
LLP	$LLP = \frac{LLP}{Total\ Aset}$	−	(Dang & Nguyen, 2022)

This study will use a dynamic panel data model characterized by the presence of lag-dependent variables among the regressor variables. The dynamic panel data model is used to describe the relationship between economic variables which in reality many are dynamic. The relationship between economic variables is basically a dynamism in which variables are not only influenced by variables at the same time but also influenced by variables at the previous time (Lubis, 2013). The regression model developed to test hypotheses 1 and 2 is as follows:

1. $\mathrm{ROA}_{i.t} = \alpha_0 + \mathrm{ROA}_{i.t-1} + \beta_1 \mathrm{NPL}_{i.t} + \beta_3 \mathrm{DUMMYSize}_{i.t} + \beta_4 \mathrm{Leverage}_{i.t} + V_i + \varepsilon_{i.t}$
2. $\mathrm{ROA}_{i.t} = \alpha_0 + \mathrm{ROA}_{i.t-1} + \beta_1 \mathrm{LLP}_{i.t} + \beta_3 \mathrm{Size}_{i.t} + \beta_4 \mathrm{Leverage}_{i.t} + V_i + \varepsilon_{i.t}$
3. $\mathrm{NIM}_{i.t} = \alpha_0 + \mathrm{NIM}_{i.t-1} + \beta_1 \mathrm{NPL}_{i.t} + \beta_3 \mathrm{DUMMYSize}_{i.t} + \beta_4 \mathrm{Leverage}_{i.t} + V_i + \varepsilon_{i.t}$

This study used the Generalized Method of Moments (GMM) first introduced by Pearson in 1895. GMM will provide a generalization of conventional estimator methods that have been widely applied in finance and are suitable for time series, cross-sectional, and panel data. GMM is more efficient than others in examining dynamic panel data and overcoming potential endogeneity, heteroscedasticity, and autocorrelation problems (Thi Thanh Tran & Phan, 2020). The data analysis method used in this study is GMM First Differences (GMM-FD) developed by Arellano-Bond (1991) which has results with unbiased, consistent, and efficient properties. The use of the GMM method is done with the consideration that GMM is a common estimator is a simple alternative to other estimators and provides benefits for comparison and assessment (Lubis, 2013).

The type of research used was descriptive. This research was called descriptive because this research starts from collecting data, inventorying data, processing data, and then presenting the results accompanied by interpretation so that a clear picture can be obtained to answer the problem formulation (Fadillah, 2022).

RESULTS AND DISCUSSION

Descriptive Statistics

Table 5 presents descriptive statistics of the data used in this study. The results of descriptive statistics are divided into 2 (two) categories, namely data before the Covid-19 pandemic and during the Covid-19 pandemic. The observed data (N) is data with a semi-annual period with the amount of data (T) for the period before the pandemic, namely 2016-2019, which is 520 data, while during the pandemic, namely 2020-2022, there are 390 data.

Table 5
Descriptive Statistics Before the Pandemic (2016-2019) and During the Pandemic (2020-2022)

Variable	Before the pandemic					During the pandemic				
	Obs.	Mean	Std.Deviasi	Minimum value	Maximum value	Obs.	Mean	Std. deviate	Minimum value	Maximum value
ROA	520	1.2245270	1.9942110	-18.48	5.7210000	390	0.6855695	2.48048	-14.994	5.739
NIM	520	4.644	1.981	0.391	19.171	390	3.983844	2.312572	-2.892	18.612
NPL (+)	520	0.0525208	0.0352631	0.0002920	0.2986419	390	0.169719	0.1223593	0.00000512	0.563534
LLP	520	0.0139684	0.0126083	0.0000345	0.1509545	390	0.1039641	0.5996439	0.0003	9.129
Total assets	520	98.200.000	216.000.000	539.608	1.340.000.000	390	130.000.000	295.000.000	961.047	1.760.000.000
L Size	520	16.899	1.780	13.199	21.019	390	17.29437	1.599028	13.77578	21.28692
Leverage	520	0.191	0.107	0.075	0.868	390	0.2395736	0.2239859	0.014	2.1136

Source: Stata output, 2023 (processed)

The statistics of the research variables show that before the pandemic, the dependent variables ROA and NIM had the highest values (Max) of 5.72 and 19.17, while the lowest values (Min) were both -18.48 and 0.39. The average value (Mean) of ROA and NIM is 1.22 and 4.64 with a standard deviation of 1.99 and 1.98, respectively. Furthermore, during the pandemic, the dependent variables ROA and NIM have the highest values (Max) of 5.74 and 18.61, while the lowest values (Min) are -14.99 and -2.89. The mean during the pandemic for the dependent variables ROA and NIM is 0.68 and 3.98 with a standard deviation of 2.48 and 2.31, respectively. This illustrates that the dependent variable ROA both before the

pandemic and during the pandemic has a large enough distribution because the deviation is greater than the average value so that the data deviation on the ROA variable is classified as poor, while the dependent variable NIM both before the pandemic and during the pandemic has a relatively smaller distribution because the deviation is smaller than the average value so that the data deviation on the NIM variable is classified as good. The profitability variable before and during the pandemic has a negative value for the minimum value or from the bank sample, there are still banks that experience losses.

Independent variables including control variables including NPL+, LLP, Size, and Leverage have descriptive statistics both before the pandemic and during the pandemic as follows:

1. The NPL (+) variable before the pandemic has a Mean of 0.05 with a standard deviation of 0.035, while during the pandemic it has a Mean of 0.17 with a standard deviation of 0.12. This illustrates that the NPL variable both before the pandemic and during the pandemic has a fairly large distribution with poor data deviation. There has been an increase in NPL values during the Covid-19 pandemic.
2. The LLP variable before the pandemic has a Mean of 0.014 with a standard deviation of 0.013, while during the pandemic it has a Mean of 0.10 with a standard deviation of 0.60. This illustrates that the LLP variable before the pandemic has a relatively smaller distribution with a data deviation that is classified as good, while during the pandemic it has a fairly large distribution with data that is classified as unfavorable. In line with the increase in NPLs during the pandemic, LLP during the pandemic has also increased.
3. The Size variable in the form of total assets has a Mean of 98.2 trillion with a standard deviation of 216 trillion before the pandemic. In the period during the pandemic, it has a Mean of 130 trillion with a standard deviation of 295 trillion. This illustrates that the Size variable both before the pandemic and during the pandemic has a fairly large distribution with the data deviation on the Size variable classified as unfavorable. During the pandemic, banks in Indonesia are still experiencing good growth so the Mean and Maximum values have increased. Furthermore, LnTA (Lsize), before the pandemic had a Mean of 16.89 with a standard deviation of 1.78 while during the pandemic it had a Mean of 17.29 with a standard deviation of 1.59.

4. The Leverage variable before the pandemic had a Mean of 0.19 with a standard deviation of 0.11, while during the pandemic it had a Mean of 0.24 with a standard deviation of 0.22. This illustrates that the Leverage variable both before and during the pandemic has a relatively small distribution with a relatively good data deviation.

Model Estimation Results Before and During the Pandemic

Model Test

Dynamic model testing is done by looking at the significance of the lag variable (t-1), which if the result is significant then the model is a dynamic GMM model.

Table 6
Model Test

Variable	Before the pandemic			During the pandemic		
	Value t-stat	Sig.	Description	Value t-stat	Sig.	Description
Lag ROA	22.26	0.000	Significant	8.16	0.000	Significance
Lag NIM	45.99	0.000	Significant	16.43	0.000	Significance

Source: Stata output, 2023 (processed)

The model test results in Table 6 show that the dependent variable with t-1 is significant so the suitable model is a dynamic model using GMM-FD.

Classical Assumption Test

The Generalized Method of Moment (GMM) approach for dynamic models will only use autocorrelation and heteroscedasticity tests considering the lag (t-1) variable in panel data regression analysis has significant results.

Autocorrelation Test

The autocorrelation test uses the Arellano-Bond test which is carried out to test whether or not residuals are bound or independent between one observation and another. The results of the autocorrelation test are as follows:

Table 7
Autocorrelation Test Results

AB Test	Before the Pandemic		During the Pandemic	
	z	Prob>z	z	Prob>z
AR1	-2.4988	0.0125	-1.3477	0.1777
AR2	1.0474	0.2949	-0.54705	0.5843

Source: Stata output, 2023 (processed)

The provisions of the GMM Arellano-Bond approach are as follows:

H_0 = There is an autocorrelation problem in the model.

H_1 = There is no autocorrelation problem in the model.

The results from Table 8 show that the dynamic panel method with the GMM Arellano-Bond (AR2) approach has a Prob> z value both before the pandemic and during the pandemic. With an alpha of 5%, the autocorrelation test results decide to reject H0, which means that there is no autocorrelation problem in the model before and during the pandemic. According to (Juanda, 2021), the Arellano Bond test for GMM-FD is used to ensure that the error term is not serially correlated in AR(2) so that the estimate obtained shows that there is no autocorrelation.

Heteroscedasticity Test

A heteroscedasticity test is conducted to test whether or not there is a residual variance model for different observations. In the GMM Arellano-Bond approach, the Sargan test is used to detect heteroscedasticity. The Sargan test hypothesis is as follows:

H_0 = There is no heteroscedasticity problem in the model.

H_1 = There is a heteroscedasticity problem in the model.

Table 8
Heteroscedasticity Test Results

Sargan Test	Before the Pandemic	During the Pandemic
Chi2	36.66534	13.4421
Prob > chi2	0.0801	0.2654

Source: Stata output, 2023 (processed)

The results of the Sargan test show a p-value (prob> chi2) of 0.0801 before the pandemic and 0.2654 during the pandemic with an alpha of 5%, so the conclusion in this study is that the value of the Sargan test is greater than alpha, namely there is no heteroscedasticity problem in the model before and during the pandemic.

Dynamic Panel Data Regression Model

The regression results of the two dynamic models with the t-test are used to test the effect of each independent variable on the dependent variable. The test is conducted by comparing the t-count with the t-table or with the probability of significance of each variable. The test results are presented in the following table:

Table 9
GMM Regression Results

Variable	Before the pandemic			During the pandemic		
	Est. Coeff.	p-value	Desc.	Est. Coeff.	p-value	Desc.
LROA	0.283	0.000	***	0.501	0.000	***
NPL(+)	-6.152	0.000	***	-2.728	0.177	-
BUKU 2	0.065	0.600	-	-14.393	0.024	**
BUKU 3	0.173	0.341	-	-20.255	0.006	***
BUKU 4	0.141	0.804	-	-19.380	0.009	***
Leverage	-2.801	0.000	***	0.456	0.438	-
Constanta	1.720	0.000	***	17.464	0.008	***
ROBUSTNESS Var. Independent (LLP)						
LROA	0.211	0.000	***	0.392	0.000	***
LLP	-73.804	0.000	***	-2.076	0.014	**
Lsize	-0.109	0.343	-	1.196	0.000	***
Leverage	-2.165	0.008	***	0.614	0.261	-
Constanta	4.495	0.022	**	-20.672	0.000	***
ROBUSTNESS Var. Dependent (NIM)						
LNIM	0.968	0.000	***	0.588	0.000	***
NPL (+)	-6.077	0.000	***	-3.938	0.007	***
BUKU 2	-0.617	0.000	***	-4.797	0.631	-
BUKU 3	-1.122	0.000	***	-5.203	0.613	-
BUKU 4	-1.240	0.000	***	-5.345	0.604	-
Leverage	-0.323	0.523	-	0.187	0.379	-
Constanta	1.176	0.000	***	7.001	0.478	-

Source: Stata output, 2023 (processed)

Notes: significance 99%; significance 95%; significance 90%

As shown in Table 9 above, in the pre-pandemic period, the independent variable NPL (+) has a significant negative effect on ROA profitability, while bank size based on BUKU has an insignificant positive effect on ROA profitability. Robustness for the Independent variable using LLP also has a significant negative effect on ROA profitability, while bank size using Ln total assets (Lsize) has an insignificant negative effect. Robustness for the dependent variable using NIM shows that NPL (+) has a significant negative effect on profitability, as well as bank size based on BUKU has a significant negative effect on NIM profitability.

Furthermore, for the period during the pandemic, the regression results show that NPL (+) has an insignificant negative effect while bank size based on BUKU has a significant positive effect on ROA profitability. If profitability uses NIM, NPL (+) still consistently has a significant negative effect but the size of the bank based on BUKU has an insignificant positive effect. Robustness for independent variables in the form of LLP has a significant negative effect and bank size with Ln total assets (Lsize) has an insignificant negative effect on NIM profitability.

Leverage in the pre-pandemic period has a significant negative effect on ROA profitability but not significant on NIM profitability. Considering that banks with high equity will try to reduce external debts, among others, through strengthening capital, so they do not benefit from leverage as researched by (Thi Thanh Tran & Phan, 2020). In the period during the pandemic, leverage has a positive but insignificant effect on ROA and NIM.

The Effect of Credit Risk on Profitability

Increased credit risk will adversely affect profitability as banks form provisions to absorb estimated losses (Handorf & Zhu, 2005). High LLP formation indicates low credit quality, therefore resulting in low profitability (Dietrich & Wanzenried, 2011). This is consistent with the regression results in this study that credit risk using both NPL(+) and LLP negatively affects profitability both before and during the COVID-19 pandemic. In practice, the reserves formed by banks in anticipation of credit risk indicate the bank's readiness to absorb estimated losses and become part of the credit risk management process (Handorf & Zhu, 2005) as stated by (Fang et al., 2019) in their research, the formation of LLP will significantly reduce profits. Banking conditions in Indonesia that anticipate credit risk by forming reserves negatively affect profitability is in line with the results of research from (Dietrich & Wanzenried, 2011) and (Thi Thanh Tran & Phan, 2020).

Especially in the period during the pandemic, NPL(+), which is a measure of credit risk after taking into account current restructured loans which are the object of OJK's credit stimulus relaxation policy, is expected to have an insignificant effect on profitability due to the stimulus policy that allows banks not to reduce credit quality (still counted as current loans) with loss reserves that do not have to be increased. As researched by (Dang & Nguyen, 2022), loss reserves will be postponed until the uncertain period fades so that the amount

formed will tend to decrease. This shows that the stimulus policy in the form of credit relaxation by OJK is quite effective in keeping the NPL ratio under control with uninterrupted profitability.

Bank profitability during the COVID-19 pandemic is not significantly affected by credit risk, it is suspected to be partly influenced by the good adaptability of banks in Indonesia so that the negative impact of credit risk can be minimized. This adaptation includes the ability of banks to strengthen other services that are not traditional bank products or in (Djebali & Zaghdoudi, 2020) research referred to as economic performance and eliminate imbalances due to unexpected or undesirable events (e.g. Covid-19 pandemic) from banking risks. This is in line with the concept shift from banks that focus on intermediation (traditional banks) to banks that are encouraged to carry out operational activities and banking services by utilizing digital channels through changes in OJK regulations, which were previously in the form of classifying banks based on BUKU as a basis for increasingly diverse activities and services to the classification of bank groups based on core capital (KBMI) which allows banks to operate and provide unlimited services.

Based on the above analysis, the research results are in line with previous research conducted on banks in Vietnam by (Thi Thanh Tran & Phan, 2020) and (Dang & Nguyen, 2022) and banks in Switzerland by (Dietrich & Wanzenried, 2011) that credit risk has a negative influence on profitability. This is part of the risk management process in anticipating external factors in the form of stress episodes such as the Covid-19 pandemic by increasing the formation of allowances or Provision for Impairment Losses (CKPN) which in turn will reduce profitability due to increased operating costs.

Effect of Bank Size on Profitability

Bank size will provide benefits in the form of economies of scale so as to encourage profitability (Dietrich & Wanzenried, 2011). The results of research on commercial banks in Indonesia show that bank size is a factor that positively and insignificantly affects profitability for both small, medium, and large bank sizes in the pre-pandemic period, while bank size has a negative and significant effect in the period during the pandemic for banks with small, medium and large sizes.

In the pre-pandemic period, bank size categorized by BUKU had a positive effect on profitability (ROA). This shows that banks in Indonesia in the pre-pandemic period benefited from economies of scale due to business development, thus encouraging ROA profitability. However, banks categorized as medium-sized banks, namely BUKU 3, earned higher profits than banks categorized as smaller or larger banks. Larger banks or BUKU 4 in Indonesia are dominated by Government Banks that participate in riskier long-term financing projects in order to support the government in line with the results of (Thi Thanh Tran & Phan, 2020) research in Vietnamese banking. Medium-sized banks can earn higher profits presumably because they operate more efficiently in order to survive in business competition with peers and larger banks.

In the period during the pandemic, bank size had a negative effect. This is in line with the research results from (Dietrich & Wanzenried, 2011), finding that bank size (size) has a negative relationship with profitability in certain periods (e.g. crisis) and further confirms (Bhagat et al., 2015) explanation that banks with large sizes are considered riskier even though in times of crisis they tend to be more able to survive. The larger the size of the bank, the compensation for reputation management including other operating costs in addition to higher loss formation has driven a negative relationship with profitability (Dietrich & Wanzenried, 2011). (Dietrich & Wanzenried, 2011) also showed that large banks will be less profitable in 2-3 years during the crisis or in this case during the Covid-19 pandemic, although for Indonesian banking, medium-sized banks have a higher coefficient than larger banks and smaller banks.

Simultaneous Hypothesis Test (F Test)

The F test is used to determine the effect of independent variables together (simultaneously) on the independent variable. The test results show that H0 is rejected, namely the F-Statistic value> 0.05 with an F Significance value of 0.000 so that all independent variables consisting of NPL (+), Size, and Leverage simultaneously affect ROA and NIM both before and during the Covid-19 pandemic.

Table 10
Simultaneous Hypothesis Test Results

Uji F	Before the Pandemic	During the Pandemic
ROA		

Wald Chi2	900.32	164.10
Prob > Chi2	0.0000	0.0000
NIM		
Wald Chi2	7984.74	358.32
Prob > Chi2	0.0000	0.0000

Source: Stata output, 2023 (processed)

CONCLUSION

Based on the analysis, this study concludes that credit risk, measured by NPL+ which includes current loan restructuring due to OJK stimulus policy, had a significant negative effect on profitability before the COVID-19 pandemic. However, during the pandemic, the effect of credit risk is not significant, suggesting that banks in Indonesia managed to adapt well to mitigate the impact of credit risk on profitability. In addition, bank size has no significant effect on profitability before the pandemic but has a significant negative effect during the pandemic, presumably due to increased operating costs. The suggestion from this study is that OJK's stimulus policy has proven to be effective in mitigating potential credit risk during the pandemic. However, further research needs to be conducted using more specific measures of credit risk. Banks are also advised to optimize business strategies, including leveraging economies of scale and business diversification to maintain financial performance in times of crisis.

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