

The Impacts of Green Credit Policy, Bank-Specific, Industry-Specific, and Macroeconomic Variables on Bank Profitability in Indonesia

Rahmat Siauwijaya, Meiryani, Theresia Lesmana

Accounting Department, School of Accounting, Bina Nusantara University Jakarta 11480, Indonesia

rahmat.siauwijaya@binus.ac.id (Corresponding Author)

Abstract. This empirical research investigates the impact of green credit policy, bank-specific factors, industry-specific factors, and macroeconomic variables on bank profitability using a balanced panel dataset comprising 43 Indonesian commercial banks from 2003 to 2021. The study aims to contribute to the existing literature on banking. The findings reveal several significant relationships by employing a fixed effect model for estimation. Specifically, bank size, capital, diversification, bank competition (measured by the Boone indicator), and inflation positively influence metrics such as return on assets (ROA), return on equity (ROE), net interest margin (NIM), and pre-tax profit (PBT). Conversely, an increase in market power, as indicated by the adjusted Lerner index, is associated with a decrease in NIM. The introduction of green credit policy has a positive and significant effect on ROE, NIM, and PBT, indicating that considering environmental factors in credit decisions does not impede banks' ability to channel credit; instead, it helps attract quality customers. The study finds that liquidity risk, loans to deposits ratio, and cost efficiency significantly and positively impact NIM. These three variables are interconnected, as increased liquidity risk due to higher loan-to-deposit ratios is expected to lead to increased cost efficiency and, ultimately, enhanced bank profitability. Finally, the analysis reveals risky loans negatively and significantly influence ROA, ROE, NIM, and PBT. Overall, this research contributes valuable insights into the relationships between green credit policy, bank-specific factors, industry-specific factors, macroeconomic variables, and bank profitability in the Indonesian context. The results provide implications for policymakers and practitioners in the banking industry, highlighting the importance of considering environmental factors in credit decisions and emphasizing the significance of managing liquidity risk, loan-to-deposit ratios, and cost efficiency to enhance profitability. The study's findings warrant further attention and exploration in future research.

Keywords: Green credit policy, Market Power, Macroeconomic, Bank profitability, Indonesia

1. Introduction

In the last decade, banking in Indonesia has carried out a thorough transformation both in the policy area and in the area of operation. The green credit policy is one of the transformations still being discussed in academia and professional circles. They question whether this green credit policy can improve bank performance or vice versa. In addition, factors of global economic uncertainty due to the ongoing Covid-19 pandemic could be one of the reasons for a decline in bank performance. The determinants of bank performance are still a concern of bank management, financial markets, and bank supervisors. Therefore, our paper will examine the impact of green credit policy, bank-specific, industry-specific, and macroeconomic, on bank profitability.

The studies on bank profitability, such as Addai et al. (2022), Athanasoglou et al. (2008), Lamers et al. (2022), Rakshit and Bardhan (2022), Song et al. (2019), Tan (2016) and Tan and Floros (2012) used a linear model to estimate the impact of various factors that may be important in explaining earnings. Although several researchers have demonstrated the factors that impact bank profitability, several issues have not been adequately discussed. First, the existing literature generally only considers the determinants of profitability at the bank and industry levels. Second, profitability variables such as return on assets (ROA), net interest margin (NIM), return on equity (ROE), and profit before tax (PBT) are studied separately by several researchers. Third, the econometric methodology literature was not explained adequately.

The empirical literature on bank profitability in Indonesia by Amalia and Nugraha (2021) investigates bank performance in terms of risk profile, income, and capital aspects of all banks in Indonesia. Nur Faaiz et al. (2021) conducted a comparative empirical assessment of the determinants of profitability between Islamic banks and conventional banks in Indonesia. Prasanto et al. (2020) investigate the effect of short-term and long-term variables on bank profitability. Their findings regarding factors that impact bank profitability vary among researchers. We hypothesize this could have been caused by their researchers using different bank holdings, such as Amalia and Nugraha., (2021) used state-owned banks, regional development banks, and domestic private banks. Nur Faaiz et al. (2021) investigate Islamic banks. Prasanto et al. (2020) investigated the profitability of state-owned banks. Some literature on the factors influencing bank profitability still shows different findings among researchers (see Table 1). In addition, the bank profitability variable is still used separately. Therefore, bank profitability in Indonesia is still very open to scrutiny.

In this paper, we will focus on the analysis of bank profitability in Indonesia because this is an important factor in assessing a bank's soundness, which reflects the bank's management's success. Our research question is whether green credit policy, internal and external bank factors have an impact on bank profitability in Indonesia. In addition, banks that have high profitability can increase competitiveness. Using a commercial sample of commercial banks, we will test whether green credit policy, bank-specific, industry-specific, and macroeconomic variables impact bank profitability in Indonesia. This paper contributes as follows: (1) This paper is the first that uses the green credit policy variable to examine its impact on bank profitability in Indonesia. (2) This paper can be used by bank management as a basis for determining policies related to profitability. (3) The impact of industry-specific bank profitability will be measured using adjusted Lerner and Boone indicators, which was previously done by most researchers using the Lerner index and Herfindahl-Hirschman. According to some researchers, using adjusted Lerner and Boone indicators as competition indicator is more appropriate (see Koetter et al., 2012; Rakshit and Bardhan, 2022).

Our findings show that bank size, capital, diversification, and competition (Boone indicator) strongly impact ROA, ROE, NIM, and PBT. These findings explain that Indonesia's banking industry has large and strong assets and capital structures. Another fact, banks in Indonesia are actively maximizing profitability. As measured by the Boone indicator, competition positively impacts ROA, ROE, NIM, and PBT. Interestingly, these results differ from the competition indicator measured by the

adjusted Lerner, which negatively impacts NIM. We suspect this may be due to the adjusted Lerner assuming that all banks are not fully efficient. Our findings show that liquidity risk, loans to deposits, cost efficiency, and inflation significantly and positively affect NIM. This finding explains that banks must have channels that are always ready to provide funds to meet maturing obligations such as withdrawing deposits, credit, or capital requirements for operational purposes. Bank management must also consider the loan to deposits ratio and cost efficiency during bank operations to maximize bank profitability. The inflation factor is also one of the determinants of bank profitability. In addition, green credit also has a positive relationship with ROE, NIM, and PBT. These findings report that the green credit policy does not impede the credit granting process. On the contrary, it can help banks minimize the risk of default. Finally, increased loan risk will reduce bank profitability, such as ROA, ROE, NIM, and PBT.

The next sections of this paper will be structured as follows: Section 2 discusses the literature on bank profitability, green credit policy, and the development of the Indonesian banking sector. Section 3 introduces data, determinants of bank profitability, variable selection, and empirical models. Section 4 introduces the results of the empirical research. Section 5 summarises the conclusions and proposes policy suggestions.

2. Literature Review

2.1 The empirical literature on bank profitability

In the literature, internal and external factors are usually stated as a determinant of bank profitability. Athanasoglou et al. (2008) found that internal determinants come from items in the balance sheet and income statement, usually called micro or bank-specific determinants of profitability. External factors come from variables unrelated to bank management but reflect the economic or macroeconomic environment. Researchers have proposed several variables for both categories. Research that focuses on the analysis of banking profitability across countries and each country. The empirical literature that investigates the determinants of profitability using cross-country banks includes Altavilla et al. (2018), Demirgüç-Kunt and Huizinga (2000), Dietrich and Wanzenried (2014), Le and Ngo (2020), Maudos (2017), Tan and Floros (2012), Verissimo et al. (2021). Moreover, the researchers who used each country's banks are Curak et al. (2012); Joaqui-Barandica et al. (2022); Lamers et al. (2022); Rakshit and Bardhan (2022); Tan (2016); Vera-Gilces et al., (2020).

Empirical studies that examine internal and external factors such as determining profitability Athanasoglou et al., (2008); Tan, (2016); Tan et al., (2017); Tan and Floros, (2012); Vera-Gilces et al., (2020); Verissimo et al., (2021). Empirical findings vary. We suspect this is due to different data sets, environments, and consumer behavior in each country. Therefore, we believe that research related to bank profitability is still worthy of scrutiny. A recent empirical study by Joaqui-Barandica et al. (2022) examined banks' profitability in the United States economy by the mean dynamic factor, and Lamers et al. (2022) investigated profitability convergence for the euro-area banks. (Rakshit and Bardhan, 2022) investigate whether changes in bank competition, efficiency, and risk-taking affect the profitability of Indian commercial banks. The empirical literature that examines the impact of internal and external factors on bank profitability in Indonesia includes Rachim et al. (2021), Sihotang et al. (2022), and Widyastuti et al. (2017) using data from commercial banks and Islamic banks with internal, external and bank profitability variables.

Overall, the existing empirical literature has explained the influence of internal and external determinants on bank profitability. However, most of the literature proposes that the determinants of bank profitability are not comprehensive or are still being proposed separately. Alexiou and Sofoklis (2009) analyze internal factors determining profitability (ROA, ROE) using bank size, loan-to-deposit, cost efficiency, credit risk, and bank productivity. Verissimo et al. (2021) use variable profitability (ROA, ROE), internal and external factors such as non-performing loans, bank efficiency, bank size,

capitalization, GDP, and inflation. Vera-Gilces et al. (2020) propose variable probability (ROA, ROAA), internal and external determinants of capital, liquidity, size, lending rate, labor productivity, credit risk, cyclical, inflation, H-statistic, Boone, and adjusted Lerner. However, there is minimal literature proposing ROA, ROE, NIM, and PBT to measure bank profitability. Therefore, we propose more comprehensive variables to measure bank profitability and its determinants in this paper.

2.2 Green credit policy and development of the Indonesia banking sector

The Indonesian government has determined Undang-Undang on environmental protection and management. Environmental protection and management is a systematic effort by the government to prevent environmental pollution and damage. Following up on this matter, Bank Indonesia determines Peraturan Bank Indonesia regarding assessing the quality of commercial bank assets. Bank Indonesia requires that business actors who apply for funding from banks conduct an environmental feasibility assessment of their business activities following regulations drawn up by the government. In addition, Bank Indonesia also stipulates that Peraturan Bank Indonesia encourages banks to increase lending to the micro, small, and medium enterprise sector. Policies and regulations governing the banking system in each country are compiled, taking into account local needs and characteristics, which may differ from country to country. Yao et al. (2021) found that environmental regulation is essential to promoting economic development. Banks are critical in supporting development to create economic, environmental, and social sustainability. Petitjean 2019 found that the environmental policies of large companies in the United States are not related to financial performance. Nevertheless, Liu et al. (2021) found that tighter energy policies will reduce the financial performance of companies in industries with high energy intensity. This condition prompted several researchers to investigate the impact of green credit policy on bank profitability, such as Lian et al. (2022), Mirza et al. (2023), Song et al. (2019), Yao et al. (2021), Zhao and Xu, (2012).

The external and internal banking environment has developed rapidly in the past decade. The increasing complexity of banking activities will increase the need for risk management. Poor asset quality, risk management, and low liquidity levels are the causes of bank failure. Empirical studies that analyze the impact of loan risk and liquidity risk on bank profitability are Acharya et al. (2010), Alexiou and Sofoklis (2009), Altavilla et al. (2018), Khan et al. (2017), Rakshit and Bardhan (2022), Sufian (2011). Alexiou and Sofoklis (2009) found that loan risk negatively impacts bank profitability, while liquidity risk is related to the bank's ability to manage funding sources. Rakshit and Bardhan (2022) found that liquidity risk negatively impacts bank profitability. Acharya et al. (2010) found that a flood of liquidity will reduce the sensitivity of bankers to the risk of decreasing credit quality. Yao et al. (2021) found that green credit policy can help bank reduces the risk of default due to environmental problems. Nandy and Lodh (2012) analyze the impact of green credit policy on credit granting decisions. Cui et al. (2018) and Zhang et al. (2011) found that the green credit policy can help banks avoid loan risk due to environmental problems.

Commercial banks' total assets grew by 38.36% in the last decade, accompanied by increased credit and third-party funds. In quarter 4 of 2011, the bank's total current commercial earnings were recorded at 75,077 billion rupiah, an increase of 168.81% compared to the position in quarter 4 of 2022, which was recorded at 201,817 billion rupiah. Conventional commercial bank income for Return on Assets (ROA) and Net Interest Margin (NIM) each year is 2.73% and 5.36%. In addition, conventional commercial banks' efficiency is also improving, as seen from the decrease in operating expenses to operating income (BOPO) ratio of 6.77% from 85.42% in 2011 to 78.65% at the end of 2022. The national banking risk profile is controlled, with an average non-performing loan ratio of 2.31 % and a high liquidity ratio of 20.86%. Even though there is a trend of increasing performance in various indicators nationally, several banks still have experienced a decline in profitability when viewed individually. The cause of the decline in profitability could be due to internal and external factors.

3. Data, Determinant of Bank Profitability, Variable Selection and Methodology

3.1 Data

We used a sample of 43 commercial banks in Indonesia from 2003-2021 to achieve the goals proposed in this paper. The data used is panel data. We limit the sampling to banks that publish financial statements with complete and audited data during the sampling period. Balance and income statement data are obtained from the official website of the Indonesia Stock Exchange or each bank's website. The data we take from the financial statement are credit working capital, net loans, total assets, total equity, total deposits, loans to deposits, gross revenue, number of employees, net interest income, overhead expenses, interest income, non-interest income, liquid assets, interest expenses, non-interest expenses, total operating cost, total saving, ROA, ROE, NIM, PBT. For inflation data, we took it from the Bank Indonesia website.

Table 1. Descriptive statistics and correlation

Panel A: Descriptive statistics						
Variables	Observations	Mean	Standard Deviation	Minimum	Maximum	
1. Return on assets	817	0.0108356	0.0630842	-1.5299000	0.1770000	
2. Return on equity	817	0.0723998	0.4228756	-9.8163000	4.0286000	
3. Net interest margin	817	0.0562743	0.0258368	-0.0352000	0.2184000	
4. Profit before tax	817	0.0100431	0.0514320	-1.2855040	0.1239569	
5. Green credit	817	0.4911105	0.0243109	0.4498000	0.5322000	
6. Bank size	817	16.3147700	2.2516310	9.7722390	21.2688500	
7. Capital	817	0.1593414	0.1270485	-0.2748754	0.9901368	
8. Loan risks	817	0.0196840	0.0213197	-0.0330000	0.2051000	
9. Liquidity risk	817	0.2095628	0.1567801	0.0080092	2.6572450	
10. Labor productivity	817	0.0513139	1.7620910	-6.0334790	7.2431990	
11. Loans to deposits	817	0.8451212	0.4393754	0.1235000	6.3082000	
12. Lending rate	817	0.1874083	0.3041997	0.0117262	5.4629780	
13. Diversification	817	0.1119348	0.1263885	0.0010548	1.9149320	
14. Cost efficiency	817	0.0182735	0.1246290	-0.0142398	0.1240593	
15. Adjusted Lerner	817	-6.0326500	2.4325880	-25.8515500	-0.4971114	
16. Boone indicator	817	-8.5978920	6.3275550	-76.1088600	-1.7705640	
17. Inflation	817	0.0562474	0.0366257	0.0168000	0.1711000	

Panel B: Pearson product-moment correlation test results													
Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Green credit	1.0000												
2. Bank size	-0.3415	1.0000											
3. Capital	-0.1305	-0.4097	1.0000										
4. Loan risks	0.1670	-0.1323	-0.1842	1.0000									
5. Liquidity risk	0.3378	-0.3802	0.2451	-0.0746	1.0000								
6. Labor productivity	0.0023	0.0009	0.0369	-0.0029	-0.0246	1.0000							
7. Loans to deposits	-0.1637	-0.1042	0.2954	-0.0921	-0.1304	0.0759	1.0000						
8. Lending rate	0.1290	-0.1698	0.2674	-0.0025	0.2824	-0.0506	-0.0764	1.0000					
9. Diversification	0.0157	0.2282	-0.0980	-0.0166	-0.0320	-0.0386	-0.0815	-0.0337	1.0000				
10. Cost efficiency	0.0962	-0.3790	0.3589	-0.0764	0.2392	0.0296	0.1802	0.0709	-0.0870	1.0000			
11. Adjusted Lerner	0.3744	-0.2593	-0.1485	0.1115	0.1016	-0.0007	-0.1283	0.0461	-0.2030	-0.3511	1.0000		
12. Boone indicator	0.0922	-0.0207	-0.1817	0.0546	0.0202	-0.0120	-0.1135	0.0272	-0.5412	-0.3302	0.5782	1.0000	
13. Inflation	0.5400	-0.2232	-0.1098	0.1000	0.1914	-0.0046	-0.0735	0.0535	-0.0620	0.0900	0.2327	0.1098	1.0000

Notes: Panel A reports the descriptive statistics of the variables. Panel B reports the product-moment correlation test results.

3.2 Determinants of bank profitability

3.2.1 Green credit policy determinants

The Indonesian government issued Surat Edaran Bank Indonesia regarding the assessment of the quality of commercial bank assets. Through this regulation, the government encourages banks to increase their ability and effectiveness in managing credit risk, minimizing potential losses from providing funds. One of the contents of this regulation is that it requires every business that applies for credit to a bank to include a report Environmental Impact Assessment (AMDAL). This report will be used to decide whether to grant credit. In addition, banks must also pay attention to the performance rating assessment program in environmental management (PROPER) issued by the Ministry of Environment. Green credit policy has become a concern for researchers and academics. Some researchers have questioned whether the existing green credit policy prevents banks from extending credit. The empirical literature investigating the impact of green credit policy on bank profitability includes Lian et al. (2022), Mirza et al. (2023), Song et al. (2019), Yao et al. (2021), Zhao and Xu (2012). Based on data from Statistik Perbankan Indonesia, commercial banks increased green credit by 2.49 percent from 1,361.81 trillion rupiah at the end of 2011 to 1,068.68 at the end of 2021. Nationally, the average green credit growth in Indonesia in the past decade can be said to be high. Lian et al. (2022) found that green credit improves the financial performance of commercial banks. Mirza et al. (2023) demonstrated that when banks expand their sustainable SME lending, they will likely get bottom-line support from improved net interest margin and reduced default risk. Song et al. (2019) found that green credit negatively affects commercial banks in China. Yao et al. 2021 found that green credit policy reduces company performance in highly polluting industries.

3.2.2 Bank-specific determinants

Bank size: we measure this variable using the natural logarithm of total assets. This measure is used in some empirical literature such as Athanasoglou et al. (2008), Tan (2016), Tan and Floros (2012), Vera-Gilces et al. (2020), Veríssimo et al. (2021), Yao et al. (2021). When a bank makes a policy, one of the essential questions underlying a bank's policy is whether the size of a bank determines profitability. Several empirical studies have answered this question, such as Mirzaei et al. (2013) found that the larger size of banks has lower rates of return in developing countries but higher in developed countries. Goddard et al. (2004) found that Economies of scale are visible at a low level of asset size but became exhausted as size increased. Athanasoglou et al. (2008) found that bank size positively affects profitability.

Capital: we use the equity-to-assets ratio to proxy for this variable (see: Athanasoglou et al. (2008), Dietrich and Wanzenried (2014), Lee and Hsieh (2013), Maudos (2017), Rakshit and Bardhan (2022), Tan (2016), Tan and Floros (2012). One measure that can explain the soundness of a bank is capital. The higher the capital ratio, the higher the soundness level of the bank, and vice versa. Capital is one of the essential variables for financial institutions. Tan (2016) found that a higher capital ratio indicates that these banks have higher lending capacity. This statement is consistent with Rakshit and Bardhan (2022), which says that capital has a positive relationship with bank profitability. Banks with significant capital may be more careful in extending loans. Tan (2016) argues that capital is vital in absorbing risks from high-risk assets. Dietrich and Wanzenried (2014) state that banks with higher capital will be safer than banks with lower capital.

Loan risks: to measure this variable, we use the ratio of three types of non-performing loans to the total loans granted. The higher risk ratio indicates an increase in risk exposure, leading to a decrease in bank profitability. The empirical literature showing that risk negatively impacts bank profitability includes Altavilla et al. (2018), Dietrich and Wanzenried (2014), Rakshit and Bardhan 2022, Sufian (2011), Sufian and Chong (2008), Tan (2016), Veríssimo et al. (2021). They also found that changes in credit risk can reflect changes in the health of the bank's portfolio. The recent literature by Rakshit and

Bardhan (2022) investigated whether risk-taking affects the profitability of Indian commercial banks and found that an increase in credit risk can reduce bank profitability.

Liquidity risk: we measure this variable by using the ratio of liquid assets to total assets. We follow the measurements (see Acharya et al. (2010), Alexiou and Sofoklis (2009), Bourke (1989), and Khan et al. (2017)). We consider that banks with higher deposits have lower funding liquidity risk. Imbierowicz and Rauch (2014) said that funding liquidity risk and bank credit risk does not have a contemporaneous or causal relationship, but these two risks individually and together contribute to bank profitability. Alexiou and Sofoklis (2009) said that liquidity risk is related to the bank's ability to anticipate changes in funding sources to meet obligations at maturity. According to Bourke (1989), liquidity risk positively impacts bank profitability. Most of Indonesia's primary sources of banking liquidity come from time deposits, which are expensive funds, while interbank loans have a small portion.

Labor productivity: we use the ratio of change in gross revenue to change in the number of employees to measure this variable. Some empirical literature uses this variable to test the impact of labor productivity on bank profitability (see Alexiou and Sofoklis, 2009; Athanasoglou et al., 2008; Naceur and Omran, 2011; Rakshit and Bardhan, 2022; Tan, 2016; Tan and Floros, 2012b; Vera-Gilces et al., 2020). According to Tan (2016), higher labor productivity reflects efficient bank management, increases bank efficiency, and ultimately drives profitability. Vera-Gilces et al. (2020) analyzed the determinants of private banking profitability in Ecuador and found that labor productivity determines bank profitability. Tan and Floros (2012) state that maximizing labor productivity can be done by increasing the workforce's skills, ultimately improving company performance.

Loans-to-deposits: we measure this variable by using the total loan ratio to total deposits. We follow these measurements (see: Alexiou and Sofoklis (2009), Lamers et al. (2022), Vera-Gilces et al. (2020), and Veríssimo et al. (2021)). We find that loans-to-deposits positively impact NIM, which indicates that the higher loans-to-deposits will be followed by an increase in loan interest income, ultimately impacting bank profitability. Alexiou and Sofoklis (2009) and Lamers et al. (2022) found that loans-to-deposit positively impact bank profitability. However, Vera-Gilces et al. (2020) found that loan-to-deposits did not impact bank profitability.

Lending rate: we measure this variable using the interest income ratio to total loans. We follow the measurement of this variable (Vera-Gilces et al., 2020). the lending rate is an important factor for bank lending, as it will impact profitability.

Diversification: we measure this variable using the non-interest income ratio to gross revenue. We follow the measurement of this variable (see: Addai et al. (2022), Chiorazzo et al. (2008), Rakshit and Bardhan (2022), Tan (2016), and Tan and Floros (2012)). Addai et al. (2022) examined the impact of diversification on bank performance using bank data in several countries and found that diversification positively impacts bank performance. However, Rakshit and Bardhan (2022), Tan (2016), and Tan and Floros (2012) found that diversification has a negative impact on bank profitability. Turk Ariss (2010) say that mineralizing costs are necessary for maximizing higher profits by diversifying their sources of income.

Cost efficiency: we measure this variable by using the overhead expense ratio to total assets. We follow the measurement of this variable (see: Alexiou and Sofoklis (2009), Athanasoglou et al. (2008), Berger and Mester (2003), García-Herrero et al. (2009), Rakshit and Bardhan (2022), Tan and Floros (2012)). Berger and Mester (2003) found that banks in more concentrated local markets had lower cost efficiencies, perhaps due to a lack of competition. Besides that, Berger and Mester (2003) also found that banks that report high costs and are inefficient may generate greater profits than efficient banks in terms of costs. Athanasoglou et al. (2008) reducing operational costs will increase banks' profitability in Greece. Molyneux and Thornton (1992) examined the determinants of bank performance in eighteen European countries, and the findings support the cost preference spending theory.

3.2.3 Industry-specific determinants

We propose that market power is measured as the adjusted Lerner index and competition is measured as a Boone indicator to measure this variable. First is the adjusted Lerner index. We define inputs and outputs using the intermediation model (Koetter et al., 2012). The bank's production function uses labor and the cost of capital to attract deposits. Funds collected are used for credit lines and other productive assets. W denotes the input price. We consider two input prices; the price of funds (interest expenses to assets) and the price of capital (non-interest expenses to total assets). Y represents the output variables of the bank: total loan, total deposit, and non-interest income, according to Chen et al. (2006), Jiang et al. (2009), and Rakshit and Bardhan (2022). We also include equity following Koetter et al. (2012) because it can be used to finance loans. Besides that, equity also reflects bank risk. We are following Koetter et al. (2012) to measure this variable. Estimating marginal costs, we employ a translog total cost function for bank $j = 1, \dots, m$ at time $t = 1, \dots, T$ as:

$$\begin{aligned} \text{Log } toc_{jt} = & \alpha + \sum_{i=1}^2 \beta_i \log w_{ijt} + \sum_{p=1}^3 \gamma_p \log y_{pjt} + \delta \log z_{jt} + \sum_{i=1}^3 (\zeta_i/2) (\log w_{ijt})^2 \\ & + \sum_{i < 1} \sum_{k < 1} \eta_{ik} \log w_{ijt} \log w_{kjt} + \sum_{p=1}^3 (\theta_p/2) (\log y_{ptj})^2 + (\kappa_{12}/2) \log y_{1jt} \log y_{2jt} \\ & + \sum_{i=1}^3 \sum_{p=1}^3 \lambda_{pi} \log w_{1jt} \log y_{pjt} + \sum_{k=1}^2 v_k \text{trend}^k + \sum_{i=1}^2 \xi_i \log w_{ijt} \text{trend} \\ & + \sum_{p=1}^3 \omega_p \log y_{pjt} \text{trend} + \varepsilon_{jt}, \end{aligned} \tag{1}$$

where toc denotes total operating costs of a bank, w_{ijt} input factors $i = 1, 2$ of bank j at time t , y_{1jt} is total loans of bank j in year t , y_{2jt} is the total deposits of bank j at time t , z_{jt} is the total equity of bank j at time t , and $trend$ is the time trend that shows the technological change leading to a change in production over time, w_{kjt} represent two input prices. $\alpha, \beta, \gamma, \zeta, \eta, \theta, \kappa, \lambda, v, \xi, \omega$ are the estimated coefficients. The two inputs refer to the ratio of interest expenses to total savings, the ratio of personal expenses to the number of employees, and the ratio of non-interest expenses to total assets (w_1).

$$\begin{aligned} MC_{jt} = & \frac{TOC}{y_{1jt}} \left[\gamma_1 + \theta_1 \log y_{1jt} + (\kappa_{12}/2) \log y_{2jt} + \sum_{i=1}^3 \lambda_{1i} \log w_{ijt} + \omega_1 \text{trend} \right] \\ & + \frac{TOC}{y_{2jt}} \left[\gamma_2 + \theta_2 \log y_{2jt} + (\kappa_{12}/2) \log y_{1jt} + \sum_{i=1}^3 \lambda_{2i} \log w_{ijt} + \omega_2 \text{trend} \right] \end{aligned} \tag{2}$$

Koetter et al. (2012) said that the conventional Lerner index as a measure of competition fails to reflect true market power because this measure assumes that all banks are fully efficient. Turk Ariss (2010) states that if the assumption that all banks are fully efficient does not apply, it will lead to a bias in the Lerner index because some banks can exploit pricing opportunities arising from market power. To avoid bias on the Lerner index, the variables we use *adjusted Lerner index* following Clerides et al. (2015), Koetter et al. (2012), and Rakshit and Bardhan (2022). The following is the efficiency-adjusted Lerner index:

$$\text{Adjusted Lerner}_i = \frac{pbt_i + toc_i - mc_i \times to_i}{pbt_i + toc_i} \tag{3}$$

where pbt_i is the profit before taxes of bank i , toc_i is total operating cost, mc_i is marginal cost, and

to_i is total loans plus total securities. Similar to the conventional Lerner index, the adjusted Lerner ranges from 0 to 1, with larger values indicating greater market power.

Second is the Boone indicator. We are following Rakshit and Bardhan (2022) in measuring this variable. Boone (2008) proposed a new measure of business competition called relative differences. He defines market power as an estimate of the percentage profit reduction resulting from a one percent increase in marginal cost. In addition, he also said that in most theoretical models of oligopoly business competition, the difference in profits between more or less efficient companies increases as the intensity of business competition increases. Boone indicator for the bank i at time t can be defined as follows:

$$\text{Profit elasticity} = \frac{\partial \ln PBT_i}{\partial \ln MC_i} \tag{4}$$

The inverse relationship between profit and marginal cost suggests the profit elasticity to be negative. The stronger the effects of competition, the more negative the value of the Boone indicator is. It can also be derived from the adjusted Lerner index, solving for π in Eq. (3) and differentiating it w.r.t marginal cost, as follows:

$$\text{Profit elasticity} = \frac{to_i \times mc_i}{to_i \times mc_i - tc_1 (1 - \text{adjusted lerner}_i)} \tag{5}$$

3.2.4 Macroeconomic determinants

Macroeconomic conditions can affect bank profitability, where higher economic growth will be followed by increased credit demand, ultimately impacting bank profitability. In addition, the company's ability to repay loans will also increase, followed by an increase in bank credit quality and profitability. For macroeconomic determinants, we use the inflation variable.

Inflation: we use the annual inflation rate to measure this variable. In measuring this variable, we are following (see: Athanasoglou et al. (2008), Rakshit and Bardhan (2022), Sufian (2011), Tan (2016), Vera-Gilces et al. (2020), Veríssimo et al. (2021). Inflation is a determining factor in bank profitability. García-Herrero et al. (2009), Sufian and Chong (2008), and Vera-Gilces et al. (2020) stated that inflation negatively impacts bank profitability. However, unlike Athanasoglou et al. (2008), Rakshit and Bardhan (2022), Tan (2016), and Veríssimo et al. (2021), they find that inflation has a positive relationship with bank profitability. Their findings can be interpreted that an increase in inflation can reduce bank profitability or vice versa.

3.3 Variable selection

We propose the use of more comprehensive variables. This paper proposes four profitability indicators: ROA, ROE, NIM, and PBT.

Table 2. Summary of the variables used in the current study and their expected effects on bank profitability

Variables	Notation	Measurement	Expected effect
Probability indicators			
ROA		Net income ÷ Total assets	
ROE		Net income ÷ Shareholder's equity	
NIM		Net interest income ÷ Earnings assets	
PBT		Profit before tax ÷ Total assets	
Green credit policy			
Green credit	GC/TL	Green credit ÷ Total loans	?
Bank-specific variables			

Bank size	LnTA	Natural logarithm of total assets	?
Capital	EQ/TA	Equity ÷ Total assets	?
Loan risks	NPL/TL	Total of three types of non-performing loans ÷ Total loans	-
Liquidity risk	LA/TA	Liquid assets ÷ Total assets	?
Labor productivity	GR/NE	Δ Gross revenue ÷ Δ Number of employees	+
Loans to deposits	TL/TD	Total loans ÷ Total deposits	+
Lending rate	INT/TL	Interest income ÷ Total loans	?
Diversification	NII/GR	Non-interest income ÷ Gross revenue	?
Cost efficiency	OE/TA	Overhead expense ÷ Total assets	?
Industry-specific variables			
Adjusted Lerner	ALI	Market power	?
Boone indicator	BI	Competition metric	?
Macroeconomic determinants			
Inflation	IFL	The annual inflation rate (in %)	?

Notes: + means positive effect; - means negative effect; ? means no indication

3.4 Empirical Model

We examine the impact of green credit policy, bank-specific, industry-specific, and macroeconomic variables on bank profitability in Indonesia. We estimate a linear regression model in the following from:

$$\begin{aligned}
 \text{Bank Profitability}_{i,t} &= \beta_0 + \beta_1 \text{Green Credit}_{i,t} + \beta_2 \text{Bank Size}_{i,t} + \beta_3 \text{Capital}_{i,t} + \beta_4 \text{Loan Risks}_{i,t} \\
 &+ \beta_5 \text{Liquidity Risk}_{i,t} + \beta_6 \text{Labor Productivity}_{i,t} + \beta_7 \text{Loans to Deposits}_{i,t} \\
 &+ \beta_8 \text{Lending Rate}_{i,t} + \beta_9 \text{Diversification}_{i,t} + \beta_{10} \text{Cost Efficiency}_{i,t} \\
 &+ \beta_{11} \text{Adjusted Lerner}_{i,t} + \beta_{12} \text{Boone Indicator}_{i,t} + \beta_{13} \text{Inflation}_{i,t} + \varepsilon_{i,t}
 \end{aligned} \tag{6}$$

Where bank profitability_{*i,t*} represent the proxies of bank performance *i* during the period *t* and is measured by ROA, ROE, NIM, and PBT. Bank-specific proxies as measured by bank size, capital, loan risk, liquidity risk, labor productivity, loan to deposits, lending rate, diversification, and cost efficiency. Industry-specific is measured by adjusted Lerner and Boone indicator. The macroeconomy is measured by inflation. The formula for each size and expected effect can be seen in Table 2.

4. Results and discussions

Before entering the discussion, we selected the best model for the panel data regression test. Based on the results of the Chow test, the best model is the fixed effect. We employed the robust Hausman test with Sigmaxmore to test for endogeneity and select fixed or random effects to determine the best model for estimation. The Hausman test results show that our model is robust from endogeneity and that fixed effects best fit our model. Finally, we use robust estimation to address the heteroscedasticity and autocorrelation problems. After selecting our model, testing for endogeneity, addressing heteroscedasticity and autocorrelation, and passing the classic assumption test, we discuss the summary statistics and the linear regression model.

4.1 Summary statistic

We present summary statistics for all variables in Table 3 in panels A and B. Panel A provides summary statistics such as mean, standard deviation, minimum, and maximum. Panel B presents the correlation test results. Based on summary statistics, the standard deviation and the minimum and maximum values for each variable have a large difference in value. Bank size has a mean value of 16.31, a standard deviation value of 2.25, and minimum and maximum values of 9.77 and 21.27, respectively, likewise, with other variables such as capital, loan risk, labor productivity, loans to deposits, lending rate, cost efficiency, and inflation. Also, in panel B, we can see that the correlation coefficient is notable between

the variables.

Table 3. Empirical evidence: Green credit policy, bank-specific, industry-specific, macroeconomic of bank profitability

Author	Country	Period	Profitability	Green credit policy	Bank-specific	Industry-specific	Macroeconomic
Yao et al., (2021)	China	2008 – 2015	ROA, ROE	Green credit (-)	Bank size (+), Leverage (-), Intangible assets (-), Capital intensive (-), Age (+), Fixed assets (-), share owned (+)		
Rakshit and Bardhan (2022)	Indian	1996 – 2016	ROA, ROE, NIM		Liquidity risk (-), Profit efficiency (+), Efficiency competition (+), Bank size (-), Risk competition (+), Diversification (-), and Labor productivity (+).	Adjusted Lerner index (+), Boone indicator	Inflation (+)
Alexiou and Sofoklis (2009)	Greek	2000 – 2007	ROA, ROE		Capital (+), Efficiency (-), Bank size (+), productivity (-), Liquidity (-).		
Zhou and Zhang (2023)	China	2011 - 2019	ROA	Green credit (-)		Bank competition (+)	
Sufian (2011)	Korean	1992 – 2003	ROA, ROE		Loans to deposits (+), Credit risk (-), Diversification (+), Efficiency (+), Interest rate (+), Bank size (-), Capital (+), Cost efficiency (-), Loans growth (+), Bank age (+), Foreign ownership (-).	Stock market capitalization (+)	Inflation (+),
Mirza et al. (2023)	European	1999 – 2008	ROAA, ROAE		Bank size (-), Capital (+), Credit risk (-), bank size (+), Cash ratio (+), Management free (+),	Market share (+), Firm concentration (-),	Inflation (-)
Song et al. (2019)	China	2008 – 2015	ROA	Green credit (-)	Credit risk (-), Bank size (-), Efficiency (-), Diversification (+), Capital (+),		Inflation (-)
Sufian and Chong (2008)	Philippines	1990 - 2005	ROA		Bank size (-), Liquidity (+), Taxation (-), Overhead cost (+), Labor productivity (+), Capitalization (+), Cost efficiency (+), NIM (+), Credit risk (-).	Lerner index (+).	Inflation (+)
Tan (2016)	China	2003 – 2011	ROA, ROE, NIM, PBT		Labor Productivity (+), Capital (+), Operating Expenses (-).		
Naceur and Omran, (2011)	Tunisia	1980 – 1995	ROA, ROE		Bank size (-), Capital (+), Liquidity (-), Credit risk (-), Business and Management (-).		
Athanasoglou et al. (2008)	Greek	1985 – 2001	ROA		Technical efficiency (+), Scale efficiency (-), Bank lending (+), Credit risk (+), Capital (+), Bank risk (-)	HH index of lending (-), Market share (-)	Inflation (+)
Lian et al. (2022)	China	2007 – 2018	ROA, NIM	Green credit (+), Green development index (+)	Capital ratio (+), cost to income ratio (-), Credit risk (-), Growth deposits (+), Size (-), Interest income share (-),	Bank concentration (+)	Inflation (+)
Alhassan et al. (2016)	Ghanaian	2003 – 2011	ROA, ROE, NIM				
Dietrich and Wanzenried (2014)	Switzerland	1998 – 2012	ROAA, ROAE, NIM				

Notes: This table reports previous empirical evidence at the country or cross-country level research. We take the variables used in this paper and present the previous findings, represented by ‘+’ for positive relationships and ‘-’ for damaging relationships

4.2 Results of the linear regression model

Table 4 presents the results of the green credit, bank-specific, industry-specific, and macroeconomic variable regression tests on ROA, ROE, NIM, and PBT. Columns (1), (2), (3), and (4) report empirical results on the impact of green credit policy, bank size, capital, loan risks, liquidity risk, labor productivity, loans to deposits, lending rate, diversification, cost efficiency, adjusted Lerner, Boone indicator, inflation, on bank profitability in Indonesia. Statistics F shows that all independent variables simultaneously affect the dependent variable or ROA, ROE, NIM, and PBT with a significance level of 1 percent.

We find that the green credit policy positively affects bank profitability, indicating that any increase in green credit will increase ROE, NIM, and PBT. However, ROA is not affected by green credit. Interestingly, we found that ROE has a reasonably high value compared to other variables. Based on these findings, the green credit policy does not hinder banks from extending credit. This finding aligns with Lian et al. (2022), who examined Chinese commercial banks and found that green credit policy positively affects banking performance. These findings indicate that green credit improves banking financial performance. The improvement was mainly due to the increasing role of banks in encouraging environmentally friendly working capital credit financing. Our finding indicates that the Indonesian commercial banks have succeeded in carrying out one of the intermediary functions, namely channeling working capital loans to the business world. In addition, this finding can also be evidence that the distribution of bank working capital loans has succeeded in driving economic growth. However, this finding does not align with Song et al. (2019), who examined Chinese commercial banks and found that green credit negatively affects bank profitability.

Table 4. Impact of green credit policy, bank-specific, industry-specific, and macroeconomic variables on bank profitability

	(1) ROA	(2) ROE	(3) NIM	(4) PBT
Green credit	0.1479 (0.1242)	2.0339*** (0.7260)	0.2659*** (0.0697)	0.2413*** (0.0739)
Bank size	0.0430*** (0.0038)	0.0410*** (0.0208)	0.0032*** (0.0025)	0.0042*** (0.0028)
Capital	0.0882*** (0.0343)	0.5869*** (0.5759)	0.0331*** (0.0135)	0.1000*** (0.0729)
Loan risks	-0.3965*** (0.0612)	-3.5771*** (1.2301)	-0.0890*** (0.0559)	-0.4836*** (0.2715)
Liquidity risk	0.0006 (0.0143)	0.1335 (0.1913)	0.0111** (0.0116)	0.0030 (0.0139)
Labor productivity	0.0006 (0.0012)	0.0080 (0.0071)	0.0006 (0.0003)	-0.0010 (0.0009)
Loans to deposits	-0.0005 (0.0037)	-0.0276 (0.0407)	0.0055*** (0.0034)	-0.0064 (0.0072)
Lending rate	-0.0066 (0.0042)	-0.0735 (0.0727)	0.0030 (0.0023)	-0.0054 (0.0075)
Diversification	0.0867*** (0.0490)	0.5026*** (0.3968)	0.0211*** (0.0150)	0.0734*** (0.0341)
Cost efficiency	0.2161 (0.2644)	0.5829 (2.7531)	1.0769*** (0.2174)	-0.1013 (0.4348)
Adjusted lerner	0.0011 (0.0030)	0.0118 (0.0125)	-0.0007* (0.0006)	0.0005 (0.0015)
Boone indicator	0.0029*** (0.0013)	0.0152*** (0.0079)	0.0012*** (0.0003)	0.0026*** (0.0009)
Inflation	0.0718 (0.0281)	-0.0958 (0.3732)	0.0393* (0.0192)	0.0041 (0.0327)
Prob. > F	0.0000	0.0000	0.0000	0.0000
R - Squared	0.1035	0.1308	0.3641	0.1733
Adj. R - Squared	0.0890	0.1168	0.3538	0.1599

Notes: Columns (1), (2), (3), and (4) report regression results. ROA, ROE, NIM, and PBT to measure bank profitability. *, **, and *** denote significance at 10, 5%, and 1% levels, respectively. Figures in the parentheses represent robust standard error.

Bank size positively affects ROA, ROE, NIM, and PBT. This result is in line with Sufian's research (2011), which examined banks in Korea and found that an increase in bank size will increase ROA. Song et al. (2019) found that bank size positively influences ROA. Studying the Greek banking sector, Alexiou and Sofoklis (2009) found that an increase in bank size will increase ROA dan ROE. DeYoung and Rice (2004) analyzed United States commercial banks and found that bank size positively impacts NIM and ROE. Demirgüç-Kunt and Huizinga (1999) analyzed commercial banks and found that size positively impacts bank profitability. Maudos (2017) analyzed European banks and found that an increase in bank size will be followed by an increase in ROA and ROE. Kim and Kim (2020), examining banks in the United States, found that an increase in bank size will increase ROA and ROE.

Our finding indicates that banks with large assets will have greater market power in extending credit at more competitive interest rates. Additionally, banks with large-scale assets can operate with a lower average cost of capital so that loan interest can be more competitive with other banks. Conversely, a bank with a smaller asset scale will charge a higher interest rate because a bank with a low asset scale will operate with a high average cost of capital, thus segmenting the market. However, Tan (2016) analyzed the Chinese banking sector and concluded that increasing bank size would reduce ROA, NIM, and PBT. Tan and Floros (2012) found that bank size negatively affects NIM. Rakshit and Bardhan (2022) found that an increase in bank size will decrease ROA, ROE, and NIM.

Capital is an essential factor for banking because it is one of the indicators used to measure the level of financial soundness of banks. This finding shows that banks in Indonesia have excellent capital capabilities. These results also indicate that the higher the capital the bank owns, the higher the bank's profitability will be. Banks with large capital will be more flexible in managing its use, such as channeling credit, and ultimately impact company income. Vera-Gilces et al. (2020) analyzed Ecuador banks and found that increasing capital will increase ROA. This result aligns with Dietrich and Wanzenried (2014), who analyzed banks in low-middle and high-income countries and found that a capital increase will follow an increase in ROA, ROE, and NIM. In researching Greek banks, Athanasoglou et al. (2008) found that a capital increase will increase bank profitability. Maudos (2017) states that a capital increase will increase ROA and ROE. However, these results do not align with Tan (2016) and Tan and Floros (2012), which say that capital does not affect ROA and NIM while ROE has a positive effect. Rakshit and Bardhan (2022), analyzing Indian banks, state that a capital increase will reduce ROA, ROE, and NIM.

As expected, the coefficient for loan risks is negative and statistically significant against ROA, ROE, NIM, and PBT at the one percent level. These results indicate that banks with high credit risk tend to have a low level of profitability. The empirical findings imply that banks in Indonesia must be more careful in extending credit to consumers, both individuals, and companies. In addition, banks must also focus more on implementing credit risk management. Banking problems arise from decreased banking productive assets because it will increase reserves for productive asset write-offs and ultimately affect bank profitability. These findings align with Sufian and Chong (2008), who analyze the determinants of profitability of banks in the Philippines, showing that an increase in loan risks will reduce ROA. Naceur and Omran (2011) analyzed banks in the Middle East and North African countries and found that a decrease will follow increased loan risks in ROA, ROE, and NIM. Lamers et al. (2022) and Sufian (2011) stated that increasing loan risks would decrease ROA and ROE. Dietrich and Wanzenried (2014), Kim and Kim (2020), and Rakshit and Bardhan (2022) said that an increase in loan risks could reduce ROA, ROE, and NIM. However, these findings are inconsistent with Alhassan et al. (2016), who studied banks in Ghana and argued that increasing loan risks would increase ROA, ROE, and NIM. Vera-Gilces et al. (2020) stated that the increase or decrease in loan risks did not impact bank profitability.

Mostak Ahamed (2017), Pennathur et al. (2012), and Rakshit and Bardhan (2022) explore the relationship between risk-taking and bank profitability without considering the role of competition and efficiency. Most empirical studies consider credit risk while assessing its impact on the availability of

bank liquidity. Rakshit and Bardhan (2022) use liquidity risk as a risk indicator to measure banking risk-taking behavior in India. Liquidity risk concerns the ability of a bank to anticipate changes in funding sources. We find that an increase in liquidity risk positively impacts banking NIM but has no impact on ROA, ROE, and PBT. Our finding indicates that the higher the banking liquidity risk, the higher the NIM. The bank's primary function is to collect and distribute public funds. These findings imply that most banks in Indonesia have used their liquidity to the maximum by extending credit to companies or individuals and will eventually generate interest income. However, this can seriously impact a bank's ability to meet its obligations when they fall due because interbank deposits and loans are the primary sources of banking liquidity. Our findings align with Tan (2016), who argues that an increase would follow increased liquidity risk in ROA, NIM, and PBT. Tan and Floros (2012) said an increase in liquidity risk would increase NIM. However, these findings contradict Rakshit and Bardhan (2022), who found that increased liquidity risk will decrease ROA, ROE, and NIM. Lian et al. (2022) state that an increase in liquidity risk will impact a decrease in ROA, while NIM has no impact. Mirza et al. (2023) said increasing liquidity risk would decrease NIM.

Aside from reflecting efficient bank management, higher labor productivity can also increase bank efficiency and ultimately impact bank profitability. We hope that variable labor productivity has a positive impact on bank profitability. However, labor productivity does not impact ROA, ROE, NIM, or PBT. These findings are not expected because it implies that most banks in Indonesia are not efficient. The average operational costs can prove the lack of efficiency compared to bank operating income in the last decade which is above one hundred percent. This finding is in line with Tan and Floros (2012), who argue that labor productivity has no impact on NIM but has an impact on ROA. This finding is inconsistent with Athanasoglou et al. (2008) and Vera-Gilces et al. (2020), who concluded that labor productivity positively impacts ROA. Rakshit and Bardhan (2022) and Tan (2016) argue that labor productivity positively impacts ROA, ROE, and NIM.

Generally, most banks in Indonesia finance their asset growth with customer deposits in the form of time deposits. Because deposits are expensive funds, banks will set high NIMs to cover all capital costs. When viewed from the mean loans to deposit ratio, all banks in Indonesia are above eighty percent, indicating that they have maximally used deposit funds to channel them to credit. This finding follows the expected increase in the loans to deposits ratio, followed by an increase in NIM. This paper also finds that loans to deposits ratio has no impact on ROA, ROE, and PBT. However, these findings are inconsistent with Sufian (2011), who states that loans to deposits ratio positively impacts ROA dan ROE. Alexiou and Sofoklis (2009) found that the ratio of loans to deposits negatively impacts ROA and ROE.

The lending rate has no relationship with bank profitability. These findings indicate that a bank's high or low lending rate will not impact bank profitability. These findings are inconsistent with Vera-Gilces et al. (2020), who found that the lending rate has a positive relationship with ROA.

The purpose of switching from interest income to non-interest income is to reduce the total risk that the bank owns. The higher diversification indicates that non-interest income from cooperation with other financial institutions, such as insurance companies, will increase and ultimately impact bank profitability. Our findings show that increased diversification will increase ROA, ROE, NIM, and PBT, indicating that the income of banks in Indonesia does not only come from one source. Chiorazzo et al. (2008) examine the relationship between non-interest income and bank profitability in Italy and find that income diversification increases risk-adjusted returns. Addai et al. (2022) state that income diversification increases bank profitability.

Variable cost efficiency can be seen from the ability of bank management to use and control all assets owned to maximize profits. Siauwijaya (2017) said that using and controlling is the ability of management to determine the direction of bank policy either directly or indirectly. Cost efficiency is a banking management policy often discussed in professional and academic circles. We find that

increasing cost efficiency will increase NIM but has no impact on ROA, ROE, and PBT, indicating that the lower the cost efficiency, the more inefficient the bank's management from a cost standpoint will ultimately impact bank profitability. Rakshit and Bardhan (2022) argue that maximizing profit is not only by minimizing costs but also by maximizing revenue. Naceur and Omran (2011) state that cost efficiency positively impacts bank performance.

Industry-specific profitability determinants, we find that an increase in market power as measured by the adjusted Lerner index will reduce NIM while competition with the Boone indicator will increase ROA, ROE, NIM, and PBT during the study period. Interestingly, the market power variable using the adjusted Lerner index has different findings from the competition we measure using the Boone indicator. These findings indicate that the power of the bank market in Indonesia has a different impact. When viewed from the significance level, the Boone indicator has a significant positive effect with a confidence level of ninety-nine percent, while the adjusted Lerner index has a negative impact with a confidence level of ninety percent. Bank competition, measured by the Boone indicator, indicates that the higher the level of competition, the higher the profit the bank achieves. Rakshit and Bardhan (2022) stated that an increase in competition (Boone indicator and adjusted Lerner index) would increase ROA, ROE, and NIM.

As a macroeconomic variable, we find that inflation has a positive and significant relationship to bank profitability during the study period. Inflation can affect bank profitability because it is decisive in the interest rate structure. In determining interest rates on deposits and loans, we recommend that banks in Indonesia consider the inflation factor. High inflation rates can result in high loan interest rates and large bank NIMs. On the other hand, an increase in high loan interest rates will reduce the company's ability to repay its loans. Inflation will cause credit risk to increase, reduce bank liquidity, increase the cost of capital, and ultimately impact the declining bank profitability. These findings also imply that an increase in the economy will encourage the growth of the business world and the company's business, ultimately impacting company profitability. This empirical study is in line with Rakshit and Bardhan (2022), Tan (2016), and Verissimo et al. (2021), which state that the increase in inflation will increase bank profitability. However, this is not in line with Sufian and Chong (2008), who found that an increase in inflation will reduce bank profitability.

5. Conclusion

We analyze bank profitability factors comprehensively. This paper contributes to the empirical banking literature in developing countries such as Indonesia, which examines the impact of green credit policy, bank-specific, industry-specific, and macroeconomic on bank profitability. We use ROA, ROE, NIM, and PBT as indicators of bank profitability. To strengthen the findings, we use the adjusted Lerner index and Boone indicator to measure competition as an industry-specific indicator.

Our findings show that bank size, capital, diversification, and competition (Boone indicators) have a significant positive impact on ROA, ROE, NIM, and PBT. Meanwhile, liquidity risk, loans to deposits, cost efficiency, and inflation have a significant and positive effect on NIM. In the macroeconomic environment, the inflation factor is also one of the determinants of bank profitability. The monetary authority should consider the banking industry, one of the economic drivers, in making or determining policies. In addition, green credit also has a positive relationship with ROE, NIM, and PBT. This finding shows that the green credit policy does not hinder banks from extending environmentally friendly credit.

On the contrary, the green credit policy can help minimize credit risk. Moreover, increased loan risks such as ROA, ROE, NIM, and PBT will reduce bank profitability. Based on these empirical results, we suggest regulators support banks in increasing assets and capital and diversifying businesses. Supporting healthy bank competition in conducting business by providing convenience in granting licenses, ease of acquisition, and ease of expanding office networks. The results of this study can assist bank management in determining policy directions and decision-making, especially those related to profitability.

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