Journal of Information Systems Engineering and Management
2025, 10(28s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

The Role of Green Credit and Competition in Shaping Bank Profitability: Cross Country Evidence from Indonesia and China

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ARTICLE INFO

Received: 26 Dec 2024

Revised: 14 Feb 2025

Accepted: 22 Feb 2025

ABSTRACT

This research study investigated factors influencing the profitability of banks in Indonesia and China, with special emphasis on green credit policy, competition, and structural attributes. An examination of 43 banks in Indonesia and 19 banks in China between the years 2018-2022 used the Lerner Index to gauge competitive pressure and assessed profitability through ROA, ROE, and NIM. The key results show a mixed effect of green credit: it negatively affects ROA and ROE but positively affects NIM due to higher spreads from green finance. Competition among banks positively influences ROE from the perspective of efficiency of operations. The size of banks has a dual-fold influence: it benefits NIM through economies of scale but may also damage ROE due to inefficiency. The paper connects sustainable finance with competitive banking, providing insight into policymakers and practitioners. Policymakers must then formulate regulations for green finances without hurting competition and market stability. Industry players may utilize these results in strategizing for the interest of profit together with sustainability. The implications here are that general policies will instead be tailored in favor of green issues if those policies do not interfere with banks' proper functioning; banks become more operationally efficient and seek businesses that take advantage of green financing. The findings of this research contribute toward the sustainability banking debate and serve as a solid reference for setting up resilience and innovation-geared banking systems in host countries. It highlights the co-existing interplay of sustainability, competition, and profitability within transitioning markets.

Keywords: Bank profitability, green credit policy, heteroskedasticity-robust standard errors, sustainable growth.

INTRODUCTION

Profitability is a critical determinant of business performance, particularly in the banking sector, where it serves as a primary indicator of financial health and competitiveness. Extensive research has demonstrated that bank-specific characteristics, macroeconomic conditions, and sustainability practices significantly influence profitability [18], [13]. Understanding these determinants is crucial for bank management, regulators, and investors in formulating effective strategic decisions.

To date, green credit, banking competition, and bank size remain contentious topics among researchers, professionals, and academics. This study addresses these debates by examining the impact of green credit, market competition, and structural characteristics, such as bank size, on the profitability of commercial banks in a cross-country context involving Indonesia and China. Green credit, as a component of sustainable finance, has emerged as a transformative element in banking operations. For instance, Siauwijaya, Meiryani, and Lesmana [21] emphasize that green credit policies in Indonesia align with environmental objectives and positively impact financial performance. Similarly, Fata and Arifin [7] highlight that incorporating green credit into bank portfolios enhances financial stability and customer engagement, contributing to key profitability metrics, such as Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM). Banking competition also plays a vital role in shaping profitability. Advanced analytical approaches and machine learning methods have been employed to

evaluate risks and optimize financial outcomes under competitive pressures [12]. Furthermore, Chong et al. [3] suggest that market power and operational efficiency are pivotal determinants of profitability, reflecting a balance between competition and sustainability in banking.

Bank size is another critical structural factor influencing profitability. Larger banks often benefit from economies of scale and diversified portfolios, allowing them to manage risks more effectively. Salike and Ao [20] identify bank size as a significant variable in Asian markets, where larger institutions demonstrate superior profitability metrics due to enhanced resource utilization and operational efficiency. In addition to these primary factors, control variables such as liquidity risk, diversification, capitalization, and cost efficiency contribute to a comprehensive analysis of profitability. For example, Chen, Siddik, Zheng, Masukujjaman, and Bekhzod [2] illustrate how sustainable financial innovations and financial technologies (FinTech) mitigate liquidity risks and improve overall profitability. These control variables provide additional insights when contextualized within the unique economic settings of Indonesia and China.

This study focuses on Indonesia and China to explore how green credit, banking competition, and bank size influence bank profitability. According to the Regional Economic Outlook for Asia and Pacific: Steady Growth amid Diverging Prospects published by the International Monetary Fund (IMF) [9], the real GDP growth rates of both countries were comparable in the second half of 2023, reflecting similarities in economic conditions. These parallels offer a unique opportunity to examine the determinants of profitability within two distinct regulatory and economic frameworks. By addressing gaps in comparative profitability analysis, this research contributes to a deeper understanding of the role of sustainable finance and market dynamics in banking. The findings are expected to provide theoretical insights and practical recommendations for policymakers and industry practitioners in promoting sustainable financial strategies in Indonesia and China.

LITERATURE REVIEW

Bank Profitability

Bank profitability serves as a critical measure of financial stability and operational efficiency within the banking sector. Key metrics such as Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM) are widely utilized to evaluate financial performance. According to Le and Ngo [13], variations in bank profitability across countries are significantly influenced by a combination of macroeconomic, industry-specific, and bank-specific factors. This finding is reinforced by Salike and Ao [20], who highlight that poor asset quality, operational cost efficiency, and market power are crucial determinants of profitability, particularly in the Asian banking sector. Furthermore, Kou, Chao, Peng, Alsaadi, and Herrera-Viedma [12] emphasize that advancements in machine learning applications have the potential to transform risk management practices, thereby enhancing profitability evaluation and overall bank performance.

In the context of Indonesia and China, differences in profitability are shaped by unique market conditions, regulatory frameworks, and the pace of financial innovation. For instance, Siauwijaya, Meiryani, and Lesmana [21] demonstrate that bank-specific factors and macroeconomic conditions play pivotal roles in shaping profitability outcomes in Indonesia. Similarly, Zhou, Sun, Luo, and Liao [29] find that government-supported sustainable finance initiatives in China contribute to both risk reduction and financial stability.

H1: Bank-specific characteristics, including cost efficiency and capitalization, positively influence bank profitability in Indonesia and China.

Green Loans and Bank Profitability

Green loans, as an innovative financial instrument aimed at promoting environmentally sustainable projects, have become a transformative element in the banking sector. These loans facilitate the transition to a greener economy while offering potential financial benefits by mitigating risks associated with non-sustainable projects. Several studies have highlighted the positive impact of green loans on bank profitability. For instance, Siauwijaya, Yusanto, and Grania [22] argue that integrating green loans into a bank's portfolio enhances both financial and marketing outcomes, contributing positively to profitability indicators such as ROA and ROE. Additionally, Zhou, Sun, Luo, and Liao [29] emphasize the role of financial technology (FinTech) in maximizing the benefits of green loans by improving operational efficiency and risk assessment mechanisms.

However, other studies report mixed or insignificant impacts of green loans on profitability. Gilchrist, Yu, and Zhong [8], and Siauwijaya, Meiryani, and Lesmana [21] note that despite their long-term potential, green loans often face challenges such as higher implementation costs and project-specific risks, which can dilute their profitability effects. Alonso-Conde and Rojo-Suárez [1] further argue that green financial instruments, including green loans, may yield limited financial impacts due to high operational costs and implementation challenges. Additionally, R. Wu, Fang, Hossain, and A. Wu [26] and Ranning [19] argue that the financial impacts of green loans can vary across markets due to differences in regulatory frameworks and market dynamics.

H2: Green loans have a mixed impact on bank profitability, with positive effects on NIM but insignificant or negative effects on ROA and ROE in Indonesia and China.

Dynamics of Competition, Bank Size, and Profitability

The interaction between market competition and bank size creates significant dynamics in determining bank profitability. Larger banks often leverage economies of scale, advanced technologies, and diversified portfolios to maintain competitive advantages. Kou, Chao, Peng, Alsaadi, and Herrera-Viedma [12], Zhou, Sun, Luo, and Liao [29], and Alonso-Conde and Rojo-Suárez [1] assert that large banks operating in competitive markets benefit from technological adoption and market power, enabling them to set favorable pricing strategies and achieve higher profitability. Conversely, smaller banks face greater challenges in maintaining NIM and operational efficiency due to limited resources and higher liquidity risks. Salike and Ao [20] as well as Love and Martínez Pería [15] find that in highly competitive markets, smaller banks struggle to balance risk and efficiency, which ultimately undermines their profitability.

Regulations and technological advancements also play crucial roles in moderating these dynamics. For instance, Fata and Arifin [7] demonstrate that regulatory frameworks supporting green credit provide larger banks with incentives to allocate resources to sustainable projects, enhancing their profitability. Similarly, Kasman and Carvallo [11] highlight that effective regulatory policies create an environment where larger banks can mitigate risks and capitalize on growth opportunities in competitive markets. Meanwhile, Zhou, Sun, Luo, and Liao. [29] and Li and Chen [14] highlight the role of FinTech in improving operational efficiency and reducing liquidity risks for both large and small banks, fostering competitiveness in evolving markets.

H3: Bank size moderates the relationship between market competition and profitability, with larger banks benefiting more in competitive environments.

Green Loan Practices in Indonesia and China

The adoption of green loan instruments in both Indonesia and China, however, bears resemblance and difference as shaped by government policies and market-orientedness. Initiatives by the government in China to support a program have made a strong effect on how green loans are practiced, exposed to reuse risks, and increased financial stability [29]. Xi, Wang, and Yang [27] added further that green financial vehicles improve credit quality and assist in financing long-term project financing in China.

In Indonesia, however, the growth of green loans is driven by policies that seek to bridge the disjuncture between the economic and environmental objectives. As noted by Siauwijaya, Meiryani, and Lesmana [21], green credit policies enhance national sustainability targets and at the same time boost profitability in banks. According to the report by Mirovic et al. [16], Indonesian banks capitalize on green loans as an instrument for competition-a focus on improving the marketing and operations efficiency.

DATA AND METHODOLOGY

Data

This study utilizes panel data from commercial banks in Indonesia and China covering the period from 2018 to 2022. The selection of this period aligns with the implementation of Financial Service Authority Regulation (Peraturan Otoritas Jasa Keuangan/OJK), which mandates financial institutions to adopt and report sustainable financial practices [21]. This approach is consistent with prior research on green credit practices in Asia and globally [25], [26], [27], [29]. The inclusion of data from China follows the same period to ensure consistency in cross-country

comparison. The regulation serves as the foundation for collecting data on green credit through sustainability reports published by individual banks.

The data from Indonesia comprises 43 banks listed on the Indonesia Stock Exchange (IDX). Financial data was obtained from bank financial statements, including balance sheets and income statements, following methods used in studies such as [12], [18], and [20]. The key variables analyzed include non-interest income, gross revenue, total assets, total loans, total deposits, interest income, shareholders' equity, earning assets, net interest income, liquid assets, interest expenses, non-interest expenses, total operating costs, total savings, profit before tax. The banks' sustainability reports were used to source information on green credit, which was made available on their respective official websites. This aligns with methods used in recent works analyzing green credit practices and bank performance [2], [21], [28].

The data from China includes 19 commercial banks identified through the Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE). This initial dataset was further filtered to ensure the completeness of required information, such as financial statements and sustainability reports. The smaller sample size in China compared to Indonesia is due to the limited availability of publicly accessible financial and sustainability reports from certain banks, as noted in studies on Chinese banking practices [5], [27]. For both countries, the study adopts an analytical framework similar to that employed by researchers examining the intersection of green credit and bank performance, including [8], [14], and [23].

Table 1: Descriptive statistics of panel data used.

Variables	N	Mean	Standard Deviation	Min	Max
Return On Asset (ROA)	310	0.0144023	0.0197302	-0.0900000	0.1589000
Return On Equity (ROE)	310	0.1067238	0.1477268	-0.6079000	0.8903000
Net Interest Margin (NIM)	310	0.0414719	0.0223972	-0.0352000	0.1930000
Green Credit	310	0.3427049	0.1907134	0.0047605	0.4827000
Bank Competition	310	-6.9153420	4.9726870	-47.0917300	0.0062399
Bank Size	310	16.8539400	1.8445910	13.2761000	21.2688500
Liquidity	310	0.6074264	0.1882430	0.0504073	1.0825320
Diversification	310	0.2099091	1.0620310	-0.4666219	11.6129900
Cost Efficiency	310	0.0118067	0.0078764	0.0003517	0.0723854
Capitalization	310	0.1571492	0.1120874	0.0499477	0.8358051

Measuring the Level of Bank Competition

The measurement of competition in the banking sector has been a critical focus of numerous empirical studies. Various methods have been utilized to quantify banking competition, including the Lerner Index [3], [4], [21], [27], Herfindahl-Hirschman Index (HHI) [6], [7], and exogenous shock measures [12]. In this study, we adopt the Lerner Index as it can be calculated at the annual bank level and provides a straightforward yet comprehensive approach to capturing market power, as discussed by Love and Martínez Pería [15].

Lerner Index measures the degree of market power possessed by a bank. It is calculated as the difference between price and marginal cost, divided by price. A higher Lerner Index value indicates lower levels of competition and greater market power, suggesting limited market access for smaller players. The formula for the Lerner Index is expressed as follows:

$$Lerner\ Index = \frac{P-MC}{P} \quad (1)$$

Where P is the price output, and MC is the marginal cost. Price is calculated as the bank's total gross revenue divided by total assets. We calculate marginal costs by taking the following derivative of the translog cost function with respect to total assets:

$$MC_{it} = a_{0i} + \beta_0 \ln(Q_{it}) + \beta_1 0.5[\ln(Q_{it})]^2 + \alpha_1 \ln(W_{it}) + \alpha_2 \ln(W_{2it}) + \alpha_3 \ln(W_{3it}) + \beta_2 \ln(Q_{it}) \times \ln(W_{1it}) + \beta_3 \ln(Q_{it}) \times \ln(W_{2it}) + \beta_4 \ln(Q_{it}) \times \ln(W_{3it}) + \alpha_4 \ln(W_{2it}) + \alpha_5 \ln(W_{1it}) \times \ln(W_{3it}) + \alpha_6 \ln(W_{2it}) \times \ln(W_{3it}) + \alpha_7 0.5[\ln(W_{1it})]^2 + \alpha_8 0.5[\ln(W_{2it})]^2 + \alpha_9 0.5[\ln(W_{3it})]^2 + \alpha_{10} \ln(Equity)_{it} + \alpha_{11} \ln(\text{Net Loans})_{it} + F_1 + e_{it} \quad (2)$$

Here, C_{it} represents the total operating and financial costs of bank i at time t. Q denotes total assets, W_1 is ratio of interest expenses to total deposits, W_2 is ratio of personnel expenses to total assets, and W_3 is ratio of other operational expenses to total assets. Additional variables include equity (*Equity*) as the ratio of capital to total assets and net loans (*Net Loans*) as the ratio of loans to total assets. Fixed effects (F_t) are included to account for bank-specific characteristics under the assumptions of symmetry and first-degree homogeneity in prices.

The data utilized in this study includes commercial banks listed on the Indonesia Stock Exchange, Shanghai Stock Exchange, and Shenzhen Stock Exchange from 2018 to 2022. To ensure data validity, observations in the upper and lower percentiles of the distributions of W_1, W_2, W_3, and their interactions with equity (*Equity*) and net loans (*Net Loans*) were removed. After estimating the regression in Equation (2), the coefficients obtained were used to calculate the value of marginal cost for each bank in each period (t). Marginal cost is calculated using the following model:

$$MC_{it} = (\beta_0 \ln(Q_{it}) + \beta_2 \ln(W_{1it}) + \beta_3 \ln(W_{2it}) + \beta_4 \ln(W_{3it})) \times (C_{it} \div Total\ Asset) \quad (3)$$

Here, C_{it} represents the total operating and financial costs of bank i at time t. Q denotes total assets, W_1 is ratio of interest expenses to total deposits, W_2 is ratio of personnel expenses to total assets, and W_3 is ratio of other operational expenses to total assets. Additional variables include equity (*Equity*) as the ratio of capital to total assets and net loans (*Net Loans*) as the ratio of loans to total assets. Fixed effects (F_t) are included to account for bank-specific characteristics under the assumptions of symmetry and first-degree homogeneity in prices.

Table 2: Pearson correlation model result.

Variabels	**1**	**2**	**3**	**4**	**5**	**6**	7
Green Credit	1.0000						
Bank Competition	-0.5237	1.0000					
Bank Size	0.4689	-0.2711	1.0000				
Liquidity	-0.3069	0.2407	0.1021	1.0000			
Diversification	-0.2681	0.1198	-0.1355	0.2794	1.0000		
Cost Efficiency	0.6036	-0.7278	0.1264	-0.2764	-0.1731	1.0000	
Capitalization	0.4619	-0.4161	-0.0994	-0.2195	-0.1321	0.4392	1.0000

Notes: The Pearson correlation coefficients indicate the linear relationship between the variables. No significant multicollinearity issues are detected as all correlation coefficients are below the critical threshold of 0.8.

Conceptual Model for Assessing Bank Profitability

Bank profitability is an important metric of financial success, which is influenced by a variety of factors at the bank, industry, and macroeconomic levels [13]. Using panel data from commercial banks in Indonesia and China, this study uses Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM) as the key profitability measures. The independent and control variables in the analysis are derived from relevant literature and previous empirical evidence.

Green loans are the percentage of a bank's loan portfolio dedicated to ecologically sustainable projects. In Indonesia, green loans are highly affected by government policies and municipal rules that encourage renewable energy and infrastructure projects. In China, green loans are primarily pushed by state-owned banks and stringent environmental regulations to meet the country's carbon neutrality targets [14], [28]. These differences reflect the disparities in approaches and challenges to implement green financing in these two countries. They play an important role in profitability. Cui, Geobey, Weber, and Lin [5] and Zhou, Sun, Luo, and Liao [29] report that green lending improves profitability by enhancing risk management and bolstering reputational capital.

Bank competition is measured using metrics such as the Herfindahl-Hirschman Index (HHI) [3], which evaluates market concentration and competitiveness among banks, and the Lerner index, which assesses a bank's pricing power in relation to its costs. Fata and Arifin [7], and Siauwijaya, Meiryani, and Lesmana [21] suggest that more competition improves efficiency and profitability by lowering monopolistic power. However, Cornaggia, Mao, Tian, and Wolfe [4] pointed out that overwhelming competition may reduce margins. In emerging markets such as Indonesia and China, Mirovic et al. [16] indicate that the impact of competition on profitability varies according to market structure and regulatory framework.

Bank size, calculated as the natural logarithm of total assets, accounts for economies of scale and diversification benefits. Larger banks frequently attain higher profitability as a result of operational efficiencies and a broader revenue base, as noted by Chong, Lu, and Ongena [23] and Xi, Wang, and Yang [27]. However, Kasman and Carvallo [11] warn that size-related inefficiencies may occur above a certain threshold, particularly in overly regulated markets.

Liquidity risk, assessed as the loan-to-asset ratio, represents a bank's capacity to manage funding challenges and maximize returns. Jayakumar et al. [13] contends that balanced liquidity levels boost profitability by stabilizing interest income. Conversely, Gilchrist, Yu, and Zhong [8] emphasizes that excess liquidity may dilute gains. In China, Yin, Z. Zhu, Kirkulak-Uludag, and Y. Zhu [28] emphasize the significance of market-specific liquidity dynamics in determining profitability.

Diversification, as indicated by the ratio of non-interest income to gross income, reflects the ability of a bank to reap revenues outside conventional lending modes. Diversification increases profitability through revenue stream stability and adverse risk effects, as shown by Chong, Lu, and Ongena [3] and Xi, Wang, and Yang [27]. However, Trisnawati and Wahyuni [24] warn that excessive levels of diversification can lead to inefficiency and greater operational risks.

Capitalization as measured by equity to assets will signify a bank's ability to absorb shocks and support growth. Gilchrist, Yu, and Zhong [8] and Chong, Lu, and Ongena [3] note that well-capitalized banks tend to enjoy low costs of funds and much better profitability; however, Zhou, Sun, Luo, and Liao [29] say that there are various regulatory and market-specific factors influencing the capitalization-profitability relationship. An alternative proxy for cost efficiency is the overheads cost-to-total asset ratio. Cost management is therefore cited as a major determinant for profitability by Olmo, Saiz, and Azofra [18] while Kou, Chao, Peng, Alsaadi, and Herrera-Viedma [12] argue that profitability may be derived by some banks from innovative revenue-maximizing strategies in spite of their higher costs. Cost reduction and revenue growth, like others in the banking industry, are emphasized by Salike and Ao [20] to be extremely crucial in banking sectors of Indonesia and China.

Drawing on studies such as those conducted by Fata and Arifin [7], Kasman and Carvallo [11], and Zhou, Sun, Luo, and Liao [29], the current research will examine the link between green lending, competition, and bank size. By inserting control variables of liquidity risk, diversification, capitalization, and cost efficiency into the equation, this study broadly captures the factors of bank profitability dominating in emerging economies.

Table 3: Breakdown of the variables utilized in present research and their expected impact on bank profitability

Variables	Measurement	Expected Effect
ROA	Net income ÷ Total assets	
ROE	Net income ÷ Shareholder’s equity	
NIM	Net interest income ÷ Earnings assets	
Green Credit	Green credit ÷ Total loans	?
Bank Competition	Lerner index constructed using variables from bank scope	?
Bank Size	Natural logarithm of total assets	?
Liquidity	Liquid assets ÷ Total assets	?
Diversification	Non-interest income ÷ Gross revenue	+
Cost Efficiency	Overhead expense ÷ Total assets	?
Capitalization	Equity ÷ Total assets	?

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

Empirical Framework of Bank Competition

The primary objective of this study is to analyze the impact of green credit policies and banking competition on bank profitability in Indonesia and China. To achieve this goal, we comprehensively utilize Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM) as the key indicators. These metrics were chosen to enable a comparative analysis of the research findings with the existing literature (see Table 3).

This study aims to assess the impact of green credit policies, banking competition, and bank-specific variables on the profitability of commercial banks in Indonesia. To achieve this, we employed a heteroskedastic linear regression model, which allows for the estimation of relationships while accounting for variability in error terms across observations. The model is specified as follows:

$$Bank\ Profitability_{i,t} = \beta_0 + \beta_1 Green\ Credit_{i,t} + \beta_2 Bank\ Competition_{i,t} + \beta_3 Bank\ Size_{i,t} + \beta_4 Liquidity_{i,t} + \beta_5 Diversification_{i,t} + \beta_6 Cost\ Efficiency_{i,t} + \beta_7 Capitalization_{i,t} + \varepsilon_{i,t}$$

This study focuses on bank profitability$_{i,t}$ as the key indicator of financial performance evaluated by three major proxies: Return on Assets, Return on Equity, and Net Interest Margin. These three measures combined provide a comprehensive view of the bank's earning capability with respect to its assets, equity, and interest-related activities. The Lerner index is used as a proxy in assessing competition in the banking sector. Lerner index has become one of the popular measures in the literature of banking that shows market power at the level of the individual bank-a difference between pricing and marginal cost normalized by price. It reflects the competitive dynamics within the banking industry.

EMPIRICAL RESULTS

This study reveals that green credit has a significant negative impact on ROA and ROE, while it shows a significant positive impact on NIM. This finding is in line with Cui, Geobey, Weber, and Lin [5], which states that green credit disbursement can increase credit risk, leading to decreased profitability. However, the positive impact on NIM indicates that green credit can increase net interest income due to banks' preference to fund green projects with lower risk, as highlighted in research by Li and Chen [14]. This finding is consistent with previous literature showing that although green credit can increase credit risk due to involvement in sustainable projects with higher uncertainty, green credit also contributes to increasing net interest margin through income diversification from green projects [1, 7].

Table 4: Bank profitability regression results

	(1)	**(2)**	**(3)**
	ROA	**ROE**	**NIM**
Green Credit	-0.00309***	-0.0695***	0.00310**
	(-4.21)	(-15.18)	(3.27)
Bank Competition	-0.00109	0.0157*	-0.0000591
	(-1.44)	(2.24)	(-0.04)
Bank Size	-0.000124	-0.00859*	0.00327***
	(-0.23)	(-2.37)	(4.45)
Liquidity	0.000482	0.0159***	-0.00190**
	(1.52)	(4.52)	(-2.68)
Diversification	0.000560**	0.00817**	0.000510
	(2.83)	(3.20)	(1.83)
Cost Efficiency	0.00257***	0.00360	0.0147***
	(3.40)	(0.74)	(14.34)
Capitalization	0.0465***	0.0508*	0.0714***

	(1)	(2)	(3)
	ROA	**ROE**	**NIM**
	(4.79)	(2.28)	(9.58)
Prob > F	0.0001	0.0000	0.0000
R-Squared	0.817	0.871	0.757
Adj. R-Squared	0.812	0.867	0.751

Notes: Figures in parentheses represent heteroskedasticity-robust standard errors. The regression model employs a heteroskedasticity-consistent framework to address issues of non-constant variance in the error terms. Column (1), (2), and (3) are the regression result. The t-statistics are reported in parentheses below the estimated coefficient values. The asterisks *, *, and *** indicate statistical significance at the 10%, 5%, and 1% confidence levels, respectively

Lerner index, as a measure of banking competition, shows an insignificant negative impact on ROA, a significant positive impact on ROE, and an insignificant impact on NIM. Previous studies, Fata and Arifin [7] have identified that increased competition can narrow profit margins, while Jayakumar et al. [10] argues that moderate competition improves operational efficiency, thereby increasing ROE. The insignificant impact on ROA and NIM may reflect unoptimized inefficiencies in the banking sector. However, banking competition has a positive impact on ROE, reflecting increased operational efficiency in a competitive environment. This supports the findings of Kou, Chao, Peng, Alsaadi, and Herrera-Viedma [12], which show that banks operating in more competitive markets tend to adopt innovations to improve efficiency and profitability.

Bank size shows an insignificant negative impact on ROA, a significant negative impact on ROE, and a significant negative impact on ROE, and a significant positive impact on NIM. These results are consistent with Le and Ngo [13], which shows that larger banks face efficiency pressures that can lower ROE. However, Mirovic et al. [16] shows that larger banks can increase NIM through better product diversification.

Liquidity shows an insignificant positive impact on ROA, a significant positive impact on ROE, and a significant negative impact on NIM. This is consistent with Le and Ngo [13], who stated that high liquidity supports better ROE because banks meet short-term credit demand. However, R. Wu, Fang, Hossain, and A. Wu [26] highlighted that high liquidity can decrease NIM due to lower returns on liquid assets.

Diversification has a significant positive impact on ROA and ROE, but its impact is insignificant on NIM. As reported in Olmo, Saiz, and Azofra [18], diversification increases non-interest income, which contributes positively to ROA and ROE. However, the impact on NIM is insignificant because non-interest income does not directly affect net interest margin. Cost efficiency significantly increases ROA and NIM, although it has an insignificant effect on ROE. This supports Song, Deng, Wu [23], which shows that cost efficiency increases ROA by reducing operating costs. The significant impact on NIM is in line with Yin, Z. Zhu, Kirkulak-Uludag, and Y. Zhu [28], where cost efficiency increases net interest income.

Capitalization has a significant positive impact on ROA, ROE, and NIM. This finding supports Alonso-Conde and Rojo- Suárez [1], which highlights that well-capitalized banks tend to be more stable and profitable. Similarly, Zhou, Sun, Luo, and Liao [29] show that higher capitalization gives banks the flexibility to take calculated risks, leading to increased profitability.

CONCLUSION

This study conducted an in-depth analysis of the factors influencing bank profitability in Indonesia and China, with a focus on the role of green credit, banking competition, and bank size. It, then, presents its own rather interesting research findings that are complex in content. One interesting aspect of the research findings is that while it has wide prospects of increasing profitability through revenue diversification, and a much better reputation, this one resulted in a negative impact on the two profitability ratios, such as ROA and ROE-the green credit implementation. This indicates further that risk management as well as increased operational costs must still be dealt with in implementing green credit.

High competition in banking manifests a variation with profit generation. Competition between banks is not an obstacle for banks in Indonesia and China. On the contrary, this competition is a driving force for each bank to diversify its products, so that it can compete effectively in the market. Increased competition increases operational efficiency and encourages innovation that is later reported as an increase in ROE. It has certainly not made a difference to ROA or NIM, thereby demonstrating that efficiency of competition in conversion to profit depends on the parameter. Bank size generates complicated results as well, providing that large banks always have advantages like diversification and economies of scale but have to cope with pressure of costs as well. In short, results reveal that although bank size is an important factor influencing NIM, it will have not so much importance in ROA and ROE.

ACKNOWLEDGEMENTS

We would like to express our sincere gratitude to Dr. Rahmat Siauwijaya, S.E., M.M. for his invaluable guidance and constructive feedback throughout the research and writing process. His insights and expertise have significantly contributed to the development of this study.

We also extend our appreciation to Universitas Bina Nusantara for providing the necessary academic support and research facilities. Furthermore, we are grateful to the journal reviewers for their valuable comments and suggestions, which have helped enhance the quality of this paper.

The authors take full responsibility for the content and interpretations presented in this paper.

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