

Green Banking and Bank Performance in ASEAN: The Moderating Role of Bank Size

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Abstract. This study investigates the impact of green banking disclosure and green credit on bank financial performance in the context of ASEAN countries. Using a sample of 31 listed banks from Indonesia, Malaysia, Singapore, Philippines, and Thailand during the period 2020-2022, the authors examine the effects of green banking disclosure and green credit on return on equity (ROE) and the moderating role of bank size. The green banking disclosure is measured using content analysis based on the Green Disclosure Index, while green credit is measured as the ratio of green credit to total credit. The results, based on OLS and moderated regression analyses, indicate that green banking disclosure has a significant positive impact on ROE, while green credit has no significant effect. However, in the presence of bank size, green credit shows a significant negative impact on ROE, and bank size positively moderates this relationship. The findings suggest that green banking disclosure enhances bank financial performance, while green credit may have a negative impact, particularly for larger banks. The study contributes to the literature by providing empirical evidence from the ASEAN region and considering both disclosure and credit aspects of green banking. The results have implications for bank management and regulators in promoting sustainable finance and improving bank performance.

Keywords: Green banking disclosure, green credit, financial performance, stakeholder theory, legitimacy theory, SDG 13

1. Introduction

Banks are assumed impacting on the environment negatively and being one of the main drivers of global climate change. This is due to the fact that banks serve as a funds facilitator for industrialization operations which may impact negatively on the environment (Handajani et al., 2019). According to the International Forests & Finance Coalition, 15 banks from Indonesia, Japan, Malaysia, China, Canada, England, and France provided funds to 23 enterprises in three tropical regions—Southeast Asia, Central and West Africa, and Latin America—that were at risk of deforestation, water pollution, and human rights violations during 2016 -2021. These banks provided USD 16.1 billion in loans to enterprises in Southeast Asia that were at risk of deforestation, water pollution, and human rights violations, while enterprises in Central and West Africa and Latin America received USD 10.8 billion (Walhi, 2022). Therefore, in recent decades, there has been an increase in global demand for environmentally responsible banking practices and environmental disclosure in bank's report (Khan et al., 2021).

The environmentally responsible demand also applies to the ASEAN, a regional intergovernmental organization consists of ten Southeast Asian countries, which economy is heavily based on environmentally sensitive industries like agriculture and fisheries. Extreme weather events and rising sea levels due to climate change might result in economic losses (Zhong & Kan, 2023). Thus, ASEAN is predicted to suffer more economic losses from climate change than the other regions, with an 11% reduction in the region's GDP in 2100 (ASEAN Working Committee on Capital Market Development, 2020). Therefore, several policies and guidelines have been published by finance ministers and central bank governors in seven ASEAN countries—Indonesia, Malaysia, Philippines, Singapore, Thailand, Cambodia, and Vietnam—encourage banks to implement green banking practices and provide environmental disclosures (Jeffries et al., 2019).

In response to that, banks are beginning to change from having a profit-oriented to one that is stakeholder-oriented and more concerned on social and environmental responsibility. The business operational practices that consider environmental concerns for banking is known as green banking (Akhter et al., 2021). However, green banking practices are not only banks that help to prevent environmental pollution, but they also encourage other industries to protect the environment which is carried out through green financing (Do et al., 2023). According to the ASEAN Sustainable Finance State of the Market 2022 report, green credit is the most common green finance trend in ASEAN compared to other green instruments. Green credit is the most common instrument in Singapore, Thailand, and Vietnam, and it comes in second place after sukuk in Indonesia and Malaysia. Environmental disclosures have gained popularity due to environmental regulations, investors and societal pressures, customers' awareness (Sra et al., 2022) and the commitment to prevent issues such as greenwashing (Wedari et al., 2021). Furthermore, banks must communicate green banking initiatives through green banking disclosures to maintain stakeholder relationships and enhance transparency and accountability (Solikhah et al., 2018).

However, the impact of green banking is still a debate among researchers whether green banking practice can improve bank performance, moreover, the research findings are still inconsistent. Research conducted by Buallay (2019) and Shakil et al. (2019) finds that banks that provide environmental issue's information have higher profitability because of the stakeholder's awareness and consideration on the environmental practices in their decision-making as a key driver for better asset efficiency. Yin et al. (2021) and Siauwijaya et al. (2023) also found that green credit stimulates banks to have new green consumers, allowing banks to explore new markets, thus green credit can improve bank profitability. However, Utami & Muslichah (2019) and Zaman et al. (2020) found that banks' financial performance was not impacted by their disclosure of environmental issues because banks need additional costs to provide information related to environmental issues which may reduce bank's profitability. According to Xi et al. (2021), green credit

significantly improves bank financial performance in the first two periods through increased market share, improved reputation, and regulatory support, and its significance reduced in the third period since it depends on factors such as market dynamics, regulatory environment, risk management practices, and how effectively banks manage the transition to sustainable practices. While key determinant of a bank's effectiveness and operational success is its financial performance (Teixeira et al., 2021), financial performance measurements may help to determine whether bank management strategies or policies have an impact on the internal aspects of the bank's operations and financial health. Stakeholders also require the financial performance measurements to assess the conditions of the bank and the level of bank's success in its operational activities (Istan, 2024). Hence, this study aims to address debates, by examining the impact of green banking disclosure and green credit practice on bank financial performance in ASEAN countries. Specifically, this study examines whether bank size moderates the relationship between green credit and bank's financial performance, which assumed the existence of moderating variable may strengthen the relationship existed.

This study contributes to the literature in several ways, first, prior literature has mostly either focused on green banking disclosures (Adu, 2022; Karyani & Obrien, 2020; Khan et al., 2021) or green credit practice (Siauwijaya et al., 2023; Del Gaudio et al., 2022; Lian et al., 2022). Therefore, this study contributes to the literature as the first that utilizes green credit and green banking disclosure as a measure of green banking practice and examines the impact on bank financial performance. Moreover, this study examines the impact of green banking disclosure and green credit on bank financial performance, particularly in ASEAN countries, which has not been addressed in previous studies. Prior literature has mostly either focused on a single country (Khan et al., 2021; Lian et al., 2022; Xi et al., 2022) or a group of developed countries (Al-Qudah et al., 2022; Buallay, 2019; Zaman et al., 2020). Hence, this study contributes to address the gaps by considering the impact of both green credit and green banking disclosure on bank financial performance from ASEAN countries. Second, this study also includes bank size, which is measured by market capitalization, as a moderating variable on the effect of green credit on bank financial performance. The bank's size is an indicator of attention and pressure from its stakeholders; thus, it will strengthen the influence on the bank's financial performance (Ardiantini et al., 2020; Dang et al., 2018). Thus, this study contributes to the literature by not only emphasizing the impact of green banking disclosure and green credit on bank's financial performance, but also investigating if bank size can moderate the relationship between green credit and bank's financial performance. Third, bank Management may use the findings to assist in decision-making and determining policy that will maximize bank financial performance. Therefore, the findings contribute to enhance bank management's awareness about the importance of green banking practices and transparency to meet stakeholders' interests and increase the bank's reputation. Last but not the least, the Regulators may use this study's findings to strengthen green banking regulations and develop green banking reporting standards for large banks, to increase green banking transparency and to make it easier for stakeholders to evaluate green banking practices. Thus, it will not only help to increase bank financial performance, but also increase the pressure on large banks to be more environmentally responsible with consistently enhance green banking initiatives and related reporting which may improve environmental quality.

The next sections of this paper will be structured as follows: Section 2 discusses the literature review and hypothesis development. Section 3 presents the research methodology which contains variable definitions and research model. Section 4 presents the results of the empirical research and discussion. Section 5 summarises the conclusions and suggestions.

2. Literature Review and Hypothesis Development

2.1. Green Banking Practice

Green banking is integrating environmentally friendly concepts in bank operating activities and considering environmental protection in their business activities (Akhter et al., 2021). In green banking practices, bank is implementing green transformation for its operating activities, such as adopting renewable energy sources, automation, and other pollution-prevention measures to reduce the carbon footprint of banking operations. However, green banking practices are not only banks that help to prevent environmental pollution, but they can also encourage other industries to protect the environment. In this case, bank carefully assess the environmental risks of business projects and how enterprise may reduce their impact on environmental before providing funds to the project or enterprise (Luo et al., 2021; Song et al., 2023). Bank may stop or refuse to provide financing for projects with negative environmental impact, as well as enterprise who have been proven to have violated environmental protection or energy conservation norms and laws (Hu et al., 2020).

Green banking practices in ASEAN countries, specifically Indonesia, Malaysia, Philippines, Singapore, Thailand, Cambodia, and Vietnam, have been supported by government's regulations or guidelines. In Indonesia, Law Number 32 of 2009 on Environmental Protection and Management, Bank Indonesia Regulation (PBI) Number 14/15/PBI/2012 followed by Bank Indonesia Circular Letter No. 15/28/DPNP, and Government Regulation Number 46 of 2017 on Environmental Economic Instruments encourages Indonesian banks to include environmental consideration in their business operations, as well as include debtors' environmental management practices in credit risk assessment. In Malaysia, the Value-based Intermediation Financing, and Investment Impact Assessment Framework (VBIAF), released by Bank Negara Malaysia in 2019, encourages Malaysian banks to incorporate environmental considerations into their financing decisions and operations and publish sustainability disclosures in their annual reports. In Philippines, Draft Circular on the sustainable finance framework issued by The Bangko Sentral ng Pilipinas (BSP) and Memorandum Circular No. 4/2019 issued by the Securities and Exchange Commission (SEC) requires banks and all listed companies in Philippine to integrate sustainability principles into their governance, risk management systems, and strategic objectives, as well as disclose sustainability strategies in their annual reports. In Singapore, The Responsible Financing Guidelines were released in 2015 by the Association of Banks in Singapore (ABS). Through environmental risk management guidelines, the Monetary Authority of Singapore (MAS) encourages Singapore banks to make regular environmental risk disclosures. In Thailand, the Thai Bankers' Association (TBA) released the Sustainable Banking Guidelines - Responsible Lending in 2019, which were supported by the Bank of Thailand. In Cambodia, the association of Banks in Cambodia (ABC) with the support from the government issued Cambodia Sustainable Finance Principles and implementation guidelines in 2019 to encourage the environmental risk management and the integration of sustainability initiatives in bank lending operations. In Vietnam, The State Bank of Vietnam (SBV) issued Directive No. 03/CT-NHNN to encourage green credit growth and manage environmental risks in lending activities, SBV 1604/QD-NHNN concerning Approval of the Green Bank Development Scheme in Vietnam, and Circular No. 155/TT-BTC on information disclosure in the securities market, which requires public companies in Vietnam to report their environmental and social impacts every year (International Capital Market Association, 2020; Jeffries et al., 2019).

2.2. Green Banking Disclosure on Bank Financial Performance

Green banking disclosure provides information for stakeholders about bank's commitment, efforts, and quality in terms of environmental responsibility, which may reduce information asymmetry and increase transparency (Khan et al., 2021; Vitolla et al., 2019). Stakeholder theory suggests that the existence

of a business is significantly influenced by the stakeholder's support (Freeman, 1984). According to Akhter et al. (2021), green banking disclosure can be used as communication channel to its stakeholder on green banking implementation, to meet stakeholders' interests. Green banking disclosure provides stakeholders with the information they need to assess green banking practices. Thus, banks may gain a positive reputation and competitive advantage, stakeholder's trust, and support, which will improve investment and profitability (Akhter et al., 2021; Zhou et al., 2021).

Meanwhile, legitimacy theory suggests that banks must act following the values or norms of society to gain and maintain its legitimacy for its business operation (Dowling & Pfeffer, 1975). According to legitimacy theory, green banking disclosure can be a strategy to avoid legitimacy gaps or environmental conflicts by disclosing their green commitments and initiatives (Deegan, 2002). In this case, banks provide information indicating that their business processes ethically met with the regulation and environmentally friendly. Therefore, green banking disclosure may create a good reputation and legitimacy status from society which helps banks to achieve financial benefits (El Qirem et al., 2023; Yunidwi & Napitupulu, 2023). Bank may receive stakeholder's trust and support which leads to higher working capital and business profits (Fernando et al., 2022; Ishak & Asmawi, 2022). Previous research found that environmental disclosure has a significant positive influence on bank financial performance (Buallay, 2019; Shakil et al., 2019). Given this, the hypothesis developed as follows:

H1: Green banking disclosure has a positive impact on return on equity.

2.3. Green Credit on Bank Financial Performance

Green credit refers to bank's financing activities for projects and enterprise by taking consideration of the project's sustainability for the environment and how enterprises reduce the impact of their business on the environment in bank's credit risk assessment (Luo et al., 2021; Song et al., 2023). Stakeholder theory suggests that the existence of a business is significantly influenced by the stakeholder's support (Freeman, 1984). Thus, banks may maintain relationships with their stakeholders by concentrating on the environment and long-term sustainable development, which aligns with stakeholders' growing concern on environmental issues (Kılıç & Kuzey, 2019). Based on stakeholder theory, banks that distribute green credit may meet their responsibilities to stakeholders because of pressure from stakeholders to consider environmental balance in every business decision, allowing banks to gain trust and positive support from stakeholders which will improve bank's profitability (Zhou et al., 2021). Legitimacy theory suggests that banks must act following the values or norms of the surrounding community to receive legitimacy from society and maintain their existence (Dowling & Pfeffer, 1975). According to legitimacy theory, bank that distribute green credit contributes to financing that considers environmental protection and follows the norms and regulations, allowing banks to gain a positive reputation from the society which leads to higher working capital and business profits (Wan, 2023; Yulinartati et al., 2020). Bank may also reduce environmental risks caused by climate change and environmental degradation, thus reducing bank credit risk in the long term (Xi et al., 2022). However, green credit distribution process may incur higher costs for bank in the short term such as costs for evaluating the debtor's environmental impact and monitoring debtor compliance with sustainability standards, where these costs would reduce bank financial performance (Zhang, 2018). Furthermore, according to Xi et al. (2022), green projects or enterprises who meet green credit criteria may not provide immediate financial benefits to the bank than conventional project's debtors. This is due to the large initial cost's requirement, such as the initial costs for installing environmentally friendly technology and costs related to regulatory compliance. Therefore, green credit will generate low interest income which will reduce bank financial performance. Previous research found that green credit has a negative impact on bank financial performance (Del Gaudio et al., 2022; Ranning, 2022). Given this, the hypothesis developed as follows:

H2: Green credit has a negative impact on return on equity.

2.4. Green Credit on Bank Financial Performance with the Presence of Bank Size

Banks with large market capitalization receive greater attention and pressure from stakeholders (Roosmawarni et al., 2022). As a result, large banks tend to be the focus of various government regulations, such as sustainable finance which encourages banks to issue green credit. Stakeholder theory suggests that the existence of a business is significantly influenced by the stakeholder's support (Freeman, 1984). Banks may maintain relationships with their stakeholders by concentrating on the environment and long-term sustainable development, which aligns with stakeholders' growing concern on environmental issues (Kılıç & Kuzey, 2019). Thus, banks may meet their responsibilities and maintain relationships with their stakeholders by the issuance of green credit due to stakeholder's pressure to consider environmental balance in every business decision, allowing banks to obtain stakeholder's trust and positive support which will improve bank's profitability (Zhou et al., 2021). Meanwhile, legitimacy theory suggests that banks must act following the values or norms of the surrounding community to receive legitimacy from society and maintain their existence (Dowling & Pfeffer, 1975). Based on legitimacy theory, banks may build a positive reputation in society by the issuance of green credit which leads to higher working capital and business profits because they contribute to financing that takes environmental protection aspects which in line with norms and regulations (Yulinartati et al., 2020). Therefore, large banks tend to face greater cost pressures from the issuance of green credit because the characteristics of green credit debtors and green credit distribution process requires a long period of time to generate profits (Chiesa & Barua, 2019; Galán & Tan, 2022). According to Zhang (2018), the complicated processes of green credit distribution may incur higher costs in the short term, which would affect bank financial performance. Furthermore, green credit debtors require large initial costs, such as the initial costs for environmentally friendly technology instalment (Xi et al., 2022). Thus, it can reduce bank operational income which may have a negative impact on bank financial performance. Previous research found that green credit has a negative impact on bank financial performance (Del Gaudio et al., 2022; Ranning, 2022). The hypothesis developed as follows:

H3: Green credit has a negative impact on return on equity with the presence of bank size.

2.5. Green Credit on Bank Financial Performance with Bank Size as a Moderating Variable

Large and small banks may encounter different problems and opportunities in managing green credit portfolios. Banks with large market capitalization receive more attention from stakeholders than the small banks, resulting in greater pressure from stakeholders regarding the bank's sustainable activities (Angganararas et al., 2023). Large banks are mostly the target of various government regulations, including the adoption of sustainable finance, which encourages large banks to implement green credit mechanisms. Based on stakeholder theory, the existence of a bank is significantly determined by the stakeholder's support (Freeman, 1984). Large banks, which are more visible to stakeholders, distribute green credits as a response to stakeholder's pressure to include environmental balance into all business decisions. Through the distribution of green credit, large banks engage in selective financing activities taking into consideration the prospective borrowers' environmental efforts which help banks to avoid reputational risks. According to Platonova et al. (2018), large bank has better access to capital sources, and thus bank may receive more financial resources. In addition, Hörisch et al. (2015) found that large banks have more human resources, which enable them to acquire information and develop expertise in sustainability management systems. Therefore, large banks have better resources that may facilitate the success of green credit distribution. Large banks are considered to have clear strategies and objectives for monitoring their business, thus they are in a better position to deal with sustainability projects (Abdi et al., 2022). Thus, large bank may respond

more effectively to stakeholder's pressure which leads to bank's financial performance improvement (Platonova et al., 2018). Previous research finds that bank size moderates (strengthen) the relationship between green credit and bank financial performance (Galán & Tan, 2022). Therefore, the hypothesis developed as follows:

H4: Bank size strengthen the impact of green credit on return on equity.

3. Research Methodology

3.1. Data

The population for this study is banks listed on the stock exchanges of ASEAN countries in 2020-2022 that have green banking and sustainable financing regulations or guidelines, such as Indonesia, Malaysia, Singapore, Philippine, Thailand, Cambodia, and Vietnam. This study focused on listed banks because these banks are mostly the target of government regulations, including the adoption of green banking practice, to ensure economic stability and protect the stakeholders. In addition, listed banks receive more attention from stakeholders, thus the measurement of bank's financial performance is important for stakeholder's decision-making. The study's time period is chosen to provide a sample that is more recent since all the seven ASEAN countries had policies related to green banking practices during these period. This study uses purposive sampling method to determine the sample. The study's initial sample includes 95 banks. However, the final sample used in this study is 31 banks with 84 observation data due to the unavailability of the data needed for research, banks do not provide annual reports or sustainability reports in English and outliers in the data. The outliers were identified based on boxplot observations, with extreme values, therefore, it needs to be removed as they may significantly distort classical analysis of data. Therefore, all the listed bank in Vietnam and Cambodia could not be used as a sample in this study. Table 1 presents summary of the sample selection in the following:

Tabel 1. Sample Selection

Sampling Criteria	Total
Banks listed on the stock exchanges of ASEAN countries for the period 2020-2022	95
Banks that do not consistently publish annual reports or sustainability reports during the period 2020-2022	(13)
Banks that use a language other than English in annual reports or sustainability reports during the period 2020-2022	(3)
Banks that do not have complete data related to the research variables	(44)
Total banks that meet the criteria	35
Total research samples (35×3)	105
Data Outliers	(21)
Total of data observations	84

This study was conducted with the support of secondary data. The green banking disclosure, green credit information and bank age were retrieved from sustainability reports or annual reports in bank's official websites. Then, other data such as company size and bank financial performance were retrieved from the Osiris database.

3.2. Variable Measurement

The dependent variable in this study is bank financial performance using profitability measurement,

which is return on equity (Adu, 2022; Buallay, 2019; Roosmawarni et al., 2022; Shobhwani & Lodha, 2023; Wahyuningrum et al., 2020; Xi et al., 2022; Zhou et al., 2021). Return on Equity (ROE) is the ratio of net profit to total shareholder equity which reflects the profits generated by the bank from shareholder investments (Xi et al., 2022). Yin et al. (2021) and Siauwijaya et al. (2023) discovered that green credit positively affects bank's return on equity. However, Zaman et al. (2020) found that environmental disclosure did not impact bank's return on equity.

There are two independent variables in this study, which are green banking disclosure and green credit. Green banking disclosure is measured by using content analysis techniques in the bank's annual report or sustainability report (Bose et al., 2017, 2018; Khan et al., 2021) based on 21 Green Disclosure Index (GDI) developed by Bose et al (2018). Furthermore, bank was given a score of 1 if the annual report or sustainability report contains a disclosure indicator, otherwise bank was given a score of 0. The total green disclosure score is calculated as the proportion of the bank's total disclosure score divided by the maximum disclosure score. Then, green credit distribution is measured by the green credit ratio which calculated by the amount of green credit distributed divided by the total bank credit (Julia & Kassim, 2016; Rahaman et al., 2018; Zhou et al., 2022).

Tabel 2. Green Disclosure Index

Index	Description
GBDI-1	Bank policy on environmental conservation and/or climate change
GBDI-2	Environmentally friendly project financing
GBDI-3	Reducing paper waste by encouraging internal communication
GBDI-4	Adoption of policies and technology to reduce water and gas waste in internal bank operations
GBDI-5	The use of environmentally friendly materials
GBDI-6	Energy conservation in business operations
GBDI-7	Adoption of policies to address climate change and reduce emissions by reducing employee business travel.
GBDI-8	Information related to environmentally friendly products banks
GBDI-9	Bank's initiatives and involvement in the construction of networks related to environmental issues
GBDI-10	Evaluate the impact of the client's business on the environment before sanctioning financing facilities
GBDI-11	Organizing seminars, workshops, or training to increase community's environmental awareness
GBDI-12	Bank awards for environmentally friendly activities and/or environmental reporting practices
GBDI-13	Information related to clients or partners who have won awards for environmental conservation initiatives
GBDI-14	The involvement of banks in sponsoring activities to beautify the city or village environment
GBDI-15	Information on the establishment of a climate change fund
GBDI-16	Information on the establishment of green branch
GBDI-17	Introduction of green marketing in internal communication media
GBDI-18	Bank's initiatives and involvement to train employee related to the green movement
GBDI-19	Information related to the total budget allocated annually for green banking

	practices
GBDI-20	The actual amount spent on various green banking activities.
GBDI-21	The green banking reporting has separate page in the annual report

Source: Bose et al (2018)

This study uses bank age as a control variable which is measured by the number of years since the bank was established (Adu, 2022; Isayas, 2022; Xi et al., 2022). Bank financial performance will be impacted by the fact that older banks have more management expertise and experience to manage risks than newer banks (Kwashie et al., 2022). In addition, this study uses bank size, which is measured by the normal logarithm of market capitalization as a moderating variable on the effect of green credit distribution on bank financial performance. This measure is used in some empirical literature such as Dang et al. (2017), Hashmi et al. (2020), Parikh et al. (2023), and Wuttichindanon (2017). Market capitalization indicates the value of all banking shares which are traded on the equity market (Dang et al., 2017). Thus, the bank size is an indicator of attention and pressure from its stakeholders which may strengthen the influence on the bank's financial performance (Ardiantini et al., 2020; Dang et al., 2018). Galán & Tan (2022) found that banks with a large capitalization may be able to reduce the negative impact of green credit on profitability since they may receive more appreciation and incentives from shareholders. However, Yin et al. (2021) discovered that bank size did not impact the relationship between green credit and bank's return on equity. Although the previous research that examines green credit and bank financial performance with bank size as a moderating variable is still limited, thus some empirical literature that may be related to the moderating role of bank size, such as D'Amato & Falivena (2020) who found that company size significantly moderates the relationship between CSR and company value.

3.3. Methodology and Empirical Model

This study is a quantitative study. To test the hypothesis, this study uses ordinary least squares (OLS) regression and moderated regression analysis. The data were analyzed using SPSS statistical software. The use of OLS regression requires that the regression model is free from classical assumptions to ensure that the regression is accurate in estimation, consistent, and unbiased, in other words the model is BLUE. Therefore, the classical assumption tests used in this study consisting of normality, heteroscedasticity, multicollinearity, and autocorrelation. The descriptive statistical analysis will be carried out to describe all the data that has been collected through the mean, standard deviation, maximum and minimum.

The regression model 1 tests the effect of green banking disclosure and green credit distribution on bank financial performance. Therefore, model 1 is used to test hypotheses 1-2 and the regression was constructed as follows:

$$ROE_{it} = \beta_0 + \beta_1 GreenBankingDisclosure_{it} + \beta_2 GreenCredit_{it} + \beta_3 AGE_{it} + \varepsilon_{it} \dots\dots\dots (1)$$

Then, this study used moderated regression analysis in regression model 2 to test bank size as a moderating variable in the effect of green credit on bank financial performance. Therefore, model 2 is used to test hypotheses 3-4 and the regression was constructed as follows:

$$ROE_{it} = \beta_0 + \beta_1 GreenBankingDisclosure_{it} + \beta_2 GreenCredit_{it} + \beta_3 SIZE_{it} + \beta_4 AGE_{it} + \beta_5 (GreenCredit * SIZE)_{it} + \varepsilon_{it} \dots\dots\dots (2)$$

4. Results and Discussion

4.1. Descriptive Statistics and Correlation

Table 3 presents the descriptive statistics for each variable, including the mean, standard deviation, maximum and minimum value. The mean return on equity is 6.94. This shows that the average return on equity for the sample banks in ASEAN is relatively lower than the sample banks in China according to Xi

et al. (2021) which shows that the average return on equity is 16.245. Additionally, the good return on equity is worth more than 12% (Bank Indonesia, 2011). This indicates that the sample banks in ASEAN generate low profit for their shareholders. However, on average, banks have disclosed 56.12% of the total items in the green disclosure index. This indicates that green banking disclosure in ASEAN is quite high with an average value of more than 50%. Meanwhile, Khan et al. (2021) found that on average, the sample banks in Bangladesh disclosed 30.60% of the green disclosure index. According to Adu (2022), that examined a sample of banks in Sub-Saharan African (SSA) countries, the average value of environmental disclosure provided by these banks is 37.58%. This shows that the average value of green banking disclosure in ASEAN countries is higher than banks in Bangladesh and Sub-Saharan African (SSA) countries which indicates that sample banks in ASEAN disclosed more information about their green banking activities than sample banks in Bangladesh and Sub-Saharan African (SSA) countries.

On the other hand, the average level of green credit disbursement by banks is still very low, which is 4.67%. Xi et al. (2021) with the sample of listed bank in China also shows that the mean value of the green credit in the study is still very low, which is 5.28%. This shows that the average value of green credit in ASEAN countries is lower than banks in China. The small average value of green credit ratio indicates that ASEAN banks still lack awareness and initiatives in the distribution of green credit. Nevertheless, the sample banks in ASEAN used in this study tend to be more transparent in disclosing their green banking activities than distributing green credit. This may indicate that the existing regulations are still ineffective in encouraging banks to issue green credit, requiring an evaluation or enhancement of green credit mechanisms and regulations. The average size of banks in this study is a bank with a mean market capitalization value of 14.57 or \$7,953,233.981. Banks with a market value of \$10 billion or more are included in the big cap category, banks with a market value between \$2 billion and \$10 billion are the mid-cap and small cap is banks with a market value less than \$2 billion (Roosmawarni et al., 2022). Thus, the sample banks included in the mid-cap category. The maximum value of bank size is 17.94 or \$62,436,645, while the minimum value of bank size is 11.02 or \$8,030,376. The average bank has been around for 57 years. The maximum value of bank age is 22 years, while the minimum value of bank size is 106 years.

Tabel 3. Descriptive Statistics Results

	Mean	Std. Deviation	Minimum	Maximum
ROE	6.946933521	5.116396334	-6.67330643	19.65603335
Green Banking Disclosure	56.12244897	14.67385188	23.80952381	85.71428571
Green Credit	4.672519232	3.620578249	.0785325425	13.87272553
Bank Size	14.57884957	1.738254096	11.02331699	17.94966293
Bank Age	57.52	20.392	22	106

After normality, autocorrelation, and heteroscedasticity tests for the dataset, results show that dataset has normal distribution and has no autocorrelation and heteroscedasticity issues. Table 4 presents the Pearson’s correlation for each variable, including dependent variables, independent variables, moderation variables and control variables. The highest correlation value is between green banking disclosure and ROE with a coefficient value of 0.468. The correlations’ value between variables are less than 0.70, indicating that multicollinearity is not at problematic level.

Table 4. Correlation Matrix

	ROE	Green Banking Disclosure	Green Credit	Bank Size	Bank Age
ROE	1.000				
Green Banking Disclosure	0.468***	1.000			

Green Credit	0.052	0.134	1.000		
Bank Size	0.466***	0.554***	0.121	1.000	
Bank Age	0.162	0.170	0.101	0.164	1.000

***, **, * Correlation is significant at the 0.01, 0.05, 0.10 level (2-tailed).

4.2. Regression Results

The regression results for model (1) are presented in Table 5. The Adjusted R Square value is 0.211 or 21.1%. It indicates that return on equity can be explained by green banking disclosure, green credit, and bank age of 21.1%. Meanwhile, the remaining 78.9% can be explained by other variables not included in this study.

Table 5. Regression Result

Variable	Model (1)			Model (2)		
	Coefficient	t	p-value	Coefficient	t	p-value
Green Banking Disclosure	0.154	4.772	0.000***	0.105	2.887	0.005***
Green Credit	-0.023	-0.181	0.857	-2.071	-2.686	0.009***
Bank Size				-0.013	-0.026	0.979
Bank Age	0.020	0.682	0.497	0.026	0.957	0.342
Green Credit*Bank Size				0.254	2.669	0.009***
Constant	-1.273	-1.075	0.286	-0.255	-0.070	0.944
F-stat	8.31***			8.14***		
Adjusted R2	0.211			0.303		

***, **, * t-test is significant at the 0.01, 0.05, 0.10 level (2-tailed)

This study found that green banking disclosure variable has a positive coefficient of 0.154 and a significant value of 0.000 (<0.05), **H1 is accepted**. This indicates that green banking disclosure has a positive and significant effect on the return on equity. The result is consistent with Buallay (2019) and Shakil et al., (2019) that found significant positive effect between environmental disclosure and bank financial performance.

The second independent variable, green credit, shows a coefficient value of -0.023 and insignificant value of 0.857 (>0.05), **H2 is rejected**. This indicates that green credit does not have a significant effect on return on equity. The negative coefficient suggests that an increase in the green ratio would decrease the return on equity, however the impact is insignificant. This result is inconsistent with findings from Del Gaudio et al. (2022) and Ranning (2022) who found that green credit had a negative significant effect on bank financial performance.

Meanwhile, bank age as a control variable shows a coefficient value of 0.020 and insignificant value of 0.497 (>0.05). The positive coefficient suggests that an increase in the bank age would increase the return on equity, however the impact is insignificant. Therefore, it can be concluded that bank age do not influence return on equity. This result is in accordance with Isayas (2022) and Siddique et al. (2022).

Table 5 presents the regression results for model (2). The Adjusted R Square value is 0.303 or 30.3%. It indicates that return on equity can be explained by green banking disclosure, green credit, bank size, bank age and the interaction green credit*bank size of 30.3%. Meanwhile, the remaining 69.7% can be explained by other variables not included in this study.

When firm size is introduced as a moderating variable, the coefficients and significance of the model change. This study found that green credit variable has a coefficient value of -2.071 and a significant value of 0.009 (<0.05), **H3 is accepted**. This indicates that green credit has a negative effect on return on equity

with the presence of bank size. The negative coefficient of green credit in model (2) indicates that the green credit distribution may have different effects on bank's return on equity depending on the size of bank. Thus, the higher green credit ratio distributed by large banks leads to lower bank profitability. Meanwhile, the insignificant effect of green credit on bank's return on equity in model (1) indicates that without considering the bank size, green credit, by itself, has insignificant impact on return on equity. The result is consistent with Del Gaudio et al. (2022) and Ranning (2022) that found significant negative effect between green credit and bank financial performance.

In addition, the interaction variable green credit*bank size has a coefficient value of 0.254 and a significant value of 0.009 (<0.05), **H4 is accepted**. This indicates that bank size moderates the effect of green credit on return on equity. The positive coefficient suggests that a one unit increase in the interaction between green credit ratio and bank size would increase the return on equity by 0.254 units. Therefore, it can be concluded that bank size may strengthen the effect of green credit on return on equity. This is consistent with Galán & Tan (2022) that found one unit in the green credit ratio would increase the bank's financial performance by 0.0194 units in large banks which the magnitude of effect is smaller than the findings of this study.

4.3. Discussion

This study found that green banking disclosure has a positive and significant effect on return on equity. This finding is related to stakeholder theory that the existence of a business is significantly influenced by the stakeholder's support (Freeman, 1984). Banks that disclose more information on their green banking activities may indicate their commitment to transparency and accountability, which help to maintain stakeholder relationship. Legitimacy theory suggests that banks must act following with the values or norms of the surrounding community by being transparent about their commitment, efforts, and quality in terms of the environmental issues (Deegan, 2002). As ASEAN countries that used as the sample in this study have issue green banking regulations, then by disclosing green banking initiatives, banks may avoid the losses caused by punishments because green banking disclosure can be used as the evidence of bank's compliance with government regulations and sustainable frameworks. Thus, the information disclosed by the banks will convince stakeholders that bank business processes are not only profit-oriented, but also environmentally responsible. As a result, banks may receive a positive reputation from the stakeholders, allowing stakeholders to give positive support, such as becoming users of banking products or supporters of banking funds. This has an impact on improving banking operational activity, which improves a bank's ability to earn profits for its shareholders. These findings align with Buallay (2019), who examined listed banks in European Union countries and found that environmental disclosure positively affects bank's financial performance. Shakil et al (2019) analyzed banks in emerging countries based on S&P Dow Jones emerging country list and found that environmental disclosure positively affects bank's return on equity. The findings of both studies indicate that environmental disclosure will lead to higher financial performance since the stakeholders in those countries are aware of environmental practices and consider it into decision-making. This study's finding can be evidence that green banking disclosure has succeeded in improving bank's financial performance. Based on the mean value of green banking disclosure, banks in ASEAN have disclosed more than 50% of the items in the green disclosure index, indicating that these banks have shown their commitment to transparency related to their green banking practices which may improve their financial performance.

Based on the results, green credit does not significantly affect the return on equity. The amount of green credit distributed by banks is relatively small compared to the overall credit portfolio distributed by banks, thus the impact on bank profits is not significant. This finding can be explained by the sample used in this study which revealed that the average level of green credit disbursed by banks is still very low with

an average value of 4.67%, since sustainable finance regulations in ASEAN countries which encouraging banks to adopt green lending procedures are still relatively new (International Capital Market Association, 2020). In addition, green credit distribution process is more complex and green projects or enterprises that meet green credit criteria may be fewer than the conventional projects. Banks also need a long period of time to earn profit from implementing green credit due to the characteristics of green credit debtors and green credit distribution process. This study's finding does not provide evidence that green credit may have an impact on bank's financial performance. The small average value of green credit ratio indicates that ASEAN banks still lack awareness in the distribution of green credit. This finding does not align with Del Gaudio et al. (2022), who examined the worldwide syndicated green loan facilities and found that a higher green credit will lead to lower profitability. Ranning (2022), who analyzed commercial bank in China, found that green credit negatively affects bank's profitability because green credit projects often require a long payback period, green credit distribution process need high costs and the interest rate concessions for specific enterprises applying for green finance will result in a significant decline in bank interest revenue.

This study found that green credit has a negative effect on return on equity with the presence of bank size. Large banks receive more attention and pressure from stakeholders, thus they mostly become the target of government regulations, such as the adoption of sustainable finance, which encourages banks to provide green credit. Based on stakeholder theory, the existence of a business is significantly influenced by the stakeholder's support (Freeman, 1984). Meanwhile, legitimacy theory suggests that banks must act following with the values or norms of the surrounding community to receive legitimate from society (Dowling & Pfeffer, 1975). Bank may meet their responsibilities to stakeholders' pressure and following with norms and regulations by the issuance of green credit. However, large banks tend to face greater cost pressures from green credit distribution because banks require high costs for the green credit distribution process, but green credit debtors cannot provide banks with immediate financial benefits, thus the profits generated from green credits are low, which reduces the level of profit generated by banks. Therefore, the higher the level of green credit issued by banks as a form of compliance with the regulations, the lower the bank's return on equity. These findings align with Del Gaudio et al. (2022), who examined the worldwide syndicated green loan facilities and found that a higher green credit will lead to lower profitability. Ranning (2022), who analyzed commercial bank in China and found that green credit negatively affects bank's profitability. The findings of both studies indicate that a higher green credit ratio will lead to lower bank's financial performance because green credit projects often require a long payback period, green credit distribution process need high costs and the interest rate concessions for specific enterprises applying for green finance will result in a significant decline in bank interest revenue. This study's finding can be evidence that green credit may have different effects on bank's return on equity depending on the size of bank. The findings in ASEAN banks imply that larger banks may face the negative effects of green credit distribution, which reduce their financial performance. Therefore, the results suggest that large banks should enhance their credit risk management and control to reduce the negative risks. However, this finding does not align with Yin et al. (2021) who analyzed banks in China and found that green credit positively affects bank's profitability because green credit stimulates banks to have new green consumers and allowing banks to explore new markets, thus green credit may improve bank profitability.

Based on the results, bank size may strengthen the influence of green credit on return on equity. This finding is in line with stakeholder theory that the existence of a bank is significantly determined by the support of stakeholders (Freeman, 1984). Large banks will be more responsive to stakeholder demand because banks with a large market capitalization receive more attention and pressure from stakeholders than small banks. In this case, large banks are mostly the target of government regulations, such as the adoption of sustainable finance. Large banks issue green credit as a form of regulation's compliance, and they will be more careful in managing the green credit risks to maintain their reputation. Moreover, banks

with large market capitalization have better resources to manage green credit's high costs and risks. Large banks can still depend on profits from other profitable business lines when green credit distribution generates low profits since they have diversified services or products which create more diverse income streams. As a result, large banks may strengthen the positive impact of green credit on return on equity. These findings align with Galán & Tan (2022), who examined the banks in China and found that banks with a large capitalization may be able to reduce the negative impact of green credit on profitability since they receive more incentives from shareholders. Thus, banks may have more efficient operational structures and corporate governance, reducing their vulnerability to the green credit's risks. This study's finding can be evidence that large banks may mitigate the risks and negative effects of green credit distribution.

4.4. Robustness Test

We test the robustness of our results by replacing the dependent variable, return on equity, with return on assets as shown in Table 6. Return on Assets (ROA) is the ratio to measure a bank's effectiveness in generating profits using its assets, which is calculated by net profit to total assets. The results of robustness test are the green banking disclosure has positive and significant effect on return on assets. The green credit has negative and significant effect on return on assets with the presence of bank size. Bank size may strengthen the influence of green credit on return on assets. Therefore, based on the robustness test, all the findings consistent with the previous analysis, which indicates the robustness of our results.

Table 6. Robustness result

Variable	Model (1)			Model (2)		
	Coefficient	t	p-value	Coefficient	t	p-value
Green Banking Disclosure	0.021	3.832	0.000***	0.016	2.580	0.012**
Green Credit	0.005	0.225	0.823	-0.516	-3.539	0.001***
Bank Size				-0.122	-1.415	0.161
Bank Age	0.003	0.681	0.498	0.005	1.094	0.278
Green Credit*Bank Size				0.056	3.601	0.001***
Constant	-0.096	-0.403	0.688	1.127	1.579	0.118
F-stat	5.71***			7.15***		
Adjusted R2	0.147			0.273		

***, **, * *t*-test is significant at the 0.01, 0.05, 0.10 level (2-tailed)

5. Conclusion

This study examines the impact of green banking disclosure and green credit on bank financial performance in the context of ASEAN countries. The findings suggest that green banking disclosure has a significant positive effect on return on equity (ROE), indicating that banks with higher levels of disclosure tend to have better financial performance. This result is consistent with the stakeholder theory and legitimacy theory, which suggest that disclosure enhances transparency, accountability, and reputation, leading to improved stakeholder relationships and financial outcomes. On the other hand, green credit shows no significant effect on ROE in the main model, possibly due to the low average ratio of green credit to total credit in the sample banks. However, when bank size is introduced as a moderator, green credit exhibits a significant negative impact on ROE, and this effect is positively moderated by bank size. This finding implies that larger banks may face higher costs and risks associated with green credit, which can adversely affect their financial performance.

The study contributes to the literature by providing empirical evidence from the ASEAN region and considering both disclosure and credit aspects of green banking. The results have implications for bank

management and regulators in promoting sustainable finance and improving bank performance. Bank managers should enhance their green banking disclosure to improve financial performance, while being cautious about the potential negative impact of green credit, particularly for larger banks. Regulators should provide clear guidelines and incentives for green banking practices, while considering the differential effects on banks of different sizes. The study has some limitations, such as the small sample size and focus on listed banks which only reflect the performance of listed banks and may not represent the general conditions of banking industries, short time period which may not capture the long-term impact of green banking practice on bank financial performance, single financial performance measure and potential subjectivity in the disclosure measure, which could be addressed in future research. Further studies could also examine the impact of green banking on other aspects of bank performance, such as risk and efficiency, and explore the mediating mechanisms through which disclosure and credit affect financial performance.

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