



# The impact of green finance on profitability with credit risk as an intervening variable

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## ABSTRACT

Sustainable Development Goals (SDGs) have become a global concern and have touched various industrial sectors. Through the application of green finance in the financial industry, green credit is provided by banks to support the sustainability of business projects based on environmental sustainability as determined in the Sustainability in the Sustainable Business Activity Category (KKUB) by OJK. On the other hand, as profit-oriented companies, banks need to consider how it impacts credit risk and banking profitability. Using credit risk as an intervening variable, this study seeks to establish the correlation between green finance and profitability of banks listed on the Indonesia Stock Exchange. This research uses the path analysis method and a quantitative study using the financial statements of banks that apply green finance for 2018-2022. The result shows that green lending (green finance) positively affects credit risk and negatively impacts bank profitability. Other result shows that credit risk can mediate the development of green lending on profitability.

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## 1. INTRODUCTION

Sustainable Development Goals are practical sustainability ideas formulated by United Nations (UN) member countries in 2015, with the expectation of achieving them by 2030. These sustainability practices are intended to address the world's leadership demands to tackle environmental sustainability, poverty, inequality, and climate change by involving various sectors in concrete actions. The SDGs encompass three dimensions of sustainable development: environmental, social, and economic, which are outlined in 17 pillars.

The banking system has integrated efforts to achieve the Sustainable Development Goals pillars into the economic sector. The banking sector is a primary focus due to its impact on national development and economic growth (Sharma & Choubey, 2022). Indonesia, through the Financial (OJK), has actively embraced the Sustainable Development Goals by implementing Sustainable Financing outlined in the Sustainable Finance Roadmap Phase I (2015-2019). This initiative primarily concentrated on enhancing the understanding of economic actors regarding sustainable finance. The efforts have yielded anticipated outcomes, including the introduction of sustainable finance principles, categorization of sustainable business criteria, development of incentives, and the execution of awareness campaigns and training sessions for the financial industry. Responding to the success achieved, the OJK evaluated existing gaps and launched the Sustainable Finance Roadmap Phase II (2021-2025). This phase is strategically focused on taking concrete actions to create a comprehensive sustainable financial ecosystem, engaging stakeholders, and fostering

expanded collaboration with other entities. The aim is to empower economic actors to maximize the opportunities Sustainable Finance presents (Otoritas Jasa Keuangan, 2021).

Sustainable financing involves the financial services sector providing all-encompassing assistance to promote sustainable economic development by harmonizing environmental, social, and economic concerns. By utilizing sustainable finance, in line with the principles of the 3P (Profit, People, Planet), businesses are expected to adopt a mindset emphasizing the pursuit of long-term prosperity over short-term gains. This approach suggests that sustainable profits can be more impactful when considering the sustainability of natural resources and social impacts on communities. The initiatives introduced by OJK through Phase I of the Roadmap aim to encourage businesses to prioritize sustainable finance through various measures, including (1) Introducing eight principles of Sustainable Finance, (2) Mandating the implementation of Sustainable Financial Reports for businesses in the financial industry, and (3) Formulating Sustainable Business Activity Categories (KKUB) categorized into 12 indicators, such as pollution prevention and control, energy efficiency, renewable energy, sustainable land and resource management, conservation of terrestrial and aquatic biodiversity, environmentally friendly transportation, sustainable water, and wastewater management, eco-friendly products, and climate change adaptation, environmentally conscious buildings, and other environmentally conscious business activities (Otoritas Jasa Keuangan, 2021). By establishing Sustainable Business Activity Categories, OJK channels financing towards projects based on sustainable environmental practices to attract industry interest. The financing directed towards these sustainable projects is called green finance.

Green finance in banking encourages more businesses to opt for green loans to finance their operations. While this can be advantageous for stakeholders, it introduces considerations for the sustainability of banking operations, as it can impact credit risk and banks' profitability. Credit risk theory reveals that the risk of default, indicated by the likelihood of payment failure, can be explained by factors such as debtor capital, liquidity, income, and financial and managerial indicators held by the debtor, influencing their ability to repay loans (Hatmadi & Trihadmini, 2022). Consequently, a decrease in the default risk for company loans may lead to a corresponding decline in credit risk for banks, measured in this study by Non-Performing Loans (NPL).

Furthermore, banks serving as lenders and implementing green credit policies are assumed to have lower NPL. This assumption is based on the premise that the environmental score of consumers affects its credit risk and functions as a significant additional indicator for assessing credit risk. On the other hand, legitimacy theory posits that companies must gain legitimacy from all stakeholders due to limitations set and emphasized by social norms and values. The association in such constraints highlights the worth of the company's behavior examination, considering the environment (Hasanah & Hariyono, 2022).

Previous research has presented varied findings regarding the relationship between green finance and profitability, with some studies indicating a negative effect on profitability in Chinese commercial banks associated with the level of green credit development (Chang, 2021). Further classifications based on heterogeneous analysis in China revealed that green credit significantly enhances the profitability of large-scale state-owned banks with abundant resources but negatively affects joint-stock and city commercial banks (Ranning, 2022).

Other studies have produced contrasting results, that indicate a significant positive correlation between green credit ratios and profitability (Danye, 2020) while others found no significant impact (Hasanah & Hariyono, 2022; Nurhalida & Sofwan, 2023; Xi et al., 2022; Li & Chen, 2022). These variations may be attributed to the time required to observe the benefits of green credit policy implementation in a country. In Indonesia, environmentally friendly green credit performance is still relatively new and has not been uniformly distributed in quantity.

This research explores the relationship between green finance and profitability, considering credit risk as an intervening variable over an extended period. Given the evolving regulatory landscape, especially in Indonesia, where differing research outcomes are influenced by a country's circumstances, regulations, banks' ability to manage credit risk affecting profitability, and the borrowers' capacity to repay loans. Therefore, this study remains relevant, and further research is warranted as regulations continue to evolve, especially in Indonesia. In the context of sustainable finance implementation, this research is envisaged to make a theoretical contribution to the

financial and banking management literature. So that in this case, banks can further maximize their operational efforts but still run in accordance with sustainability values. In addition, this research is expected to be a consideration critically in decision-making to establish regulatory updates regarding sustainable finance that will continue to grow.

## 2. RESEARCH METHOD

### 2.1 Literature Review

#### Green Finance

Green finance is a concept or financial idea to promote environmentally friendly investments and sustainable development by creating or distributing financial products and services (Tentiyo, 2023). In broad terms, green financing refer to financial investment schemes in sustainable development projects involving the provision of loans to environmentally friendly businesses. Green finance is a framework designed to support sustainable development systems through funding allocation for investments in sustainable projects (Roelfsema et al., 2014). From the perspective of sustainable development, green finance can be considered successful if it meets the government's targets of decreasing reliance on conventional bioenergy, raising the share of primary and modern renewable energy sources to 23% by 2025 and 31% by 2050, and expanding the renewable energy sector's GDP contribution from 21% in 2015 to 30% in 2035. However, green finance projects are perceived as less attractive to investors compared to fossil fuel investments due to higher costs and the need for the latest technology (Wijaya & Leon, 2022). Liebman et al., (2019) In addition, emphasize the high costs and perceived high risks associated with investments in renewable energy, which are anticipated to result in less economically viable projects due to the absence of subsidy incentives to support green finance. With their ability to facilitate green finance, banks play a crucial role, including providing environmentally friendly loans or green credits. In this study, the focus on green finance is directed toward green credit issued by individual banks, considering that this measurement is perceived to have strong relevance to the research focus.

#### Credit Risk

Credit can be defined as the trust to entrust a sum of money to provide collateral that will create a loan obligation (Wahyuningsih, 2021). In another definition, credit is the provision of funds that promise to be repaid at a specified time (Suhartono et al., 2023). Banks extending credit to borrowers must consider the associated risks to avoid default indications. The more indications of default in a bank's credit risk, the more credit risk for that bank can be said to increase. Credit risk in this research refers to the Non-Performing Loan (NPL) indicator. NPLs are loans that are less liquid, doubtful, and in default in their settlement (Suhartono et al., 2023). The lower the NPL ratio in a bank, the fewer problematic loans exist, indicating a better level of credit risk for the bank. The formula to calculate NPL is as follows:

$$\text{Non - Performing Loan (\%)} = \frac{\text{Total non - performing loans}}{\text{Total gross loans}} \times 100$$

#### Profitability

Profitability is a crucial aspect reflecting how much a bank can generate profit through its resources, including cash, capital, employees, and others. It is essential in assessing a bank's financial performance (Giavinny & Ugut, 2022). Profitability is the capacity of a financial institution to generate revenue in an effective and efficient manner. A higher level of profitability indicates that the bank's financial performance is strong. Factors influencing profitability include credit, liquidity, and interest rate risks (Dewi & Wartana, 2021). This study measures profitability using the Return on Assets (ROA) ratio. ROA serves as an indicator of a bank's ability to generate profit concerning the assets it possesses (Yasin et al., 2023). The higher the ROA, the greater the bank's profitability. The formula for ROA can be expressed as follows:

$$\text{Return on Asset (\%)} = \frac{\text{Net Income}}{\text{Average Total Assets}} \times 100$$

### Net Interest Margin (NIM)

Net Interest Margin (NIM) is a commonly employed financial ratio utilized to assess the magnitude of interest income a bank generates in relation to its average productive assets (Wibowo, 2020). In practice, banks have productive assets to support their operational activities, intentionally managed to optimize the company's profit from these productive assets, such as through the provision of loans. The calculation of NIM can be used to assess the optimization of interest income earned on the average assets held. The larger the value of NIM, the more optimal the interest income regarding the productive assets controlled by the banking institution (Setyaningsih & Ernitawati, 2023). The formula for NIM is as follows:

$$\text{Net Interest Margin (\%)} = \frac{\text{Net Interest Income}}{\text{Average Productive Assets}} \times 100$$

### Capital Adequacy Ratio (CAR)

According to the Indonesian Bankers Association (2016:176), the Capital Adequacy Ratio (CAR) is a ratio of the Minimum Capital Provision Obligation (KPMM) that banks must fulfill, with a minimum nominal requirement of 8%. In the execution of banking operations, the Capital Adequacy Ratio (CAR) or KPMM needs to be considered as part of the bank's efforts to ensure the availability of funds in managing its capital (Poniman & Saragih, 2022). Higher capital adequacy ratio, the greater the bank's capacity to minimize or mitigate credit risk (Desy Purnama et al., 2023). CAR significantly and positively influences Non-Performing Loans (NPL) (Abidi, et al., 2023). The elevated CAR value indicates that the capital held by the banking sector is considered ideal. The CAR value will likely increase due to the bank's independent capital growth, additional loans, and other factors. However, banks can enhance their business development by expanding loan disbursement as the CAR ratio rises. When a bank possesses substantial capital, it instills confidence in the bank to extend credit; nevertheless, the associated risk of increased NPL also grows. The formula used to calculate CAR is as follows:

$$\text{Capital Adequacy Ratio (\%)} = \frac{\text{Total Capital}}{\text{Risk - Weighted Assets}} \times 100$$

### Operating Cost and Operating Income (BOPO)

Operating Cost and Operating Income (BOPO) is one of the banking ratios indicating a bank's efficiency, where its operating income constitutes its primary revenue. This income is derived from fund placements in the form of loans and other operational revenues (Iklin, 2023). The higher the BOPO value, the bank manages its operational activities less efficiently. This is due to the amount of obligatory expenses incurred by the bank to generate income exceeding its earnings (Zikri et al., 2023). A lower BOPO value is expected to correspond to lower Non-Performing Loans (NPL) and, consequently, a higher Return on Assets (ROA) ratio. Previous research findings have revealed a significant positive effect of BOPO on NPL (Abidi & Sastradipraja, 2023) and a significant negative impact on ROA (Rafinur et al., 2023). The formula used to calculate BOPO is as follows:

$$\text{BOPO (\%)} = \frac{\text{Operating Costs}}{\text{Operating Income}} \times 100$$

### Green Finance and Credit Risk

The larger the exposure to green finance credit disbursement, the greater the number of environmentally-focused companies emerging. This is supported by rigorous environmental risk

assessments of financed projects, encompassing evaluations of environmental impact compliance, adherence to environmental regulations, and environmental risk management plans. Projects seeking approval for green finance funding must meet these criteria, as outlined in the OJK Roadmap, thereby reducing credit risks associated with environmentally detrimental projects. In other words, green finance can contribute to economic stability when the environmental conditions are favorable or have no significant impact on economic decline.

Credit risk theory reveals that credit risk, indicated by the risk of default, can be explained by debtor factors such as capital, liquidity, income, financial indicators, and debtor management, affecting the debtor's ability to repay the loan. Thus, when the risk of default on corporate credit decreases, the credit risk on the bank, measured by Non-Performing Loans (NPL) in this study, also decreases. Banks acting as creditors and implementing green credit policies are assumed to have the environmental performance of debtors influence their credit risk and serve as a significant additional credit risk assessment indicator, resulting in a decrease in NPL (Hatmadi & Trihadmini, 2022).

Previous research suggests that green financing distribution in Indonesia, with green credit indicators, does not significantly impact credit risk. This indicates that the allocation of funds for sustainable development activities is still limited because Indonesian banks primarily focus on consumer, investment, and working capital credits. It has not significantly contributed to reducing credit risks in Indonesian banking (Hatmadi & Trihadmini, 2022). This finding contrasts with research in China, which suggests that implementing green credit policies depends on the structure and size of specific bank ownership within the unique context of China's banking system and institutions (Zhou, et al., 2022). Other research findings in China imply that NPL ratios are lower for banks with larger green lending implementation ratios (Cui, et al., 2018).

### **Credit Risk and Profitability**

The critical determinants of optimal profitability can be observed through the risks inherent in operational activities, with credit risk being one of them (Rohmadhoni, 2023). The better a bank manages its credit risk, the higher its level of profitability is assumed to be. In this study, credit risk is measured by Non-Performing Loans (NPL), and Return on Assets (ROA) indicates profitability. A lower NPL reflects better credit risk management by a bank, and it is assumed that profitability, reflected through a higher ROA, will be better (Anggraini, et al., 2022) argue that credit risk does not impact profitability because an increase in credit risk essentially does not invariably result in heightened profitability. In another study, it is suggested that NPL has a negative impact on ROA, meaning that higher credit risk leads to decreased profitability because elevated NPL affects the bank's earnings, causing a decline (Dewi & Wartana, 2021; Giavinny & Ugut, 2022; Yasin, et al., 2023).

### **Green Finance and Profitability**

Profitability plays a crucial role in determining a company's performance, particularly in the banking sector. In this research, ROA is used as an indicator of profitability, and green finance is represented by the amount of green credit issued by banks. Green finance has gained global attention as a response to sustainable environmental development efforts. Banking is a primary target, especially in the economic sector, because it drives the national economy. Therefore, implementing green finance in banking is expected to be effective and provide collective benefits to the nation. However, on the other hand, in corporate operations, especially in banking, achieving optimal profits is a primary goal.

The legitimacy theory explains that companies must obtain legitimacy from all stakeholders due to constraints imposed by norms and social values. The relationship with these constraints emphasizes the importance of organizational behavior analysis while considering the environment (Hasanah & Hariyono, 2022). According to Rehman et al., (2021) on Hasanah & Hariyono, (2022) it is stated that adopting sustainable green banking practices can influence overall bank performance by creating a conducive environment for green finance. This is presented through financial reports mandated by security and exchange commissions, including financial statements and strategies for green finance, to increase stakeholder understanding of green practices.

Malini, (2021) researched the value and financial performance based on social responsibility and green finance, with social and green financial responsibility as moderating variables. The findings reveal a positive influence between the performance of Islamic banks on investments and market value through green finance. It is concluded that policy-making should prioritize granting Islamic banks the freedom to invest in green finance projects or activities and the flexibility to define CSR as more than just charity.

Previous studies in Indonesia indicate that green banking policies do not affect bank profitability, using operational banking activities with a more paperless approach as a green banking indicator (D. Anggraini et al., 2020). This aligns to Jo et al., (2014) and Mustika et al. (2023) research, stating that the lack of impact on ROA may be because reducing operational costs from green banking implementation takes at least one to two years before improving ROA.

According to Ramila dan Gurusamy (2015), green banking indicators have two dimensions: green banking conducts its operational activities with more reliance on technology to be paperless, and green banking places its funds in sustainable financing activities or provides green credit to projects categorized as sustainable business activities.

Contrary findings in China reveal that the green credit ratio has a negative impact on the profitability growth of commercial banks related to the development level of green credit in China (Chang, 2021). Furthermore, after classifying companies with heterogeneity analysis in China, green credit will significantly increase the profitability of large-scale state-owned banks with abundant resources but have specific negative effects on joint-stock and commercial city banks (Ranning, 2022).

### **Green Finance and Profitability through Credit Risk**

The credit risk theory reveals that the credit risk, indicated by the risk of default, can be explained by factors such as debtor's capital, liquidity, income, financial indicators, and management. Thus, if the risk of default on corporate credit decreases, the credit risk in banks, measured by NPL in this study, also decreases. Banks, as credit providers implementing green finance policies, are assumed to have lower NPLs due to the ecological effect of creditors' activities, serving as a significant additional indicator for credit risk assessment (Hatmadi & Trihadmini, 2022). With a favorable NPL, it is expected to result in an increase in ROA for the bank, indicating that NPL may serve as a mediator between profitability and green finance.

### **2.2. Method**

This study aims to identify the direct influence of green finance on bank profitability and credit risk in Indonesia and recognize the indirect impact of green finance on profitability through credit risk. The research employs a quantitative approach with documentary study as the data collection method. Secondary data from banks' financial reports between 2018 and 2022 are accessed through the respective banks' official websites and [www.idx.co.id](http://www.idx.co.id). The population consists of all banks listed on the Indonesia Stock Exchange, and the sample is selected through purposive sampling, considering criteria such as stock exchange registration, sustainable banking practices, regular publication of Sustainability Reports, and disclosure of green credit data from 2018 to 2022. A total of 20 banks meet these criteria and are included in the study.

The variables under investigation include green finance as an independent variable, measured by the amount of green credit. Credit risk is an intervening variable measured by the Non-Performing Loan (NPL) indicator. Profitability, the dependent variable, is measured by Return on Assets (ROA), while Net Interest Margin (NIM), Capital Adequacy Ratio (CAR), and Operating Expenses to Operating Income (BOPO) function as control variables. The analytical method applied in this research is path analysis.

Based on the description above, the research framework can be constructed as follows:

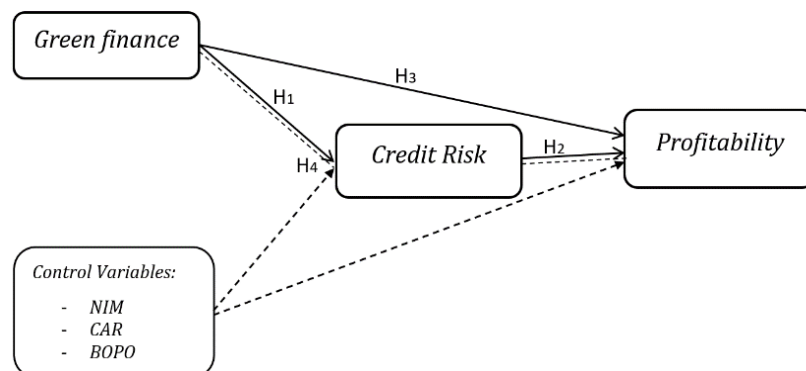


Figure 1. Conceptual Framework

### 3. RESULTS AND DISCUSSIONS

Twenty banks meet the criteria based on purposive sampling and the sample criteria applicable for analysis. Statistical testing is conducted using E-views software, with 100 observations. Descriptive statistical tests are performed to understand the data distribution and describe or provide an overview of the object under investigation through sample or population data (Sugiyono, 2010).

Table 1. Descriptive Statistics

Variable	Mean	Maximum	Minimum	Std. Dev
GF	0,197129	0,610000	0,000000	0,147983
NPL	0,031550	0,079900	0,001000	0,015619
ROA	0,019045	0,210000	-0,00710	0,023043
BOPO	0,780672	0,998800	0,029000	0,197480
NIM	0,055024	0,486000	0,004700	0,046227
CAR	0,248468	0,592700	0,592700	0,094122

Source: Processed Data

Descriptive statistics indicate that the green finance indicator has an average value of 0.20, which is larger than the standard deviation of 0.15, indicating no data deviation in the green finance indicator in this study and high variability. The highest percentage of green credit disbursement is held by Bank Rakyat Indonesia at 61% of the total credit in 2022. Meanwhile, the minimum value is 0.0000, held by Bank Victoria International, indicating that this bank had the lowest nominal amount in green credit disbursement in 2018.

As for the credit risk indicator, measured by Non-Performing Loan (NPL), it has an average value of 0.03, where this value is larger than the standard deviation of 0.01, indicating high variability in the NPL data in this study. The maximum value is 0.08, held by Bank Rakyat Indonesia Syariah in 2022, indicating that the bank in that year had a high risk of default. The minimum value for the NPL indicator is 0.001, held by Bank Rakyat Indonesia Syariah in 2018.

The Return on Assets (ROA) figures explain a bank's profitability level; in this study, the highest ROA figures are found at Bank Danamon Indonesia in 2018 and 2019, indicating that the bank has a high return on net profit compared to its total assets. In 2021, Bank Victoria Indonesia had the least value for the ROA indicator in this research. The average value of the ROA indicator is 0.02, with a standard deviation of 0.02.

Furthermore, control variables, namely BOPO, NIM, and CAR, can also be seen in the descriptive statistics table, which shows that BOPO has an average value of 0.78, larger than the standard deviation of 0.19. It has a maximum value of 0.1 at Bank Mayapada Internasional and a minimum value of 0.02 at Bank Danamon Indonesia in 2022. Then, NIM has an average value of 0.055, which is larger than the standard deviation of 0.046, and it has a maximum value of 0.48 and a minimum value of 0.004. Similarly, CAR has an average value of 0.29, larger than the standard deviation of 0.09. The maximum value for the CAR indicator is at Bank Bumi Arta with a value of 0.592700, and the minimum value is 0.111300, obtained by Bank Mayapada Internasional.

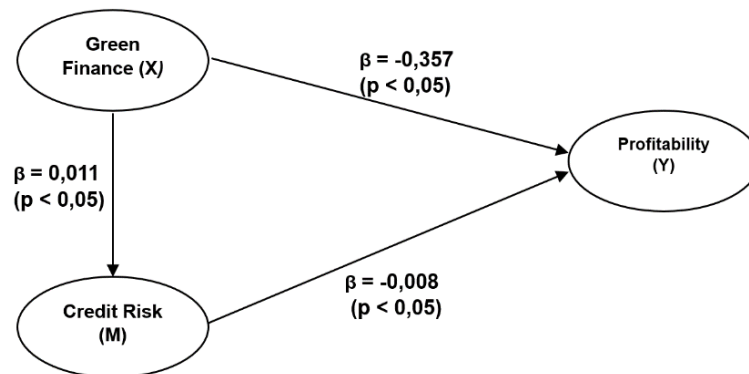


Figure 2. Path Analysis Result

To determine the direct influence, two models are employed in this research. The first model is executed to understand the impact of green finance (X) and control variables NIM, CAR, and BOPO on credit risk (NPL). Chow Test and Hausman Test are conducted to determine the most suitable model for Model I. The results indicate that the best-fitting model for Model I is the Fixed Effect Model (FEM).

$$NPL = 0.0067 + 0.0111GF - 0.0044NIM + 0.0429CAR + 0.0155BOPO + [CX=F]$$

Table 2. Model I Partial Test Result (T Test)

Model	Variable	Coefficient	T-Statistics	T-Table	Prob.
I	GF	0,011131	3,079022	1,984723	0,0029
	NIM	-0,004443	-0,575106		0,5669
	CAR	0,042923	2,855611		0,0055
	BOPO	0,015564	2,575077		0,0120
Intervening Variable: Credit Risk (NPL)					

Source: Processed data

Based on the equation of Model 1, it can be observed that the T-value for GF is 3.08; for NIM, it is -0.58; for CAR, it is 2.86; and for BOPO, it is 2.58. The T-value for GF, NIM, and BOPO is greater than the T-table, and the probability values for these three variables are less than 0.05. This indicates that GF, CAR, and BOPO variables have a significant positive partial effect on NPL. However, NIM does not have a significant effect on NPL.

Next, Model 2 is conducted in this study, involving the influence of GF and NPL and control variables such as NIM, CAR, and BOPO on ROA. Chow Test, Hausman Test, and Lagrange Multiplier Test are performed to determine the most suitable model for Model II. The results reveal that the best-fitting model for Model II is the Common Effect Model.

$$ROA = 0.0632 - 0.0087GF - 0.3574NPL - 0.0064NIM - 0.0129CAR - 0.0368BOPO$$

Table 3. Model II Partial Test Result (T Test)

Model	Variable	Coefficient	T-Statistics	T-Table	Prob.
II	GF	-0,008701	-2,385304	1,984723	0,0191
	NPL	-0,357403	-7,965240		0,0000
	NIM	-0,006449	-0,316897		0,7520
	CAR	-0,012930	-1,792055		0,0763
	BOPO	-0,036836	-10,22397		0,0000
Dependent Variable: ROA					

Source: Processed data

Meanwhile, based on the equation of Model II, it is evident that the T-value for GF, NPL, and BOPO is greater than the T-Table, and they have probability values below 0.05. Therefore, it can be stated that GF, NPL, and BOPO variables have a significant negative partial effect on ROA.

However, for NIM and CAR variables, it can be observed that these variables do not have a significant effect on ROA.

**Table 4.** Simultaneous Test Result (F Test)

Model I		Model II	
R-Squared	0,8916	R-Squared	0,8515
Adj R-Squared	0,8587	Adj R-Squared	0,8436
F-Statistics	27,165	F-Statistics	107,76
F-Table	2,4675	F-Table	2,31127
Prob.	0,0000	Prob.	0,0000

Source: Processed data

The table of the F-test results indicates that in Model I, the probability value is  $0.0000 < 0.05$ , meaning that the variables GF, NIM, CAR, and BOPO have a significant simultaneous effect on NPL. These variables can account for 86% of the observed influence; the remaining 14% is due to the influence of other factors not considered in this research's regression equation.

The F-test results also state that the variables GF, NPL, NIM, CAR, and BOPO have significantly impact ROA. In this study, these variables can explain their influence on ROA by 84%, with the remaining 16% influenced by variables not included in the regression equation or this study.

A Sobel test was conducted to determine the indirect influence between the GF variable and ROA through NPL. The Sobel test was performed using the following formula (Sobel, 1982):

$$z = \frac{ab}{\sqrt{(b^2 SEa^2) + (a^2 SEb^2)}}$$

Explanation:

a Regression coefficient of the independent variable on the mediating variable

b Regression coefficient of the mediating variable on the independent variable

SEa Standard error of estimation of the influence of the independent variable on the mediating variable

SEb Standard error of estimation of the influence of the mediating variable on the dependent variable

**Table 5.** Sobel Test Result

GF on ROA through NPL	
T-Statistics	-2,5983
T-Table	1,9847
Prob.	0,004

Source: Processed data

The Sobel test results reveal a T-Statistic value of -2.60, greater than the T-Table value of 1.99, and a probability value of 0.004. Therefore, it can be concluded that the variable NPL can mediate the relationship between GF and ROA.

Based on the research findings, green finance has a significant positive effect on credit risk. This indicates that a high level of risk accompanies a high level of green credit issuance. This finding can be explained by the longer duration of green credits than conventional credits. Even though providing green credit involves applying lower interest incentives, it is not the sole factor influencing the level of green credit issuance and credit risk. With a longer credit duration, credit risk can persist over an extended period, and factors influencing risk, such as market conditions or regulations, can have a more substantial impact during the credit period. Credit risk, indicated by the risk of default, can be explained by the debtor's capital, liquidity, income, financial indicators, and management, affecting the debtor's ability to repay the loan, as suggested by credit risk theory.

This finding contrasts with the study conducted by (Hatmadi & Trihadmini, 2022), stating that green credit issuance does not yet indicate a high or low level of credit risk because the proportion of green finance disbursement for sustainable development activities in Indonesian banks is still tiny. Indonesian banks primarily focus on consumer, investment, and working capital loans, which do not significantly reduce credit risk. Furthermore, (Zhou et al., 2022) asserted that although an increase in the proportion of environmentally friendly loans reduces credit risk for large state-owned banks, it increases credit risk for small-scale commercial banks in cities/regions. The same Environmental Credit Policy has opposite effects for different-sized banks with distinct ownership structures. According to this identifying, small-scale city/regional commercial banks have less evolved risk management systems and limited industrial capacity and expertise in comparison to other large banks, and contributing to the economic losses they experience in providing environmentally friendly loans (Ho & Virginia, 2018). Local governments' ownership of these companies can also constrain them in the local operational environment.

The research results indicate that green finance has a negative impact on profitability. This can be explained by the extensive disbursement of green credit in a bank, which can decrease the profitability of that bank. This finding aligns with the studies conducted by Chang, (2021) & Ranning, (2022). Chang, (2021) revealed that the green credit ratio has a negative impact on the profitability growth rate of commercial banks in China. This is due to the relatively low operating costs of companies with "high pollution, high energy consumption, and excess capacity" and the insufficient government penalties imposed on these companies compared to environmentally friendly companies. Furthermore, Ranning (2022) explained the heterogeneity results after classifying companies. The results suggest that green credit will significantly increase the profitability of large state-owned banks with abundant resources. However, it has a negative effect on joint-stock banks and commercial city banks. This contradicts the findings of the study conducted by Mustika et al., (2023) which stated that green finance positively impacts profitability using the BOPO variable as a mediation variable. This difference arises because the green finance indicator used in that study is related to the disclosure of green banking in the operational activities of environmentally conscious companies, which differs from the measurement of green finance in this study.

Based on the hypotheses proposed in this study, credit risk is suspected to negatively affect profitability, with a significance level of 0.05. The T-test results can confirm that credit risk has a negative impact on profitability. This explains that the higher the NPL value, the higher the potential for default in the bank. A high potential for default can reduce company profits, leading to a decrease in profitability. These research findings are consistent with previous studies that revealed a higher NPL value would lower a company's profitability (Dewi & Wartana, 2021; Giavinny & Ugut, 2022; Yasin et al., 2023).

The results of this study also indicate that an increased risk of default can follow an excessively high indication of green credit disbursement. The high default rate in green credit disbursement is indicated because the credit duration in green credit tends to be longer than conventional credit. Although the process of granting green credit has implemented lower interest rate incentives, it is not the sole factor influencing the level of green credit disbursement's impact on credit risk. With longer credit durations, credit risk can occur over an extended period, and factors influencing risk, such as market conditions or regulations, can have a more significant impact during the credit disbursement period. A high level of credit risk can reduce company profits, leading to a decline in profitability.

#### **4. CONCLUSION**

Based on the issues, objectives, and correlations with the results of the analysis and discussion, this study provides an overview of how green finance affects credit risk and profitability and how credit risk mediates the relationship between green finance and profitability. The research findings indicate that the disbursement of green credit as an indicator of green finance in this study has a positive impact on credit risk and a negative impact on profitability. This result can be explained by the longer credit duration in green credit compared to conventional credit. Although the process of granting green credit has implemented lower interest rate incentives, this is not the sole factor

influencing the level of green credit disbursement's impact on credit risk. With longer credit durations, credit risk can occur over an extended period, and factors influencing risk, such as market conditions or regulations, can have a more significant impact during the credit disbursement period. A high level of credit risk can reduce company profits, leading to a decline in profitability. Similarly, in the indirect relationship in this study, it can be concluded that credit risk can mediate the relationship between green finance and profitability.

Moreover, other controlled indicators in this study strengthen the interconnectedness between variables, ensuring that other unexamined factors do not affect the influence between variables. These indicators include NIM, CAR, and BOPO. The results show that CAR and BOPO, both partially and simultaneously, can significantly positively affect NPL, meaning that capital adequacy and operational efficiency in banking can affect credit risk. Meanwhile, NIM does not affect credit risk. On the other hand, BOPO has a negative impact on profitability, while NIM and CAR do not affect profitability.

In connection with the research findings indicating that green finance positively influences credit risk and negatively impacts profitability, a more precise evaluation and screening of green credit provision is deemed necessary, considering the assessed risk levels. The causes of credit risk are extensive and depend on the conditions and circumstances of prospective debtors, including factors such as debtor capital, liquidity, income, financial indicators, and management, which can affect the debtor's ability to repay loans. Hence, a more in-depth and detailed evaluation and analysis are imperative before the disbursement of green credit.

For future research endeavors, it is recommended to include additional relevant variables and extend the research timeframe to observe developments from the perspective of improving regulations, thereby yielding more refined findings. Concerning the limitations of this study, it is noteworthy that the research did not classify Indonesian banks based on their size, particularly distinguishing large banks by assets, as done in a previous study in China. Therefore, the specific factors and influences affecting the relationship between green finance, credit risk, and profitability are not yet known. This serves as a reference for future research to classify banks in Indonesia and uncover more specific insights.

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