# Green Finance and Bank Performance: Evidence from Bangladesh

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**ABSTRACT:** The severe repercussions of the global climate catastrophe are being felt all across the world. Each industrialized and developing country must take action in response to the consequences of global climate change that endanger life on our planet. This study looks into how green finance has affected Bangladeshi private commercial banks' financial performance. For eight years, from 2014 to 2021, all private commercial banks are surveyed quarterly for secondary data. The performance of the banks is evaluated using return on assets, return on equity, net interest margin, and net non-performing loan to total loan ratios, whereas green finance is used as an independent variable. The study uses linear regression and questionnaire analysis to determine the impact of green finance on a bank's financial performance. According to the study, at a 10% significance level, green finance has a negligible positive effect on return on assets but a significant positive impact on return on equity, net interest margin, and net non-performing loans to total loan ratio. The questionnaire analysis also demonstrates green finance's significant impact on banks' performance. This study can be used as a starting point for policy discussions with practitioners, governments, decision-makers, academics, and future researchers.

**KEYWORDS:** Green Finance; Financial Performance; Banks; Regression; Questionnaire Analysis

## 1. INTRODUCTION

The importance of green finance to our long-term sustainability is enormous. Stakeholders are now aware of the significant benefits of sustainable business practices. Bangladesh Bank gave a definition of green finance in 2009. It stated that investments made by pre-approved banks and financial institutions (FIs) and recorded in accordance with the BSEC Rules of 2015 for environmentally friendly areas/targets producing fields of resource and power efficiency, renewable energy, misuse administration and treatment, climate-friendly transport, etc. are regarded as green finance. Additionally, Bangladesh Bank's green banking initiatives include effective regulatory measures, more stringent regulation of banks' and NBFIs' green banking operations, refinancing assistance for a range of green goods, sectors, projects, and initiatives, as well as the ambitions of Bangladesh Bank for environmental management. Banks can play a significant role in ensuring environmental sustainability and inclusive economic growth due to their connections to the majority of industries as a source of financing.

Private commercial banks have expressed very little spontaneous interest in adopting green finance strategies although Hossain et al. (2022), Chen & Ma (2021), Zhang (2018), Mengyao (2018), Hossain & Kalince (2014), Awino (2014), and others found that green finance significantly effect the banks' profitability. In general, bank is a corporate entity that mainly seeks profit. And, if green finance significantly effect the banks' profitability, then banks must have sponteneous participation in green financing. Julia and Kassim (2020) stated that both conventional and non conventional banks were not fully meet the requirements of green/sustainable policy. Moreover several studies on Bangladesh found mixed results. Hoque and Roy (2018), Mamun and Rana (2020), and Hossain et al. (2020) discovered a sizable positive relationship between green finance and firm performance, whereas Hoque, Masum, and Babu (2022), Cui et al. (2018), and Rajput, Arrora & Khanna (2013) found no significant correlation between green finance and firm performance. Additionally, Julia and Kassim (2016) discovered that asset utilization, return on assets, and return on deposit all had meaningful positive relationships with green financing, but return on equity did not. Thus the study's aims to find out how green finance affects banks' performance. This study distincts from other

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studies in that it evaluates banks' financial performance over a longer time period and all private commercial banks of Bangladesh are included in the study.

## 1.1 Research Significance

Green financing are crucial for steering the economy in a sustainable direction. By providing green financing, banks improve the economic and environmental performance of a nation. Additionally, lowering costs is a crucial step in improving any organization's financial performance. Green financing is increasingly important globally, particularly in developing nations like Bangladesh. According to economists' theories, financial performance and green financing are positively correlated. By participating in green finance, banks can take an active part in the renovation process for a greener economy in addition to their operational activities. Moreover, this study may serve as appropriate guidelines for bank regulators and can be used as a starting point for policy discussions with practitioners, governments, decision-makers, and future researchers.

## 1.2 Research Objective

This study aims to investigate the impact of green financing on banks' performance.

## 1.3 Research Questions

The study answers the following questions

a)  What effect does green financing have on return on asset?
b)  What effect does green financing have on return on equity?
c)  What effect does green financing have on net interest margin?
d)  What effect does green financing have on net non-performing loan to total Loans?

## 1.4 Research Hypothesis

To answer the above research questions this study use the following hypothesizes

$H_1$      Green financing has no discernible effect on return on assets.

$H_2$      Green financing has no discernible effect on return on equity.

$H_3$      Green financing has no discernible effect on net interest margin.

$H_4$      Green financing has no discernible effect on net non-performing loan to total loans.

## 2. LITERATURE REVIEW

Few pieces of research illuminate the impact of green financing on banks' financial performance in Bangladesh, whereas several pieces of research illuminate the connection between green financing and banks' profitability on other countries. Most studies found a significant positive relationship between green finance and firm's performance. Some studies also found no relationship between green financing and firm's performance, whereas others found different result for different performance measure variables.

To determine the connection between green financing and financial performance, Molina-Azorin et al. (2009) reviewed 32 literatures and revealed conflicting findings, with a positive environmental impact on financial performance being predominant. Furthermore, on the basis of information on the top 500 publicly traded companies in the world, Chen, Ngniatedema, and Li (2017) compared green initiatives, green performance, and financial performance across countries. The study discovered a positive relationship among green initiatives, green performance, and financial performance. Again, in a three-year study from 2011 to 2013, Awino (2014) investigated the connection between green banking and the financial performance of Kenyan commercial banks. The study found a significant positive relationship between financial performance and green banking initiatives using regression analysis. Hossain and Kalince (2014) investigated the connection between green banking and banks' performance. The

study discovered a statistically significant positive relationship between green banking and banks' loan and profit after tax using regression analysis, the Granger F Test, and VAR Model. For seven years, from 2012 to 2018, Mengyao (2018) examined the effects of green credit on small and medium-sized commercial banks. Green loan and total loan were used as independent variables, whereas return on assets was used as a dependent variable. Using regression analysis, the study discovered that green credit had a favorable effect on small and medium joint-stock commercial banks. Zhang (2018) demonstrated how green credit affected commercial banks financial results from 2015 to 2017. The financial performance was gauged by return on assets, and the industrial bank's green credit was quantified by the amount of green credit. The study discovered a beneficial effect of green credit on bank financial performance using regression analysis. Wang and Chang (2022) confirmed the existence of co-integration relationships between these variables by examining the relationships between environmental performance, green finance, and green innovation in 57 developing countries from 2002 to 2016. Rahman, Hoque and Roy (2018) investigated the effects of green financing on bank profitability over a three-year period, from 2013 to 2015 in Bangladesh. Return on investment, total assets, green financing, and total financing were used to gauge the banks' performance and involvement in green financing. The study discovered that the green financing had a significant favorable impact on the banks' profitability using correlation and regression analysis. Furthermore, Mamun and Rana (2020) in their study of the relationship between green banking practices and commercial banks' profitability in Bangladesh from 2012 to 2019, used return on assets as a dependent variable and green finance as an independent variable. The study conveyed a favorable relationship between green finance and firm profitability using correlation and simple regression methods. Additionally, Hossain, et al. (2020) looked at the impact of green banking practices on the financial performance of Bangladesh's listed banks from 2011 to 2020. The study used green cost and volume of the risk management committee to measure the green banking practices, and return on asset, return on equity, and market value to measure banks' performance. Green banking practices and financial performance were found to have a positive relationship using panel regression analysis.

On the other hand, some studies found no significant relationship between green financing and firms' performance. Rajput, Arora, and Khanna (2013) conducted an empirical study over a seven-year period, from 1997 to 2013, on the impact of the environment on the financial performance in the Indian banking sector. The study discovered that there was no meaningful connection between the adoption of green banking and the bank's profitability using panel regression analysis. Furthermore, the effect of green lending on credit risk in China over a seven-year period from 2009 to 2015 was demonstrated by Cui et al. (2018). Green credit ratio was used as an independent variable, and the non-performing loan ratio (NPL ratio) was used as a dependent variable. The study also found no connection between the proportion of green loans in a bank's total loan portfolio and its non-performing loan ratio using random-effect panel regression. Additionally, Hoque, Masum, and Babu (2022) investigated the effect of green banking disclosures on the caliber of financial performance of over thirty listed banks of the Dhaka Stock Exchange over the course of four years from 2014 to 2017. Using multivariate analysis, the study found that there was no significant relationship between liquidity ratio, and debt to asset ratio and green banking spending, but green banking disclosures significantly positively impact return on assets. Additionally, from 2012 to 2014, Julia and Kassim (2016) conducted a three-year study in Bangladesh on the effects of green financing on bank profitability. Use of green finance by banks was used to measure the involvement of the bank in green financing, whereas performance was measured by return on equity, return on asset, asset utilization, and return on deposit. The study found that return on asset, asset utilizing, and return on deposit had significant positive relationships with green financing, whereas the return on equity showed no significant relationship with green financing using one way ANOVA and Pearson correlation analysis. Again, Julia and Kassim (2020) examined the green banking performance of conventional and non-conventional banks in Bangladesh. According to the study, neither bank fully complied with green/sustainable policy requirements.

## 3.0 Research Methodology

Research methodology includes data and variables, sources of data, banking sectors of Bangladesh and research design.

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**3.1 Data and Variables**

The secondary data collected from all private commercial bank for eight years from 2014 to 2021 on quarter basis. All variables and their measurement methods are shown below:

**Table 1:** Variables

| Variable | Symbol | Measure |
|---|---|---|
| Return on Asset | ROA | Efficiency of utilizing assets to generate revenues. |
| Return on Equity | ROE | How effectively investor's money is being employed. |
| Net Interest Margin | NIM | Expansion and profitability of the bank. |
| Net Non-performing Loan to Total Loan | NPLNTL | The ratio demonstrates the asset quality. |
| Green Finance | GF | It measures the total green finance (Direct and Indirect) that ensure a better environmental outcome. |

**3.2 Sources of Data**

The primary data collected through questionnaire from 350 employees of banks. Data also collected from the following secondary sources:

a. Annual reports of Bangladesh Bank.

b. Sustainable Finance Department, Bangladesh Bank.

c. Annual reports of private commercial banks.

d. Academic journals.

e. Books and Newspaper.

**3.3 Banking sector of Bangladesh**

Banking sector of Bangladesh comprise of state owned, specialized, private and foreign commercial banks. There are six state-owned, three specialized, forty three private commercial and nine foreign commercial banks in Bangladesh. Banking sector can also be classified as conventional and non-convention banks. There are thirty three (33) conventional and ten (10) non-conventional banks in Bangladesh. Bangladesh Bank is the central bank in Bangladesh. Bangladesh Bank, which has the authority to do so under the Bank Company Act of 1991 and the Bangladesh Bank Order of 1972, fully controls and supervises all scheduled banks in Bangladesh. The following table represents banking sector of Bangladesh.

**Table 2:** Banks in Bangladesh

| Sl. No. | Category of Bank | No. | Definition |
|---|---|---|---|
| 01 | State Owned Bank | 06 | Owned entirely or primarily by the government of Bangladesh. |
| 02 | Specialized Bank | 03 | Owned entirely or primarily by the government of Bangladesh and operating for specific objectives. |
| 03 | Private Commercial Bank | 43 | Individuals/the private entities hold majority share. |
| 04 | Foreign Commercial Bank | 09 | Banks incorporated in abroad. |

Note: the data collected from Sustainable Finance Department, Bangladesh Bank.

**3.4 Research Design of the Study**

Chen & Ma (2021), Mamun & Rana (2020), Hossain & Kalince (2014), Rahman et al. (2018), Mengyao (2018), Zhang (2018), and Awino (2014) used regression analysis to show the impact of green finance on firms' performance. Thus, the study uses linear regression to understand the impact of the green financing on banks' financial performance. Moreover, the study also does questionnaire analysis to understand the impact.

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## 4.0 Results and Discussion

### 4.1 Descriptive statistics and correlation analyis

Return on asset of private commercial banks has a mean value of .9167 with std. deviations of .0983, compared to the return on equity which has 11.0667 mean value with std. deviations of .5573. The range value of return on assets and return on equity are .20 and 1.70, respectively. On the other hand, net interest margin has a mean value of 3.74 with a std. deviation of .2467, compared to the lowest positive mean (.3333), and std. deviation (.33267) of net non-performing loan to total loan. The mean of green financing of private commercial banks is 84883.40, with a std. deviation of 103127.68.

**Table 3:** Statistical analysis and correlation analysis

| Variables | GF | ROA | ROE | NIM | NPLNTL |
|---|---|---|---|---|---|
| GF | 1 | | | | |
| ROA | .208 | 1 | | | |
| ROE | .669** | .389 | 1 | | |
| NIM | .602* | .857* | .771* | 1 | |
| NPLNTL | .590* | .530 | .672 | .680 | 1 |
| VIF | 1.000 | | | | |
| Range | 269706.2 | 0.2 | 1.70 | .59 | .90 |
| Mean | 84883.41 | .9167 | 11.0667 | 3.7400 | .3333 |
| Std. Deviation | 103127.68 | .09832 | .55737 | .24674 | .33267 |

Note: ***, ** and * indicate significance at 1%, 5% and 10% levels of significance based on t-statistics

The direction and degree of link between the variables are shown by correlation (Anwaar, M. 2016). Between return on asset and net interest margin, there is the maximum significant positive correlation (85.70%), whereas there is no significant correlation (.208) between green financeing and return on asset at 10% level of significance. The correlation coefficient between green financeing and return on equity is .669, which means that return on equity is 66.90% significantly positively correlated with green financeing at 5% level of significance. Moreover, green financeing and net interest margin have a correlation coefficient of .602, indicating that net interest margin is 60.20% significantly positively linked with green financeing at 10% level of significance. A significant positive association (59%) also presents between net non-performing loan to total loan and green financeing. The study use one independent variable. The VIF test indicates that there is no multicolliniarity issues.

### 4.2 Regression Analysis

All data except return on assets are normally distributed because of the Sig. value of the Shapiro-Wilk Test for all variables except return on assets are greater than 0.05. After log transformation, the resulted normality test given below shows the normality of the data of return on assets.

**Table 4:** Regression output of PCB

| Variables | Sig. Shapiro-Wilk | Regression Analysis | | | R square | P-value | Durbin-Watson test |
|---|---|---|---|---|---|---|---|
| | | Dependent Variables | Unstandardized coefficients | | | | |
| | | | GF_Ln | Constant | | | |
| GF | .399 | | | | | | |
| ROA_ln | .065 | ROA | .215 | .116 | .620 | .205 | 1.897 |
| ROE | .733 | ROE | .314 | 14.486 | .813 | .005 | 1.799 |
| NIM | .168 | NIM | .081 | 2.854 | .707 | .090 | 2.173 |
| NPLNTL | .955 | NPLNTL | .129 | 1.065 | .747 | .063 | 1.239 |

Note: ***, ** and * indicate significance at 1%, 5% and 10% levels of significance based on t-statistics

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The green finance of private commercial banks has a insignificant positive impact on return on asset at a 10% level of significance (P=.205) with a coefficient value of .215, which indicates that one unit increase (decrease) in green finance will result in .314 times increase (decrease) in return on assets. The value of R-squared indicates that this model explains 62% of the variation in the response variable around its mean. Moreover, the value of the Durbin-Watson test indicates the absence of autocorrtion.

The study accepts $H_1$ hypothesis indicates that green financing insignificantly impact the return on assets.

Green financing significantly positively impact the return on equity at a 1% level of significance (P=.005) with a coefficient value of .314, which indicates that one unit increase (decrease) in green finance will result in .314 times increase (decrease) in return on equity. The value of R-squared is .813 indicates that this model explains 81.3% of the variation in the response variable around its mean. Moreover, the value of the Durbin-Watson test for this Model (1.897) lies between 1.5 and 2.5 indicates the absence of autocorrelation. The study concludes that the $H_2$ hypothesis is rejected indicates green financing significantly impact the return on equity of the banks.

Likewise, The  green finance has a significant positive impact on net interest margin and net non-performing loan to total loan at a 10% level of significance with a coefficient value of .081 and .129 respectively. Addittionnaly, the regression analysis interprets that one unit increase (decrease) in green finance will result in .081 times increase (decrease) in net interest margin and .129 times increase (decrease) in net non-performing loan to total loan. The value of R-squared for net interest margin and net non-performing loan to total loan are .707 and .747 respectively. Both models explain about 75% of the variation in the response variable around its mean. Moreover, the value of the Durbin-Watson test for this Model lies between 1.5 and 2.5 indicates the absence of autocorrelation. The study rejects $H_3$ and $H_4$ hypothesis indicates that green financing significantly impact the net interest margin and net non-performing loan to total loan. Overall the study finds that green financing significantly impact the banks' performance of Bangladesh.

**4.3 Questtionnaire analysis**

The primary data collected through questionnaire from 350 employee of banks. Ninety percent (90%) of the respondents (315) agreed that green finance impact the banks' performance, whereas the remaining ten percent (10%) respondent (35) conveyed no relation between green finance and banks' performance. the ninety percent respondents mentioned that the following points of green financing played significant role to improve the banks' performance.

**4.3.1 Financial and non financial support from the Government**

Eighty percent (80%) of the total respondent agreed that banks doing green financing activities are getting financial and non-financial support from the government. Moreover, if the commercial banks and financial institutions can achieve a better rating from Bangladesh Bank concercing sustainable banking practices then they will get financial and advisory support from the government, which is vital to success in the competitive market.

**4.3.2 Electronic Banking Facilities**

Seventy five percent (75%) of total respondents agreed that electronic banking facilitates banking services using electronic equipment, such as online banking, ATM and debit card services, phone banking, SMS banking, electronic alert, mobile banking, fund transfer services and point of sales banking. Due to the electronic banking innovation, now all clients can access banking services from anywhere around the country. ATM and Fast Track reduce time, energy, paper and money cost for both the customer and the banks. Similarly, plastic money, POS, Rocket, and mobile banking are also the examples of green banking facilities provided by commercial banks. Due to these green banking facilities, the number of customers is increased significantly. Electronic banking facilities also created immense goodwill and expand the market. Moreover, the government not only provides permission and guideline for doing the banking through the ATM, Fast Track and POS but also helps the bank to ensure the security on online banking services for both parties (customer and banker).

### 4.3.3 Solar power based Branch, ATMs and Fast Tracks

Only thirty five percent (35%) conveyed that solar power based branch, ATMs and Fast Tracks improve the banks' performance. There is no constant reliable electricity in some Bangladesh's rural areas, where solar-powered ATMs and Fast Track cab provide limited banking services. Additionally, it enables the bank to continue offering its clients cutting-edge banking services.

### 4.3.4 Building positive image and attract young customer

Seventy eight percent (78%) of all respondents agreed that green financing build positive image of the company and attract new customers. The involvement in the green activities of the banks attracts young entrepreneurs, businessmen and depositors to do their business and personal transactions with that particular commercial bank. Additionally, green finance facilitates financial institutions with an opportunity to increase their market share, profits, and customer loyalty through new products, employee satisfaction and retention. Moreover green finance enhance brand image, positive media attention, improved operating licenses from governments, and relationships and partnerships with external sustainable stakeholders.

### 4.3.5 Publish report on non-performing loans and carbon emissions

Sixty percent (60%) of the respondents agreed that publishing report on non-performing loans for environmental reasons and carbon emissions helps in improving banks' performance. As a proxy measure to estimate the financial effects of environmental risks, Bangladesh Bank also required banks and financial institutions to publish an annual list of non-performing loans for environmental reasons. This enables the bank's policymakers to make smart choices that improve the banks' financial performance and profitability. Commercial banks are also required to disclose their carbon emissions. If commercial banks disclose their carbon emissions, market participants will have access to higher levels of quantitative and qualitative information. All of the aforementioned activities were carried out by banks as green financing initiatives to increase their profitability.

### 4.3.6 Green finance helps firm to deal with pandemic

Eighty five percent (85%) of total respondents agreed that businesses that have better access to green and social finance are better able to withstand the COVID-19 pandemic than other businesses. Data from 60 nations covering all of the major economies in the world support this evidence. As opposed to traditional banking, banks that operate electronic banking were able to offer banking services to their clients during the pandemic.

### 4.3.7 Others

Ten percent (10%) of the respondents agreed that businesses were able to issue new bonds to finance their operations if they involved in green activities. Due to their involvement in green finance, banks have been given permission by the Bangladesh Securities and Exchange Commission (BSEC) to issue an unsecured non-convertible subordinated bond.

On the other hand ten percent (10%) of total respondents agreed that green finance have no influence in improving banks' financial performance. Seven percent (7%) of the total respondents believe that green finance is a new concept in our country. It will take time for green finance to exert significant influence on banks' performance. About four (4%) of total respondents believe that illiteracy of the bankers and illiteracy of the customers are also responsible for no influence of green finance on banks' performance.

### 5. CONCLUSION

By providing green finance and launching green costs in the community's various sectors, green banking practice helps to improve the environment and the economy. It also plays a crucial role in improving an organization's financial performance by reducing costs. Green financing is increasingly important on a global scale, particularly in developing nations like Bangladesh. This study examines, using a sample of all private commercial banks, the effects of green finance on bank profitability over the course of eight years on a quarter basis, from 2014 to 2021. In order to perform linear regression, this study used one independent variable (green financing) and four dependent variables (return on assets, return on equity, net interest margin, and net non-performing loan to total loan ratio). Overall, the study finds that green financing significantly impact the firms' performance. Furthermore, the research supports the hypothesis that green financing has a negligible impact on asset returns. But at a

1% level of significance, green financing has a significant positive impact on return on equity, and at a 10% level of significance, it has a significant positive impact on net interest margin and net non-performing loan to total loan. The absence of autocorrelation is indicated by all models' Durbin-Watson test values, which range from 1.5 to 2.5. The study's overall conclusion is that Bangladesh's banks' performance is significantly impacted by green financing. Through creative financial mechanisms and by encouraging investments in projects with obvious and sustainable externalities, green finance foretells the financial industry's impending collapse. The study's findings may serve as an appropriate direction for bank regulators as they make decisions about environmental concerns and contribute to society. Additionally, this study can be used as a starting point for policy discussions with practitioners, governments, decision-makers, and future researchers.

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**Questionnaire**

**Dear Respondent**

For research purpose, I require data on green finance and banks' performance (research title: *Green finance and Bank Performance: Evidence from Bangladesh.).* It would be highly appreciable if you provide me some necessary information regarding this issue. I also assure you that the information collected from you will be reserved with strict confidentiality.

**Part-A: Personal Information**

Name:

Gender:          Male          ↑Female                          Designation:

Age Range:    20-30years          31-40 years          ↑41-50 year's          51-more

**Part-B: Questions (Please put tick marks)**

**Do you think that green finance significantly impact the banks' performance?**

o          Yes

o          No

**If the answer is "YES",** please specify reasons **(Please put tick marks)**

o          Green finance allow banks to receive financial and non-financial support from the Government

o          Electronic Banking improves bank's financial performance

o          Solar power based Branch, ATMs and Fast Tracks improves banks' performance

o          Green finance helps in building positive image of the banks

o          Publish report on non-performing loans for environmental reasons and carbon emissions

o          Green finance helps firm to deal with pandemic

o          Others (Write in the below box)

|  |
|  |

**If the answer is "No",** please specify the reasons

o          Newness of Green finance

o          Illiteracy of the bankers

o          Illiteracy of the customers

o          Others (Write in the below box)

|  |
|  |

**Thanks for your cordial cooperation!**