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THE IMPACT OF GREEN BANKING PRACTICES ON BANKS' COST OF CAPITAL; EVIDENCE FROM A DEVELOPING COUNTRY

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Rabiya Imran
Department of Management Science, COMSATS University Islamabad, Wah Campus. Wah Cantt. Pakistan
Majid Jamal Khan
Department of Management Science, COMSATS University Islamabad, Wah Campus. Wah Cantt. Pakistan
Corresponding Email: majidjamal@ciitwah.edu.pk
Shahab ud Din
Department of Management Science, Karakoram International University, Ghizer Campus, Gilgit-Baltistan. Pakistan

ABSTRACT

Purpose: This study aims to explore whether green banking practices by Pakistani banks have any impact on their cost of equity and cost of debt.

Design/Methodology: We constructed a specifically designed composite green banking index to measure the extent of green banking practices from banks within the sample. Cost of capital is represented by the cost of debt and cost of equity. Banks listed on Pakistan's KSE-100 Index over a period of the 10 years i.e. from 2010 to 2019 is used as our study sample. Panel Data Regression analysis is used to test the hypothesized relationships.

Findings: Green banking is still in its evolution phase among Pakistani banks. While the debt market is stricter and is incorporating these practices in advancing financing to the banks, there is still a need for investor education and awareness at the equity market level, which has not yet been incorporated in the pricing of the banking stocks.

Originality: Green banking is still in its evolution phase among Pakistani banks. While the debt market is stricter and is incorporating these practices in advancing financing to the banks, there is still a need for investor education and awareness at the equity market level, which has not yet been incorporated in the pricing of the banking stocks.

Keywords: Green Banking; Cost of Capital; Cost of Equity; Cost of Debt; Environment
Paper type: Research Paper

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INTRODUCTION

One of the significant predicaments faced by mankind at this time is a surge in the degradation of the environment and natural resources. Unsustainable human activities are the main contributor towards this alarming environmental trend (Bukhari, Hashim, & Amran, 2019). Nevertheless, preservation of the environment remained a foremost problem in many countries (Julia & Kassim, 2019).

Like any other major sector of the economy, the financial system is getting affected by climate change because of its great influence across all the fields and geographies, and the high level of confidence that there will be risk involved with irrevocable effects (Park & Kim, 2020).

Many banks have started financing green projects but still, the vast majority of banks have a low green portfolio. The lack of regulatory policies and supervisory framework is evident. The integration of environment related risks and climate change, into the bank's risk management system has failed brutally (Park & Kim, 2020). Volz (2017) expressed that several central banks around the world in response to the absence of a properly regulatory system and supervisory framework are becoming aware of their part in considering climate change and environmental risk and are ready to take action against it.

Pakistan comes under the top 10 countries that are most adversely affected by climate change according to the German Watch report (2020). The federal government of Pakistan established a Ministry of Climate Change which was active in framing the National Climate Change Policy 2012. The provinces too have passed their environmental protection laws in compliance with the Federal Environmental Protection Act, 1997 (Hasnain, Aly, Ishfaq, & Afgan, 2017) .

Recent studies have empirical findings regarding the adverse impacts of climate change on various sectors of the Pakistani economy. Notably, according to Wahab et al., (2023) climate change has had a significant negative impact on the agricultural sector. Further, this fall in agricultural productivity has not only resulted in agricultural loan defaults but has also affected the overall financial stability of the banking sector in Pakistan (Wahab, Khan & Khan 2022). The banking sector is therefore more vulnerable as well as equally responsive now to environmental concerns. According to Javeria, Siddiqui, and Rasheed (2019) and SBP concept paper (SBP 2015) that CSR, environmental concerns, sustainability, and economic gains are the most important reasons for the banks in Pakistan to adopt Green banking. The degradation of the environment, being socially irresponsible, and poor governance will only lead to reactions by the public, investors and customers, and apart from this, it will make the regulations more strict and severe which can cause harm to the profitability of the bank restraining the market for the products of their clients. Furthermore, the financers can be held accountable for the environmental impacts caused by their clients (Ahmed, 2012). Therefore, banks have strong motives to be green. The increasing focus on environment related activities of the banks by the

credit rating agencies and investors might have an impact on the way they price their securities in the capital market, affecting in turn their cost of capital.

One of the most important sources of financing industrial projects is the banking industry, which leads to utmost carbon emission. Hence, an intermediary role is played by the banking industry between economic growth and environmental conversation, by promoting environmentally friendly and socially responsible investment. To help in the reduction of carbon emissions the banks should invest in environment-friendly projects. It is observed that the performance of the banks enhances after the adoption of green banking policies, they are doing better in the context of valuation, profit/loss, and ROE. Green banking is a new concept, whose main purpose is to reduce carbon footprints and benefit the environment by promoting environmentally friendly practices.

Banks are increasingly switching to green banking due to two reasons:

1. Regulatory pressure because increased regulations, ranking and rating agencies are emphasizing it.
2. Competitive pressure arising from a competitor bank adopting green practices.

Taking into consideration this whole background, the objective if this work is to analyze whether the investors in the Pakistan stock market incorporate green practices into their pricing of the banks stock prices. To be specific, we will explore the impact of adopting green banking practcies on banks cost of capital in a sample of Pakistani listed banks.

The rest of the paper is organized as follows; Section 2 presents a theoritical framework detailing the connections of this work to relevant established theories, Section 3 discusses critical review of previous related research literature, Data, sample and econometric methodology is covered in Section 4, results and interpretations/discussions of the findings are presented in Section 5, while Section 6 concludes the paper.

THEORATICAL FRAMWORK

The capital structure's theoretical foundation was established by Modigliani and Miller (1958) work, known as the capital structure irrelevance theorem. According to this, a company's value would not be influenced by its capital structure in a perfect market. Regarding the financing structure for sustainable development, this could imply that businesses will choose to use green bonds for debt capitalization as long as they stand to gain more than they lose—for instance, when these instruments provide lower-cost funds or greater access to investors, among other benefits (B. Zhang & Wang, 2021). Myers (1984) Developed the pecking order theory, which states that managers may rely more on internal funding than on outside sources when there is a lack of transparency between investors and administrators. Regarding green financing, this could be made worse by an information asymmetry brought on by the intricate and innovative nature of green projects, which Zhou, Tang, and Zhang (2020)

call the "green information gap." Because these projects are complex and unprecedented, businesses may find it more difficult to obtain outside funding for their green initiatives. This further supports the applicability of pecking order theory in the green finance area, as further explained by (Ibrahim, Al-mulali, Ozturk, Bello, & Raimi, 2022). As per the financial model of the pecking order theory the debt is favored over equity and the corporations would choose to issue debt rather than equity to mitigate the information asymmetry and information cost.

Corporations can now access green funding including green bonds and sustainability-linked credits. The reason for this is that investors are increasingly considering environmental, social, and governance (ESG) factors when making investment decisions, a trend known as ESG investing (Friede, Busch, & Bassen, 2015). One effect of increasing ESG investments, is that it makes it possible for businesses to engage in sustainable finance through green bonds and sustainability-linked loans(Wu, Wen, Tian, & Xiao, 2024).

The Stakeholder theory

The stakeholder theory was introduced by Freeman (2010), which helps to understand that how the organization engages and manages the connection with numerous stakeholders beyond shareholders such as employees, consumers, vendors and the community (Mahajan, Lim, Sareen, Kumar, & Panwar, 2023). In relation to green banking, the stakeholder theory examines how green banking initiatives influences the perspective and behavior of employees, customers and larger community (Ye & Dela, 2023). This theory acknowledges the relation between banks and their stakeholders, offers an extensive structure to comprehend how green finance initiatives change the banks image and goodwill while supporting social responsibility ideals.

Legitimacy theory

The legitimacy theory refers to organizations adoptability and compliance with the legislations and policies that applies in its operating environment (Nurmalia, 2021). Complying with societal standards is essential for the financial sustainability of the organization (Deegan, Rankin, & Tobin, 2002; Siregar & Tampubolon, 2019). This is implemented to establish trust, as the community provides financial resources for the company. On the other hand, Socially Responsible Investment theory (SRI) is influenced by ethical investment principles, anchored by numerous belief system (Chatzitheodorou, Skouloudis, Evangelinos, & Nikolaou, 2019). These two theories help to understand the three dimensions which include social, environmental and sustainability.

Green banking strategies is one of the ways that organizations adopts to make their environmental sustainability performances better. The need for the natural environment have impacted the lives of the employees which has become tough for the businesses to ensure the wellbeing of its employees (like water, transportation, cooling/heating etc.) to get maximum production from the workforce (DuBois & Dubois, 2012). The declaration about the green banking to the stakeholders reveals a lot to them about the banks commitments, endeavors and quality with regards to

environmental responsibility, which decreases the disparity of the information and increase transparency (Khan, Bose, Sheehy, & Quazi, 2021). Green Banking declaration enhances the goodwill and authenticity of the banks which benefits them by achieving financial goals (Qirem et al., 2023; Yunidwi & Napitupulu, 2024)

The theories suggest that the establishment of capital structure is motivated by several factors.

LITERATURE REVIEW

Climate resilience is the most complex issue the world is facing. There have been relentless attempts worldwide to measure and reduce the threat of climate destabilization due to human activities (Bhardwaj & Malhotra, 2013). A Ministry of Climate Change was established by the Federal Government of Pakistan which was useful in articulating National Climate Chang. This included further rules and regulations for the protection of the environment to mitigate toxic pollution (Hasnain et al., 2017). This invited the idea of green banking which aims to diminish the carbon footprints of the banks (Ahuja, 2015). Over the last decades, banks have been considered eco-friendly. But with time it was realized that banking activities do affect the environment both directly and indirectly (Bukhari et al., 2019). The shareholders have also pressurized the banks to function in an eco-friendly way (Sahoo & Nayak, 2007).

Although the banks were never seen as a polluting industry, their current banking activities have given a rise to carbon footprints of banks because of their maximum utilization of energy, high wastage of paper, absence of green building, etc. Such procedures, technologies and products should be chosen by the banks, which will minimize the carbon footprints and will develop a sustainable business (Bhardwaj & Malhotra, 2013). A banking activity that helps in reducing external carbon emissions by funding green technologies and projects which help in the reduction of pollution is called green banking (Meena, 2013). According to Bihari (2011) social responsibility is promoted via green banking. The banks finance those projects which are environmentally friendly. The objective of the bank is shifted from “profit only” to “profit with responsibility”.

In emerging economies, banks are viewed as the major source of financing the industries (Rehman et al., 2021). SM Mahfuzur and Barua (2016) Said that banks should perform an insightful part to bind enterprises to use environmentally friendly technologies. Therefore, banks can perform as ethical corporations by providing loans to those industries which are concerned about the environment.Following the International Institute for sustainable development, the incorporation of sustainable growth into the banking industry has two basic points: (1) track down the social and environmental responsibility into the activities of the banks using environmental initiatives and (2) inclusion of sustainability into the core activities of the bank by considering the inclusion of environmental and social consciences into product development, mission strategy, and policies (Tu & Dung, 2017).

The green finance market can be described as "a credit intermediary of environmental protection's capital" (Gilchrist, Yu, & Zhong, 2021). The market of green finance comprises of market-based mechanisms and financial tools which can control the pollution discharge, comprehend the ecosystem and prevent enterprises from sudden nature changes (Wang & Zhi, 2016). According to Bukhari, Hashim, and Amran (2020) embracing green banking can safeguard the banks from various types of risk for example; credit default, the risk to the reputation of the banks, legal risk, and risk to the environment. (Lymperopoulos, Chaniotakis, and Soureli (2012)) Also expressed that the improved effectiveness of the operations and enhanced brand identity due to the adoption of green banking will give rise to the market share, better staff participation, profitability, and boost social and economic authenticity in favor of the banks.

The association between a firm's environmental practices and the value of its stock has been long documented in extant literature. For example a moderate to strong relationship between the value of the common share of a company and its social performance regarding environmental risk was found by (Spicer, 1978). Later, Richardson and Welker (2001) tested the association for a sample of Canadian firms between financial and social disclosure and the cost of capital and the results showed that there is an inverse relationship between the quality and quantity of the financial disclosure and the cost of capital. It is essential for the banking industries to execute the concept of green banking because they are the major source of providing loans to the companies and while also mitigating the negative environmental effect of their operations. This study by Jelli and Dura (2024) used quantitative approach, drawing on secondary data from financial statements and sustainability reports. The method used was classical assumption test, F test and T test on the population comprises of 57 industries and a sample of 40 companies. The T test results show a positive impact of green banking on return on assets while there is a negative impact on return on assets of operational costs to operating income (BOPO). Based on the F test the return on assets is influenced by green banking and BOPO.

Another research aims to recognize the influence of green banking practices on green finance and environmental performances of the banks in Bangladesh along with investigating the mediating role of green finance regarding the association between the green banking activities and environmental performances. The convenience sampling technique was used to collect the firsthand data with the final sample size of 352 was documented from the banks in Bangladesh. Structural equation modeling (SEM) was used to evaluate the relationship amongst the variables. The results showed that sources of green financing have a considerable impact on banks' environmental performance, and that green banking operations have a significantly positive impact on banks' environmental performance and sources of green financing. Furthermore, it is noticed that the relationship between green banking activities and environmental performance is mediated by green financing. Additionally, the study found that the major perks of green banking development are elevating banks' competitiveness, lowering long-term costs and expenses, offering online banking,

enhancing customer satisfaction, and lowering carbon footprints. All of these factors contribute to the nation's sustainable economic development (X. Zhang, Wang, Zhong, Yang, & Siddik, 2022).

According to Ramnarain and Pillay (2016) the five most important benefits for green banks were proposed by Global Systemically Important Financial Institution (GSIFIs). Advantages include having healthier clients' coverage relating to attracting deposits and providing loans, which ultimately results in increased growth in income and assets and will give better returns on assets. Papastergiou and Blanas (2011) Shows various useful reasons that why green eco-friendly banking structure is followed by more banks; for instance, green banks have greater repute and branding, it also enhanced the quality of the portfolio of the banks and lessened the liability insurance and compensation allege. Earnhart and Lizal (2007) evaluated the effect of environmental performance on cost and revenue and the outcome showed that healthier environmental performance will improve profitability through cost reduction than driving down revenues.

Auwa, Syamni, and Muchtar (2024) examined the influence of profit quality, intellectual capital and green banking on the value of banking firms as measured by Price to Book Value (PBV) from the period of 2018-2022 in banks listed on Indonesia stock exchange. The sample size consists of 42 companies and the research used panel data regression analysis method. The results show that green banking is negatively associated with the firm value. On the other hand, no relation can be seen between the profits, intellectual capital with firm value. Similarly, in another research the influence of green banking and financial performances on profitability was examined. Thirty samples were chosen for this research using a purposive selection technique from six banking businesses that were listed on the Indonesia Stock Exchange from the period of 2028-2022. Panel data regression analysis was used, and the results depict profitability is negatively affected by capital adequacy ratio and efficiency ratio, on contrary it has a positively associated with non-performing loans and the loan to deposit ratio. Also green banking disclosure relation with profitability is significantly negative (Walzer, Tamimi, & Firmansyah, 2024).

Pakistan comes under the top 10 countries that are most adversely affected by climate change. The CO2 emissions by Pakistan are much higher than the less advanced SAARC countries but are lesser than the Himalayan slope states (Abas, Kalair, Khan, & Kalair, 2017). The parameters of drinking water set by WHO are often dishonored (Azizullah, Khattak, Richter, & Häder, 2011). Imran, Haydar, Kim, Awan, and Bhatti (2017) Found that Pakistan is also a target for the E-waste of the developed countries. E-waste includes numerous forms of metal. They also said that recycling activities by informal sectors does not consider the contamination of the environment and is also hazardous for individual health.

The state bank of Pakistan launched the green banking guidelines in October 2017 to lessen the exposure of the banks from the risks emerging from the environment. The Ministry of Climate Change of Pakistan introduced further environmental rules and regulations to mitigate and control pollution and other destructive acts (Hasnain et

al., 2017). Jafar, Malik, Azhar, and Shafiq (2021) stated that adoption of green banking practices in daily operations minimized energy consumption usage and encourages e-banking practices to reduce operational costs (Shaumya & Arulrajah, 2016). A study was conducted by Ikram, Zhou, Shah, and Liu (2019) on 211 manufacturing companies of Pakistan that either the compliance of environmental management system (EMS) with integrated management system (IMS) will enhance corporate sustainability or not, the results disclosed that corporate sustainability performance of the companies who adopted EMS is a lot better than the companies who didn't.

Based on the above literature, many studies have been carried out related to this field, mostly using different aspects of green banking. It becomes apparent that only a few studies are carried out in this field in Pakistan. In this regard, there is a need to examine green banking practices in Pakistan and their impact on the cost of capital of the banks. Therefore, this investigation was initiated in the context of Pakistan to fill the research gap.

METHODS

Data and Sample

The sample for this study comprised banks listed on the Pakistan Stock Exchange over a period of 10 years i.e. from 2010-to 2019. The data was collected using the annual reports of all the banks and their websites each year. We started our sample period in 2010 as green banking practices were less common in Pakistan before 2010. Further, we ended our sample period in 2019 as we believed including 2020 and 2021 may add noise to our findings due to the exceptional impacts of COVID-19 during these years.

We included in our sample, those Pakistani listed commercial banks that:

1) Had continuous stock price data for at least three consecutive years to allow calculations of the cost of equity.
2) Had annual reports available for at least three consecutive years to be able to calculate their Green Banking scores.
3) Had information in their annual reports on their Green Banking practices.

After applying this rigorous sample selection criteria and then cleaning the data for extreme values, our final sample comprised of 20 banks with 175 Bank-Year observations. The number of banks in Pakistan are limited and because of this minimal ratio, selecting 20 banks is a considerable share of the whole market which still capture a significant insight. As State bank of Pakistan issued its green banking guidelines in 2017, the sample includes the banks who have adopted green banking practices and were working their way towards sustainability even before green banking was introduced in Pakistan. Also, not all the banks have complete or reliable data overall, so the focus was on the banks with complete datasets. Furthermore, for a thorough and meticulous analysis of each bank a smaller sample size was more suitable.

Model

Our data set is panel having several years and several entities while static panel data estimation models with fixed or random effects regression is applied. The following equation describes our model:

$$COC_{it} = \alpha_o + \beta_1 GBanking_{it-1} + \beta_2 DivP_{it-1} + \beta_3 FirmS_{it-1} + \beta_4 CaptS_{it-1} + \beta_5 Proft_{it-1} + \beta_6 BSize_{it-1} + \beta_7 BInd_{it-1} + \epsilon \quad \text{(1)}$$

The details of the variables used in the above model are summarized in Table 1 below.

Table 1:List of Variables and Measurements

Variables	Code	Measure
Dividend Payments	DivP	Dividend paid divided by net income
Firm Size	FirmS	Ln of Deposits
Capital Structure	CaptS	Total Liabilities by Total Assets
Board Size	Bsize	Total number of members on the board of directors
Board Independence	Bind	Ratio of non-executive members on the directors' board divided by total No, of members on the board.
Profitability	Proft	Banks' net income divided by Total Assets

Measuring the Green Banking

Our main variable of interest here is Green Banking, which is an equally weighted index based on dummy variables. First, we identified the components of green banking based on the literature and then we did the content analysis in which we examined the sources of secondary data which includes the annual reports, green banking publications, and the websites of the banks to get information regarding the green activities of the banks. The information collected is then transformed into quantitative data to measure the magnitude of the banks' green activities. According to the dummy variable technique, if a bank unveils the information related to green banking items in the annual reports, it was assigned a score of "1" and if the related data is not present, then it was assigned a score of "0". Details of the components of Green Banking Practices we have considered while constructing the index are summarized in Table 2

Table 2 Components of Green Banking Index (UNEP, 2021)

Governance	Environment	Social
Green HRM	Green Building	Employee Right
Green Finance	Natural resources conservation	Stakeholder Awareness
Green report	Elimination of wastage	Islamic CSR
Green Audit	Green product and services	

Next, we present a detailed discussion on the descriptions and definitions of these components of our Green Banking index.

Governance

i. Green HRM

GHRM spread awareness among the employees and society about the usage of natural resources in an economical way. If the Banks are performing the following activities, they were assigned a score "1" otherwise "0"

- Job sharing,
- Car sharing,
- Electronic filing,
- Virtual interviews,
- Teleconferencing,
- Online recruitment and training,
- Recycling,
- Energy-efficient office spaces, etc.

ii. Green Finance

Any financial process, a product, or service that is devised either to safeguard the natural environment or to handle the impacts of the environment on finance and investment is called green finance. If the Bank is financing the companies that are providing and supporting environmentally friendly products and services e.g. green tech projects, recycling projects etc. then they are assigned a score "1" otherwise "0".

iii. Green Report

A report on an organization's financial status has been printed using the method of production that preserves energy, water, and trees and mitigates waste and carbon emission is called a green report. Soy inks are used to print eco-friendly green reports. Soy inks are simpler to recycle paper. Even the annual reports of the banks are called green reports as they are available online and no paper is wasted.

iv. Green Audit

It is a method of identification and evaluation of a business regarding its influence on the environment. The main purpose is to scrutinize the internal and external environmental practices, which are affecting the environmentally friendly atmosphere. The green audit is very beneficial in determining how and where most of the energy or resources are being utilized which can further help them to execute changes and efficiently use the resources. If the banks are providing green audit report then they are given a score of "1" otherwise "0"

Environment

i. Green building

A building that is designed, constructed, or operates in a way that eliminates the adverse effects and develops a positive influence on the natural environment and climate. Green buildings help in the conservation of natural resources. If the banks are doing any of the things mentioned below, they are given a score of 1

- Installing solar panels
- Superior air quality
- Water efficiency
- Use of efficient light bulbs
- Noise control
- Installation of HVAC (Heating, Ventilation and Air conditioning)
- Rooftop Planting etc.

ii. Natural resource conservation

It is a procedure of efficient utilization and proficient handling and conservation of natural habitat with all its resources. It includes:

- Use less water
- Turn of the lights
- Use renewable energy
- Choose reusable goods
- Recycling etc.
- Solar panels
- Less usage of the paper

iii. Elimination of wastage

The practice of reducing all the wastage dangerous or not at its root and when the wastes cannot be avoided, then to use tactics that are environmentally sound to reuse and recycle them. It includes:

- To use reusable goods
- Recycling
- Curb the use of paper etc.

iv. Green products and services

The products and services benefit the environment and help in preserving natural resources. Green products are made to reduce their carbon footprints and do not affect the environment throughout their life and after it. Green products are made using toxic-free elements and methods that are environmentally friendly. If the bank is offering any of the product, they are assigned a score "1"

- Green mortgage
- Green car loans
- Online banking
- Remote deposit capture
- Green credit cards

Social

i. *Employee rights*

They are both the legal rights and the human rights of an employee. Several approaches are used to protect the employee in a firm. This includes the following attributes:

- Staff get together
- Appreciation of Achievement
- Employee Benevolent fund trust
- Medical benefit and health facility
- High-tech security systems and security guards deployed at the Bank's premises
- Provision of a trained and assigned team to aid staff in the case of a fire or natural calamity etc.

ii.*Stakeholder Awareness*

Stakeholders should have an awareness of the ongoing project and product. Stakeholders' perspectives come into light when they participate in the business either directly or by choosing a representative. The awareness of the stakeholders and their engagement in the business helps the organization to view their demands, which further helps to generate a good trustworthy connection between the organization and the stakeholders.

iii.*Islamic CSR*

Islamic CSR focuses on moral principles and social responsibility by the principles of sharia law [28, 39]. According to sharia law gharar, usury, and destruction of the natural environment are forbidden, and they stress more on moral and ethical behavior.

Measuring the Cost of Capital

We represented the cost of capital of the sample banks through two measures i.e. the Cost of Equity (COE) and Cost of Debt (COD). Details of their measurement are given below.

Cost of Debt

The cost of debt is another measure of the cost of capital that we are using in our model. We follow (Yeh et al., 2020), (Francis et al., 2005) and (Izzo & Magnanelli, 2012) and measure the cost of debt by the ratio "financial interest expense/interest-bearing debt outstanding". All the service costs of using the capital to prior the deduction for capitalized interest is included in the interest expense. The interest-bearing debt includes loans, short-term financing and deposits. The cost of debt is calculated by using the formula given below:

$$COD = \frac{Interest\ Expence}{Interest\ Bearing\ Debt\ Outstanding} \quad (3)$$

Besides these main variables, we also included some control variables (mentioned in table 1) as suggested by the previous literature to have an association with the cost of capital. These control variables include Dividend payment (DivP), Firm size (FirmS), Capital structure (CaptS), Board Size (BSize), Board Independence (BInd) and Profitability (proft).

Sample Description

In this section we describe the sample characteristics with the help of graphical analysis and descriptive statistics of the variables of this study. Below in Table 3, we present the summary statistics of the variables.

Table 3 Descriptive Statistics

Variables	Mean	Std. Dev.	Min	Max	Medium
Cost of Debt	4.794	1.533	2.038	8.8567	4.562
Cost of Equity	4.794	34.613	-79.530	72.743	5.632
DivP	30.515	29.680	-0.003	98.016	32.009
CaptS	91.573	4.100	73.884	98.424	92.474

Firm_Size	480,826,546	4.620	14,871,806	2,301,899,086	331,205,452
Profit	0.840	0.921	-4.202	2.957	0.880
BSize	8.615	1.772	0	13	8
Bind	82.884	9.732	42.857	100	85.714

The descriptive results for our sample of banks are displayed in Table 3. The average cost of debt across our sample is 4.794% with minimum and maximum value of 2.0% and 8.8% respectively and the average cost of equity of the banks is 4.7% with standard deviation of 34.61 and ranging between as minimum as -79.5% and as high as 72.7%. This represents that it is a very diverse sample having small and big banks and therefore it is fit for analysis.

Next in Table 4 below, we present the correlation matrix that shows our results of the Pearson Correlation Coefficients among all the variables of the study

Table 4 Correlation Table

	Cosequity	CosDebt	Costofcapital	Env_Index	Soc_Index	Gov_Index	GreenBK	DIVIDEND	FSIZE	DTA	Profit	BSIZE	BIND
Cosequity	1												
CosDebt	-0.1209	1											
Costofcapital	0.1696	-0.3539	1										
Env_Index	0.0296	-0.2472	0.2331	1									
Soc_Index	0.1258	-0.1639	0.038	0.1252	1								
Gov_Index	0.0427	-0.2845	0.2412	0.6501	0.1285	1							
GreenBK	0.0628	-0.3116	0.2564	0.8877	0.3304	0.8939	1						
DIVIDEND	0.0717	-0.3976	0.445	0.2764	0.1155	0.2519	0.2997	1					
FSIZE	0.0073	-0.4706	0.4729	0.3806	-0.0071	0.3898	0.4029	0.5892	1				
DTA	-0.1028	-0.1004	-0.0251	0.2548	-0.1712	0.2027	0.2058	-0.0846	0.296 4	1			
Profit	0.1702	-0.3076	0.7761	0.1157	0.0849	0.1403	0.1512	0.5687	0.418 8	-0.365	1		
BSIZE	-0.0119	-0.0724	0.2493	0.4584	0.0086	0.3545	0.4274	0.0481	0.080 6	0.018 6	0.188 5	1	
BIND	0.1496	-0.2653	0.2175	0.0774	0.1065	0.1677	0.1503	0.2066	0.291 9	0.089 7	0.231 3	0.1759	1

The correlation s among the variables of this study are summarized in Table 4 above. The Pearson correlations in the above table show that there is no issue of any multicollinearity among the independent variables used in this study, hence meeting the basic assumption for further data regressions.

Figure 1 presents a graphical representation of the average score of each of the sample banks on our overall green banking index over the sample period while Figure 2 plots the banks by their scores of the components of green banking.

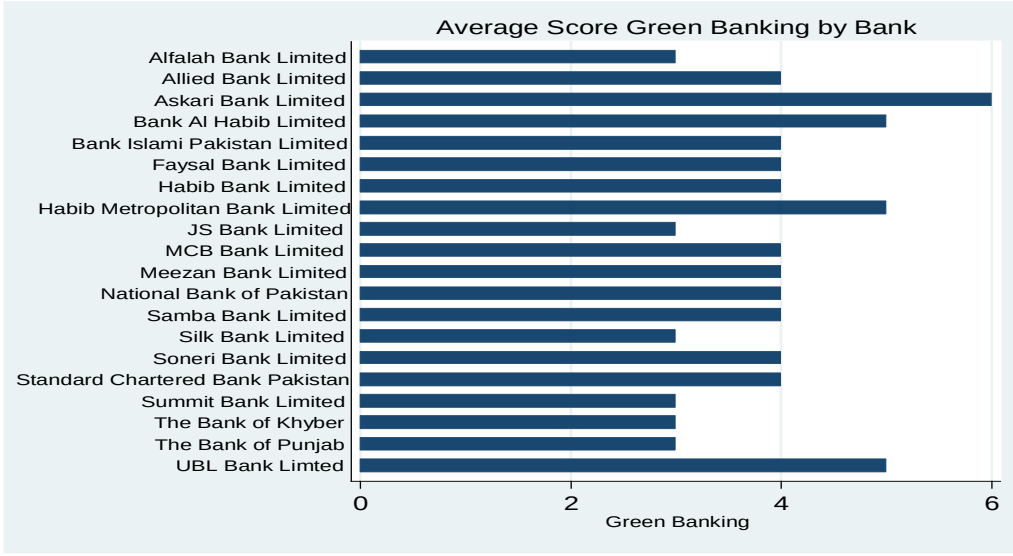

Fig 1: ***The Average score of Green Banking by Banks***

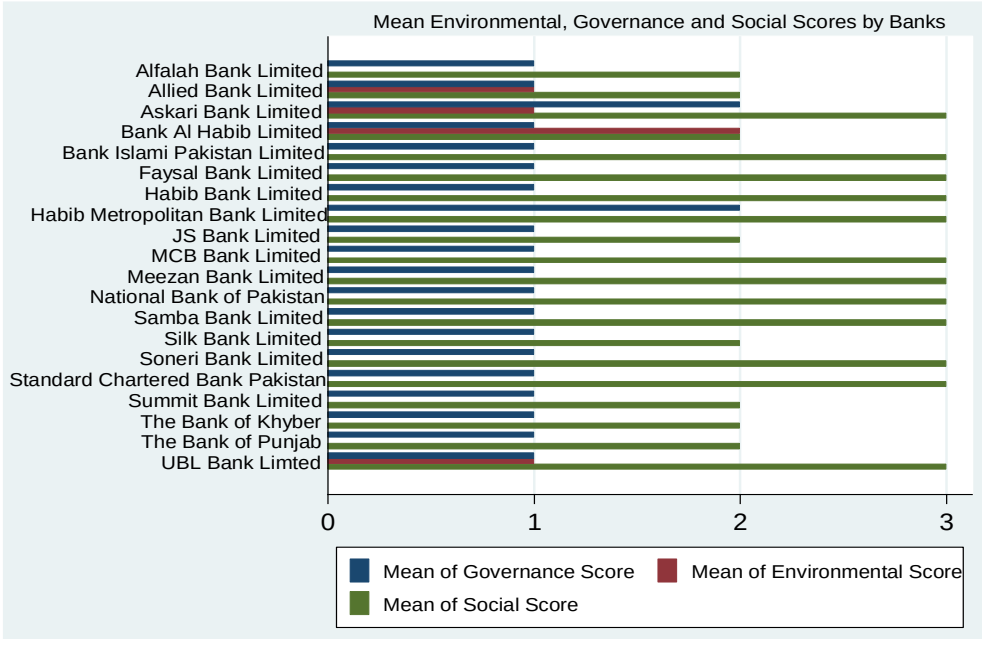

Fig 2: ***The Average Score of the Components of Green Banking by Banks***

From Figure 1 most of our sample banks are measured halfway of the scale. They have an average green banking score of 3. Then there are banks who have a green banking score of 4 and 6. Similarly, Figure 2 shows that Askari Bank and Habib Metropolitan Bank are performing better in governance than all the other banks. The mean of environmental score is high of Habib Bank Limited which means they are contributing more towards the environment followed by Allied Bank, Askari Bank and United Bank Limited. The graph shows that there are 12 banks out of 20 who are more socially responsible than the remaining 8 banks with the mean of social score of 3.

RESULTS AND DISCUSSION

Green Banking Practices and the Cost of Equity Capital

First, we estimate our hypothesized relationships of the impact of green banking practices on the cost of capital of the sample banks by taking the Cost of Equity as a measure of the cost of capital. We start analyzing these relationships, first with the overall green banking scores of the sample banks (results shown in Table 5), followed by the impact of the three main components i.e. environmental, social and governance scores (results shown in Table 6). Finally, the relationships of the subcomponents of green banking with the cost of equity are tested (results shown in Table 7).

Table 5 shows that green banking in our sample has had no effect on the cost of equity. This result is partially in line with the findings of Yeh et al. (2020) who also found that the one- year lagged values of CSR scores of the sample firms were unrelated to the cost of equity while the two-year lagged values showed an increasing impact on the cost of equity of the sample firms. We believe that while one may expect that the firms that are socially responsible can easily take advantage of lower equity costs (Botosan, 1997; K. C. Chen, Chen, & Wei, 2009; Hail & Leuz, 2006). We conclude that stock market investors are indifferent to any green banking practices. This finding in our sample may be a reflection that these banks are adopting green banking under regulatory pressures, as advocated in the Legitimacy theory that organizations adopt and comply with the legislations and policies that apply in their operating environments (Nurmalia, 2021). Further, the stock market, being possibly aware of this, therefore does not price this aspect. Since the green banking regulations were mostly imposed by the government and regulatory authorities rather voluntarily adopted. This might, in turn, be increasing their expenses and may even increase their risk of doing business too.

Table 5 Cost of Equity and Green Banking

VARIABLES	Cost of Equity Capital
Gbanking	0.628
	(1.607)
CaptS	0.253
	(0.830)
Proft	8.864**
	(4.231)
DivP	-0.0214
	(0.124)
FirmS	-7.851*
	(4.211)
Bsize	-1.350
	(1.670)
Bind	0.670*
	(0.342)
Constant	133.0
	(90.11)
Observations	175
R-squared	0.079
Number of Banks	20

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

This table represents the impact of the overall Green Banking score of sample banks on their cost of equity. The cost of equity is one of the proxies of the dependent variable cost of capital. The cost of capital is estimated by taking the natural log of stock prices/previous stock prices. Green banking is calculated using a dummy variable. Capital structure is the debt to asset ratio and profitability is the return on assets. Dividend income is the ratio of dividends paid by net income. Firm size is the natural log of deposits Board size is the total number of members on the board of directors and board independence is the total number of non-executive members on the directors' board

Table 6 Cost of Equity and the ESG Components of Green Banking

VARIABLES	Coat of Equity Capital
GovTotal	2.044
	(4.235)
EnvTotal	-0.0178
	(2.811)
SocialTotal	-1.249
	(7.915)
CaptS	0.272
	(0.859)
Proft	9.178**
	(4.335)
DivP	-0.0237
	(0.125)
FirmS	-8.072*
	(4.292)
Bsize	-1.428
	(1.750)
Bind	0.661*
	(0.350)
Constant	142.3
	(96.65)
Observations	175
R-squared	0.084
Number of Banks	20

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

This table represents the impact of the Environmental, Social and Governance (i.e., ESG) components of green banking on the cost of equity. These components are measured using dummy variable whereas cost of equity is measured as the realized excess returns.

Table 7 Cost of Equity and Green Banking Sub-Components

Variables	Cost of Equity Capital
GHR	-3.716
	(7.514)
GFINANCE	-6.519
	(8.397)
GAUDIT	19.07
	(14.66)
GBUILDING	-2.328
	(9.429)
NaturalResourceCon	-4.498
	(8.654)
EliminationofWastage	3.301
	(8.435)
GreenProductsandServices	9.272
	(12.07)
IslamicCSR	-2.191
	(8.050)
CaptS	0.0182
	(0.925)
Proft	8.241*
	(4.499)
DivP	-0.0664
	(0.134)
FirmS	-4.777
	(5.063)
BSize	-1.519
	(1.823)
Bind	0.792**
	(0.366)
Constant	75.19
	(113.3)
Observations	175
R-squared	0.087
Number of Banks	20

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

This table shows the results of the impact of sub-components of Green Banking on the cost of equity. The sub-components of governance include green HR, green finance, green audit and green report. The sub-component of environment consists of green building, natural resource conservation, elimination of wastage and green product

and services and lastly the green banking component social comprises of stake holders' awareness, employee rights and Islamic CSR. The results in both table 6 and 7 again show no relationship between the cost of equity and components of green banking practices. Our results are consistent with the findings of Nelling & Webb, (2009), who also did not find any relation between social responsibility and financial performance.

Green Banking Practices and the Cost of Debt Capital

In this section we estimate our hypothesized relationships through the impact of green banking practices on the cost of capital of the sample banks, thereby taking the Cost of Debt Capital, as a measure of the cost of capital. As with the cost of equity, we again estimate these relationships first with the overall green banking scores of the banks, then with its ESG components and then finally with the sub-components of the green banking index. Results are shown in Table 8, 9, and 10 respectively.

The results in Table 8 show a significantly negative relationship of green banking with the cost of debt. The more a bank is involved in green banking practices the less will be the cost of debt. This finding is in line with the finding of Cooper and Uzun (2015) a negative relationship between social responsibility and cost of debt. In the context of the theory of finance, it will be inefficient to invest in a firm who is socially irresponsible (Spicer, 1978). We think that this can be because the corporate might want to invest in companies who are socially responsible and are working their way towards green banking. Overall this finding is in conformity with the Socially Responsible Investment (SRI) theory and with (Qirem et al., 2023; Yunidwi & Napitupulu, 2024) who argue that green banking enhances the goodwill and authenticity of the banks which benefits them by achieving financial goals (Qirem et al., 2023; Yunidwi & Napitupulu, 2024)

Table 8 Cost of Debt and Green Banking

VARIABLES	Cost of Debt
GBanking	-0.173***
	(0.0570)
CaptS	-0.00692
	(0.0320)
Proft	-0.231*
	(0.120)
DivP	-0.0106**
	(0.00459)
FirmS	-0.0448
	(0.168)
BSize	0.0565
	(0.0716)
Bind	-0.0493***
	(0.0106)
Constant	11.73***
	(3.998)
Observations	194
R-squared	0.249
Number of Banks	20

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

This table shows the impact of overall score of banks on our Green Banking Index on their cost of debt. Cost of debt is the proxy of cost of capital measured using financial interest expense by interest bearing debt outstanding.

Table 9 Cost of Debt and the ESG Components of Green Banking

VARIABLES	Cost of Debt
GovTotal	0.0986
	(0.182)
EnvTotal	-0.215*
	(0.117)
SocialTotal	-1.219***
	(0.319)
CaptS	-0.00992
	(0.0328)
Proft	-0.177
	(0.119)
DivP	-0.0102**
	(0.00451)
FirmS	-0.0800
	(0.172)
BSIZE	0.00168
	(0.0738)
Bind	-0.0442***
	(0.0106)
Constant	15.51***
	(4.218)
Observations	194
R-squared	0.322
Number of Banks	20

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0

This table reveals the effect of the Environmental, Governance and Social components of Green Banking by sample banks on their cost of debt. Cost of debt is the proxy of the cost of capital measured using financial interest expense by interest bearing debt outstanding.

The results in Table 9 show that there is a negative and significant relationship between the environmental and social components of green banking with the sample banks' cost of debt. This finding is in line with the finding of Bauer and Hann (2010) who found, in a sample of 582 U.S public corporations, that environmental concerns are related to increased cost of debt financing and decreased credit ratings and the environmental practices which are proactive are linked with the low cost of debt. Moreover, these results are also broadly in support of the Stakeholders and Legitimacy Theories.

Table 10 Cost of Debt and the Sub Components of Green Banking

VARIABLES	Cost of Debt
GHR	0.258
	(0.325)
GFINANCE	0.0174
	(0.309)
GAUDIT	-0.0747
	(0.619)
GBUILDING	-0.0177
	(0.397)
NaturalResourceCon	-0.788**
	(0.312)
EliminationofWastage	0.345
	(0.337)
GreenProductsandServices	-0.778
	(0.477)
IslamicCSR	-1.149***
	(0.315)
L_DTA	-0.00327
	(0.0336)
L_Profit	-0.161
	(0.120)
L_DIVIDEND	-0.0112**
	(0.00457)
L_lnofdeposits	-0.0852
	(0.177)
BSIZE	0.0187
	(0.0730)
BIND	-0.0436***
	(0.0107)
Constant	12.56***
	(4.319)
Observations	194
R-squared	0.104
Number of Bank	20

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

This table represents the impact of the sub-components of the green banking on the cost of Debt of our sample banks. These components are measured using dummy variables. Cost of debt is the proxy of the cost of capital measured using financial interest expense by interest bearing debt outstanding.

Table 10 shows our random effects of the relationship between the cost of debt on the sub-components of the green banking scores for the sample banks. The results show that natural resource conservation and Islamic CSR are significant but has a negative relationship with the cost of debt. Past studies also shown the matching results, explaining that the nations who have high religiosity are prone to use less debt financing (Cai & Shi, 2019; H. Chen, Huang, Lobo, & Wang, 2016). The entrepreneurs who are religious pays low cost of debt (Li, Xu, Gill, Haider, & Wang, 2019). The results are also consistent with the following studies (Gati, Harymawan, & Nasih, 2022; Jiang, John, Li, & Qian, 2018; Shad, Lai, Shamim, & McShane, 2020).

In addition to these findings, we further found that amongst control variables Profitability, Firm Size, Dividend Payments and Board Independence are important determinants of the cost of equity and cost of debt in our sample of Pakistani listed banks. These results are also in conformity with the findings of the previous literature on the cost of capital.

CONCLUSION

In this study we analyzed the relationship between the green banking and cost of capital of the listed banks in Pakistan over a sample period of 10 years from 2010-to 2019. The data was collected by using the bank's annual reports and websites. We recognized the green banking components based on the literature then further dummy variable was used for the data collection of green banking. Cost of capital was measured by using cost of equity and cost of debt. Our results showed that the overall green banking total, its components and sub-components, does not affect the cost of equity at all in our sample, so we think that equity holders are just considering it as a formality due to regulations. In case of cost of debt, we found that green banking practices are effectively reducing the cost of debt of sample firms, and we think this can be because the corporate might want to invest in companies who are socially responsible and are working their way towards green banking. We further found out that Board independence, profitability, firm size and dividend payments are other important determinants of cost of debt and equity capital of banks in Pakistan.

This is a developing issue which is associated with international efforts to integrate sustainability into financial systems and business practices. As most of the existing research on green banking emphasized on advanced economies, this study focuses on Pakistan, a developing county, drawing attention to its challenges and opportunities while implementing the green banking practices with an adolescent financial system and regulatory framework. This research explored how green banking can affect the stakeholder's perception. The banks that adopted green banking practices are viewed as much safer, while improving their reputation.

Though, the banks of Pakistan have started realizing the significance of green policies in their day-to-day activities. Still, there are only a few banks who are busy with

internal and external environment management and are providing green finance. The banks should be motivated by the distinct government along with non-government organizations to transit towards environment-friendly enterprise rather than profit-seeking. This will help in increasing awareness regarding sustainable business practices. The customers are still not aware of green banking so, in this regard, banks should arrange some branch-level events which might help the customers to change their perspective about green banking and are willing to adopt online banking. This is because the customers still want to have a printed document like banks statement.

Some progress has been made in evaluating the relationship between cost of capital and green banking of Pakistan listed banks. However, a more integrated approach is needed to find this relationship between different types of banks in Pakistan e.g. Islamic vs commercial banks or government vs. private banks. It is evident which types of banks are performing more green banking policies in their operations. The cost of equity is not related to green banking in our sample. In future, researchers can dig out the reasons why there is no relation between them. The researchers can also investigate the channel and reasons why the cost of debt is responding to green banking and not cost of equity.

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