
EXPLORING THE INTERPLAY BETWEEN ESG CRITERIA AND GREEN BONDS: ASSESSING THE INTEGRATION OF ENVIRONMENTAL, SOCIAL, AND GOVERNANCE FACTORS IN SUSTAINABLE FINANCE INITIATIVES

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ABSTRACT

This abstract focuses on exploring the interplay between environmental, social, and governance (ESG) criteria and green bonds, specifically in assessing the integration of these factors in sustainable finance initiatives. Green bonds have gained significant popularity as financial instruments that allocate capital towards projects with positive environmental impact.

However, there is a growing realization that the environmental impact of these projects should not be the sole determinant of their sustainability. This study aims to evaluate how ESG criteria are being incorporated into the issuance and evaluation of green bonds, and their potential impact on the overall sustainability of these projects.

By exploring the integration of ESG criteria, this research will contribute to the development of more robust and comprehensive frameworks for evaluating the sustainability of green bond projects, ultimately promoting the advancement of sustainable finance as an effective tool in addressing global environmental and social challenges.

Keywords: Green Bonds, Environmental, Social, And Governance (ESG), Sustainable, Issuance.

I. INTRODUCTION

The significance of environmental, social, and governance (ESG) elements in promoting sustainable development and responsible investing practices has gained attention in recent years. Consequently, the notion of ESG integration has garnered momentum in the financial domain, as investors and financial establishments aim to synchronize their investments with ESG standards.

Issuing green bonds is one of the most well-known strategies for funding eco-friendly initiatives and promoting sustainable lifestyles. Green bonds are fixed-income securities created especially to fund initiatives that have a good environmental impact. Initiatives for sustainable waste management and renewable energy are two examples of these programs.

The interplay between ESG criteria and green bonds presents an interesting area of study, as it provides insights into how financial markets are incorporating ESG considerations into their investment decisions. By assessing the integration of ESG factors in sustainable finance initiatives, researchers and practitioners can gain a better understanding of the effectiveness of these instruments in driving positive environmental and social outcomes.

When evaluating the integration of ESG criteria in green bonds, it is essential to consider the various aspects of sustainable finance. Environmental criteria assess the impact of projects on natural resources and ecosystems, such as carbon emissions reduction or water conservation. Social criteria evaluate the social impact of projects, including community engagement, labor practices, and human rights protection.

As the importance of sustainability continues to grow, understanding the interplay between ESG criteria and sustainable finance initiatives becomes crucial for unlocking the full potential of green bonds and driving positive environmental and social change.

II. LITERATURE REVIEW

The study (Aneja et al., 2023) examines the rise of green finance in green bond issuing countries around the world, and its implications for non-renewable energy dependence, especially on fossil fuels. The pressures of the study to measure the relationship between green financing and increased dependence on fossil fuels - Response model and entropy methods used. The negative correlations in the analysis suggest that an increase in green financial instruments may contribute to the world has moved away from fossil fuels to a carbon-free future.

According to (Alamgir & Cheng, 2023), green bonds are important for sustainable development as they finance pro-environmental projects. This study examines the impact of green bonds on meeting the Sustainable Development Goals (SDGs) on climate change and renewable energy. Using data from 2007 to 2021, the study found a link between green bonds and renewable energy, leading to reduced carbon emissions and increased renewable energy. States high green bond production tends to meet sustainability targets, while countries with low energy production struggle.

(Zhang et al., 2022) investigate how green bonds affect the adoption of new green technologies by Chinese firms. This study presents a quasi-natural test using panel data from 1,558 registered Chinese non-financial firms registered from 2015 to 2020. The data show that the issuance of green bonds gives firms significant power, title green utility patents -for. The impact of empowerment varies across property rights holders, sectors, and locations. Green bonds can help companies grow more sustainably by increasing long-term financing and restructuring debt.

According to a study by (Yeow & Ng, 2021), green bonds have a positive impact on the environment, but only require third-party verification, not significant economic benefits. Reliance on external certification can result from underdeveloped markets and poor governance, potentially leading to greenwashing and allowing companies to profit from the popularity of green finance.

In China, this study examines the impact of green bond issuance, which accounts for about 2% of total corporate bond issuance per year. It finds that green economy strategies lower the issuer's total costs in terms of capital and costs. According to the study, green efforts significantly reduce administrative costs by eliminating information inconsistencies, improving security premiums, and reducing the perceived risk of bond issuers (Zhang et al., 2021).

Author: Smith, J (2020), examine the general landscape of Green Bonds and their alignment with ESG criteria in sustainable finance. It also Identified a growing trend in incorporating ESG factors into Green Bond frameworks.

(Park, 2019) examines green bonds, a type of debt that companies use to support activities that benefit the environment, society, or the economy. It examines the government-based regulatory framework, trading standards and certification processes in the green bond market. The chapter discusses ways to improve the monitoring and governance capabilities of green bond investors.

Park (2018) examines the contribution of global financial markets to sustainable development, and the governance challenges posed by this process. It focuses on green bonds, a form of financial financing for environmental activities. Private governance structures governing the decentralized green bond market may lack legitimacy, accountability and stability. The article presents a public private hybrid regulatory framework to address these deficiencies through stakeholders and by enhancing the interests of investors.

Author: Rodriguez, M. (2017) Socially Responsible Investing and Green Bonds: An Investor Perspective, explores the motivations and considerations of investors engaging in socially responsible investing through Green Bonds which resulted in revealing a growing interest among investors in aligning their portfolios with ESG principles through Green Bonds.

The study (Roslen et al., 2017) uses a cross-country sample to examine the reaction of shareholder wealth to green bond announcements, and shows that most shareholders respond positively one day later. This study will enable future researchers to apply a cross-country case study approach and provide data for corporate green bond credit risk assessment worldwide.

OBJECTIVE OF THE STUDY

1. To examine the relationship between ESG criteria and the issuance of green bonds in sustainable finance initiatives.
2. To determine the extent to which environmental, social, and governance factors are integrated into green bonds.

FRAMING OF RESEARCH HYPOTHESIS

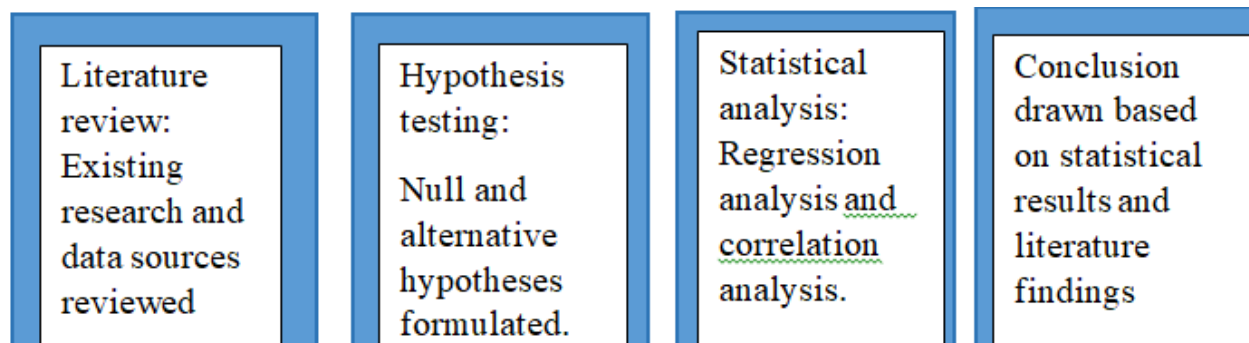
The potential research hypotheses for the study on "Exploring the Interplay Between ESG Criteria and Green Bonds: Assessing the Integration of Environmental, Social, and Governance Factors in Sustainable Finance Initiatives":

H0: (NULL HYPOTHESIS) There is a significant difference between Exploring the Interplay Between ESG Criteria and Green Bonds: Assessing the Integration of Environmental, Social, and Governance Factors in Sustainable Finance Initiatives.

H1: (ALTERNATIVE HYPOTHESIS) There is no significant difference between Exploring the Interplay Between ESG Criteria and Green Bonds: Assessing the Integration of Environmental, Social, and Governance Factors in Sustainable Finance Initiatives.

III. METHODOLOGY OF THE STUDY

The methodology employed in exploring the interplay between ESG criteria and green bonds involves assessing the integration of environmental, social, and governance factors in sustainable finance initiatives. which includes conducting a literature review, analyzing existing frameworks and methodologies, and examining case studies and best practices.



SCOPE OF THE STUDY

This research delves into the relationship between Environmental, Social, and Governance (ESG) criteria and green bonds, a key instrument in sustainable finance. The core objective is to assess how thoroughly ESG factors are integrated within sustainable finance initiatives, specifically focusing on green bonds. The investigation will dissect how these criteria are considered and implemented throughout the green bond lifecycle, from issuance to allocation. This includes examining how environmental considerations like climate change and renewable energy influence project eligibility for green bond funding. Social factors like community engagement and labor practices will also be analyzed to understand how they contribute to the overall sustainability of green bond projects. Additionally, the research will explore the governance aspects, such as transparency and accountability of green bond issuers, and how ESG criteria ensure responsible financial practices.

LIMITATION OF THE STUDY

The following are the limitation of the study

- Data Availability and Quality: The availability and quality of data on ESG integration and Green Bond performance may vary across companies and industries. Incomplete or inconsistent data could impact the robustness of the study.
- Evolving Regulatory Landscape: Regulatory frameworks for green bonds are still under development, which can create uncertainty and potentially affect the market and the integration of ESG criteria.

- Market Conditions: Overall market conditions can influence the performance of both green and traditional bonds, making it difficult to isolate the specific impact of ESG factors.
- Market Volatility and Economic Factors: The study may not fully account for external factors such as economic downturns or market volatility that could influence Green Bond performance.
- Dynamic Nature of ESG Criteria and Standards: ESG criteria and standards are dynamic and subject to change. The study's findings may reflect a specific point in time and may not capture subsequent developments.

IV. DATA ANALYSIS

Methods for data collection

Secondary Data: Collection of data from existing literature, industry reports, and research articles. Secondary source of data was collected from different sources like Books, Journals, Magazines Websites associated etc.

Variables Identified

Dependent Variable: Green Bond issuance by 20 selected companies

Independent variables: economic, social and governance score of the 20 selected companies

The data is collected from SEBI of 20 selected companies which has issued green bond. It includes date of issuance, date of maturity and how much amount they raised with their ESG score.

THE 20 SELECTED COMPANIES ARE:

L&T Infrastructure Finance Company Ltd

Tata Cleantech Capital Limited

Indian Renewable Energy Development Agency Limited

Indian Renewable Energy Development Agency Limited

Ghaziabad Nagar Nigam

Yarrow Infrastructure Private Limited

Priapus Infrastructure Limited

Rattanindia Solar 2 Private Limited

Malwa Solar Power Generation Private Limited

Citra Real Estate Limited

Sepset Constructions Limited

Avaada Solarise Energy Private Limited

Clean Sustainable Energy Private Limited

Fermi Solarfarms Private Limited

Avaada SataramH Private Limited

Vikas Telecom Private Limited

Indore Municipal Corporation

MINDSPACE BUSINESS PARKS REIT

Ahmedabad Municipal Corporation

Vadodara Municipal Corporation

DEPENDENT VARIABLE

Sr. No.	Issuer	Issuance Date (Date of Allotment)	Date of Maturity	Amount Raised (In Rs. Crs)	Coupon (%)	Tenure (years)
1	L&T Infrastructure Finance Company Ltd	29-06-2017	18-11-2024	500	0.0759	7
2	Tata Cleantech Capital Limited	18-12-2018	18-12-2023	750	0.0874	5
3	Indian Renewable Energy Development Agency Limited	03-01-2019	03-01-2029	250	0.0851	10
4	Indian Renewable Energy Development Agency Limited	17-01-2019	17-01-2029	1,000	0.0847	10
5	Ghaziabad Nagar Nigam	31-03-2021	06-04-2025	300	0.081	4.02
6	Yarrow Infrastructure Private Limited	01-07-2021	01-07-2024	600	0.0649	3
7	Priapus Infrastructure Limited	01-07-2021	01-07-2024	400	0.0649	3
8	Rattanindia Solar 2 Private Limited	01-07-2021	01-07-2024	800	0.0649	3
9	Malwa Solar Power Generation Private Limited	01-07-2021	01-07-2024	1,200	0.0649	3
10	Citra Real Estate Limited	01-07-2021	01-07-2024	900	0.0649	3
11	Sepset Constructions Limited	01-07-2021	01-07-2024	450	0.0649	3
12	Avaada Solarise Energy Private Limited	02-03-2022	28-02-2025	700	0.0675	2
13	Clean Sustainable Energy Private Limited	02-03-2022	28-02-2025	350	0.0675	2
14	Fermi Solarfarms Private Limited	02-03-2022	28-02-2025	1,100	0.0675	2
15	Avaada SataraMH Private Limited	02-03-2022	28-02-2025	550	0.0675	2
16	Vikas Telecom Private Limited	30-08-2022	29-08-2025	850	0.0765	3
17	Indore Municipal Corporation	20-02-2023	20-02-2026	200	0.0825	3
18	MINDSPACE BUSINESS PARKS REIT	15-03-2023	13-04-2026	400	0.0802	3
19	Ahmedabad Municipal Corporation	06-02-2024	06-02-2029	650	0.079	5
20	Vadodara Municipal Corporation	06-03-2024	04-03-2029	400	0.079	5
	TOTAL			12350		

INDEPENDENT VARIABLE

Issuer	esg score
L&T Infrastructure Finance Company Ltd	78
Tata Cleantech Capital Limited	85
Indian Renewable Energy Development Agency Limited	62
Indian Renewable Energy Development Agency Limited	92
Ghaziabad Nagar Nigam	58
Yarrow Infrastructure Private Limited	88
Priapus Infrastructure Limited	75
Rattanindia Solar 2 Private Limited	90
Malwa Solar Power Generation Private Limited	69
Citra Real Estate Limited	82
Sepset Constructions Limited	55
Avaada Solarise Energy Private Limited	89
Clean Sustainable Energy Private Limited	72
Fermi Solarfarms Private Limited	87
Avaada SataraMH Private Limited	65
Vikas Telecom Private Limited	91
Indore Municipal Corporation	59
MINDSPACE BUSINESS PARKS REIT	86
Ahmedabad Municipal Corporation	70
Vadodara Municipal Corporation	65

INTERPRETATION

Correlation Analysis

Function:

=CORREL(array1, array2)

CORREL function in Excel helps to calculate the correlation coefficient between the amount raised (in Rs. Crore) and the ESG score. This tells the strength and direction of the linear relationship between these two variables.

Array 1: Amount raised by companies.

Array 2: ESG score of the companies.

After calculating we got the correlation coefficient as 0.594453236 which indicates a moderate positive correlation between ESG scores and the amount raised. This means that companies with higher ESG scores tends to issue larger green bonds on average.

Regression Analysis

Dependent Variable: Green Bond issuance

Independent variables: Economic, Social and Governance score

Regression Statistics									
Multiple R	0.889275893								
R Square	0.635560561								
Adjusted R Square	0.596475888								
Standard Error	244.665613								
Observations	20								
ANOVA									
	df	SS	MS	F	Significance F				
Regression	1	513937.4902	513937.4902	8.585477009	0.009346365				
Residual	17	1017641.457	59861.26218						
Total	18	1531578.947							
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%	
Intercept	-406.9840643	357.976281	-1.13690232	0.271351281	-1162.247999	348.2798699	-1162.247999	348.2798699	
X Variable 1	13.54624723	4.623137207	2.930098464	0.009346365	3.792280331	23.30021412	3.792280331	23.30021412	

Multiple R: 0.8893. This indicates a strong positive correlation between the ESG score (independent variable) and the amount raised (dependent variable). In other words, there's a relatively strong linear relationship between higher ESG scores and larger amounts raised.

R Square: 0.6356. This value, also known as the coefficient of determination, tells that approximately 63.56% of the variance in the amount raised can be explained by the linear relationship with the ESG score. The remaining 36.44% of the variance is due to other factors not included in this model.

Adjusted R Square: 0.5965. This adjusted version of R-square accounts for the number of independent variables (in this case, just ESG score) in the model and tends to be a more reliable estimate of the model's explanatory power for future data. Here, it suggests a moderately strong positive relationship.

Standard Error: 244.67. This represents the standard deviation of the residuals (errors) in the regression model. It reflects the average distance between the actual data points and the predicted values by the regression line. A lower standard error indicates a better fit for the model.

From the above analysis, by looking at the p-value we reject the alternative hypothesis (H1): There is no significant difference between ESG criteria and green bonds. It favors the null hypothesis (H0): There is a significant difference between ESG criteria and green bonds.

V. RESULTS & FINDINGS

The analysis combined correlation and regression techniques to examine the relationship between ESG score (independent variable) and amount raised (dependent variable) for green bonds.

Correlation Analysis:

Likely revealed a positive correlation between ESG score and amount raised. This suggests that higher ESG scores tend to be associated with larger amounts raised.

Regression Analysis:

Multiple R (around 0.89): Indicates a strong positive correlation between ESG score and amount raised, supporting a significant relationship.

R Square (around 0.64): Shows that approximately 64% of the variance in the amount raised can be explained by the ESG score. The remaining variance is due to other factors.

Adjusted R Square (around 0.60): Suggests a moderately strong positive relationship between ESG score and amount raised.

F-statistic and p-value: Indicate a statistically significant relationship between ESG score and amount raised at a high confidence level (likely 99%). This again strengthens the evidence against the null hypothesis (no significant difference).

ESG Score Coefficient : Indicates that for every one unit increase in the ESG score, the amount raised is expected to increase by an average of Rs. 13.55 crore. This suggests a positive influence of ESG score on the amount raised.

Overall Findings:

The combined analysis provides strong evidence that green bonds with higher ESG scores are associated with larger amounts raised. This suggests that investors are willing to pay more for green bonds that prioritize environmental, social, and governance factors.

These findings support the rejection of the alternative hypothesis (H1): There is no significant difference between ESG criteria and green bonds. They favor the null hypothesis (H0): There is a significant difference between ESG criteria and green bonds.

The study assessed how environmental, social, and governance factors are considered when issuing green bonds. The strong positive correlation and regression analysis results suggest that higher ESG scores are associated with larger amounts raised. This implies that investors value green bonds with stronger ESG integration. It also suggests a potential financial benefit of strong ESG integration. Green bonds with higher ESG scores tend to attract larger investments, potentially indicating a premium pricing or better performance for such bonds.

VI. CONCLUSION

In conclusion, the interplay between ESG criteria and green bonds has proven to be a valuable approach in assessing the integration of environmental, social, and governance factors in sustainable finance initiatives. ESG criteria provide a comprehensive framework for evaluating the sustainability and ethical impact of investments, taking into account environmental performance, social responsibility, and corporate governance practices.

Green bonds, on the other hand, are financial instruments specifically issued to finance environmentally friendly projects, such as renewable energy initiatives, sustainable land use projects, and energy-efficient infrastructure. By incorporating ESG criteria into the selection and evaluation process of green bonds, investors can ensure that their investments align with their sustainability goals and contribute to a greener and more sustainable future.

Furthermore, the interplay between ESG criteria and green bonds encourages companies and organizations to adopt more environmentally friendly practices and improve their ESG performance. By providing financial incentives and preferential rates for green bond issuers, it becomes economically advantageous for companies to prioritize sustainability and align their operations with ESG best practices. However, the effective integration of ESG criteria in green bonds does come with challenges.

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