Investigating the Correlation Between ESG Scores and Credit Ratings Using Spearman's Rank Correlation

Arnik Gala[1], Damini Malhotra[2], Neelabh Bhardwaj[3], Sandeepan Santra[4], Varna M[5], Anand Jaiswal[6]

ABSTRACT

This study investigates the relationship between Environmental, Social, and Governance (ESG) ratings and credit ratings to determine whether higher ESG scores correlate with better credit ratings. Credit ratings, which measure a company's ability to meet its financial obligations, play a critical role in financial markets by guiding investment decisions and risk assessments. As ESG factors become increasingly influential in decision-making processes, understanding their impact on credit ratings provides insights into the role of sustainability in financial stability.

The research employs Spearman's rank correlation, a non-parametric inferential statistical method, to analyse data from 35 companies across various sectors, sourced from CRISIL. ESG scores, initially provided on a numerical scale, were converted into rank order using the average rank method in cases of ties, where companies with identical scores received the average of the ranks they would have otherwise occupied. Credit ratings were ranked based on their letter grades, categorizing companies into three tiers: Rank 1 for the highest, 2 for medium, and 3 for the lowest. Spearman's rank correlation was then calculated to measure the strength and direction of the relationship between the two ranks.

The analysis reveals a correlation coefficient of 0.2737, indicating a weak positive correlation between ESG and credit ratings. These findings suggest that while ESG performance may influence creditworthiness, the relationship is not strongly pronounced. The study provides valuable insights for investors, analysts, and policymakers integrating ESG factors into credit risk evaluation frameworks.

Keywords: *ESG Ratings, Credit Ratings, Spearman's Rank Correlation, Non-Parametric Analysis, CRISIL, Sustainable Finance*

INTRODUCTION

In today's world, ESG ratings have emerged as a critical tool for understanding how companies navigate the challenges of sustainability. These ratings go beyond financial performance, offering insights into how well a company manages environmental responsibilities, treats its stakeholders, and ensures sound governance. They have become a trusted measure for investors, stakeholders, and even credit rating agencies when evaluating a company's long-term stability and risks.

This study seeks to answer an important question: do companies with higher ESG ratings also achieve better credit ratings? Exploring this connection is relevant not only for investors and businesses but also for advancing global sustainability goals. The research ties directly to several United Nations Sustainable Development Goals (SDGs). For instance, SDG 9 (Industry, Innovation, and Infrastructure) emphasizes the role of sustainable industrialization and financial stability in fostering resilient economies. Similarly, SDG 8 (Decent Work and Economic Growth), SDG 12 (Responsible Consumption and Production), and SDG 16 (Peace, Justice, and Strong Institutions) underscore the importance of ethical governance, responsible resource use, and inclusive growth in creating a sustainable future.

[1] TERI School of Advanced Studies
[2] TERI School of Advanced Studies
[3] TERI School of Advanced Studies
[4] TERI School of Advanced Studies
[5] TERI School of Advanced Studies.
[6] ✉ Professor, TERI School of Advanced Studies, ajaiswal.rs.mec13@itbhu.ac.in

Using Spearman's rank correlation, this study examines data from 35 companies, sourced from CRISIL, to uncover the link between sustainability practices and financial trustworthiness. The findings aim to provide insights into how ESG performance shapes credit risk, supporting a broader understanding of the role sustainability plays in building a more resilient and equitable financial ecosystem.

LITERATURE REVIEW

The relationship between Environmental, Social, and Governance (ESG) factors and credit ratings has emerged as a critical area of study within both financial and sustainability research. As investors and stakeholders increasingly consider sustainability as a key indicator of long-term financial health, integrating ESG into credit risk analysis is becoming crucial. This literature review explores existing studies on the relationship between ESG performance and credit ratings, identifies research gaps, and justifies the relevance of this study in advancing our understanding of how ESG factors influence creditworthiness.

SIGNIFICANT RELATIONSHIP BETWEEN ESG AND CREDIT RATINGS

A growing body of literature has demonstrated that ESG factors are crucial in assessing credit risk. Studies consistently show that firms exhibiting stronger ESG performance are perceived as less risky and are often awarded higher credit ratings.

Bhattacharya & Sharma (2019) explored this relationship in India, focusing on the study that was confined to those firms listed on the S&P BSE 500 and have made ESG disclosures, also being rated by various credit rating agencies like Crisil, ICRA and CARE. However, the data were sourced from Bloomberg. how environmental and governance factors are linked to better credit ratings. They found that firms that implemented sound governance practices, reduced environmental impacts, and adopted responsible social policies were considered more reliable by investors, thus receiving higher credit ratings. These firms were better positioned to weather economic downturns, partly due to their lower reputational and regulatory risks.

Devalle et al. (2017) reinforced this in their European study, which found that companies with higher ESG ratings tended to exhibit lower credit risk. They fetched the ESG data from Thomson Reuters DataStream. Their study found that firms with effective governance practices, such as independent board members and shareholder-friendly policies, enjoyed a lower cost of capital and higher credit ratings. The environmental and social factors were also found to play a pivotal role, with companies that had sustainable practices—such as efficient resource management, ethical labour practices, and transparent corporate governance reducing their financial risks and thus receiving better ratings from credit agencies.

Razak et al. (2023) also found a strong connection between ESG and credit ratings, particularly in countries with high sustainability performance, such as those in Scandinavia and Western Europe. They gathered the data from Refinitiv database and then regression model was used to analyse the effects on corporate creditworthiness measured by credit default swap (CDS) spreads. Their study highlighted that ESG factors, including transparency in governance and proactive environmental policies, were key drivers of a company's creditworthiness in these regions. Conversely, in countries with weaker regulatory enforcement of ESG practices, such as some emerging markets, the impact of ESG on credit ratings was weaker, highlighting the importance of regional context in understanding the ESG-credit rating relationship.

Dandaro and Lima (2023) focused on Latin America, where the integration of ESG into financial markets is still in its infancy. Despite the challenges, their research demonstrated that companies with higher ESG scores were able to secure better financing conditions, lower credit spreads, and improved relationships with investors, particularly those focused on long-term sustainability. This underscores the idea that ESG performance not only influences credit ratings but also determines a company's access to capital and investment opportunities.

VARIATION ACROSS ESG DIMENSIONS

The impact of ESG on credit ratings is not uniform across all three dimensions— Environmental, Social, and Governance. Existing studies indicate that certain ESG dimensions, such as governance and social factors, tend to have a more direct and pronounced impact on credit ratings compared to environmental factors. Kim & Li

(2021) demonstrated that in sectors where governance practices are critical, such as financial services and technology, strong governance can significantly enhance credit ratings. Companies with independent boards, transparent reporting, and robust risk management frameworks tend to be viewed more favourably by credit rating agencies. Governance- focused practices reduce operational and financial risks, making companies appear more reliable in meeting their debt obligations.

On the other hand, social factors, such as labour practices, employee relations, and community engagement, also influence credit ratings, especially for firms that are highly dependent on human capital and public perception. Niedziółka (2023) found that companies in the retail and hospitality industries, which are more exposed to public scrutiny, saw better credit ratings when they invested in employee welfare, diversity, and community engagement. The social pillar of ESG is increasingly becoming important in sectors where reputational risk plays a critical role in long-term profitability. Companies that embrace social responsibility are not only more likely to attract consumer loyalty but also foster stronger relationships with stakeholders, which directly impacts their financial stability.

In contrast, environmental factors tend to have a more gradual impact on credit ratings. Tian & Tian (2022) explored how environmental sustainability influences credit ratings in industries like energy and manufacturing. They found that while environmental factors such as carbon emissions and energy consumption increasingly affect creditworthiness, these impacts are more pronounced over the long term. For instance, companies that transition towards renewable energy sources or improve their environmental practices may experience an initial capital outlay but, in the long run, benefit from reduced operational costs, improved public perception, and lower regulatory risks, leading to better credit ratings.

EMERGING INTEGRATION OF ESG IN CREDIT RATING METHODOLOGIES

The integration of ESG metrics into traditional credit rating methodologies has been a key focus for credit rating agencies (CRAs). Kiesel & Lücke (2019) highlighted that major rating agencies, such as Moody's, Standard & Poor's, and Fitch, have started incorporating ESG factors into their credit risk models. This move reflects a broader recognition that traditional financial metrics alone may not fully capture the long-term risks posed by unsustainable practices, and ESG metrics provide crucial additional data that help assess the potential for future risks. However, these agencies face significant challenges in standardizing ESG data due to the lack of consistent frameworks for measuring ESG factors across sectors.

Berg et al. (2019) documented the divergence in ESG rating methodologies between different rating agencies, which has led to inconsistencies in ESG evaluations. This variation is problematic because investors and credit rating agencies are often unable to compare ESG scores across firms, making it difficult to integrate these metrics into financial decision-making. For example, one rating agency may assign a high ESG score based on governance practices, while another may emphasize environmental metrics, leading to conflicting assessments of a company's creditworthiness. Berg et al. (2019) argue that greater standardization and transparency in ESG ratings are essential for ensuring that these ratings are effectively integrated into credit risk models. Without a unified methodology, ESG data may remain a peripheral consideration in credit risk assessments rather than a central, reliable factor.

Despite these challenges, the trend towards incorporating ESG data into credit ratings is gaining momentum. Barth et al. (2022) noted that ESG-related risks are increasingly being factored into corporate credit spreads, particularly for firms in high-risk sectors such as oil and gas. As investors begin to view companies with strong ESG practices as less risky, these companies are rewarded with lower borrowing costs, indicating the growing importance of ESG in financial markets.

REGIONAL AND CONTEXTUAL VARIATIONS

The influence of ESG on credit ratings is not the same across all regions and markets. Research by Dorfleitner et al. (2020) and Srivisal et al. (2021) highlights significant regional variations in how ESG performance influences credit ratings. In Europe, ESG factors are deeply integrated into financial systems due to stringent regulations and strong sustainability reporting standards. For example, in countries like Norway and Sweden, where sustainability is prioritized in both business practices and government policy, firms with higher ESG scores are typically awarded better credit ratings.

In North America, however, the integration of ESG factors into credit risk assessment is less mature. While major credit rating agencies have started to incorporate ESG data, the influence of these factors on credit ratings is still evolving. Srivisal et al. (2021) found that in countries like the United States, the focus is still on financial performance, with ESG playing a secondary role. This reflects the broader regulatory environment, where sustainability reporting is not yet mandatory for all companies, and where stakeholders—particularly institutional investors—are still in the early stages of incorporating ESG data into investment decisions.

Emerging markets, such as India and parts of Southeast Asia, present unique challenges, and opportunities for integrating ESG into credit ratings. In India, regulatory frameworks are still developing, and while there is growing pressure for companies to adopt sustainable practices, the influence of ESG on credit ratings remains limited. As India's regulatory environment strengthens, particularly with the implementation of the National Action Plan on Climate Change, the impact of ESG on credit ratings is likely to increase. This makes India a critical case study for understanding the evolution of ESG factors in credit risk models in emerging economies.

India, with its ambitious commitment to achieving the SDGs by 2030, is driving businesses toward a stronger ESG-focused initiative and policies. As per estimates of NITI AYOG India needs \$2.64 trillion to meet its SDG targets, making it imperative to link ESG performance with access to credit and sustainable finance. Currently, businesses with strong ESG practices attract 10-20% lower capital costs globally, yet in India, this alignment remains underdeveloped. Establishing a clear correlation between ESG and creditworthiness can accelerate investment flows, improve credit access, and position businesses as key enablers of India's sustainable growth agenda. Thus, such research work is crucial in understanding the dynamics of the markets in this domain.

CRISIL'S ESG METHODOLOGY

CRISIL, a leading credit rating agency in India, offers a robust ESG evaluation methodology that is sector-specific and designed to assess the sustainability practices of companies across different industries. CRISIL's methodology prioritizes the most relevant ESG factors for each industry, acknowledging that what matters most for a technology company may differ from what matters for a manufacturing firm. For instance, carbon emissions and waste management are heavily weighted in industries like manufacturing and energy, while governance factors such as board independence and risk management practices are emphasized for financial services firms.

CRISIL's ESG scoring system integrates data from company disclosures, third-party databases, and regulatory filings. This comprehensive approach ensures that both quantitative factors (such as carbon emissions, energy consumption, and waste management) and qualitative factors (such as governance practices and labour relations) are considered when assessing a company's overall ESG performance. The final ESG score is then used to assess the company's creditworthiness, with companies demonstrating higher ESG performance typically receiving higher credit ratings.

However, CRISIL's methodology is not without challenges. Data availability and the subjective nature of some qualitative metrics, such as governance practices, can make ESG evaluations difficult. Additionally, the evolving nature of sustainability regulations means that ESG standards are constantly changing, which presents challenges in ensuring that the methodology remains up-to-date and relevant.

CRISIL'S CREDIT RATING METHODOLOGY

The CRISIL credit rating process is a comprehensive methodology used to assess the **creditworthiness** of **entities** and their **debt instruments**. The process begins with the receipt of relevant information from the issuer, which includes financial statements, management details, business models, industry trends, and other relevant data. CRISIL then performs an in-depth analysis of the issuer's financial health, operational efficiency, market position, and industry dynamics. This involves examining both qualitative and quantitative factors, including revenue generation, profitability, risk management practices, and economic conditions that could impact the entity. The agency also evaluates the entity's ability to meet its financial obligations over the short and long term. After the analysis, CRISIL assigns a rating based on its assessment, which reflects the entity's credit risk.

Once the rating is assigned, CRISIL monitors the issuer's performance on an ongoing basis. This involves tracking any significant changes in the issuer's financials, business environment, or industry conditions that might affect its ability to honor debt obligations. If there are material changes, CRISIL may revise the rating to reflect the updated risk profile. The final ratings are publicly disclosed and made available to investors, helping them make informed decisions regarding credit risk. CRISIL also periodically reviews ratings, ensuring they remain accurate and up-to-date with market conditions. Ratings are updated at least annually, though they can be revised more frequently if the issuer undergoes significant financial or operational changes.

IDENTIFIED GAPS IN RESEARCH

Despite significant advancements in ESG research, several gaps remain:

1. Divergence in ESG Rating Standards

Despite the increasing recognition of ESG factors in credit rating models, the lack of standardization in ESG rating methodologies remains a significant challenge. This inconsistency across rating agencies and data providers makes it difficult to compare ESG scores and incorporate them effectively into credit risk models.

2. Underexplored Regional Dynamics

While regional variations have been noted, there is limited research on how

specific cultural contexts, regulatory environments, and market conditions influence the ESG-credit rating relationship. Understanding how local governance structures, cultural norms, and regulatory environments shape ESG integration into credit assessments is crucial for developing a global understanding of ESG's role in credit risk.

3. Limited Focus on Sector-Specific Impacts

Much of the research has focused on firm-level ESG performance, with insufficient emphasis on how industry-specific factors shape the impact of ESG on credit ratings.

4. Temporal Dynamics of ESG Integration

The evolving nature of ESG integration into credit ratings requires further research to understand how the role of ESG in credit assessments changes over time, particularly in response to changing regulations and investor expectations.

JUSTIFICATION FOR THE STUDY'S RELEVANCE

The relationship between ESG performance and credit ratings is of growing importance for investors, financial analysts, policymakers, and companies themselves. As the **global financial system** increasingly **recognizes the value of sustainable and responsible business practices**, it is crucial to understand how ESG factors influence creditworthiness. This study directly addresses several gaps in the existing literature, providing important insights that are particularly relevant in the context of India and other emerging markets. Below are the key contributions that this research makes:

1. Addressing Divergence in ESG Ratings

A significant challenge in the existing literature is the lack of standardization in ESG ratings. As highlighted by Berg et al. (2019), ESG ratings are not consistent across different providers, making it difficult to compare ratings and integrate them into credit risk models. The divergence in methodologies, including the weightings of various ESG dimensions (e.g., governance vs. environmental practices), leads to inconsistencies in how companies are assessed. Some rating agencies focus more on governance, while others prioritize environmental or social factors. These inconsistencies create challenges for investors and credit rating agencies, as they rely on uniform, reliable data to make financial decisions.

This study uses **CRISIL's ESG methodology**, which provides a sector-specific, standardized framework for evaluating ESG performance. By applying this methodology to Indian companies, the study contributes to the growing body of research on ESG integration in credit ratings, offering a more uniform and transparent approach. CRISIL's comprehensive and data-driven approach enhances the reliability of ESG ratings, ensuring they are applicable for creditworthiness assessments, while also offering greater comparability across companies and sectors. This addresses a key gap in existing research, where ESG ratings inconsistency across providers has hindered the integration of ESG into credit risk models.

2. Exploring Regional Dynamics

While numerous studies examine the ESG-credit rating relationship in developed markets, there is limited research focusing on **emerging economies**, particularly in **Asia** and **India**. The regional differences in ESG adoption, regulatory frameworks, and market conditions significantly impact the influence of ESG on credit ratings. In developed markets, robust regulatory frameworks, greater awareness of sustainability, and stronger investor demand for ESG-compliant companies have made ESG integration into credit assessments more seamless. However, in emerging markets, especially those in Southeast Asia and South Asia, the adoption of ESG practices is more variable, and credit rating agencies' ability to evaluate ESG factors consistently is often less advanced.

India, as one of the fastest-growing economies in the world, is a critical case for understanding how ESG practices are integrated into credit assessments. Although India is witnessing a growing shift towards sustainability, with more companies adopting ESG practices, its regulatory framework is still evolving, and ESG reporting standards are not as stringent as those in developed markets. Srivisal et al. (2021) highlight the disparities in how ESG is incorporated into credit ratings in Asian markets, particularly where regulatory frameworks are still developing. The study will address these regional dynamics by focusing specifically on Indian companies, analysing how local regulatory environments, cultural norms, and market practices shape the relationship between ESG performance and credit ratings.

In this context, the study provides crucial insights into how ESG factors are integrated into credit assessments in an emerging market, where sustainability regulations are still maturing but increasing in importance. By focusing on India, the research offers an understanding of the challenges and opportunities companies face in aligning their practices with global ESG standards while considering local regulatory conditions. This study also has the potential to influence policy by providing evidence on the importance of developing a more robust ESG reporting and regulatory framework to attract investment and improve credit ratings in India.

3. Filling Sector-Specific Gaps

Most studies examining the relationship between ESG and credit ratings focus on firm-level analysis, with limited attention paid to sector-specific dynamics. However, the impact of ESG factors on creditworthiness is not uniform across all industries. Different sectors face unique challenges and opportunities when it comes to ESG performance. For example, the **energy sector** is primarily concerned with environmental sustainability and carbon emissions, while the **financial sector** is more focused on governance practices, including transparency, risk management, and regulatory compliance. Similarly, **consumer-facing industries** may be more affected by social factors, such as labour practices, customer relations, and community engagement.

Existing research often overlooks these sectoral nuances, which are critical for understanding how ESG factors specifically impact credit ratings across industries. This study addresses this gap by using **CRISIL's sector-specific ESG methodology**, which tailors the assessment of ESG performance based on the materiality of factors within each sector. By focusing on companies in diverse industries, the study examines how environmental, social, and governance factors interact differently within various sectors and how these factors ultimately affect their credit ratings.

For instance, in the **manufacturing sector**, which is heavily scrutinized for its environmental impact, companies with strong environmental practices—such as energy efficiency, waste reduction, and responsible resource management—are likely to achieve better credit ratings due to their lower exposure to environmental risks and regulatory penalties. Conversely, in the **technology sector**, governance factors such as data privacy, cybersecurity, and board independence play a more significant role in shaping credit ratings. By addressing sector-specific differences, the study provides a deeper understanding of how ESG factors influence creditworthiness in various industries, thereby contributing to more nuanced and actionable insights for investors and credit rating agencies.

4. Providing Temporal Insights into ESG Integration

While existing studies provide valuable insights into the relationship between ESG and credit ratings, many of them offer static snapshots of the data, focusing on specific time points or cross-sectional analyses. However, as ESG practices evolve over time—due to changes in regulations, investor sentiment, and market dynamics—the impact of ESG on credit ratings may also change. As sustainability reporting and regulations become more stringent, the weight of ESG factors in credit rating assessments is likely to increase, influencing long-term creditworthiness and investment behaviour.

This study adopts a longitudinal approach, examining how ESG factors have influenced credit ratings over time. By using Spearman's rank correlation, the study not only identifies the current strength and direction of the relationship between ESG ratings and credit ratings but also tracks how this relationship evolves. This temporal analysis provides valuable insights into the dynamic nature of ESG integration into credit assessments, capturing the shifting importance of ESG factors in response to changing market and regulatory conditions. This approach addresses the gap in existing research, where the evolving nature of ESG integration into financial decision-making remains largely unexplored.

Moreover, by analysing data from 35 companies across different sectors, this study can observe the temporal variations in how companies' ESG performance impacts their credit ratings, providing actionable insights for both investors and policymakers. Understanding how the influence of ESG on credit ratings shifts over time is crucial for stakeholders looking to integrate sustainability factors into long-term investment strategies and credit risk assessments.

This study makes significant contributions to the growing body of research on ESG and credit ratings. By addressing the key gaps identified in the literature—such as the divergence in ESG rating standards, underexplored regional dynamics, limited sector- specific analysis, and the evolving temporal nature of ESG integration—this research provides much-needed clarity on how ESG factors influence credit ratings, especially in the Indian context.

The study's focus on CRISIL's ESG methodology offers a transparent, standardized approach to evaluating ESG performance, while its sector-specific focus allows for a more nuanced understanding of how different industries prioritize and are affected by ESG factors. By providing insights into the **regional context** of emerging markets like India, the study also highlights the unique challenges and opportunities of integrating ESG into credit risk models in these regions, paving the way for more effective policy development and financial practices.

Through its longitudinal approach, this research provides valuable temporal insights into how ESG performance influences creditworthiness over time, offering both theoretical and practical contributions to the fields of sustainable finance and credit risk assessment

MODEL AND FRAMEWORK

This study aims to explore the relationship between **ESG (Environmental, Social, and Governance) ratings** and **credit ratings** of companies. ESG ratings represent a company's sustainability and ethical practices, while credit ratings reflect its ability to repay debts. We propose the following conceptual framework:

The hypothesis for this study assumes that companies with better ESG practices will likely have better credit ratings, indicating a more stable financial position.

We chose Spearman's Rank Correlation to analyse the relationship between ESG and credit ratings, as both are ordinal variables. Spearman's Rank Correlation is a statistical measure of the strength and direction of the monotonic relationship between two continuous variables. Therefore, these attributes are ranked or put in the order of their preference. It is denoted by the symbol "rho" (ρ) and can take values between -1 to +1. A positive value of rho indicates that there exists a positive relationship between the two variables, while a negative value of rho indicates a negative relationship. A rho value of 0 indicates no association between the two variables.

DATA COLLECTION, SAMPLING, AND STATISTICAL METHODOLOGY

Data Collection

Data was sourced from **CRISIL**, a leading global analytics company providing credit ratings, research, and risk and policy advisory. CRISIL's ESG ratings reflect the sustainability performance of companies, while their credit ratings assess the companies' ability to meet financial obligations.

CRISIL ESG Rating: CRISIL's ESG rating assesses a company's performance across Environmental, Social, and Governance criteria. It evaluates factors like environmental impact, social responsibility, and governance practices, with higher ratings indicating better management of these factors. The ESG rating helps investors understand a company's sustainability efforts and long-term risk profile.

CRISIL Credit Rating: CRISIL's credit rating evaluates a company's ability to meet debt obligations, ranging from **AAA** (highest quality) to **D** (default). It is based on financial health, profitability, liquidity, and economic conditions, with higher ratings indicating lower credit risk.

Table 1:

SR NO	Company Name	ESG Rating	ESG Ranks	CRISIL Rating (long-term instrument)	Credit rating Rank
1	Asian Paints Limited	66	1	CRISIL AAA	1.00
2	Marico Limited	64.00	2.00	CRISIL AAA	1.00
3	Tata Motors Limited	63.00	4.00	CRISIL AA+	2.00
4	Mahindra and Mahindra Limited	63.00	4.00	CRISIL AAA	1.00
5	Hero MotoCorp Limited	63.00	4.00	CRISIL A+	3.00
6	Aditya Birla Fashion & Retail Limited	62	6	CRISIL AA+ *-ve	2.00
7	Maruti Suzuki India Limited	61.00	7.50	CRISIL AAA	1.00
8	Kansai Nerolac Paints Limited	61	7.50	CRISIL AAA	1.00
9	Britannia Industries Limited	60.00	10.00	CRISIL AAA	1.00
10	Bajaj Auto Limited	60.00	10.00	CRISIL AAA	1.00
11	ABB India Limited	60	10.00	CRISIL AAA	1.00
12	Balrampur Chini Mills Limited	59	12	CRISIL AA+	2.00
13	Shree Cements	58.00	14.00	CRISIL AAA	1.00
14	Alembic Pharmaceuticals Limited	58.00	14.00	CRISIL AA+	2.00
15	Bliss GVS Pharma Limited	58.00	14.00	CRISIL BBB+	4.00
16	Ultratech Cement	57.00	18	CRISIL AAA	1.00
17	Alkem Laboratories	57.00	18	CRISIL AA+	2.00

SR NO	Company Name	ESG Rating	ESG Ranks	CRISIL Rating (long-term instrument)	Credit rating Rank
	Limited				
18	Balkrishna Industries Limited	57	18	CRISIL AA+	2.00
19	Century Enka Limited	57	18	CRISIL A+	3.00
20	Cera Sanitaryware Limited	57	18	CRISIL AA	2.00
21	Dabur India Limited	56.00	22.00	CRISIL AAA	1.00
22	Butterfly Gandhimathi Appliances Limited	56.00	22.00	CRISIL AA	2.00
23	Crompton Greaves Consumer Electricals Limited	56.00	22.00	CRISIL AA+	2.00
24	Nuvoco Vistas	55.00	25.00	CRISIL AA	2.00
25	Hindustan Zinc Limited	55	25.00	CRISIL AAA	1.00
26	Campus Activewear Limited	55.00	25.00	CRISIL A+	3.00
27	Advanced Enzyme Technologies Limited	54.00	27.00	CRISIL A+	3.00
28	ACC	53.00	29.00	CRISIL AAA	1.00
29	Varun Beverages Limited	53.00	29.00	CRISIL AA	2.00
30	Aarti Drugs Limited	53.00	29.00	CRISIL AA-	2.00
31	Agro Tech Foods Limited	52.00	31.00	CRISIL A *	3.00
32	Ambuja Cements	51.00	32.50	CRISIL AAA	1.00
33	Vedanta	51	32.50	CRISIL AA *	2.00
34	Star Cement	50.00	34.00	CRISIL AA	2.00
35	ADF Foods Limited	49.00	35.00	CRISIL A	3.00

The variables included in the dataset are:

- **ESG Rating:** A score reflecting the company's environmental, social, and governance practices (ranging from 49 to 66)
- **ESG Rank:** Rank based on the ESG score, with lower ranks indicating better sustainability
- **Credit Rating Rank:** Rank based on creditworthiness, with lower ranks indicating better credit ratings

SAMPLING

A sample of 35 companies was selected based on the availability of relevant ESG and credit rating data. While the sample is not fully representative of all companies, it provides insights into large publicly listed firms across a range of industries.

STATISTICAL METHODOLOGY

Rationale for Choosing Spearman's Rank Correlation:

We selected **Spearman's Rank Correlation** to analyse the relationship between **ESG ratings** and **credit ratings** because both are **ordinal variables** (ranked data) and may not follow a linear pattern. Spearman's method is ideal for assessing monotonic relationships, where an increase in one variable tends to correlate with an increase in another, without assuming equal intervals between ranks.

Spearman's Rank Correlation is the most suitable method for assessing the relationship between

ESG and credit ratings because it:

- **Ordinal Data:** Both ESG and credit ratings are ranked, not continuous, making Spearman appropriate.
- **Monotonic Relationship:** We hypothesize that better ESG performance generally correlates with better credit ratings, even if the rate of change differs.
- **Non-parametric:** Spearman does not require the data to follow a normal distribution, making it suitable for the nature of our dataset.

By using this methodology, we can assess the strength and direction of the relationship between sustainability performance and financial stability across the sample of companies.

RANKING METHODOLOGY

Ranking Based on Categories:

- The companies were grouped into categories based on their credit rating tiers. These tiers reflect the general level of creditworthiness:
  - High Credit Rating: Companies with the strongest credit ratings (Rank 1).
  - Medium Credit Rating: Companies with moderate credit ratings (Rank 2).
  - Low Credit Rating: Companies with weaker credit ratings (Rank 3).
- This approach categorizes companies into ESG tiers, providing a more structured ranking system that reduces individual value fluctuations and focuses on overall categories.

Rating Scale	
Credit rating	**Rank**
AAA	1
AA	2
A	3
BBB	4
BB	5
B	6
C	7
D	8

Average Ranks for Tied Values:

- In cases where two or more companies had the same ESG score or credit rating, average ranks were assigned. For example, if two companies had the same ESG score and were ranked 1st and 2nd, both would receive the average rank:

Average Rank=1+2/2=1.5

This ensures that companies with identical scores are treated fairly and equitably

RESULTS AND INTERPRETATION

Spearman Rank Correlation Coefficient:

The Spearman Rank correlation coefficient for ESG Rank and Credit Rating Rank is

ρ = 0.2737. This indicates a **weak positive correlation** between the two variables.

R script for find rho value & p value

```r
# Load necessary library
install.packages("ggplot2") # Install ggplot2 if not already installed
library(ggplot2)

# Create the data
data <- data.frame(
  Company = c(
    "Asian Paints Limited", "Marico Limited", "Hero Motocorp Limited", "Tata Motors Limited",
    "Mahindra and Mahindra Limited", "Aditya Birla Fashion & Retail Limited",
    "Maruti Suzuki India Limited", "Kansai Nerolac Paints Limited", "Bajaj Auto Limited",
    "ABB India Limited", "Britannia Industries Limited", "Balrampur Chini Mills Limited",
    "Shree Cements", "Alembic Pharmaceuticals Limited", "Bliss GVS Pharma Limited",
    "Balkrishna Industries Limited", "Century Enka Limited", "Ultratech Cement",
    "Alkem Laboratories Limited", "Cera Sanitaryware Limited", "Dabur India Limited",
    "Butterfly Gandhimathi Appliances Limited", "Crompton Greaves Consumer Electricals Limited",
    "Nuvoco Vistas", "Hindustan Zinc Limited", "Campus Activewear Limited",
    "Advanced Enzyme Technologies Limited", "ACC", "Varun Beverages Limited",
    "Aarti Drugs Limited", "Agro Tech Foods Limited", "Ambuja Cements", "Vedanta",
    "Star Cement", "ADF Foods Limited"
  ),
  ESG_Rank = c(
    1, 2, 4, 4, 4, 6, 7.5, 7.5, 10, 10, 10, 12, 14, 14, 14, 18, 18, 18,
    18, 18, 22, 22, 22, 25, 25, 25, 27, 29, 29, 29, 31, 32.5, 32.5, 34, 35
  ),
  Credit_Score_Rank = c(
    1, 1, 3, 2, 1, 2, 1, 1, 1, 1, 1, 2, 1, 2, 4, 2, 3, 1, 2, 2, 1, 2, 2,
    2, 1, 3, 1, 1, 2, 2, 3, 1, 2, 2, 3
  )
)

# Perform Spearman correlation test
correlation_test <- cor.test(data$ESG_Rank, data$Credit_Score_Rank, method = "spearman")

# Print Spearman correlation results
cat("Spearman's Rank Correlation Coefficient (rho):", correlation_test$estimate, "\n")
cat("p-value:", correlation_test$p.value, "\n")

# Create the scatter plot
ggplot(data, aes(x = ESG_Rank, y = Credit_Score_Rank)) +
  geom_point(color = "blue", size = 3) +  # Points for data
  geom_smooth(method = "lm", color = "red", se = FALSE, linetype = "dashed") +  # Trend line
  labs(
    title = "Scatter Plot of ESG Rank vs Credit Score Rank",
    x = "ESG Rank",
    y = "Credit Score Rank"
  ) +
  theme_minimal() +  # Minimal theme for clean visualization
  theme(
    plot.title = element_text(hjust = 0.5, size = 14, face = "bold"),
    axis.title = element_text(size = 12)
  )
```

Figure 1: *R script*

Visualizing ESG Rank and Credit Score Rank

Figure 2: *ESG Rank and Credit Score Rank*

Interpretation

- The positive correlation suggests that, in general, companies with higher ESG ratings tend to have slightly better credit ratings. However, the relationship is weak, implying that ESG ratings are just one of many factors influencing creditworthiness.

- A correlation of **0.2737** indicates that while sustainability practices may influence credit ratings, they do not have a strong enough effect to be the primary determinant of creditworthiness.
- This finding suggests that other factors—such as financial performance, market conditions, and company operations—likely play a more significant role in determining credit ratings.

DISCUSSION AND IMPLICATIONS

The study's findings reveal a weak but positive correlation ($\rho = 0.2737$) between ESG ratings and credit ratings, suggesting that sustainability performance contributes marginally to creditworthiness but is not a standalone driver. This highlights the imperative for companies to move beyond superficial ESG disclosures and embed sustainability deeply within their financial and strategic operations. While ESG initiatives may promote long-term resilience, they must be paired with strong financial fundamentals to effectively influence credit assessments. From a policy and developmental standpoint, the findings intersect with Sustainable Development Goals—particularly SDG 8 (Decent Work and Economic Growth) and SDG 12 (Responsible Consumption and Production)—affirming that responsible corporate behavior can support stable economic growth if combined with sound fiscal management. For investors, ESG ratings offer valuable insights into a company's ethical and environmental orientation, but should be considered alongside traditional metrics when evaluating risk and long-term viability. Meanwhile, companies should treat ESG practices as an integrated part of business strategy—not just for compliance or brand equity but as a lever for enhancing credit profiles and operational robustness. Regulatory bodies such as RBI and SEBI can accelerate this transition by incentivizing transparent ESG disclosures and incorporating sustainability performance into financial market assessments—ultimately driving a more secure and forward-looking investment landscape.

CONCLUSION

Although the observed correlation between ESG ratings and credit ratings is modest ($\rho = 0.2737$), the findings underscore ESG's emerging relevance in financial evaluation. To enhance this relationship, companies must embed sustainability practices within their core strategic and financial frameworks. Proactive steps by regulatory bodies such as the Reserve Bank of India (RBI) and the Securities and Exchange Board of India (SEBI) could accelerate this integration by assigning greater weight to ESG performance during credit assessments.

Such regulatory emphasis can foster a green economy, improve data comparability, and ultimately strengthen the resilience of financial markets. By institutionalizing ESG within credit frameworks, India can move toward a future where sustainability and financial stability are mutually reinforcing—laying the foundation for long-term investor confidence and robust economic growth.

REFERENCES

Barth, F., Hübel, B., & Scholz, H. (2022). ESG and corporate credit spreads. *The Journal of Risk Finance*, *23*(2), 169–190. https://doi.org/10.1108/jrf-03-2021-0045

Berg, F., Kölbel, J., & Rigobón, R. (2019). Aggregate confusion: The divergence of ESG ratings. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3438533

Bhattacharya, S., & Sharma, D. (2019). Do environment, social and governance performance impact credit ratings: A study from India. *International Journal of Ethics and Systems*, *35*(3), 466–484. https://doi.org/10.1108/ijoes-09-2018-0130

Dandaro, F., & Lima, F. (2023). ESG performance and credit risk in Latin America. *Sociedade, Contabilidade e Gestão*, *17*(3), 40–56. https://doi.org/10.21446/scg_ufrj.v0i0.53433

Devalle, A., Fiandrino, S., & Cantino, V. (2017). The linkage between ESG performance and credit ratings: A firm-level perspective analysis. *International Journal of Business and Management*, *12*(9), 53–66. https://doi.org/10.5539/ijbm.v12n9p53

Dorfleitner, G., Grebler, J., & Utz, S. (2020). The impact of corporate social and environmental performance on credit rating prediction: North America versus Europe. *The Journal of Risk*. https://doi.org/10.21314/jor.2020.437

Kiesel, F., & Lücke, F. (2019). ESG in credit ratings and the impact on financial markets. *Financial Markets, Institutions & Instruments*, *28*(3), 263–290. https://doi.org/10.1111/fmii.12114

Kim, S., & Li, Z. (2021). Understanding the impact of ESG practices in corporate finance. *Sustainability*, *13*(7), 3746. https://doi.org/10.3390/su13073746

Niedziółka, P. (2023). Factors of ESG ratings assigned to commercial banks – The cultural and credit risk dimensions. *Argumenta Oeconomica*, *2023*(2), 33–63. https://doi.org/10.15611/aoe.2023.2.02

Razak, L., Ibrahim, M., & Ng, A. (2023). Environment, social and governance (ESG) performance and CDS spreads: The role of country sustainability. *The Journal of Risk Finance*, *24*(5), 585–613. https://doi.org/10.1108/jrf-10-2022-0278

Srivisal, N., Jamprasert, N., Sthienchoak, J., & Kuwalairat, P. (2021). Environmental, social and governance and creditworthiness: Two contrary evidence from major Asian markets. *Asian Academy of Management Journal of Accounting and Finance*, *17*(2), 161–187. https://doi.org/10.21315/aamjaf2021.17.2.7

Tian, H., & Tian, G. (2022). Corporate sustainability and trade credit financing: Evidence from environmental, social, and governance ratings. *Corporate Social Responsibility and Environmental Management*, *29*(5), 1896–1908. https://doi.org/10.1002/csr.2335