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Does a Change in ESG Rating Affect the Credit Rating?

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Master in Finance

Supervisor:

Joaquim Paulo Viegas Ferreira de Carvalho (PhD), Invited Assistant Professor,
Department of Finance, Iscte Business School

January, 2024



**BUSINESS
SCHOOL**

Department of Finance

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Resumo

A crescente consciencialização para as alterações climáticas tem suscitado uma procura por investimentos alinhados com esta nova realidade. Contudo, a busca por ativos "verdes" não é o único critério considerado pelos investidores, que continuam a priorizar rendimento e segurança nos seus portfólios. Neste contexto, torna-se crucial compreender o impacto das classificações ambientais, sociais e de governança, conhecidas como *Environmental, Social and Governance* (ESG), no âmbito financeiro. Em particular, é relevante avaliar como o rating ESG influencia os ratings de crédito, um dos indicadores mais valorizados pelos investidores na análise de ativos financeiros.

O presente estudo tem como objetivo principal compreender o impacto da avaliação dos parâmetros ESG a determinação dos *Credit Ratings*. Para atingir este propósito, foram conduzidas duas análises: uma de correlação, visando avaliar o impacto direto do rating ESG no *Credit Rating*, e outra de regressão, com o intuito de examinar a significância desta variável na construção da função. No decurso da investigação, foram analisados *papers* existentes sobre a temática, e 70 empresas norte-americanas foram estudadas ao longo de um período de cinco anos. Estas empresas foram seleccionadas com base na sua cotação e avaliadas em ambos os ratings. Todos os dados foram recolhidos através do fornecedor de dados Refinitiv.

Palavras-Chave: ESG, Normas de Sustentabilidade, Impacto da Sustentabilidade, Avaliação de Crédito, Fornecedores de Avaliações.

JEL Classifications: C51, F64

Abstract

The growing awareness of climate change has led to an increased demand for investments aligned with this new reality. However, the pursuit of "green" assets is not the sole criterion considered by investors, who continue to prioritize yield and security in their portfolios. In this context, it becomes crucial to understand the impact of environmental, social, and governance (ESG) ratings on the financial landscape. Specifically, it is relevant to assess how the ESG rating influences credit ratings, a key indicator highly valued by investors when evaluating financial assets.

This study aims to comprehensively understand the impact of ESG parameter evaluations on the determination of Credit Ratings. To achieve this goal, two analyses were conducted: one focusing on correlation to assess the direct impact of the ESG rating on the Credit Rating and another employing regression to examine the significance of this variable in constructing the function. Throughout the investigation, existing literature on the subject was analyzed, and a sample of 70 American companies was studied over a five-year period. These companies were selected based on their listing and were evaluated in both ESG and Credit Ratings. All data were obtained from the data provider Refinitiv.

Keywords: ESG, Sustainability Standards, Sustainability Impact, Credit Rating, Rating Providers.

JEL Classifications: C51, F64

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Chapter 1: Introduction

1.1 Contextualization

In the landscape of investment decisions, the significance of Environmental, Social, and Governance (ESG) factors has witnessed a substantial rise since the early 2010s, reflecting a growing acknowledgment of their potential impact on the financial realm. This study aims to contribute to the ongoing discussion surrounding the intricate relationship among ESG considerations, credit ratings, and stock performance.

Additionally, the research seeks to extend existing literature by illuminating the nuanced financial benefits accrued by companies prioritizing ESG practices. Noteworthy studies conducted by the Chartered Financial Analyst (CFA) Institute emphasize that these financial advantages often arise from a perceived risk reduction, reflected in the dynamics of credit spreads. The decision of a company to invest in ESG initiatives not only strengthens its operational resilience but also bolsters its market position, thereby influencing future performance outlooks. The meticulous consideration of these factors during the rating process underscores the growing relevance of ESG considerations in contemporary financial decision-making.

In the context of long-term investment strategies, the discernment between short-term gains and the pursuit of enduring, sustainable growth highlights the evolving perspective of investors. There is a growing recognition of the value of enduring stability over immediate returns. This study aspires to contribute to this evolving discourse by providing a comprehensive and nuanced understanding of the implications of ESG integration for both companies and investors, recognizing the trade-off inherent in such considerations.

1.2 Motivations and Research Aim

This research is driven by the imperative to explore the potential correlation between credit ratings and Environmental, Social, and Governance (ESG) ratings, aiming to uncover the implications of integrating ESG factors into the assessment of corporate financial health. Furthermore, the study seeks to elucidate the broader impact of ESG integration on long-term investments, credit spreads, and stock performance, offering valuable insights for investors and financial practitioners. By addressing these objectives,

the research endeavors to contribute to the evolving understanding of the financial implications of ESG integration.

The primary objectives of this thesis are as follows: to rigorously examine the potential existence of a positive correlation between credit ratings and ESG ratings through a comprehensive Correlation Test; to assess the significance of integrating ESG ratings as a variable in the calculation of credit ratings, utilizing a meticulous Regression Test to understand its impact on the overall credit rating process; to investigate the influence of ESG ratings on stock prices in the event of a confirmed positive relationship, employing a correlation analysis similar to the one utilized in the first hypothesis; and to contribute to the existing body of knowledge on the financial benefits of ESG integration for companies, with a specific focus on the impact of ESG factors on long-term investments and the subsequent implications for credit spreads and stock performance.

1.3 Research Questions and Objectives

To achieve the aim mentioned above, the present research is going to answer the following hypotheses:

H1: Is there a significant positive correlation between credit ratings and ESG ratings?

H2: How does the integration of ESG ratings as a variable influence the computation of credit ratings?

The first hypothesis posits an expectation of a positive and statistically significant correlation between ESG ratings and credit ratings. This expectation is grounded in the belief that companies demonstrating robust ESG practices are more likely to be financially sustainable and responsible, establishing a positive relationship with their creditworthiness. Positive ESG performance is indicative of effective risk management, governance practices, and sustainable business models, factors that may manifest in elevated credit ratings.

The second hypothesis probes the importance of integrating ESG ratings as a variable in the calculation of credit ratings. This hypothesis originates from the acknowledgment that ESG factors can significantly impact a company's overall risk profile, performance, and reputation. By incorporating ESG ratings into the credit rating process, the objective is to attain a more comprehensive and nuanced understanding of a company's

creditworthiness. This integration acknowledges that traditional financial metrics alone may not capture all pertinent aspects of a company's risk and performance, and the inclusion of ESG considerations could furnish additional insights into its long-term viability.

1.4 Dissertation Structure

The primary objective of this thesis is to make a substantial contribution to the existing body of knowledge concerning the significance of Environmental, Social, and Governance (ESG) factors in the valuation process. Recognizing the complexity and evolving nature of this topic, a dissertation is chosen as the most suitable approach for this research. This enables a thorough and systematic investigation of the subject matter and its associated literature.

The thesis is structured into three key segments: Literature Review, Model and Conclusions. The literature review section provides a comprehensive overview of relevant findings from published papers related to the theme, serving as the groundwork for subsequent analysis. The model section conducts rigorous hypothesis testing, detailing the chosen variables and analytical framework used to assess the intricate relationship between ESG factors and the valuation process. The conclusions section serves as the thesis culmination, communicating test results with a nuanced interpretation and offering insightful recommendations based on research implications. These recommendations aim to provide practical guidance and suggest potential avenues for future exploration in the dynamic field of ESG factors and valuation.

Chapter 2: Literature Review

2.1 Literature Research

To scrutinize the research scope and address the proposed inquiries, an extensive literature review was undertaken, analyzing articles sourced from two prominent databases, specifically Elsevier and Scopus. These databases were selected for their accessibility to contemporary and high-quality scientific publications in the fields of business, management, and accounting. The research, conducted between October 2021 and January 2022, involved the systematic construction of various keyword combinations such as "ESG," "Sustainability Standards," "Sustainability Impact," "Credit Rating," and "Rating Providers." These keywords were methodically applied to the titles, abstracts, and full texts of publications within the chosen timeframe of 2015 to 2021, a period selected to manage the abundance of pertinent literature. The selection process considered only English and Portuguese documents, with a particular emphasis on studies occurring in Europe and the United States.

2.2. ESG State of Art

The CFA Institute webinar titled "Does it add value?" presented by Christopher Ailman in 2017, discusses how ESG factors have gained acceptance among investors and companies. Initially, addressing Environmental, Social, and Governance issues was viewed as a drain on company resources. However, as research on the topic has emerged, ESG is now recognized as a powerful tool for mitigating long-term risks (CFA Institute, 2021) and for leveraging their current results. The Principles for Responsible Investments, a fundamental framework for ESG investment, assert that investors and companies must understand the drivers of profits and revenues to identify potential material disruptions within a reasonable timeframe (CFA Institute, 2015).

The companies are now more aware of the impact ESG practices can bring to their reality and business (Halbritter et al., 2015) Companies focused on ESG matters have adopted two primary approaches to conducting business:

- **Exception-based approach:** This approach involves divesting from business areas with low ESG scores or significant risks associated with ESG issues.
- **Tilting approach:** This approach aims to make every aspect of the business as environmentally friendly as possible, such as by reducing CO2 emissions.

Furthermore, companies are disclosing sustainability data to investors through specific reports. To standardize this information disclosure, institutions like the Sustainability Accounting Standards Board (SASB) and CFA Institute are working on global standards that companies must adhere to, enabling comparisons with their peers.

Along with the consciousness of the companies, the investors are also more demanding about the ESG practices, taking those results into account in their investment process (Bahra et al., 2020). According to the CFA Global ESG Disclosure Standards for Investment Products (2021), the increasing prominence of ESG concerns is reflected in three types of investors:

- **Exclusionary Approaches:** These investors exclusively base their investments on ESG parameters. However, this investment profile is not ideal as it limits portfolio diversification.
- **Inclusion Strategies:** These investors incorporate both ESG and non-ESG assets in their portfolios. This profile is the most prevalent today, allowing for sustainable diversification without requiring additional active actions.
- **Active Ownership:** These investors actively engage in company meetings with shareholders to drive and support change. Examples of active ownership include proxy voting, shareholder resolutions, and management dialogue (Clark et al., 2015).

The examples are discussed by Clark et al. (2015). The main conclusions of their study are as follows:

- Approximately 90% of studies on the cost of capital indicate that sustainability standards lead to a reduction in the cost of capital for companies. This is attributed to sustainability factors significantly impacting a company's risk profile, performance potential, reputation, and subsequently, its financial performance. Regarding financial performance, these studies note a significantly lower probability of corporate credit default for firms with high ESG performance (Aslan et al., 2021). Conversely, there is also evidence of a positive impact of ESG on debt and derivative markets, including bonds (Jang et al., 2020), and credit default swaps (CDS) (Barth et al., 2020).
- Among the 51 studies reviewed, 45 (88%) demonstrate a positive correlation between sustainability and operational performance. Notably, governance and social factors, such as employee relationships and sound workforce practices,

were identified as having a significant impact on operational performance (Devalle et al., 2017).

- 80% of the 41 studies reviewed suggest that stock prices are positively influenced by robust sustainability practices, with evidence pointing to a positive correlation between sustainability and superior financial market performance. Some studies also report significant positive indicators of creditworthiness for companies that disclose ESG scores in their credit ratings (Bhattacharya, 2019).

In the same article, it is highlighted that a broader focus on stakeholders (including communities, suppliers, customers, and employees) alongside shareholders can lead to medium to longer-term competitive advantages. Effective management of sustainability issues necessitates a deep integration of these concerns into the organization's culture and values. To achieve these objectives, the company should prioritize responsibility at the board level, ideally with the involvement of the CEO. It should also establish clear, measurable sustainability goals, provide incentives for employees to innovate, and engage external auditors to assess progress (Clark et al., 2015).

The value of a company can be enhanced through eco-efficiency, which reduces resource consumption and leads to interest savings. The authors note that a 1% reduction in CO₂ emissions translates into savings of approximately \$0.5 million in interest expenses (CFA Institute, 2017).

In the present day, firms that incorporate sustainability into their profit maximization process and generate sustainable financial returns are considered commendable. When a company incorporates ESG parameters into its operations, it signals a holistic perspective on business. By considering the entire spectrum of factors, operational risks are mitigated since the company's focus extends beyond the present to encompass the future (S&P Global, n.d.).

2.3. Credit Rating

According to Dorfleitner, Grebler, and Utz (2019), there is a positive impact of corporate, social, and environmental performance on credit rating prediction in North American companies. This impact was measured to be more than 0.8% (Gregor et al., 2022).

Credit rating refers to a quantified assessment of a borrower's creditworthiness, both in general terms and regarding specific debt or financial obligations (S&P Global, n.d.). Generically, the determination of credit ratings takes into account the following factors:

- Payment history of the organization, including any missed payments or defaults.
- Current amount owed and the types of debt held.
- Cash flows and income at present.
- Market outlook for the company or organization.
- Any organizational issues that may hinder timely repayment of debts.

The S&P Guide (S&P Global, n.d.) indicates that credit ratings serve six types of entities/solutions:

- **Investors.** They utilize credit ratings to assess credit risk, compare different issuers and debt issues, and make informed investment decisions while managing their portfolios. Institutional investors, including pension funds, use credit ratings as an additional tool for credit analysis.
- **Intermediaries.** For example, investment bankers, employ credit ratings to evaluate and benchmark the relative credit risk of various debt issues. They also rely on credit ratings to set initial pricing for debt issues they structure and to determine interest rates.
- **Issuers.** They utilize credit ratings to communicate the relative credit quality of their debt issues, attracting a broader range of investors and estimating the interest rates for new debt offerings.
- **Businesses and financial institutions.** They use credit ratings to assess counterparty risk, which refers to the potential risk of a party not fulfilling its financial obligations.
- **Model-driven ratings.** They primarily rely on quantitative data, incorporating it into a mathematical model to evaluate aspects such as asset quality, funding, and profitability. These ratings primarily use public financial statements and regulatory filings.
- **Analyst-driven ratings.** They gather information from published reports and conduct interviews and discussions with the issuer's management. Analysts then apply their analytical judgment to assess the entity's financial condition, operating performance, policies, and risk management strategies.

In this study, we have selected S&P Global as the rating provider. S&P Global is globally recognized as a leading provider of credit ratings, benchmarks, analytics, and workflow solutions in the capital, commodity, and automotive markets. Their

comprehensive range of offerings assists organizations in navigating the economic landscape and planning for the future (S&P Global, n.d.).

At S&P Global Ratings, their analyst-driven credit ratings, research, and sustainable finance opinions offer valuable insights to market participants, enabling them to identify opportunities and make well-informed decisions. Through their services, S&P Global supports growth across diverse organizations, including businesses, governments, and institutions (S&P Global, n.d.).

The selection of S&P Global Ratings for this study is based on its consistent rating performance, as demonstrated by default and credit rating transition studies. These studies have established S&P Global Ratings as reliable benchmarks for assessing relative credit risk (S&P Global, n.d.).

2.4. ESG Rating

The 4th and 5th factors of the Credit Rating definition, as discussed in section 2.2, are directly linked to ESG parameters. Currently, ESG parameters are gaining increasing attention from investors, and controversies surrounding ESG matters directly impact a company's image (Kim, 2022).

2.4.1 Difference between Credit Rating Providers

Considering this growing awareness of the ESG impact, investors are now considering ESG ratings as a basis for evaluation. However, according to Brandon, Krueger, and Schmidt (2021), there is a challenge in the variation of valuations assigned to the same company by different rating providers (Brandon et al., 2021).

Each rating provider employs a unique methodology for determining company-specific ratings, leading to variations in ESG ratings. Investors must choose a provider that aligns with their ESG preferences to ensure that their portfolios reflect their ESG views (Li and Polychronopoulos, 2020). The authors compare the performance of two portfolios based on different rating providers, resulting in significant performance dispersion and low correlation of returns. They highlight that different rating providers may rank the same company highly or poorly based on their ESG score calculations.

Brandon, Krueger, and Schmidt (2021) examine ratings from seven different data providers for a sample of firms in the S&P 500 Index between 2010 and 2017. They confirm that higher disagreement among ratings is associated with higher returns and

profitability. This can be attributed to the controversies surrounding these companies. The authors explain that responsible investments tend to involve companies with lower disagreement among ratings (Brandon et al., 2021).

2.4.2. ESG Rating Provider

ESG rating providers can be categorized into three groups (Li and Polychronopoulos, 2020):

1. **Fundamental** providers collect public data and systematically aggregate it. Two examples of this group of providers are MSCI (formerly known as Morgan Stanley Capital International) and Sustainalytics. MSCI is known for its ESG ratings that evaluate a company's exposure and resilience based on key ESG factors. Sustainalytics offers ESG research and ratings, focusing on a wide range of industries. Their focus is assessing company performance against industry-specific and global sustainability standards.
2. **Comprehensive** providers compile both objective and subjective data. They present their results in the form of a rating based on qualitative and quantitative data. Two providers of this group are FTSE Russell and Thomson Reuters Eikon (Refinitiv). FTSE Russell provides a comprehensive range of ESG indices and ratings, considering various factors, including carbon emissions, social responsibility, and governance practices. Refinitiv offers a comprehensive suite of ESG data and scores, incorporating diverse metrics to assess a company's sustainability performance.
3. **Specialists** are providers that focus on specific ESG issues. Investors seek out specialists when they have specific portfolio development objectives. The two examples of this provider group are ISS ESG (Institutional Shareholder Services) and Trucost (part of S&P Global). ISS ESG specializes in responsible investment solutions and ESG ratings, providing detailed assessments, including norm-based screening and sector-specific criteria. Trucost focuses on environmental data and natural capital valuation, by assessing the environmental impact of companies and investment portfolios.

For this study, we have chosen Refinitiv as the rating provider. Refinitiv, a global financial data and analytics provider, has emerged as a prominent player in the field of ESG ratings. With a commitment to delivering comprehensive insights into the

sustainability performance of companies, Refinitiv employs a robust methodology to assess and score entities across various industries.

Refinitiv's ESG ratings are built upon a diverse set of criteria that encompass environmental impact, social responsibility, and governance practices. The company considers factors such as carbon emissions, diversity and inclusion, labor practices, and ethical business conduct in its evaluation process.

Refinitiv's ESG scoring system utilizes a scale from 0 to 100. This enables users to gauge a company's performance relative to its peers and industry benchmarks. A general interpretation of Refinitiv's ESG scoring scale is: 0-20: Poor performance, 21-40: Below Average, 41-60: Average, 61-80: Good and 81-100: Excellent.

The scoring system allows for a granular examination of specific ESG dimensions, enabling investors to make informed decisions aligned with their values and sustainability goals. With an emphasis on transparency and accuracy, Refinitiv's ESG ratings have become an essential tool for those seeking to integrate environmental, social, and governance considerations into their investment and decision-making processes.

Chapter 3: Conceptual Model and Research Hypothesis

3.1 Conceptual Framework

This study is firmly rooted in the foundational theoretical framework of modern financial analysis, encompassing the evolving importance of Environmental, Social, and Governance (ESG) considerations in the comprehensive evaluation of corporate performance. By examining the intricate relationship between credit ratings, ESG ratings, and their consequent implications for stock performance, this research endeavors to contribute to a deeper understanding of the multifaceted dynamics within the United States financial market.

Informed by a body of literature on risk assessment, financial performance metrics, and the growing influence of ESG factors on corporate decision-making, this study aims to shed light on the increasingly pivotal role played by ESG considerations in shaping the contemporary financial landscape. By drawing upon established theoretical underpinnings, this research seeks to provide a comprehensive and nuanced perspective on the interplay between traditional financial metrics, emerging ESG criteria, and their collective impact on corporate valuation and market dynamics. Through this integrative approach, the study aims to offer valuable insights into the evolving paradigms of corporate governance, sustainability, and financial performance, thereby contributing to a holistic understanding of the contemporary financial environment.

3.2 Research Hypotheses

Integrating the evolving dimensions of Environmental, Social, and Governance (ESG) considerations into the traditional realm of financial analysis has become an increasingly pertinent subject within the contemporary financial landscape. In light of this evolving discourse, this study embarks on a comprehensive exploration of the intricate relationship between credit ratings, ESG ratings, and their collective impact on stock performance within the dynamic context of the United States financial market.

Hypothesis 1 postulates the presence of a positive and statistically significant correlation between credit ratings and ESG ratings, specifically within the selected sample of 72 (seventy) US companies, spanning a comprehensive five-year period from 2017 to 2022. To comprehensively examine this relationship, a Correlation Test will be conducted, enabling an analysis of the intricate interdependencies between these two

fundamental indicators. This investigation seeks to provide a nuanced understanding of the extent to which variations in ESG considerations correspond to corresponding fluctuations in credit ratings, offering valuable insights into the evolving landscape of financial risk assessment and corporate valuation.

Building upon this foundation, Hypothesis 2 seeks to explore the significant influence of integrating ESG ratings as a variable within the computation of credit ratings for the selected US companies. To illuminate this complex relationship, a Regression and Granger Causality Tests will be employed, facilitating an understanding of the nuanced impact of ESG considerations on the overall credit rating calculation process. By delving into the intricate dynamics of this relationship, this research aims to contribute to a deeper understanding of the contemporary paradigms of corporate evaluation and the evolving role of ESG considerations in shaping the broader financial decision-making landscape.

3.3 Variables and Relationships

At its essence, this study aims to elucidate the intricate interplay between credit ratings, ESG ratings, and their combined impact on stock performance within the dynamic landscape of the United States financial market. To explore this relationship, specific criteria were meticulously adhered to, ensuring the credibility of the study's findings. Upon a thorough examination of various data providers, Refinitiv was chosen based on the accessibility of its terminal and the comprehensive existence of data.

To guarantee the study's credibility and robustness, the following criteria were applied to the sample of companies:

- Headquarters: United States
- Market Capitalization: Equal to or exceeding 100 billion US dollars
- Listed status
- Availability of both Credit Rating and ESG Rating

Following the application of these criteria, with a focus on the availability of ratings on the data provider, a total of 70 companies were selected, representing a diverse range of industries. Since the sample size is greater than 30, the study's results are potentially robust. These companies were further categorized into 28 distinct main industry groups, as it is shown on the following table:

Industry Group	#	Companies
Aerospace & Defense	3	RTX Corp, Lockheed Martin Corp and Boeing Co
Automobiles & Auto Parts	1	Tesla Inc
Banking Services	1	American Express Co
Beverages	2	Coca-Cola Co and PepsiCo Inc
Communications & Networking	1	Cisco Systems Inc
Computers, Phones & Household Electronics	1	Apple Inc
Consumer Goods Conglomerates	3	Honeywell International Inc, Berkshire Hathaway Inc and General Electric Co
Diversified Retail	3	TJX Companies Inc, Amazon.com Inc and Costco Wholesale Corp
Electric Utilities & IPPs	1	Nextera Energy Inc
Financial Technology (Fintech) & Infrastructure	1	Intuit Inc
Food & Drug Retailing	1	Walmart Inc
Food & Tobacco	1	Philip Morris International Inc
Freight & Logistics Services	2	United Parcel Service Inc and Union Pacific Corp
Healthcare Equipment & Supplies	5	Stryker Corp, Thermo Fisher Scientific Inc, Intuitive Surgical Inc, Abbott Laboratories and Danaher Corp
Healthcare Providers & Services	2	UnitedHealth Group Inc and Elevance Health Inc
Hotel & Entertainment Services	3	Starbucks Corp, Booking Holdings Inc and McDonald's Corp
Machinery, Tools, Heavy Vehicles, Trains & Ships	2	Caterpillar Inc and Deere & Co
Media & Publishing	1	Walt Disney Co
Oil & Gas	3	Exxon Mobil Corp, Conocophillips and Chevron Corp
Personal & Household Products & Services	1	Procter & Gamble Co
Pharmaceuticals	7	Pfizer Inc, Eli Lilly and Co, Merck & Co Inc, Abbvie Inc, Bristol-Myers Squibb Co and Amgen Inc
Professional & Commercial Services	1	S&P Global Inc

Residential & Commercial REITs	1	Prologis Inc
Semiconductors & Semiconductor Equipment	7	Applied Materials Inc, Advanced Micro Devices Inc, Texas Instruments Inc, Intel Corp, Broadcom Inc, NVIDIA Corp and Qualcomm Inc
Software & IT Services	12	ServiceNow Inc, Meta Platforms Inc, Alphabet Inc, Mastercard Inc, Automatic Data Processing Inc, Salesforce Inc, Oracle Corp, Visa Inc, Microsoft Corp, International Business Machines Corp, Adobe Inc and Netflix Inc
Specialty Retailers	2	Home Depot Inc and Lowe's Companies Inc
Telecommunications Services	3	AT&T Inc, T-Mobile US Inc and Comcast Corp
Textiles & Apparel	1	Nike Inc

Table 1. List of companies per industry

To allow for a comprehensive assessment of the relative positioning of the selected companies within their respective industries and markets, the study includes the incorporation of peer data enabling a comparative analysis.

To provide a comprehensive and nuanced understanding of this intricate relationship, the research will incorporate a range of additional quantitative variables, based on the research about which factors affect the credit rating definition. The variables chosen to this study were:

- **Credit Rating:** In this study, the dependent variable represents an institution's creditworthiness, signifying the likelihood of its ability to repay debts. As the selected companies underwent evaluations from different credit rating providers, this research employs Refinitiv's ratings. Refinitiv assesses default probability, establishing intervals translated into qualitative grades. For this study, the quantitative grade utilized corresponds to the upper limit of the scale due to the unavailability of the exact grade.

Credit Rating Grade	Probability of Default (Lower Limit)	Probability of Default (Upper Limit)
AAA	0.00%	0.014%
AA+	0.014%	0.020%
AA	0.020%	0.028%
AA-	0.028%	0.038%
A+	0.038%	0.052%
A	0.052%	0.069%
A-	0.069%	0.089%
BBB+	0.089%	0.113%
BBB	0.113%	0.145%
BBB-	0.145%	0.190%
BB+	0.190%	0.255%
BB	0.255%	0.354%
BB-	0.354%	0.507%
B+	0.507%	0.757%
B	0.757%	1.153%
B-	1.153%	1.668%
CCC+	1.668%	2.357%
CCC	2.357%	3.473%
CCC-	3.473%	5.956%
CC	5.956%	100.000%

Table 2 Credit Rating Grade's: Lower and upper limits

- ESG Rating:** The key independent variable in this model is the ESG rating, assigned by a rating provider like MSCI. As discussed in Chapter 2, this qualitative grade is converted into a score interval with upper and lower limits within the data provider terminal. In this study, the exact grade was available and directly used as values in the model.

ESG Rating Grade	Lower Limit	Upper Limit
A+	91.67	100
A	83.33	91.67
A-	75	88.33
B+	66.67	75
B	58.33	66.67
B-	50	58.33
C+	41.67	50
C	33.33	41.67
C-	25	33.33
D+	16.67	25
D	8.33	16.67
D-	0	8.33

Table 3. ESG Rating Grade's: Lower and upper limits

The following variables are also independent variables chosen taking into consideration the findings of Chapter 2. These variables have been selected to facilitate a multifaceted analysis of the diverse factors impacting the credit rating definition.

By integrating these supplementary quantitative variables, the study seeks to delve deeper into the intricate dynamics that underlie the correlation between credit ratings and ESG ratings. The inclusion of financial and operational metrics serves to provide insights into the financial risk assessment mechanisms employed within the selected companies, contributing to a holistic understanding of the broader financial health and stability of these entities.

- **Market Capitalization:** a crucial variable in credit rating models, playing a significant role in evaluating a company's financial health and creditworthiness. Its importance lies in various aspects, including liquidity assessment, where a higher market capitalization indicates greater liquidity, reflecting the ease of buying or selling shares and the company's ability to access capital markets. Additionally, market capitalization reflects investor confidence and positive market sentiment, contributing to favorable credit ratings. Changes in market capitalization provide insights into market risk, with a decline potentially

signaling increased risk. Furthermore, comparing market capitalization within an industry context offers valuable comparative insights, aiding in the assessment of a company's financial standing. Lastly, market capitalization can mirror investor expectations for a company's future growth and performance, influencing its credit rating positively if investors anticipate robust future earnings and increased market share.

- **Debt-to-Equity Ratio (D/E):** The debt-to-equity ratio is a pivotal variable in credit rating models, playing a crucial role in assessing a company's financial leverage and risk profile. Its incorporation yields several key advantages, including offering insights into financial risk by indicating the level of reliance on borrowed funds. A higher ratio implies increased financial risk and susceptibility to market fluctuations. Furthermore, evaluating the debt-to-equity ratio aids in assessing a company's debt-servicing capacity, with a lower ratio indicating greater stability and stronger capabilities to meet debt obligations. The ratio also serves as an indicator of investor confidence, with a moderate and balanced ratio reflecting prudent financial management and potentially leading to more favorable credit ratings. As a key factor in creditworthiness assessment, a lower debt-to-equity ratio signifies a conservative financing approach, enhancing the likelihood of securing favorable credit terms. Lastly, monitoring changes in the ratio over time enables effective risk management and informed financial decision-making, allowing companies to strike a balance between leveraging growth opportunities and maintaining financial stability.

The value of this variable was not available on the data provider terminal. It was manually calculated for every company, with the formula:

$$\text{Debt – to – Equity Ratio} = \frac{\text{Total Long Term Debt}}{\text{Total Shareholders' Equity}} \quad (1)$$

- **Price-to-Earnings Ratio (P/E):** Integral for assessing a company's financial performance and market valuation. Its inclusion provides valuable advantages, such as insights into earnings stability and growth potential, with a higher P/E ratio indicating positive market sentiment and anticipated future growth. Additionally, analyzing the P/E ratio allows for an assessment of market expectations regarding a company's future earnings, crucial for understanding

investor confidence and risk perceptions. Comparative valuation analysis, involving industry benchmarks and competitor evaluation, enables a comprehensive understanding of a company's market position and competitiveness. The P/E ratio serves as a key metric for evaluating investor confidence, and a stable or improving ratio may contribute to more favorable credit ratings. Furthermore, monitoring fluctuations in the P/E ratio aids in understanding market volatility and sentiment changes, providing essential insights for credit risk assessment.

- **Free Operating Cash Flow (FOCF):** Vital variable in credit rating models, playing a crucial role in assessing a company's financial health, operational efficiency, and cash-generating capacity for debt repayment and operational needs. Incorporating the FOCF ratio offers key advantages, including a comprehensive assessment of debt servicing capacity, where a higher ratio suggests strong cash-generating capabilities for effective debt obligation fulfillment. The ratio also facilitates the evaluation of operational efficiency, indicating robust cash flow generation and effective management of operational costs. Furthermore, the FOCF ratio contributes to the analysis of financial flexibility, allowing companies with a healthy ratio to pursue strategic investments and expansion plans, positively impacting long-term creditworthiness. It serves as a tool for assessing risk management and solvency, with a stable or increasing ratio reflecting effective risk mitigation and a strong financial position. Additionally, monitoring the FOCF ratio over time aids in examining the sustainability of a company's cash flow and its ability to maintain consistent financial performance, ensuring stability in the face of market fluctuations and economic uncertainties.

By taking a comprehensive approach and considering these additional quantitative variables, the research endeavors to provide a holistic and nuanced perspective on the diverse factors that shape the intricate relationship between credit ratings, ESG ratings, and stock performance. Through this multifaceted analysis, the study aims to contribute to a deeper understanding of the complex interdependencies between financial evaluations, ESG considerations, and overall market dynamics within the context of the United States financial landscape.

3.4 Justification

The increasing prominence of ESG considerations within the financial sector has been widely acknowledged and emphasized in numerous studies and industry reports. This growing recognition of the pivotal role played by ESG factors in shaping the contemporary financial landscape underscores the critical importance of delving into the intricate interplay between credit ratings, ESG ratings, and their collective impact on stock performance.

By undertaking a comprehensive examination of the complex relationship between these pivotal variables, this study endeavors to make a substantive contribution to the existing body of knowledge in the field. Through a meticulous analysis of the multifaceted dynamics at play, the research aims to provide valuable insights that can offer guidance and direction for investors, financial analysts, and policymakers alike.

This study seeks to offer a nuanced understanding of the implications of integrating ESG considerations into the traditional framework of financial analysis, thereby shedding light on the evolving paradigms of corporate evaluation and investment decision-making. By elucidating the intricate connections between credit ratings, ESG ratings, and stock performance, the research aims to foster a deeper comprehension of the broader implications for financial risk assessment, investment strategies, and policy formulation within the dynamic context of the contemporary financial sector.

Chapter 4: Methodology

This section delineates the methodological approach employed in our comprehensive empirical analysis. The primary objective of our study is to thoroughly investigate the existence and significance of the intricate relationship between two distinct types of ratings: Credit Ratings and ESG Credit Ratings. To accomplish this, we will employ the widely recognized and established correlation analysis method, drawing upon the methodology as previously demonstrated by Sun (2022). The calculation of the correlation will be conducted using the following formula:

$$\text{Correlation Function } (\rho_{xy}) = \frac{\text{Cov}(r_x, r_y)}{\sigma_x \sigma_y} \quad (2)$$

Within the financial and investment sectors, correlation analysis serves as a fundamental tool for assessing the nuanced interplay between risk and performance within a given portfolio. In the context of this study, the correlation analysis will be utilized to examine whether a tangible relationship exists between fluctuations in credit conditions and corresponding variations in ESG ratings, focusing specifically on the intricate dynamics within the United States context.

It is crucial to note that the level of correlation between two variables can be classified based on the magnitude and direction of the correlation coefficient. The correlation coefficient, typically denoted by the symbol "r," ranges from -1 to 1, with values closer to -1 or 1 indicating a stronger correlation and values closer to 0 suggesting a weaker correlation (Adams et al., 2017). The following classifications are often used to interpret the level of correlation:

Definition	Range	Description
Perfect Positive Correlation	$r = 1$	Indicates that as one variable increases, the other variable also increases proportionally
Strong Positive Correlation	$0.7 \leq r < 1$	Implies a significant upward trend between the two variables, indicating that they tend to increase together but not necessarily in perfect proportion
Moderate Positive Correlation	$0.3 \leq r < 0.7$	Suggests a discernible but not definitive upward trend between the two variables
Weak Positive Correlation	$0 \leq r < 0.3$	Indicates a slight upward trend between the two variables, but the relationship is not well-defined
No Correlation	$r = 0$	Implies no linear relationship between the two variables
Weak Negative Correlation	$-0.3 \leq r < 0$	Suggests a slight downward trend between the two variables, but the relationship is not well-defined
Moderate Negative Correlation	$-0.7 \leq r < -0.3$	Implies a discernible but not definitive downward trend between the two variables
Strong Negative Correlation	$-1 \leq r < -0.7$	Indicates a significant downward trend between the two variables, suggesting that as one variable increases, the other variable decreases proportionally
Perfect Negative Correlation	$r = -1$	Suggests that as one variable increases, the other variable decreases proportionally

Table 4. Correlation Levels: Range and Definition

After running the correlation test, for each company, it was computed the average correlation level per industry group. To better understand the results of this study, these classifications will be used to categorize the results per industry group.

Furthermore, the study will delve into exploring the potential relationship between the fluctuations in ESG ratings and the corresponding effects on stock performance. Observing a correlation coefficient different from zero would serve to validate the hypothesis that shifts in ESG ratings significantly influence the overall performance of a company's stock (Adams et al., 2017). Through this analysis, we aim to provide valuable insights into the interdependencies between ESG factors, credit ratings, and stock

performance, contributing to a deeper understanding of the contemporary financial landscape.

After evaluating the correlation between the ratings, this thesis will include the study of the function of credit rating definition, through regression analysis.

Regression is a statistical method analyzing the connection between independent variables and a dependent variable, gauging how variations in independence influence the dependent variable. Researchers use it to assess relationship strength, predict outcomes, and identify data patterns.

Similarly, to the correlation test, the level of significance of each variable can be analyzed from the regression test outputs, though p-value. The p-value indicates the probability of observing the test results (or more extreme results) if the null hypothesis is true. Interpreting p-values in regression tests often follows a common convention:

P-value	Definition
p-value < 0.05	Often considered as evidence of statistical significance. You can reject the null hypothesis
0.05 < p-value < 0.1	Some consider this as marginal evidence, suggesting caution in interpretation. Depending on the context, you may or may not consider this as significant
p-value > 0.1	Generally considered as insufficient evidence to reject the null hypothesis. There is no compelling evidence of a significant relationship

Table 5. P-value Levels: Range and Definition

To enhance the robustness of the study's findings and conclusions, several additional factors were taken into account, as detailed in Chapter 3. These factors include market capitalization, debt-to-equity (D/E) ratio, price-to-earnings ratio (P/E), and free operating cash flow (FOCF). Recognizing the pivotal role of these financial metrics in determining credit ratings, the regression model utilized in this study is expressed as follows:

$$\text{Regression Function: } y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \beta_5x_5 + \varepsilon \quad (3)$$

In this equation, Y signifies the credit rating, the dependent variable. The independent variables consist of x_1 for the impact of ESG rating, x_2 for market capitalization impact, x_3 for debt-to-equity (D/E) impact, x_4 for price-to-earnings ratio (P/E) impact, and x_5 for free operating cash flow (FOCF) impact.

Chapter 5 will assess the significance levels of each variable to unveil their influence on credit rating determination. It is crucial to emphasize that the regression test will validate the results obtained through correlation tests, providing a more comprehensive understanding of the factors shaping credit rating determination.

Upon computation, the model's validity can be confirmed using the R^2 value, which indicates the percentage of the credit rating value explained by the variables in the equation.

To compute these tests, the data was run on *statsmodels*, a python module. Statsmodels provides functions for the estimation of various statistical models, hypothesis testing, and statistical data exploration. In this case, the functionality utilized was the Linear Regression Models, which allows analyzing the relationships between variables.

Furthermore, given that both correlation and regression results do not offer insights into causality between the dependent and explanatory variables, if both tests yield positive results indicating the influence of ESG on the determination of Credit Rating, causality will be further examined through the Granger causality test.

The Granger causality test, a statistical methodology employed to investigate temporal relationships in time series data, becomes particularly relevant in fields such as econometrics, as demonstrated in this study (Granger, 1969). Understanding the direction and strength of causal relationships over time is of paramount importance.

The foundational principle of the Granger causality test is grounded in the notion that if past values of variable X assist in predicting future values of variable Y, and the reverse is not true, then X is said to Granger-cause Y (Wooldridge, 2015). The procedure involves fitting autoregressive models to the variables of interest and comparing forecasting accuracy with and without the inclusion of lagged values of the potential causal variable.

Similar to the regression model using the Ordinary Least Squares (OLS) approach, the decision to accept the null hypothesis, which asserts that past values of variable X Granger-cause variable Y, relies on the p-value obtained from these tests. The interpretation of these p-values follows conventional standards, as presented in Table 5.

Chapter 5: Obtained results, Findings and Discussion

5.1 Research findings

5.1.1 Correlation Findings

After evaluating the correlation between ESG Score, Credit Rating and Stock Price, for all 70 the chosen companies, between 2017 and 2022, the global results show the following impact:

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	10	1
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	11	9	6
Weak Positive Correlation ($0 \leq r < 0.3$)	24	15	17
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	20	11	19
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	13	20	22
Strong Negative Correlation ($-1 \leq r < -0.7$)	2	5	5
Perfect Negative Correlation ($r = -1$)	0	0	0

Table 6. Correlation Findings: ESG, Credit Rating and Stock Price

As outlined in Chapter 4, correlation values can be assessed as positive or negative correlations. Concerning the correlation observed between ESG and Credit Rating, the study identifies 34 cases of companies with a positive correlation and 35 with a negative correlation.

Starting with the 34 instances of positive correlation, it is noteworthy that 70% of them exhibit a weak positive correlation, with “r” value ranging from 0 to 0.3. Industries contributing to this outcome include Aerospace & Defense, Beverages, Food & Tobacco, Healthcare Equipment & Supplies, Oil & Gas, Personal & Household Products & Services, Professional & Commercial Services, Software & IT Services, Specialty Retailers, and Telecommunications Services. The lowest value is recorded by Abbvie Inc ($r = 0.04$), while the highest is recorded by RTX Corp ($r = 0.30$). The remaining 30% exhibit values between 0.3 and 0.7, indicative of a moderate positive correlation. In this scenario, the primary industries contributing are Banking Services, Communications & Networking, and Healthcare Providers & Services, with the lowest and highest values recorded by AT&T Inc ($r = 0.31$) and UnitedHealth Group Inc ($r = 0.59$), respectively.

Conversely, the 35 cases with a negative correlation are distributed among weak (57%), moderate (37%), and strong (5%) correlations. In terms of representation, weak cases are found in companies across the Computers, Phones & Household Electronics, Consumer Goods Conglomerates, Electric Utilities & IPPs, Food & Drug Retailing, Freight & Logistics Services, Hotels & Entertainment Services, Machinery, Tools, Heavy Vehicles, Trains & Ships, Pharmaceuticals, and Semiconductors & Semiconductor Equipment sectors. Notably, Apple Inc ($r = -0.27$) presents the lowest value, while United Parcel Service Inc ($r = -0.01$) records the highest. Moderate negative correlations are observed in industries such as Financial Technology (Fintech) & Infrastructure, Media & Publishing, Residential & Commercial REITs, and Textiles & Apparel, with the highest recorded by Intuit Inc ($r = -0.35$) and the lowest by General Electric Co ($r = -0.63$). Finally, strong negative correlation instances are identified in the Automobiles & Auto Parts and Diversified Retail sectors, represented by Amazon.com Inc ($r = -0.85$) and Tesla Inc ($r = -0.72$), respectively.

By examining the correlations between ESG and Credit Rating alongside ESG and Stock Price, and Credit Rating and Stock Price, several conclusions can be drawn. Despite variations in correlation levels, within the 6 industries showing positive correlation values between Credit Rating and Stock Price, 17% also exhibit positive correlations among ESG, Credit Rating, and Stock Price. This suggests that a positive or negative change in ESG rating influences Credit Rating valuation in the same direction, subsequently affecting Stock Price. Healthcare Equipment & Supplies represents an example within this category. Conversely, the remaining 83% of positive correlation cases display a negative relationship between ESG Rating and Credit Rating, resulting in a symmetrical impact on Stock Price following an increase in ESG Rating. Media & Publishing serves as an illustration of this effect.

On the contrary, the remaining 22 industries exhibit a negative correlation between Credit Rating and Stock Price. Among these, 40% display a positive correlation between ESG and Credit Rating, indicating that Stock Price reacts inversely to ESG Rating changes. Aerospace & Defense is one of these 9 industries. Within the remaining 13 industries, 8 report a negative relationship between ESG Rating and Credit Rating, translating into a positive effect on Stock Price. An instance of this scenario is observed in the Automobiles & Auto Parts sector.

Despite the visible relationships between values, there are five industries in which no conclusive findings can be drawn due to contradictory results. These industries include

Diversified Retail, Food & Tobacco, Freight & Logistics Services, Software & IT Services, and Specialty Retailers. The conflicting outcomes within these sectors necessitate further investigation and analysis to better understand the nuanced dynamics and potential influencing factors that contribute to the observed contradictions. A deeper exploration of these industries may uncover additional insights into the complex interplay between ESG factors, Credit Rating, and Stock Price, providing a more comprehensive understanding of the relationships at play within these specific contexts.

In conclusion, the correlations between ESG factors, Credit Ratings, and Stock Prices vary significantly across industries, with some sectors exhibiting stronger and more consistent relationships than others. These findings emphasize the importance of considering industry-specific nuances when interpreting the impact of ESG performance on financial metrics. The diverse correlations underscore the complexity of these relationships and suggest that a one-size-fits-all approach may not be suitable for understanding the financial implications of ESG considerations across different industries.

5.1.2 Regression Findings

The results of the Ordinary Least Squares (OLS) regression analysis for credit rating calculation offer a compelling glimpse into the intricate interplay of variables shaping creditworthiness. By scrutinizing the statistical significance of key factors, including ESG Factors, Market Capitalization, Debt-to-Equity Ratio, Price-to-Earnings Ratio, and Free Operating Cash Flow, this analysis provides a nuanced understanding of their impact on credit ratings. These findings not only unveil the individual contributions of each variable but also emphasize the collective influence they wield in determining creditworthiness.

Regression Results		
Variable	P-value	R²
ESG Factors	0.006731349	0.415973
Market Capitalization	0.006862714	
Debt-to-Equity Ratio	0.0068982	
Price-to-Earnings Ratio	0.009851676	
Free Operating Cash Flow	0.010692886	

Table 7. Regression Findings: ESG Factors, Market Cap., D/E, P/E and FOCF

The findings from the Ordinary Least Squares (OLS) regression analysis conducted for credit rating calculation yield noteworthy insights into the relationships between various variables and credit ratings. Notably, ESG Factors, Market Capitalization, Debt-to-Equity Ratio, Price-to-Earnings Ratio, and Free Operating Cash Flow exhibit statistically significant associations with credit ratings, as indicated by their respective p-values (0.0067, 0.0069, 0.0069, 0.0099, and 0.0107, all below the conventional significance level of 0.05).

These results imply that changes in these variables are likely to have a discernible impact on credit ratings. The R^2 value of 0.416 suggests that approximately 41.6% of the variability in credit ratings can be explained by the combination of these factors. While this indicates a substantial explanatory power, it also suggests that there are other influential factors not accounted for in the model.

The statistically significant coefficients underscore the importance of considering both environmental, social, and governance factors (ESG) and financial metrics in the credit rating determination process. The inclusion of ESG factors emphasizes the growing recognition of their relevance in assessing creditworthiness. This information is crucial for financial decision-makers, providing them with a more holistic understanding of the determinants of credit ratings. Additionally, these findings contribute to the broader discourse on the integration of sustainability and financial metrics in evaluating credit risk, offering valuable implications for stakeholders navigating the intersection of finance and sustainability.

5.1.3 Granger Causality Test Findings

Given the positive impact of ESG on Credit Rating determination demonstrated by both correlation and regression tests, a Granger causality test was subsequently performed.

This test is designed to explore temporal relationships within time series data, quantified through *time lags* representing the intervals, in this context, monthly gaps between changes in variable X and those recorded in variable Y. As credit ratings are evaluated annually, the test encompassed 12-*time lags*, implying that causality would be assessed over the 12 months following a change in ESG Rating.

It is pertinent to note that this test was conducted on a sample of 72 companies, and the ensuing results are detailed below.

Variable	P-value
ESG Factors	0.053127
Market Capitalization	0.068982
Debt to Equity	0.650961
PEG Ratio	0.064897
FOCF	0.09814

Table 8: Granger Causality Test Findings

The outcomes of the Granger causality test offer nuanced insights into the temporal dynamics between various variables and their potential impact on credit rating determination. ESG Factors, with a marginally significant p-value of 0.053127, suggest a temporal relationship that may influence credit ratings over time. Market Capitalization, exhibiting a p-value of 0.068982, similarly hints at a potential causal link between a firm's market value and its creditworthiness. The PEG Ratio and Free Operating Cash Flow (FOCF), with p-values of 0.064897 and 0.09814, respectively, indicate marginal levels of causality.

Conversely, the Debt-to-Equity Ratio, with a higher p-value of 0.650961, does not demonstrate a statistically significant Granger causality, implying a limited temporal influence on credit ratings.

While cautious interpretation is warranted, these results contribute valuable insights into the evolving temporal relationships among these variables, offering a more refined understanding of their potential roles in shaping credit rating dynamics over time.

5.2 Practical Implications

In the evolving landscape of corporate governance and sustainable business practices, the integration of Environmental, Social, and Governance (ESG) factors has become a focal point for organizations seeking long-term value creation and resilience.

In this section, we delve into the practical implications derived from both correlation and regression analyses. The following recommendations span ESG integration on holistic decision-making, risk management, stakeholder engagement, continuous monitoring, sustainability planning, and benchmarking.

Each recommendation is grounded in the empirical findings of correlation and regression analyses, providing a solid foundation for organizations to enhance their practices and contribute meaningfully to both financial and non-financial aspects of their operations.

- 1. Integrated Decision-Making:** Recognize the interplay between ESG factors, market capitalization, debt-to-equity ratio, price-to-earnings ratio, and free operating cash flow. Integrate both correlation and regression insights for a comprehensive understanding of the factors influencing financial outcomes.
- 2. Risk Management:** Consider ESG factors not only as sustainability measures but also as indicators of financial risk. Leverage the identified correlations and regression coefficients to enhance risk management strategies. Acknowledge that ESG considerations in the supply chain may have downstream effects on financial metrics.
- 3. Stakeholder Engagement:** Engage with stakeholders transparently about the company's approach to ESG factors and financial metrics. Clear communication about the correlation and regression findings fosters trust and demonstrates a commitment to sustainable practices, proactively address investor concerns related to ESG factors and foster ESG literacy within the organization.
- 4. Continuous Monitoring:** Recognize that correlations and regression coefficients may evolve over time. Establish systems for continuous monitoring and adapt strategies in response to changing market dynamics, regulations, and stakeholder expectations, considering the impact on both correlation and regression results and the potential implications for credit ratings and stock prices.
- 5. Long-Term Sustainability Planning:** Incorporate ESG considerations into long-term sustainability planning. Companies with strong positive correlations may use

this as an opportunity to reinforce and expand existing sustainability initiatives. Highlight initiatives that positively impact financial metrics and address areas that may require improvement.

- 6. Benchmarking Against Peers:** Benchmark ESG and financial performance against industry peers. Understanding how peers are navigating these considerations provides valuable context for decision-making.

By integrating these implications into practice, organizations can navigate the intricate landscape of sustainable business practices and financial decision-making, ultimately contributing to long-term value creation and resilience in a dynamic market environment.

Chapter 6: Conclusions and Recommendations

6.1 Conclusions

The current study makes several contributions to existing theory in the realms of Environmental, Social, and Governance (ESG) factors and their relationship with financial performance.

Firstly, the study contributes to ESG integration theory by empirically demonstrating the impact of ESG factors on financial performance. It highlights that ESG considerations are not only relevant for ethical reasons but also have tangible implications for companies' economic success.

Beyond emphasizing the industry-specific nature of ESG impacts on financial metrics, the study extends existing theories and advocates for a more tailored approach to ESG integration. Recognizing nuanced dynamics across industries contributes to a better understanding of the diverse implications of ESG factors.

Moreover, the research introduces ESG correlations as pragmatic instruments for both risk management and strategic planning processes, providing an additional layer to current theoretical frameworks. By comprehending correlations, organizations can pinpoint areas of vulnerability or strength, enabling the formulation of proactive risk management strategies. This underscores the significance of integrating ESG considerations into long-term planning to bolster sustainability efforts and proactively address risks that could potentially influence credit ratings and stock prices.

Finally, the study recommends engaging stakeholders for industry-specific ESG insights, aligning with stakeholder theory. It also advocates for transparent reporting on ESG initiatives based on identified correlations, emphasizing the importance of clear communication to build credibility. Additionally, continuous monitoring and adaptation of ESG strategies contribute to strategic management theories, recognizing the evolving nature of ESG correlations.

By making these contributions, the study enriches existing theories in multiple domains, providing practical insights that can inform both academic research and practical decision-making in the evolving landscape of ESG integration and sustainable business practices.

6.2 Limitations

While the recommendations and implications based on the correlation and regression results offer valuable insights, it's essential to acknowledge the limitations of these disclosures that future tests can drive into.

Firstly, the study focuses on correlations rather than establishing causation. While it identifies relationships between variables, it does not definitively establish direct causal links, prompting decision-makers to exercise caution in drawing conclusions about cause-and-effect relationships.

Secondly, the findings may not be universally applicable across all industries or regions, as the study's context and sample size limit the generalizability of recommendations.

Thirdly, the dynamic nature of the business environment implies that correlations identified in the study may evolve over time. External factors, such as economic conditions, regulatory changes, or technological advancements, can influence the relationships between variables.

Additionally, the study recognizes the challenges in consistently measuring ESG factors, given their multifaceted nature and varying methodologies across industries, potentially affecting the accuracy of ESG-related findings.

Lastly, the subjectivity inherent in stakeholder engagement introduces variability, as different stakeholders may prioritize ESG factors differently, impacting the interpretation of stakeholder insights.

Overall, recognizing these limitations is crucial for decision-makers to interpret the findings appropriately and to adapt strategies in consideration of potential constraints and uncertainties.

6.3 Suggestions for Future Research

Building on the insights gained from the current study, several avenues for future research can be explored to further deepen our understanding of the relationships between Environmental, Social, and Governance (ESG) factors and financial performance. Here are some suggestions:

1. **Global Perspectives:** Expand the geographical scope of research to include companies from different regions and countries. This can shed light on the

influence of regional variations, cultural differences, and regulatory frameworks on the relationship between ESG factors and financial outcomes.

2. **Sector-Specific ESG Performance Metrics:** Develop and refine sector-specific ESG performance metrics. Tailoring ESG metrics to the unique characteristics of each industry can provide more accurate assessments of sustainability practices and their impact on financial outcomes.
3. **Event Studies:** Conduct event studies to analyze how specific ESG events or initiatives impact financial performance. This approach can help identify causal relationships and provide insights into the short-term and long-term effects of ESG-related actions.
4. **ESG Measurement Methodologies:** Investigate the impact of different ESG measurement methodologies on the study's outcomes. Comparing results using various ESG rating systems or metrics can highlight the robustness of correlations and contribute to the standardization of ESG assessments.
5. **Dynamic Risk Modeling:** Develop dynamic risk models that consider the evolving nature of ESG risks. Integrating real-time data and adaptive risk management strategies can enhance the ability of companies to navigate changing ESG landscapes.
6. **Machine Learning Approaches:** Apply machine learning approaches to identify complex patterns and nonlinear relationships between ESG factors and financial performance. This can offer a more nuanced understanding of the multifaceted nature of ESG impacts.

By exploring these avenues, researchers can contribute to the evolving field of ESG research and provide valuable insights that support more informed decision-making for businesses, investors, and other stakeholders.

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Appendix

Appendix A: List of Companies

1. Abbott Laboratories
2. Abbvie Inc
3. Adobe Inc
4. Advanced Micro Devices Inc
5. Alphabet Inc
6. Amazon.com Inc
7. American Express Co
8. Amgen Inc
9. Apple Inc
10. Applied Materials Inc
11. AT&T Inc
12. Automatic Data Processing Inc
13. Berkshire Hathaway Inc
14. Boeing Co
15. Booking Holdings Inc
16. Bristol-Myers Squibb Co
17. Broadcom Inc
18. Caterpillar Inc
19. Chevron Corp
20. Cisco Systems Inc
21. Coca-Cola Co
22. Comcast Corp
23. Conocophillips
24. Costco Wholesale Corp
25. Danaher Corp
26. Deere & Co
27. Elevance Health Inc
28. Eli Lilly and Co
29. Exxon Mobil Corp
30. General Electric Co
31. Home Depot Inc
32. Honeywell International Inc
33. Intel Corp
34. International Business Machines Corp
35. Intuit Inc
36. Intuitive Surgical Inc
37. Johnson & Johnson
38. Lockheed Martin Corp
39. Lowe's Companies Inc
40. Mastercard Inc
41. McDonald's Corp
42. Merck & Co Inc
43. Meta Platforms Inc
44. Microsoft Corp
45. Netflix Inc
46. Nextera Energy Inc
47. Nike Inc
48. NVIDIA Corp
49. Oracle Corp
50. PepsiCo Inc
51. Pfizer Inc
52. Philip Morris International Inc
53. Procter & Gamble Co
54. Prologis Inc
55. Qualcomm Inc
56. RTX Corp
57. S&P Global Inc
58. Salesforce Inc
59. ServiceNow Inc
60. Starbucks Corp
61. Stryker Corp
62. Tesla Inc
63. Texas Instruments Inc
64. Thermo Fisher Scientific Inc
65. TJX Companies Inc
66. T-Mobile US Inc
67. Union Pacific Corp
68. United Parcel Service Inc
69. UnitedHealth Group Inc
70. Visa Inc
71. Walmart Inc
72. Walt Disney

Appendix B: Correlation Findings Per Industry Group

#	Industry Group	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
1	Aerospace & Defense	0,034056907	-0,155614356	-0,375400383
2	Automobiles & Auto Parts	-0,849199425	0,725044158	-0,825225547
3	Banking Services	0,460770358	-0,357998205	-0,458464799
4	Beverages	0,194044416	-0,403560409	-0,057856903
5	Communications & Networking	0,494986117	-0,346887016	-0,744961429
6	Computers, Phones & Household Electronics	-0,266577875	0,410504092	-0,236520858
7	Consumer Goods Conglomerates	-0,27636045	0,114367989	-0,423694268
8	Diversified Retail	-0,423346376	-0,257757121	-0,03010606
9	Electric Utilities & IPPs	-0,01961557	-0,405650227	0,182721761
10	Financial Technology (Fintech) & Infrastructure	-0,347676766	-0,209462706	0,392713108
11	Food & Drug Retailing	-0,209427174	0,690253165	-0,142036862
12	Food & Tobacco	0,26124113	0,103549921	-0,657136055
13	Freight & Logistics Services	-0,111323716	-0,156365907	-0,104912956
14	Healthcare Equipment & Supplies	0,105754426	0,24272164	0,04965256
15	Healthcare Providers & Services	0,353176025	-0,153401934	-0,43084766
16	Hotels & Entertainment Services	-0,113961556	0,188065207	-0,071861179
17	Machinery, Tools, Heavy Vehicles, Trains & Ships	-0,003881588	0,1277087	-0,505581834
18	Media & Publishing	-0,600505974	-0,298303998	0,080819548
19	Oil & Gas	0,234607428	-0,631737176	-0,630185851
20	Personal & Household Products & Services	0,198799397	-0,077346037	-0,217712037
21	Pharmaceuticals	-0,023478075	-0,477667199	0,120888961
22	Professional & Commercial Services	0,057301283	-0,494065149	-0,131818643
23	Residential & Commercial REITs	-0,427109729	-0,809621587	0,134031364
24	Semiconductors & Semiconductor Equipment	-0,142992424	0,279935248	-0,335375792
25	Software & IT Services	0,059161708	0,227676805	-0,026901991
26	Specialty Retailers	0,042817887	0,282412007	-0,054066254
27	Telecommunications Services	0,121612348	-0,349393523	-0,006630552
28	Textiles & Apparel	-0,46888586	0,11873731	-0,014378377

Appendix B1: Correlation Findings - Aerospace & Defense

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	1	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	0	0	0
Weak Positive Correlation ($0 \leq r < 0.3$)	1	0	0
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	2	0	1
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	0	2	2
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	3	3	3

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
RTX Corp	0,30	-0,59	-0,58
Lockheed Martin Corp	-0,01	-0,60	-0,31
Boeing Co	-0,19	0,73	-0,23

Appendix B2: Correlation Findings - Automobiles & Auto Parts

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	1	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	0	0	0
Weak Positive Correlation ($0 \leq r < 0.3$)	0	0	0
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	0	0	0
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	0	0	0
Strong Negative Correlation ($-1 \leq r < -0.7$)	1	0	1
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	1	1	1

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Tesla Inc	-0,85	0,73	-0,83

Appendix B3: Correlation Findings - Banking Services

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	0	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	1	0	0
Weak Positive Correlation ($0 \leq r < 0.3$)	0	0	0
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	0	0	0
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	0	1	1
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	1	1	1

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
American Express Co	0,46	-0,36	-0,46

Appendix B4: Correlation Findings - Beverages

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	0	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	1	0	0
Weak Positive Correlation ($0 \leq r < 0.3$)	0	0	1
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	1	1	1
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	0	1	0
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	2	2	2

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Coca-Cola Co	0,58	-0,14	-0,20
PepsiCo Inc	-0,19	-0,67	0,08

Appendix B5: Correlation Findings - Communications & Networking

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	0	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	1	0	0
Weak Positive Correlation ($0 \leq r < 0.3$)	0	0	0
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	0	0	0
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	0	1	0
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	1
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	1	1	1

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Cisco Systems Inc	0,49	-0,35	-0,74

Appendix B6: Correlation Findings - Computers, Phones & Household Electronics

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	0	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	0	1	0
Weak Positive Correlation ($0 \leq r < 0.3$)	0	0	0
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	1	0	1
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	0	0	0
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	1	1	1

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Apple Inc	-0,27	0,41	-0,24

Appendix B7: Correlation Findings - Consumer Goods Conglomerates

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	0	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	0	1	0
Weak Positive Correlation ($0 \leq r < 0.3$)	1	1	0
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	0	1	1
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	2	0	1
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	1
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	3	3	3

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Honeywell International Inc	0,22	0,08	-0,18
Berkshire Hathaway Inc	-0,42	-0,16	-0,38
General Electric Co	-0,63	0,43	-0,71

Appendix B8: Correlation Findings - Diversified Retail

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	0	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	0	0	0
Weak Positive Correlation ($0 \leq r < 0.3$)	0	0	1
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	1	1	1
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	0	1	0
Strong Negative Correlation ($-1 \leq r < -0.7$)	1	0	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	2	2	2

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
TJX Companies Inc	-0,13	-0,33	0,01
Amazon.com Inc	-0,72	-0,18	-0,30

Appendix B9: Correlation Findings - Electric Utilities & IPPs

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	0	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	0	0	0
Weak Positive Correlation ($0 \leq r < 0.3$)	0	0	1
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	1	0	0
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	0	1	0
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	1	1	1

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Nextera Energy Inc	-0,02	-0,41	0,18

Appendix B10: Correlation Findings - Financial Technology (Fintech) & Infrastructure

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	0	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	0	0	1
Weak Positive Correlation ($0 \leq r < 0.3$)	0	0	0
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	0	1	0
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	1	0	0
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	1	1	1

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Intuit Inc	-0,35	-0,21	0,39

Appendix B11: Correlation Findings - Food & Drug Retailing

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	0	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	0	1	0
Weak Positive Correlation ($0 \leq r < 0.3$)	0	0	0
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	1	0	1
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	0	0	0
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	1	1	1

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Walmart Inc	-0,21	0,69	-0,14

Appendix B12: Correlation Findings - Food & Tobacco

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	0	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	0	0	0
Weak Positive Correlation ($0 \leq r < 0.3$)	1	1	0
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	0	0	0
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	0	0	1
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	1	1	1

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Philip Morris International Inc	0,26	0,10	-0,66

Appendix B13: Correlation Findings - Freight & Logistics Services

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	0	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	0	0	0
Weak Positive Correlation ($0 \leq r < 0.3$)	0	1	1
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	2	0	0
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	0	1	1
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	2	2	2

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
United Parcel Service Inc	-0,01	0,09	-0,37
Union Pacific Corp	-0,22	-0,41	0,16

Appendix B14: Correlation Findings - Healthcare Equipment & Supplies

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	1	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	1	1	1
Weak Positive Correlation ($0 \leq r < 0.3$)	3	2	2
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	1	1	1
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	0	0	1
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	5	5	5

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Stryker Corp	0,33	0,05	0,16
Thermo Fisher Scientific Inc	0,18	-0,01	0,45
Intuitive Surgical Inc	0,14	0,71	-0,26
Abbott Laboratories	0,11	0,32	-0,34
Danaher Corp	-0,22	0,15	0,23

Appendix B15: Correlation Findings - Healthcare Providers & Services

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	0	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	1	1	0
Weak Positive Correlation ($0 \leq r < 0.3$)	1	0	0
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	0	0	0
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	0	1	2
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	2	2	2

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
UnitedHealth Group Inc	0,59	-0,63	-0,46
Elevance Health Inc	0,11	0,33	

Appendix B16: Correlation Findings - Hotels & Entertainment Services

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	0	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	0	0	0
Weak Positive Correlation ($0 \leq r < 0.3$)	1	3	1
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	1	0	2
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	1	0	0
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	3	3	3

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Starbucks Corp	0,07	0,04	0,12
Booking Holdings Inc	-0,04	0,24	-0,22
McDonald's Corp	-0,37	0,28	-0,11

Appendix B17: Correlation Findings - Machinery. Tools. Heavy Vehicles. Trains & Ships

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	1	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	0	0	0
Weak Positive Correlation ($0 \leq r < 0.3$)	1	0	0
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	1	0	0
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	0	1	2
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	2	2	2

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Caterpillar Inc	0,04	-0,47	-0,55
Deere & Co	-0,05	0,72	-0,46

Appendix B18: Correlation Findings - Media & Publishing

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	0	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	0	0	0
Weak Positive Correlation ($0 \leq r < 0.3$)	0	0	1
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	0	1	0
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	1	0	0
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	1	1	1

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Walt Disney Co	-0,60	-0,30	0,08

Appendix B19: Correlation Findings - Oil & Gas

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	0	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	0	0	0
Weak Positive Correlation ($0 \leq r < 0.3$)	3	0	0
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	0	0	0
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	0	2	2
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	1	1
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	3	3	3

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Exxon Mobil Corp	0,25	-0,57	-0,76
Conocophillips	0,25	-0,74	-0,50
Chevron Corp	0,20	-0,59	-0,63

Appendix B20: Correlation Findings - Personal & Household Products & Services

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	0	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	0	0	0
Weak Positive Correlation ($0 \leq r < 0.3$)	1	0	0
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	0	1	1
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	0	0	0
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	1	1	1

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Procter & Gamble Co	0,20	-0,08	-0,22

Appendix B21: Correlation Findings - Pharmaceuticals

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	0	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	0	0	2
Weak Positive Correlation ($0 \leq r < 0.3$)	4	1	1
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	1	1	3
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	1	2	0
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	2	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	6	6	6

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Pfizer Inc	0,29	-0,46	-0,06
Eli Lilly and Co	0,10	-0,57	0,37
Merck & Co Inc	0,07	0,04	-0,20
Abbvie Inc	0,06	-0,93	-0,06
Bristol-Myers Squibb Co	-0,26	-0,77	0,27
Amgen Inc	-0,41	-0,17	0,39

Appendix B22: Correlation Findings - Professional & Commercial Services

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	0	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	0	0	0
Weak Positive Correlation ($0 \leq r < 0.3$)	1	0	0
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	0	0	1
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	0	1	0
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	1	1	1

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
S&P Global Inc	0,06	-0,49	-0,13

Appendix B23: Correlation Findings - Residential & Commercial REITs

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	0	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	1	0	0
Weak Positive Correlation ($0 \leq r < 0.3$)	0	0	0
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	0	0	0
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	0	1	1
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	1	1	1

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Prologis Inc	-0,43	-0,81	0,13

Appendix B24: Correlation Findings - Semiconductors & Semiconductor Equipment

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	2	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	0	2	0
Weak Positive Correlation ($0 \leq r < 0.3$)	2	1	1
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	3	1	1
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	2	1	5
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	7	7	7

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Applied Materials Inc	0,25	0,42	-0,36
Advanced Micro Devices Inc	0,15	0,15	-0,61
Texas Instruments Inc	-0,07	-0,51	-0,32
Intel Corp	-0,15	0,46	-0,53
Broadcom Inc	-0,16	0,89	-0,18
NVIDIA Corp	-0,49	-0,21	0,05
Qualcomm Inc	-0,53	0,77	-0,38

Appendix B25: Correlation Findings - Software & IT Services

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	3	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	5	2	2
Weak Positive Correlation ($0 \leq r < 0.3$)	2	3	5
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	2	1	2
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	3	3	2
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	1
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	12	12	12

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
ServiceNow Inc	0,58	0,82	0,13
Meta Platforms Inc	0,50	0,29	-0,38
Alphabet Inc	0,47	0,86	0,14
Mastercard Inc	0,35	0,00	0,51
Automatic Data Processing Inc	0,33	0,53	-0,13
Salesforce Inc	0,13	0,37	-0,09
Oracle Corp	0,07	0,12	0,59
Visa Inc	-0,09	-0,39	0,11
Microsoft Corp	-0,14	-0,45	0,02
International Business Machines Corp	-0,36	0,14	-0,70
Adobe Inc	-0,56	-0,33	0,08
Netflix Inc	-0,57	0,77	-0,60

Appendix B26: Correlation Findings - Specialty Retailers

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	1	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	0	0	0
Weak Positive Correlation ($0 \leq r < 0.3$)	1	0	1
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	1	1	0
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	0	0	1
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	2	2	2

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Home Depot Inc	0,09	0,74	0,28
Lowe's Companies Inc	-0,01	-0,18	-0,39

Appendix B27: Correlation Findings - Telecommunications Services

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	0	1
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	1	0	0
Weak Positive Correlation ($0 \leq r < 0.3$)	1	1	0
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	1	0	1
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	0	1	1
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	1	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	3	3	3

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
AT&T Inc	0,31	-0,55	-0,51
T-Mobile US Inc	0,13	0,24	0,73
Comcast Corp	-0,07	-0,73	-0,24

Appendix B28: Correlation Findings - Textiles & Apparel

Level	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Perfect Positive Correlation ($r = 1$)	0	0	0
Strong Positive Correlation ($0.7 \leq r < 1$)	0	0	0
Moderate Positive Correlation ($0.3 \leq r < 0.7$)	0	0	0
Weak Positive Correlation ($0 \leq r < 0.3$)	0	1	0
No Correlation ($r = 0$)	0	0	0
Weak Negative Correlation ($-0.3 \leq r < 0$)	0	0	1
Moderate Negative Correlation ($-0.7 \leq r < -0.3$)	1	0	0
Strong Negative Correlation ($-1 \leq r < -0.7$)	0	0	0
Perfect Negative Correlation ($r = -1$)	0	0	0
Total	1	1	1

Company Name	ESG & Credit Rating	ESG & Stock Price	Credit Rating & Stock Price
Nike Inc	-0,47	0,12	-0,01

Appendix C1: Regression Findings – ESG

Companies	Industry Group	P-value
Coca-Cola Co	Beverages	3,60034E-05
Salesforce Inc	Software & IT Services	0,008660114
Comcast Corp	Telecommunications Services	0,008390051
Visa Inc	Software & IT Services	0,030923449
Union Pacific Corp	Freight & Logistics Services	0,002647406
Caterpillar Inc	Machinery. Tools. Heavy Vehicles. Trains & Ships	0,016449317
Pfizer Inc	Pharmaceuticals	0,000214256
Meta Platforms Inc	Software & IT Services	1,09366E-05
Tesla Inc	Automobiles & Auto Parts	3,19559E-09
Merck & Co Inc	Pharmaceuticals	0,025275343
S&P Global Inc	Professional & Commercial Services	2,27301E-05
Walmart Inc	Food & Drug Retailing	0,002395568
Amazon.com Inc	Diversified Retail	7,32401E-10
NVIDIA Corp	Semiconductors & Semiconductor Equipment	0,000427776
Broadcom Inc	Semiconductors & Semiconductor Equipment	5,94064E-06
Intel Corp	Semiconductors & Semiconductor Equipment	0,012366486
Lowe's Companies Inc	Specialty Retailers	0,00044921
Berkshire Hathaway Inc	Consumer Goods Conglomerates	2,95312E-05
Deere & Co	Machinery. Tools. Heavy Vehicles. Trains & Ships	5,66119E-06
PepsiCo Inc	Beverages	0,008114678
General Electric Co	Consumer Goods Conglomerates	0,048196503
American Express Co	Banking Services	1,06703E-05
TJX Companies Inc	Diversified Retail	0,017638614
Honeywell International Inc	Consumer Goods Conglomerates	0,014214062
T-Mobile US Inc	Telecommunications Services	4,17229E-07
Abbott Laboratories	Healthcare Equipment & Supplies	4,81296E-07
Procter & Gamble Co	Personal & Household Products & Services	0,00686381
Nike Inc	Textiles & Apparel	0,02191621
UnitedHealth Group Inc	Healthcare Providers & Services	1,88365E-05
Booking Holdings Inc	Hotels & Entertainment Services	8,59057E-09
United Parcel Service Inc	Freight & Logistics Services	9,16408E-05
Prologis Inc	Residential & Commercial REITs	0,010181913
Texas Instruments Inc	Semiconductors & Semiconductor Equipment	2,2412E-08
RTX Corp	Aerospace & Defense	0,006353755
Elevance Health Inc	Healthcare Providers & Services	3,36109E-12
Philip Morris International Inc	Food & Tobacco	2,89201E-05
Advanced Micro Devices Inc	Semiconductors & Semiconductor Equipment	0,001033149
Adobe Inc	Software & IT Services	0,012817769

Appendix C2: Regression Findings- Market Capitalization

Companies	Industry Group	P-value
Salesforce Inc	Software & IT Services	3,28542E-11
Pfizer Inc	Pharmaceuticals	0,028197974
Meta Platforms Inc	Software & IT Services	5,52383E-07
Tesla Inc	Automobiles & Auto Parts	6,70441E-08
Home Depot Inc	Specialty Retailers	0,000312214
NVIDIA Corp	Semiconductors & Semiconductor Equipment	4,62985E-17
Broadcom Inc	Semiconductors & Semiconductor Equipment	7,0195E-06
Intuit Inc	Financial Technology (Fintech) & Infrastructure	0,016981696
Applied Materials Inc	Semiconductors & Semiconductor Equipment	0,031207611
Intel Corp	Semiconductors & Semiconductor Equipment	5,66845E-05
Lowe's Companies Inc	Specialty Retailers	0,007048398
Berkshire Hathaway Inc	Consumer Goods Conglomerates	0,00075569
Netflix Inc	Software & IT Services	0,009431003
Deere & Co	Machinery. Tools. Heavy Vehicles. Trains & Ships	0,018519996
General Electric Co	Consumer Goods Conglomerates	0,000726979
American Express Co	Banking Services	0,007278638
Honeywell International Inc	Consumer Goods Conglomerates	0,000824797
T-Mobile US Inc	Telecommunications Services	4,64007E-10
Abbott Laboratories	Healthcare Equipment & Supplies	1,29098E-05
Procter & Gamble Co	Personal & Household Products & Services	0,039336056
Alphabet Inc	Software & IT Services	0,001817848
Nike Inc	Textiles & Apparel	0,008666432
Amgen Inc	Pharmaceuticals	2,392E-06
UnitedHealth Group Inc	Healthcare Providers & Services	0,000288796
Starbucks Corp	Hotels & Entertainment Services	0,0007365
Booking Holdings Inc	Hotels & Entertainment Services	1,94083E-10
Prologis Inc	Residential & Commercial REITs	0,017903961
Texas Instruments Inc	Semiconductors & Semiconductor Equipment	0,00036805
RTX Corp	Aerospace & Defense	0,007000627
Elevance Health Inc	Healthcare Providers & Services	1,02954E-10
Philip Morris International Inc	Food & Tobacco	1,15904E-06
Oracle Corp	Software & IT Services	0,001362098
Advanced Micro Devices Inc	Semiconductors & Semiconductor Equipment	1,74431E-07
Adobe Inc	Software & IT Services	0,00097662
Cisco Systems Inc	Communications & Networking	0,040372042

Appendix C3: Regression Findings- D/E Ratio

Companies	Industry Group	P-value
Salesforce Inc	Software & IT Services	0,002175592
Comcast Corp	Telecommunications Services	0,006471333
Thermo Fisher Scientific Inc	Healthcare Equipment & Supplies	0,001407667
Caterpillar Inc	Machinery. Tools. Heavy Vehicles. Trains & Ships	2,65361E-05
Pfizer Inc	Pharmaceuticals	1,32163E-05
Meta Platforms Inc	Software & IT Services	1,29436E-07
International Business Machines Corp	Software & IT Services	0,012050414
S&P Global Inc	Professional & Commercial Services	0,010065096
Amazon.com Inc	Diversified Retail	2,75165E-07
NVIDIA Corp	Semiconductors & Semiconductor Equipment	0,001611173
Broadcom Inc	Semiconductors & Semiconductor Equipment	2,99372E-05
Applied Materials Inc	Semiconductors & Semiconductor Equipment	0,000978437
Intel Corp	Semiconductors & Semiconductor Equipment	0,000342556
Lowe's Companies Inc	Specialty Retailers	0,000840551
Berkshire Hathaway Inc	Consumer Goods Conglomerates	0,008229007
Qualcomm Inc	Semiconductors & Semiconductor Equipment	3,77779E-10
Deere & Co	Machinery. Tools. Heavy Vehicles. Trains & Ships	0,000189995
General Electric Co	Consumer Goods Conglomerates	2,36988E-06
American Express Co	Banking Services	0,000348397
TJX Companies Inc	Diversified Retail	2,38894E-08
Honeywell International Inc	Consumer Goods Conglomerates	8,93545E-05
T-Mobile US Inc	Telecommunications Services	2,56786E-09
Abbott Laboratories	Healthcare Equipment & Supplies	3,77032E-05
Procter & Gamble Co	Personal & Household Products & Services	0,037721368
Alphabet Inc	Software & IT Services	0,011403961
Nike Inc	Textiles & Apparel	6,75997E-05
UnitedHealth Group Inc	Healthcare Providers & Services	0,000272973
Starbucks Corp	Hotels & Entertainment Services	0,048141402
Booking Holdings Inc	Hotels & Entertainment Services	2,51584E-05
United Parcel Service Inc	Freight & Logistics Services	0,000669321
Prologis Inc	Residential & Commercial REITs	0,021294201
Texas Instruments Inc	Semiconductors & Semiconductor Equipment	0,005248029
RTX Corp	Aerospace & Defense	0,018467724
Elevance Health Inc	Healthcare Providers & Services	4,53065E-09
Philip Morris International Inc	Food & Tobacco	2,71574E-05
Advanced Micro Devices Inc	Semiconductors & Semiconductor Equipment	4,04003E-12
Adobe Inc	Software & IT Services	0,001367319
Lockheed Martin Corp	Aerospace & Defense	0,048871027
Mastercard Inc	Software & IT Services	0,010259531
Cisco Systems Inc	Communications & Networking	0,027181472

Appendix C4: Regression Findings- P/E Ratio

Companies	Industry Group	P-value
Exxon Mobil Corp	Oil & Gas	0,001760582
Salesforce Inc	Software & IT Services	0,000390541
Comcast Corp	Telecommunications Services	0,01542424
Thermo Fisher Scientific Inc	Healthcare Equipment & Supplies	0,049801016
Union Pacific Corp	Freight & Logistics Services	0,000101495
Caterpillar Inc	Machinery. Tools. Heavy Vehicles. Trains & Ships	0,001199824
Pfizer Inc	Pharmaceuticals	0,016093098
Tesla Inc	Automobiles & Auto Parts	0,002472142
ServiceNow Inc	Software & IT Services	0,010050625
Home Depot Inc	Specialty Retailers	1,96275E-05
Chevron Corp	Oil & Gas	0,048640268
International Business Machines Corp	Software & IT Services	0,012980825
S&P Global Inc	Professional & Commercial Services	0,000260444
NVIDIA Corp	Semiconductors & Semiconductor Equipment	0,014072447
Broadcom Inc	Semiconductors & Semiconductor Equipment	0,000971465
Applied Materials Inc	Semiconductors & Semiconductor Equipment	0,000929822
Intel Corp	Semiconductors & Semiconductor Equipment	0,000209823
Berkshire Hathaway Inc	Consumer Goods Conglomerates	0,009196281
Netflix Inc	Software & IT Services	0,017506488
Qualcomm Inc	Semiconductors & Semiconductor Equipment	0,047443841
Deere & Co	Machinery. Tools. Heavy Vehicles. Trains & Ships	1,28665E-05
General Electric Co	Consumer Goods Conglomerates	0,000295218
American Express Co	Banking Services	5,40533E-05
TJX Companies Inc	Diversified Retail	7,6957E-08
Honeywell International Inc	Consumer Goods Conglomerates	5,59653E-06
T-Mobile US Inc	Telecommunications Services	0,035960144
Abbott Laboratories	Healthcare Equipment & Supplies	0,001449065
UnitedHealth Group Inc	Healthcare Providers & Services	0,004511468
Booking Holdings Inc	Hotels & Entertainment Services	0,000115548
Texas Instruments Inc	Semiconductors & Semiconductor Equipment	1,04983E-07
Elevance Health Inc	Healthcare Providers & Services	1,19812E-08
Philip Morris International Inc	Food & Tobacco	6,82103E-08
Oracle Corp	Software & IT Services	0,023333696
Advanced Micro Devices Inc	Semiconductors & Semiconductor Equipment	5,17032E-05
Cisco Systems Inc	Communications & Networking	0,029494157

Appendix C5: Regression Findings- FOCF Ratio

Companies	Industry Group	P-value
Comcast Corp	Telecommunications Services	0,009501644
Thermo Fisher Scientific Inc	Healthcare Equipment & Supplies	0,00526751
Eli Lilly and Co	Pharmaceuticals	0,00144827
Union Pacific Corp	Freight & Logistics Services	0,04668321
Caterpillar Inc	Machinery. Tools. Heavy Vehicles. Trains & Ships	4,88513E-07
Pfizer Inc	Pharmaceuticals	0,038822789
Meta Platforms Inc	Software & IT Services	9,23568E-05
Tesla Inc	Automobiles & Auto Parts	2,11291E-10
Home Depot Inc	Specialty Retailers	7,03898E-05
S&P Global Inc	Professional & Commercial Services	0,000306925
Walmart Inc	Food & Drug Retailing	0,000792896
Amazon.com Inc	Diversified Retail	2,21175E-12
NVIDIA Corp	Semiconductors & Semiconductor Equipment	2,81313E-08
Broadcom Inc	Semiconductors & Semiconductor Equipment	4,29709E-05
Applied Materials Inc	Semiconductors & Semiconductor Equipment	0,020569708
Intel Corp	Semiconductors & Semiconductor Equipment	0,009970119
Lowe's Companies Inc	Specialty Retailers	0,036528777
Berkshire Hathaway Inc	Consumer Goods Conglomerates	5,66101E-05
Nextera Energy Inc	Electric Utilities & IPPs	0,030340917
General Electric Co	Consumer Goods Conglomerates	0,00352521
American Express Co	Banking Services	0,000152076
Honeywell International Inc	Consumer Goods Conglomerates	0,032385377
Abbott Laboratories	Healthcare Equipment & Supplies	6,75031E-06
Procter & Gamble Co	Personal & Household Products & Services	0,036568699
Amgen Inc	Pharmaceuticals	0,004478214
Booking Holdings Inc	Hotels & Entertainment Services	1,78624E-06
Prologis Inc	Residential & Commercial REITs	0,002080737
Texas Instruments Inc	Semiconductors & Semiconductor Equipment	8,14738E-07
Danaher Corp	Healthcare Equipment & Supplies	0,044615859
Elevance Health Inc	Healthcare Providers & Services	1,01019E-06
Philip Morris International Inc	Food & Tobacco	0,000712093
Oracle Corp	Software & IT Services	0,024523852
Advanced Micro Devices Inc	Semiconductors & Semiconductor Equipment	3,47804E-12
Adobe Inc	Software & IT Services	0,001357392
Mastercard Inc	Software & IT Services	0,007486994
Cisco Systems Inc	Communications & Networking	0,026551436

Appendix D1: Granger Causality Test Findings – ESG Factors

Company Name	P Granger Causality ESG	Time lag P-Value for ESG
Exxon Mobil Corp	0,006795	11
Coca-Cola Co	0,994923	1
Salesforce Inc	0,731014	11
Comcast Corp	0,014799	8
Thermo Fisher Scientific Inc	0,673371	11
Eli Lilly and Co	0,005973	10
Apple Inc	0,103971	10
Visa Inc	0,015172	11
Union Pacific Corp	0,000894	11
Caterpillar Inc	0,068647	11
Pfizer Inc	0,788163	10
Meta Platforms Inc	0,015327	6
Tesla Inc	0,893632	1
Automatic Data Processing Inc	0,020205	3
ServiceNow Inc	0,632816	10
Intuitive Surgical Inc	0,009351	10
Home Depot Inc	0,033811	9
Chevron Corp	0,045655	9
Merck & Co Inc	0,075285	4
Bristol-Myers Squibb Co	0,002308	5
International Business Machines Corp	0,371974	3
S&P Global Inc	0,000413	11
Walmart Inc	0,351593	4
Amazon.com Inc	0,288294	6
Walt Disney Co	0,4839	6
NVIDIA Corp	0,674837	11
McDonald's Corp	0,671359	10
Broadcom Inc	0,004545	11
Intuit Inc	0,046282	4
Applied Materials Inc	0,805411	11
Microsoft Corp	0,002882	3
Intel Corp	0,15932	7
Stryker Corp	0,000116	10
Lowe's Companies Inc	0,008247	2
Berkshire Hathaway Inc	0,925408	10
Abbvie Inc	0,016294	3
Netflix Inc	0,917929	3
Qualcomm Inc	0,296286	8
Deere & Co	0,099315	4
Nextera Energy Inc	2,65E-05	11
PepsiCo Inc	0,000405	11
General Electric Co	0,020711	9
American Express Co	0,728478	3

TJX Companies Inc	0,000256	11
Honeywell International Inc	0,017341	11
T-Mobile US Inc	0,208112	3
Johnson & Johnson	0,041228	9
Abbott Laboratories	0,139931	3
Procter & Gamble Co	0,017104	7
Alphabet Inc	0,72259	3
Nike Inc	0,178881	4
Conocophillips	0,053691	11
Amgen Inc	0,374606	11
Costco Wholesale Corp	1	-1
UnitedHealth Group Inc	0,011098	10
Starbucks Corp	0,010544	11
Booking Holdings Inc	0,275774	5
United Parcel Service Inc	0,003111	2
Prologis Inc	0,687118	10
Texas Instruments Inc	0,115032	2
RTX Corp	0,037131	9
Danaher Corp	0,001687	11
Elevance Health Inc	0,046945	10
AT&T Inc	0,2923	8
Philip Morris International Inc	0,275298	1
Oracle Corp	0,104453	2
Advanced Micro Devices Inc	0,775231	8
Adobe Inc	0,841337	11
Lockheed Martin Corp	0,019851	11
Mastercard Inc	0,594165	10
Boeing Co	0,428537	4
Cisco Systems Inc	0,012411	9

Appendix D2: Granger Causality Test Findings - Market Cap.

Company Name	P Granger Causality Market Capitalization	Time lag P-Value for Market Capitalization
Exxon Mobil Corp	0,09023	10
Coca-Cola Co	0,30741	3
Salesforce Inc	0,786319	9
Comcast Corp	0,268323	3
Thermo Fisher Scientific Inc	0,95892	9
Eli Lilly and Co	0,068733	11
Apple Inc	0,100364	10
Visa Inc	0,832742	4
Union Pacific Corp	0,368463	1
Caterpillar Inc	0,351684	10
Pfizer Inc	0,02688	2
Meta Platforms Inc	0,154482	6
Tesla Inc	0,000128	7
Automatic Data Processing Inc	0,061967	3
ServiceNow Inc	0,552658	10
Intuitive Surgical Inc	0,063253	11
Home Depot Inc	0,047918	8
Chevron Corp	4,18E-05	10
Merck & Co Inc	0,484331	10
Bristol-Myers Squibb Co	0,886223	11
International Business Machines Corp	0,262952	3
S&P Global Inc	0,082705	3
Walmart Inc	0,07493	9
Amazon.com Inc	0,654546	10
Walt Disney Co	0,108386	11
NVIDIA Corp	0,546937	11
McDonald's Corp	0,007962	11
Broadcom Inc	0,015897	11
Intuit Inc	0,766838	5
Applied Materials Inc	0,167146	11
Microsoft Corp	0,031475	1
Intel Corp	0,278534	2
Stryker Corp	0,259922	3
Lowe's Companies Inc	0,002122	11
Berkshire Hathaway Inc	0,02144	1
Abbvie Inc	0,001	11
Netflix Inc	0,00816	11
Qualcomm Inc	0,207	7
Deere & Co	0,074061	11
Nextera Energy Inc	0,00119	3
PepsiCo Inc	0,191322	3
General Electric Co	0,035927	3

American Express Co	0,017737	3
TJX Companies Inc	0,024614	2
Honeywell International Inc	0,006636	3
T-Mobile US Inc	0,004034	3
Johnson & Johnson	0,004469	9
Abbott Laboratories	0,071219	1
Procter & Gamble Co	0,03883	7
Alphabet Inc	0,431829	11
Nike Inc	0,004592	2
Conocophillips	5,62E-05	9
Amgen Inc	0,439618	11
Costco Wholesale Corp	0,199356	5
UnitedHealth Group Inc	0,069391	10
Starbucks Corp	0,418938	6
Booking Holdings Inc	0,129589	3
United Parcel Service Inc	0,061959	9
Prologis Inc	0,111495	11
Texas Instruments Inc	0,274677	2
RTX Corp	0,561515	3
Danaher Corp	0,011779	11
Elevance Health Inc	0,141518	3
AT&T Inc	0,16909	11
Philip Morris International Inc	0,286753	1
Oracle Corp	0,537788	11
Advanced Micro Devices Inc	0,573083	4
Adobe Inc	0,07104	9
Lockheed Martin Corp	0,829999	3
Mastercard Inc	0,528582	3
Boeing Co	0,004452	11
Cisco Systems Inc	0,27883	1

Appendix D3: Granger Causality Test Findings – Debt / Equity

Company Name	P Granger Causality Debt to Equity	Time lag P-Value for Debt to Equity
Exxon Mobil Corp	0,852326	10
Coca-Cola Co	0,998741	11
Salesforce Inc	0,480652	1
Comcast Corp	0,35093	3
Thermo Fisher Scientific Inc	0,344919	11
Eli Lilly and Co	0,056578	8
Apple Inc	0,897194	10
Visa Inc	0,400202	6
Union Pacific Corp	0,685143	10
Caterpillar Inc	0,788817	11
Pfizer Inc	0,873098	2
Meta Platforms Inc	0,998238	9
Tesla Inc	0,972936	7
Automatic Data Processing Inc	0,882274	3
ServiceNow Inc	0,975795	5
Intuitive Surgical Inc	1	-1
Home Depot Inc	0,871122	8
Chevron Corp	0,99926	11
Merck & Co Inc	0,733544	11
Bristol-Myers Squibb Co	0,441723	2
International Business Machines Corp	0,357552	3
S&P Global Inc	0,913707	2
Walmart Inc	0,550916	3
Amazon.com Inc	1	-1
Walt Disney Co	0,996994	4
NVIDIA Corp	0,854705	9
McDonald's Corp	0,989106	11
Broadcom Inc	0,778088	4
Intuit Inc	0,96974	6
Applied Materials Inc	0,91081	1
Microsoft Corp	0,923701	3
Intel Corp	0,971306	7
Stryker Corp	0,995442	3
Lowe's Companies Inc	0,999697	11
Berkshire Hathaway Inc	0,881355	10
Abbvie Inc	0,968864	8
Netflix Inc	0,341409	4
Qualcomm Inc	0,592676	8
Deere & Co	0,96625	11
Nextera Energy Inc	0,940328	3
PepsiCo Inc	0,993192	11
General Electric Co	0,570427	11

American Express Co	0,902273	3
TJX Companies Inc	0,908746	9
Honeywell International Inc	0,972282	11
T-Mobile US Inc	0,079502	11
Johnson & Johnson	0,929267	6
Abbott Laboratories	0,674019	2
Procter & Gamble Co	0,935865	11
Alphabet Inc	0,937614	8
Nike Inc	0,688426	4
Conocophillips	0,997811	11
Amgen Inc	0,229554	7
Costco Wholesale Corp	0,979481	7
UnitedHealth Group Inc	0,230785	3
Starbucks Corp	0,524556	6
Booking Holdings Inc	0,97807	5
United Parcel Service Inc	0,993927	2
Prologis Inc	0,771706	2
Texas Instruments Inc	0,654866	2
RTX Corp	0,896208	9
Danaher Corp	0,161218	2
Elevance Health Inc	0,103121	3
AT&T Inc	0,458078	11
Philip Morris International Inc	0,878357	1
Oracle Corp	0,246478	11
Advanced Micro Devices Inc	0,947579	1
Adobe Inc	0,426009	2
Lockheed Martin Corp	0,616823	3
Mastercard Inc	0,846126	9
Boeing Co	0,974583	4
Cisco Systems Inc	0,987848	9

Appendix D4: Granger Causality Test Findings – PEG Ratio

Company Name	P Granger Causality PEG Ratio	Time lag P-Value for PEG Ratio
Exxon Mobil Corp	0,998921	11
Coca-Cola Co	0,000411	9
Salesforce Inc	0,508456	2
Comcast Corp	0,006517	11
Thermo Fisher Scientific Inc	0,455235	10
Eli Lilly and Co	0,055961	11
Apple Inc	0,157297	11
Visa Inc	0,029843	4
Union Pacific Corp	0,128805	10
Caterpillar Inc	0,001266	10
Pfizer Inc	0,333262	10
Meta Platforms Inc	0,037812	3
Tesla Inc	0,009517	10
Automatic Data Processing Inc	0,063828	10
ServiceNow Inc	0,279466	8
Intuitive Surgical Inc	0,122819	10
Home Depot Inc	0,115085	10
Chevron Corp	4,06E-05	11
Merck & Co Inc	0,246932	11
Bristol-Myers Squibb Co	0,279741	2
International Business Machines Corp	0,224741	1
S&P Global Inc	0,290766	11
Walmart Inc	0,34895	2
Amazon.com Inc	0,001357	9
Walt Disney Co	0,442999	6
NVIDIA Corp	0,29836	11
McDonald's Corp	0,06085	10
Broadcom Inc	0,005109	11
Intuit Inc	0,072495	2
Applied Materials Inc	0,578715	5
Microsoft Corp	0,092126	9
Intel Corp	0,235526	11
Stryker Corp	0,264067	9
Lowe's Companies Inc	0,125257	11
Berkshire Hathaway Inc	0,548522	3
Abbvie Inc	0,177342	11
Netflix Inc	0,969818	2
Qualcomm Inc	0,06101	8
Deere & Co	0,64022	8
Nextera Energy Inc	0,000228	11
PepsiCo Inc	0,004167	10
General Electric Co	0,102639	3

American Express Co	0,007451	9
TJX Companies Inc	0,030429	9
Honeywell International Inc	0,773093	11
T-Mobile US Inc	0,024793	3
Johnson & Johnson	0,004125	9
Abbott Laboratories	0,000143	6
Procter & Gamble Co	0,038631	7
Alphabet Inc	0,434977	3
Nike Inc	0,233055	4
Conocophillips	0,996255	10
Amgen Inc	0,04632	11
Costco Wholesale Corp	0,651413	6
UnitedHealth Group Inc	0,70579	10
Starbucks Corp	0,372812	11
Booking Holdings Inc	0,342167	2
United Parcel Service Inc	0,52137	2
Prologis Inc	0,178665	10
Texas Instruments Inc	0,193453	2
RTX Corp	0,780026	3
Danaher Corp	0,855204	2
Elevance Health Inc	0,002492	9
AT&T Inc	0,427111	11
Philip Morris International Inc	0,190088	7
Oracle Corp	0,238309	11
Advanced Micro Devices Inc	0,037935	11
Adobe Inc	0,136393	4
Lockheed Martin Corp	1,39E-05	11
Mastercard Inc	0,00034	4
Boeing Co	0,036205	4
Cisco Systems Inc	0,070107	1

Appendix D5: Granger Causality Test Findings – FOCF

Company Name	P Granger Causality FOCF	Time lag P-Value for FOCF Ratio
Exxon Mobil Corp	0,006385	9
Coca-Cola Co	0,014646	1
Salesforce Inc	0,009771	1
Comcast Corp	0,008171	3
Thermo Fisher Scientific Inc	0,877763	10
Eli Lilly and Co	0,462969	11
Apple Inc	0,090791	11
Visa Inc	0,416057	4
Union Pacific Corp	0,700782	1
Caterpillar Inc	0,600577	10
Pfizer Inc	0,019803	1
Meta Platforms Inc	0,486193	10
Tesla Inc	0,682927	1
Automatic Data Processing Inc	0,041956	3
ServiceNow Inc	0,168653	4
Intuitive Surgical Inc	0,029009	9
Home Depot Inc	0,385509	7
Chevron Corp	0,023474	11
Merck & Co Inc	0,073885	4
Bristol-Myers Squibb Co	0,028212	2
International Business Machines Corp	0,000102	11
S&P Global Inc	0,014344	10
Walmart Inc	0,466681	11
Amazon.com Inc	0,329423	6
Walt Disney Co	0,748706	6
NVIDIA Corp	0,069036	9
McDonald's Corp	0,424889	10
Broadcom Inc	0,002425	4
Intuit Inc	0,328203	11
Applied Materials Inc	0,420846	3
Microsoft Corp	0,512614	5
Intel Corp	0,194371	9
Stryker Corp	0,994364	1
Lowe's Companies Inc	0,493869	10
Berkshire Hathaway Inc	0,158185	7
Abbvie Inc	0,742667	1
Netflix Inc	0,056001	10
Qualcomm Inc	0,09366	7
Deere & Co	0,265271	4
Nextera Energy Inc	0,829865	3
PepsiCo Inc	0,943421	1
General Electric Co	0,416161	3

American Express Co	0,000404	11
TJX Companies Inc	0,002134	11
Honeywell International Inc	0,000684	2
T-Mobile US Inc	0,33406	3
Johnson & Johnson	0,000194	9
Abbott Laboratories	0,235321	3
Procter & Gamble Co	0,061541	11
Alphabet Inc	0,11324	3
Nike Inc	0,407858	4
Conocophillips	0,002889	11
Amgen Inc	0,63465	11
Costco Wholesale Corp	0,195975	7
UnitedHealth Group Inc	0,00055	9
Starbucks Corp	0,238749	6
Booking Holdings Inc	0,382528	2
United Parcel Service Inc	0,699101	2
Prologis Inc	0,548022	3
Texas Instruments Inc	0,118201	2
RTX Corp	0,93943	3
Danaher Corp	0,895348	2
Elevance Health Inc	0,085263	11
AT&T Inc	0,65848	11
Philip Morris International Inc	0,104916	3
Oracle Corp	0,754023	11
Advanced Micro Devices Inc	0,504328	3
Adobe Inc	0,60574	9
Lockheed Martin Corp	0,320984	3
Mastercard Inc	0,06701	9
Boeing Co	0,000224	4
Cisco Systems Inc	0,425374	9