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ESG Scores and Company Financial Performance in the United States

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Abstract

This objective of this thesis was to examine the relationship between financial performance and environmental, social, and corporate governance (ESG) scores in the United States over the time period 2003 to 2022. The increasing popularity of ESG investment in recent years has highlighted the need to comprehend the effects of ESG elements on financial performance in this setting, which is what drove this research purpose. Financial performance is measured by ROA, and the independent variables is measured by Refinitiv Eikon's ESG scores. After conducting a fixed effects regression and the interpretation of the correlation matrix, it can be concluded that higher ESG score has a statistically significant negative effect on financial performance for US companies, specifically when measured by ROA.

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1.0 Introduction

Within the domain of sustainable finance, environmental, social, and governance (ESG) factors have received substantial recognition as crucial indicators of corporate performance and the generation of long-term value. As the global consciousness regarding sustainability concerns continues to expand, various stakeholders such as investors, regulators, and interested parties have increasingly acknowledged the potential impact of ESG practices on financial outcomes. This master's thesis seeks to investigate the relationship between ESG scores and financial performance for US companies, offering insightful perspectives into the intricate dynamics between sustainability endeavors and corporate profitability in the United States.

Previous research examining the association between ESG and financial performance has yielded diverse outcomes, with some studies indicating a positive influence, others suggesting a neutral influence, and still others observing a negative influence. Kempf and Osthoff (2007) were among the researchers who discovered a positive effect, whereas Halbritter and Dorfleitner (2015) found a neutral effect in their investigations. On the contrary, studies conducted by Renneboog et al. (2008) demonstrated a negative effect within this relationship. The interrelation between ESG scores and financial performance is intricate and subject to variations influenced by specific industries, prevailing market conditions, and other pertinent factors.

The phenomenon of sustainable investing, also referred to as ESG (environmental, social, governance) investing, has witnessed substantial growth in recent years. According to the Global Sustainable Investment Alliance (GSIA), global sustainable investments exceeded $35 trillion in 2020, a notable increase from the $22 trillion recorded in 2016. ESG score investing traces its origins to the concept of socially responsible investing (SRI), which entails considering a company's social and environmental impact when making investment choices. SRI has a longstanding history, with early instances dating back to the 18th century (CFI Team, 2023). However, it gained greater prominence during the latter half of the 20th century as concerns regarding environmental deterioration and social inequity intensified. In the 21st and 22nd centuries, the focus on ESG investing has further

intensified, with an escalating number of investors integrating ESG factors into their investment decision-making processes. This trend has been propelled by various factors, including heightened awareness of the potential risks and opportunities associated with ESG matters, as well as the advent of more sophisticated tools for assessing and evaluating a company's ESG performance (CFI Team, 2023).

Research conducted by sustainability data firm ESG Book (Byrne, 2022) has indicated that investments in companies exhibiting robust environmental, social, and corporate governance (ESG) performance have generally demonstrated superior performance compared to market averages over the past five years. Several factors could contribute to this trend. Firstly, companies with commendable ESG scores may be perceived as more dependable and responsible by investors, thereby generating increased demand for their securities. Secondly, these companies may possess enhanced capabilities to effectively manage risks and adapt to evolving regulations and consumer preferences, thereby bolstering their long-term financial prosperity. A survey conducted by EY in 2017 revealed that sustainable investing in America has experienced an impressive compound annual growth rate of 107.4% since 2012 (Ernst & Young, 2017). Consequently, it is reasonable to assume a positive correlation between sustainability and financial success, given the escalating interest in socially responsible investing (SRI). While CSR and ESG are broader concepts that encompass the overall sustainability and ethical practices of companies, SRI specifically focuses on the investment aspect, seeking to align investments with social and environmental goals. This implies that businesses have a financial motive to invest in sustainable operations, thereby elevating their level of social responsibility. Based on these observations, the present study is guided by the following research question.

Does the ESG score influence the financial performance of US companies?

This master's thesis will adopt an empirical research approach, utilizing an extensive dataset comprising US companies sourced from the Refinitiv Eikon database. The dataset will encompass ESG ratings and financial performance data spanning a specific timeframe. Quantitative analysis techniques, such as regression analysis and correlation studies, will be employed to investigate the correlation

between ESG scores and indicators of financial performance. In order to address the research question comprehensively, it is essential to operationalize the variables involved. The independent variable, sustainability score, will be measured using the ESG rating. On the other hand, financial performance will serve as the dependent variable, assessed through the accounting-based measure of return on assets (ROA). ROA is representing the ratio of net income to total assets and provides insight into how effectively a company is using its assets to generate profits. Both variables will be extracted from the Refinitiv Eikon database (Refinitiv, 2022).

To thoroughly explore the financial significance of sustainability ratings, the study topic will be divided into two sections. Previous research has predominantly focused on the ESG score alone, thereby necessitating a deeper understanding of its constituent elements. Consequently, the ESG score will be deconstructed into its environmental, social, and governance components, resulting in a more comprehensive analysis. Each section will encompass distinct sets of hypotheses. The first section will investigate the relationship between the overall ESG score and ROA. In the second section, the ESG score will be further disaggregated into its three components (environmental, social and governance), and the association between each component's score and ROA will be examined. Additionally, a fourth controversial score will be introduced in this section to assess its link with ROA. The controversial score provides a comprehensive evaluation of the company's sustainability impact and conduct over time (Refinitiv, 2022).

The findings of our study indicate a negative relationship between ESG scores and return on assets (ROA) when considering both overall ESG scores and individual scores for environmental, social, and governance factors. In our analysis, we utilized a Fixed Effect Model to examine the impact of ESG scores on the financial performance of US companies. The selection of this method was based on its precision, as elaborated in sections 4.0 and 6.0 of the theses. The examination and assessment of available data, along with the identification of potential result distortions, are presented in the data description section 5.3 and results section 6.2. By conducting analyses on the results obtained, we will be able to provide insights that address the research question.

2.0 Literature review

In 1970, renowned economist Milton Friedman authored a seminal article entitled "The Social Responsibility of Business is to Increase its Profits," which exerted significant influence on academic and professional discourse. Within this article, Friedman presented a counter position to the burgeoning concept of corporate social responsibility (CSR) prevalent during that era. His principal contention revolved around the notion that businesses possess an overriding obligation to their shareholders and proprietors, thereby disqualifying the pursuit of social objectives as a legitimate concern for commercial enterprises. According to Friedman, businesses ought to direct their efforts exclusively towards profit maximization, operating within the confines of legal statutes and ethical norms (Friedman, 1970)

In contrast, Moskowitz (1972) conducted an influential study titled "Choosing Socially Responsible Stocks," wherein he scrutinized the interplay between corporate social responsibility (CSR) and financial performance. With a careful selection of 14 firms recognized for their adherence to social responsibility, Moskowitz demonstrated that the stocks of these firms exhibited superior performance compared to the prominent market indices, specifically the Dow Jones Industrial Average. These findings led to the conclusion that a significant correlation exists between corporate social responsibility (CSR) and stock returns (Moskowitz, 1972). This apparent contradiction served as the catalyst for an area of research that has flourished and expanded significantly in subsequent years.

2.1 CSR, SRI and ESG

Within academic research, the term "Sustainability" is commonly recognized as "Corporate Social Responsibility" (CSR), while its practical implementation in the field of finance encompasses both "Socially Responsible Investing" (SRI) and "Environmental, Social, and Governance" (ESG) approaches. Despite the variations in nomenclature, these expressions share fundamental principles and center around the three ESG factors. When discussing relevant scholarly literature, the terminology used in the respective papers is adopted; however, throughout this thesis, the term "ESG" is employed. Assessment of ESG performance frequently relies on ESG scores provided by diverse rating agencies, such as Sustainalytics, MSCI, Bloomberg, EcoVadis, Refinitiv and Morningstar. The ESG score serves as

a numerical amalgamation of perceived performance across diverse dimensions of environmental, social, and governance domains.

Corporate Social Responsibility (CSR) entails the conceptual framework and operational practices by which corporations assume accountability for their societal and environmental impact. It encompasses the voluntary endeavors undertaken by companies to integrate social and environmental concerns into their organizational activities and engagements with stakeholders. CSR transcends the traditional emphasis on profit maximization and shareholder value, acknowledging that businesses bear broader responsibilities to society (Carroll & Brown, 2022).

In recent years, there has been a notable surge in the prominence of Socially Responsible Investments (SRI), which are alternatively referred to as ethical investments or sustainable investments. SRI entails the incorporation of environmental, social, and governance (ESG) factors into the decision-making processes associated with investment activities. It provides investors with the opportunity to align their portfolios with their personal values, supporting enterprises that demonstrate positive social and environmental practices while pursuing financial returns (Renneboog, Ter Horst, & Zhang, 2008; US SIF, 2020).

The ESG score is posited as a superior instrument for capturing the corporate social responsibility (CSR) endeavors undertaken by a company. However, a notable impediment in utilizing ESG ratings for evaluating a company's sustainability pertains to the limited availability of pertinent information. The diverse levels of disclosure concerning sustainability data by companies present a challenge to numerous ESG rating agencies in faithfully representing the actual sustainability of these entities (Schäfer, 2005). Further exploration of this issue will be undertaken in section 2.3 of the forthcoming literature review.

The disclosure of socially responsible activities undertaken by firms has witnessed enhancements through both voluntary and non-voluntary disclosure agreements. One notable example of a voluntary initiative in this realm is the United Nations Global Compact (UNGC), which seeks to promote the adoption of sustainable and socially responsible policies among companies. These policies entail conducting business operations in a manner that, at the very least, fulfills essential obligations

pertaining to human rights, labor practices, environmental stewardship, and anti-corruption measures. The UNGC has outlined ten principles that participating companies are expected to adhere to. As of the latest available data from the United Nations (2022), there are currently 22,117 participants from 162 countries who have committed to following these principles and providing the necessary reports. By intensifying the reporting on ESG data, the UNGC furnishes investors with the requisite groundwork for incorporating ESG considerations into their decision-making processes and aligning their actions with the principles set forth by the United Nations Principles for Responsible Investing (UN Global Compact, 2014).

2.2 ESG and Financial performance

Empirical investigations examining the association between environmental, social, and governance (ESG) factors and financial performance have yielded inconclusive findings, presenting conflicting evidence across diverse accounting and stock-based metrics. Gordon and Rogene (1978) conducted an empirical investigation to examine the association between corporate social responsibility (CSR) and stock market performance. Their study utilized a sample of Fortune 500 companies spanning the period from 1972 to 1976, employing multiple regression analysis as the analytical approach. The findings revealed a positive relationship between CSR and stock market performance, indicating that companies with higher levels of CSR exhibited higher stock returns and risk-adjusted stock returns relative to those with lower levels of CSR (Gordon & Rogene, 1978).

In a complementary study, Servaes and Tamayo (2013) further supported these results by arguing that there exists a positive link between corporate social responsibility (CSR) and firm value, particularly for firms with substantial customer awareness, as measured by advertising expenditures. Their research drew upon the KLD Stats database, which encompasses CSR activities of a significant subset of US companies, spanning the timeframe from 1991 to 2005. The outcomes of their investigation highlighted that strong CSR performance contributed to improved firm value through enhanced advertising effects and superior financial performance (Servaes & Tamayo, 2013).

Cheung et al. (2012) conducted a comprehensive investigation to examine the impact of corporate social responsibility (CSR) practices on investor reward in the

Chinese market. Given the distinct institutional settings in China compared to other global regions, the perceived advantages of CSR have gained significant importance in this context. The study devised a corporate social responsibility (CSR) index, which served as a metric to assess the quality of CSR practices among the top 100 Chinese listed firms from 2004 to 2007. The findings of the study provided empirical evidence supporting the presence of a positive value-adding factor associated with the implementation of a socially responsible business approach (Cheung, Jiang, & Tan, 2012).

Hong and Kacperczyk (2009) presented a notable scholarly contribution in their highly regarded study titled "The price of sin: The effects of social norms on markets." This research introduced a contrasting perspective on the relationship between environmental, social, and governance (ESG) factors and financial performance. The authors defined sin stocks as publicly traded companies engaged in activities related to alcohol, tobacco, and gambling. Notably, institutional investors exhibited a tendency to avoid investing in sin stocks, leading to downward pressure on their stock prices. Consequently, these companies faced an elevated risk of legal actions stemming from societal norms, which in turn contributed to an increased expected return. The study revealed that sin stocks consistently outperformed common stocks by an average of 2.5% annually (Hong & Kacperczyk, 2009).

In a subsequent article by Lobe and Walkshäusl (2011), the authors conducted an empirical study to explore the potential outperformance of a portfolio strategy involving long positions in sin stocks and short positions in socially responsible stocks, as compared to market benchmarks. The authors rigorously examined the data and incorporated controls for common factors to ensure robust analysis. However, their investigation did not yield any empirical evidence supporting the notion that sin stocks or socially responsible stocks exhibit divergent returns (Lobe & Walkshäusl, 2011)

In a more recent study, Velte (2017) examined the relationship between environmental, social, and governance (ESG) factors and financial performance specifically within the German market. The investigation employed two measures to assess financial performance: Return on Assets (Accounting measure) and

Tobin's Q (Market oriented measure). The sample period of analysis spanned from 2010 to 2014, chosen due to the implementation of new regulations on corporate social responsibility (CSR) in listed companies following the financial crisis. These regulations prompted increased emphasis on ESG considerations among German listed firms. The findings of the study indicated that ESG, as a composite factor, along with each individual ESG factor, exhibited a significant impact on Return on Assets (ROA). However, no significant impact was observed on Tobin's Q, which measures firm value. Thus, while ESG factors influenced ROA, they did not significantly affect Tobin's Q (Velte, 2017).

The scholarly literature also explores the correlation between environmental, social, and governance (ESG) factors and firm risk. Bénabou and Tirole (2010) conducted a study that revealed firms with robust ESG profiles may exhibit distinct levels of systematic risk exposure. This divergence can be attributed to their ability to endure and recover from crisis periods, as well as to the influence of specific ESG risk factors. Furthermore, Lins et al. (2017) conducted research indicating that firms with strong ESG performance outperformed their counterparts during the financial crisis of 2008-2009, thereby supporting the argument for resilience. Additionally, Albuquerque et al. (2019) proposed a theoretical framework wherein firms with high ESG performance encounter relatively less price elastic demand due to ESG being an outcome of a differentiation strategy. Their findings highlight that companies with elevated corporate social responsibility (CSR) ratings experience a reduced cost of capital owing to lower levels of systematic risk.

Recent scholarly investigations have shifted their attention towards examining the mediating mechanisms of environmental, social, and governance (ESG) factors and their potential to facilitate the sustainable creation of long-term value within capital markets. Hoepner et al. (2022) contributed to this area of study by presenting empirical evidence that engaging with environmental, social, and governance concerns resulted in favorable outcomes for shareholders. Specifically, they demonstrated that such engagements led to a reduction in downside risk, as measured by both partial movement and value at risk. Moreover, the research revealed that the observed benefits were particularly pronounced in engagements that focused on environmental matters, with climate change being of primary importance (Hoepner, Oikonomou, Sautner, Starks, & Zhou, 2022).

2.3 ESG rating weaknesses

Presently, a multitude of ESG rating agencies exist that gather and evaluate data pertaining to diverse environmental, social, and governance aspects, culminating in the assignment of an ESG rating for a particular firm. Each agency employs its own distinct methodologies and approaches to appraise a company's performance (Berg, Koelbel, & Rigobon, 2019). Drempetic et al. (2020) conducted a study which revealed that larger firms endowed with greater resources tend to attain higher scores on ESG metrics. This finding raises apprehensions regarding the adequacy of these scores in furnishing sustainable and responsible (SR) investors with the requisite information to guide their investment decisions in line with their ethical framework (Drempetic, Klein, & Zwergel, 2019).

The accurate representation of genuine sustainability by multiple ESG rating organizations encounters obstacles due to variations in the disclosure of sustainability data by corporations. The global adoption of sustainability reporting by corporations has increased significantly in response to stakeholders' demand for enhanced transparency regarding environmental and social concerns. These reporting tools, collectively known as corporate sustainability reporting tools (SRTs), play a crucial role in tracking corporations' progress towards achieving sustainability objectives. However, one significant issue prevailing in current corporate SRTs is the evident lack of standardization, both in terms of criteria and proposed methodologies. Consequently, comparing and benchmarking the sustainability performance of corporations becomes challenging (Siew, 2015).

The selection of a rating provider holds considerable influence over the outcomes of this study, which can be perceived as a limitation. The limited disclosure of ESG data may restrict the inclusion of certain firms within our dataset. The voluntary nature of data disclosure implies that firms opting to disclose information regarding the underlying variables of the ESG rating are likely to exhibit favorable performance in relation to these dimensions. Conversely, companies that fare poorly on these metrics tend to withhold their financial results, resulting in an inherent bias in the information available. A more detailed examination of the ESG data will be provided in subsequent chapters, specifically in the methodology and data description sections.

3.0 Theory

Stakeholder theory argues that considering the interests of all parties affected by a company's decisions, such as debt holders, employees, suppliers, communities, and the general public, can reduce agency costs (Freeman, 1984). In contrast, shareholder theory asserts that a company should prioritize the interests of its shareholders, as involving other stakeholders in decision-making may reduce shareholder value (Friedman, 1962). The presented theories offer conceptual frameworks for comprehending the connection between ESG scores and financial performance.

3.1 Shareholder theory

In his influential book "Capitalism and Freedom" (1962), Milton Friedman introduced the shareholder theory advocating that a corporation's obligations are solely directed towards its shareholders. According to Friedman, the primary objective of a firm is to maximize profits and provide returns to shareholders who have assumed financial risks by investing in the company. Consequently, corporations are not socially responsible to external stakeholders, and instead of depending on businesses to carry out such activities on their behalf, shareholders should independently determine their own contributions to society (Friedman, 1962). Friedman asserts that the inclusion of diverse stakeholder interests, particularly opposing ones, would result in wasted resources, time, and ultimately lead to a reduction in value. Supporting Friedman's viewpoint, Sternberg (1994, 1997, 1998) criticizes the stakeholder theory as hazardous and unethical due to its disregard for private property rights, as well as the trust that shareholders have placed in the company.

In his work, Friedman (1962) emphasizes that businesses should only focus on maximizing profits while operating within the boundaries of the law and engaging in "open and free competition, without deception or fraud" (Friedman, 1962, p. 6). Furthermore, according to Smith (2003), the crucial phrase from Friedman's (1962) statement "without deception or fraud" is frequently overlooked. This implies that critics of the shareholder theory frequently mistakenly believe that those who support the idea are encouraging unlawful activity. Therefore, criticism of the shareholder theory often arises from a misinterpretation, rather than from disagreement (Smith, 2003). Smith (2003) further asserts that the shareholder

theory does not prohibit the allocation of funds towards charitable or socially responsible endeavors. As long as these activities offer the best investment opportunity available, the shareholder theory supports their implementation (Smith, 2003). Consequently, if it is profitable for shareholders, investing in activities aimed at enhancing Environmental, Social, and Governance (ESG) ratings should be pursued.

It is necessary to closely examine the dynamics of the manager-shareholder relationship, in order to further explore activities that enhance ESG ratings. Regarding these activities, a major challenge is the division of ownership and control, hence large publicly traded companies are owned by their shareholders but are run by hired managers (Berle & Means, 1932). Managers possess various avenues through which they can act against shareholders' best interests, with one such approach involving the allowance of cost drift and involvement in personal projects. Managers may favor these projects due to the personal benefits they offer (Jensen & Meckling, 1976). This category might include ESG improvement initiatives because they may give managers personal advantages, including being seen as environmentally friendly. As a result of these possible personal gains, managers might not behave in the best interests of shareholders.

3.2 Stakeholder theory

In response to shareholder theory, Freeman (1984) introduced stakeholder theory as an alternative perspective. The fundamental principle of stakeholder theory is that "organizations should be managed in the interest of all their constituents, not only in the interest of shareholders (Laplume et al., p. 1153). Stakeholders encompass individuals or groups who possess an interest, or "stake," in the company. The specific extent of their stake is not explicitly defined, allowing for a potentially limitless number of stakeholders. Those who disagree with the theory, argues that management's responsibilities do not include balancing the interests of an unlimited number of stakeholders. Instead, stakeholders such as debtholders, employees, customers, the local community, and suppliers are commonly recognized as constituents of the firm, with the level of stake attributed to each stakeholder determined by the degree to which they are affected by the firm's decisions.

The availability of greater financial resources for high-performing businesses may contribute to their ability to enhance their Environmental, Social, and Governance (ESG) scores, surpassing the capabilities of smaller businesses. Consequently, it can be argued that there exists a potential two-way causal relationship between financial performance and corporate social responsibility. Alternatively, one can propose that a high ESG score, and strong stakeholder relationships result in improved financial performance by reducing agency costs. These two explanations are referred to as the slack resources' hypothesis and the good management hypothesis, as described by Waddock and Graves (1997). In this thesis, the focus will be on exploring the potential wealth creation associated with a high ESG score. In the subsequent section of the study, we will delve into the development of this hypothesis in alignment with our research objective. However, before delving into that discussion, we will examine the potential sources of value creation linked to high ESG scores.

Shah and Bhaskar (2007) present a compelling argument, rooted in stakeholder theory, for the positive impact of improving Environmental, Social, and Governance (ESG) scores on financial performance (Shah & Bhaskar, 2007). In support of their stance, they reference two relevant studies, namely Whysall (2000) and Downing (1997), in their 2015 review. Whysall (2000) studied the consequences of stakeholder disagreements within companies and found that such conflicts tend to be significant, widely publicized, and prolonged (Whysall, 2000). Downing (1997), on the other hand, posited that mishandling stakeholders' interests can lead to boycotts and damage to a company's brand, resulting in financial losses and market share decline (Downing, 1997). The rationale behind the proposition that increasing ESG activities will positively impact financial performance is that by mitigating these negative repercussions, a firm's overall financial performance will improve.

Moreover, companies that proactively invest in eco-friendly initiatives, surpassing existing or anticipated legislation, can experience cost reductions (Dechant et al., 1994; Hart, 1995; Shrivastava, 1995). Furthermore, businesses have an opportunity to boost financial performance, increase efficiency, and gain competitive, by investing time and money in their workers and effective human resource solutions, as advantages stakeholder theory proponents contend (Pfeffer 1994; Huselid, 1995).

If products are promoted as environmentally friendly, ecological investments can be leveraged to yield a competitive advantage (Shrivastava, 1995). Notably, eco-friendly investments can enhance a company's reputation, thereby fostering stakeholder loyalty across various entities ranging from employees to customers to governmental bodies.

To enhance financial performance, companies can adopt a comprehensive approach that encompasses cultivating a skilled and engaged workforce, fostering positive relationships with key stakeholders such as the community, customers, and employees. By implementing these strategic business practices can lead to cost reductions for companies, as the chance of less regulation and tax benefits will rise with strong ties to the community. Thus, robust community connections and greater environmental consciousness may serve as competitive benefits for businesses (Waddock & Graves, 1997).

3.3 Shareholder vs. Stakeholder Perspective: Boosting Financial Performance through ESG Activities

One area of contention between the shareholder and stakeholder approaches is the integration of Environmental, Social, and Governance (ESG) activities to enhance financial performance. Shareholder theory, contrary to popular misinterpretation, does not prohibit the allocation of funds towards socially responsible endeavors as long as they offer the best investment opportunity available. Therefore, if investing in activities aimed at improving ESG scores proves to be profitable for shareholders, the shareholder theory supports such initiatives.

Stakeholder theory, on the other hand, argues that strong stakeholder relationships and a focus on ESG activities can lead to improved financial performance. Studies referenced by Shah and Bhaskar (2007) indicate that mishandling stakeholder interests can result in brand damage, boycotts, and financial losses. By actively addressing stakeholder concerns and investing in eco-friendly initiatives, companies can mitigate these negative consequences and enhance their financial performance. Additionally, businesses that proactively invest in eco-friendly initiatives can benefit from cost reductions, increased efficiency, and gain a competitive advantage. Such investments not only improve a company's reputation

but also foster stakeholder loyalty, ranging from employees to customers to governmental bodies.

In conclusion, the shareholder and stakeholder theories present divergent perspectives on corporate responsibility and the integration of ESG activities. In this thesis, the objective is to examine how ESG scores impact financial performance, where we can determine whether our results align with either shareholder or stakeholder theory. While the shareholder theory focuses primarily on maximizing profits for shareholders, it does not inherently oppose investments in ESG activities if they prove to be financially advantageous. In contrast, the stakeholder theory emphasizes the interests of all constituents and argues that addressing stakeholder concerns and investing in ESG activities can contribute to improved financial performance. Ultimately, finding the right balance between these two approaches is crucial for companies seeking to achieve sustainable financial success while considering the broader social and environmental impacts of their operations.

4.0 Hypotheses and methodology

The preceding sections have elucidated the pertinent body of literature and theoretical frameworks. Additionally, this chapter aims to expound upon our primary hypotheses, the various regression variables employed, the selection of a suitable panel data model, and the validation of the selected model. The objective of these activities is to address the research question posited by this thesis: *Does the ESG score influence the financial performance of US companies?* The process of model selection will be reiterated for each hypothesis, and the outcomes derived from the conducted tests will be presented in the subsequent results chapter.

4.1 Hypotheses

We shall undertake a comprehensive examination of the research question by dividing it into two distinct parts. The first part involves an investigation into the overarching relationship that is to be explored. The second part aims to enhance our comprehension of the ESG rating by scrutinizing the individual dimension scores, namely environmental, social, and governance, along with the controversies scores. The primary aim of this controversial score is to adjust the ESG performance score by taking into account adverse media narratives. This is accomplished by integrating the influence of substantial and consequential ESG controversies into the overall ESGC score. These two parts will contribute to the body of knowledge necessary for addressing the research question effectively.

Nevertheless, owing to the concurrent nature of causality, the relationship between the ESG score and financial performance becomes intricate (Waddock & Graves, 1997). To effectively analyze the association between the ESG score and financial performance, it becomes imperative to consider the lagged ESG score, thereby accounting for the causality dilemma.

$$ESG\ score_{t-1} \rightarrow Financial\ performance_t$$

The presence of a positive relationship between an organization's ESG score and its financial performance implies that enhancing the ESG rating generates value. Conversely, a negative relationship signifies that enhancing the ESG rating leads to value destruction.

4.1.2 Part 1: Total ESG Score

Hypothesis 1: Companies with higher ESG score are linked with higher financial performance in US market.

H0: There is no relationship between ESG score and financial performance.

HA: There is a relationship between ESG score and financial performance.

4.1.3 Part 2: Individual dimensions scores

Hypothesis 2.1: Companies with higher environmental score are linked with higher financial performance in US market.

H0: There is no relationship between ESGE score and financial performance.

H1: There is a relationship between ESGE score and financial performance.

Hypothesis 2.2: Companies with higher social score are linked with higher financial performance in US market.

H0: There is no relationship between ESGS score and financial performance.

H1: There is a relationship between ESGS score and financial performance.

Hypothesis 2.3: Companies with higher governance score are linked with higher financial performance in US market.

H0: There is no relationship between ESGG score and financial performance.

H1: There is a relationship between ESGG score and financial performance.

Hypothesis 2.4: Companies with higher controversies score is linked with higher financial performance in US market.

H0: There is no relationship between ESGC score and financial performance.

H1: There is a relationship between ESGC score and financial performance.

4.2 Regression Variables

To tackle the research problem at hand, this study adopts a quantitative research design, chosen for its appropriateness when dealing with a sufficiently large sample population, as is the case in this particular study. The subsequent multi-regression models incorporate specific variables, which are elaborated upon in this section for further clarity and understanding. In the forthcoming section 5.2, a comprehensive elucidation is presented regarding the foundational reasoning underlying the acquisition of the regression variables in question.

4.2.1 Dependent Variable – ROA

Return on Assets (ROA) serves as a financial indicator that assesses a company's profitability through its ability to generate earnings from its asset base. ROA provides insights into the efficiency with which a company utilizes its assets to generate profits. This metric aids investors, analysts, and stakeholders in evaluating a company's profitability and its efficacy in utilizing available resources. ROA quantifies the earnings generated by a company relative to its total assets by comparing net income to the average total assets (Graham & Dodd, 2020).

The employment of return on assets (ROA) as a metric for evaluating a firm's financial performance yields a dependable and consistent assessment, owing to its foundation in accounting principles and utilization of objective financial data. ROA effectively circumvents the potential distractions presented by market-based measurements, which are susceptible to the influences of bidding and selling dynamics, as well as the inherent measurement errors associated with perceptual measures (Jewell & Mankin, 2011). ROA provides a comprehensive assessment of the overall financial performance of the firm, expressed as a percentage. A higher ROA signifies effective asset utilization and profit generation, while a lower ROA suggests inefficiency in asset deployment. Thus, ROA will serve as the dependent variable in this research investigation. For analysis purposes, ROA data will be sourced from the Refinitiv Eikon database and computed using the formula provided by Refinitiv (2022).

$$ROA = \frac{(Net\ income\ before\ preferred\ dividends + ((Interest\ expenses\ on\ debt - Interest\ capitalized) * (1 - Tax\ rate)))}{Average\ of\ last\ year's\ and\ current\ year's\ total\ assets} * 100$$

4.2.2 Independent Variables - ESG scores

The primary independent variables utilized in this study, namely the ESG score and the individual scores pertaining to the environmental (E), social (S), and governance (G) pillars, were acquired from Refinitiv (2022). Additionally, a controversy score (ESGC) has been incorporated, which accounts for unfavorable press coverage associated with 23 ESG controversy categories. In the event of a controversy emerging during a year, the implicated firm is subject to penalties, thereby exerting an influence on both its overall ESG Combined Score and corresponding grading (Refinitiv, 2022). Consistent with the findings of Iamandi et al. (2019), it is imperative not to disregard controversies when appraising a company's ESG

practices. This further substantiates the rationale behind incorporating the ESGC as an independent variable.

Given our primary objective of accurately measuring the ESG performance of American corporations, we employ a comprehensive approach by examining various dimensions of ESG factors and pillars. These distinct ESG ratings are thus utilized as independent variables. In subsequent stages of the study, we investigate whether the financial performance of firms has been influenced by their ESG rankings. Consequently, the environmental, social, and corporate governance (ESG) pillars are individually examined in the regression analysis to ascertain their overall effects.

The comprehensive assessment of environmental, social, and governance (ESG) performance entails the integration of distinct pillar scores to calculate an overall ESG score. Each pillar comprises various categories, and these categories are accorded varying weights. The determination of pillar scores involves the computation of aggregate scores derived from individual category scores, in conjunction with the corresponding category weights (Refinitiv, 2022). To elucidate the weight distribution, Table 1 in section 5.2.2 furnishes a comprehensive summary of the allocated weights for each individual category. The scoring mechanism within each category adheres to a scale ranging from 0 to 100. This scoring process encompasses the evaluation of firms within the same category, considering both the quantity of companies and their corresponding performance levels. The TRBC industry group is employed as the standard reference point for evaluating the environmental and social category scores, in addition to the controversies score. Conversely, the country of incorporation serves as the benchmark for assessing the governance categories. The formula employed to determine the category scores, sourced from Refinitiv, is as follows (Refinitiv, 2022):

$$score = \frac{\text{no. of companies with a worse value} + \frac{no.\,of\ companies\ with\ the\ same\ value\ included\ in\ the\ current\ one}{2}}{no.\,of\ companies\ with\ a\ value}$$

4.2.3 Control Variables

To ensure the robustness and significance of our research findings, it is crucial to incorporate various control variables that align with prior studies (Orlitzky & Benjamin, 2001; Fischer & Sawczyn, 2013; Velte, 2017). In accordance with

previous research by Fischer & Sawczyn (2013) and Velte (2017), it is important to consider the level of investment in research and development (R&D) since it is often considered an indicator of a company's commitment to innovation and long-term growth. However, due to limitations in available observations, as indicated in section 5.3, we have made the decision to exclude the R&D variable from our analysis. It is important to acknowledge that this exclusion could potentially introduce omitted variable bias, as discussed in section 4.4.

Firm Size (Size): In the regression model, firm size is represented by the natural logarithm of total current assets, obtained from Refinitiv (2022). Previous research conducted by Goss and Roberts (2011) has demonstrated that larger firms may exhibit higher cash flow volatility and possess greater collateral compared to smaller firms, all while being perceived as less risky by lenders. Additionally, Fama and French (1993) explored this relationship, revealing that smaller firms tend to yield higher returns, indicating an inverse association between company size and ROA.

Debt Ratio (Debt Ratio): The debt ratio, calculated as the ratio of total debt to total assets, reflects the financial leverage or the extent to which a company's assets are financed by debt. A higher debt ratio generally indicates a higher level of financial risk, as the company has a greater reliance on debt financing. In the realm of analysis, the debt ratio is employed as an indicator of unsystematic risk (Velte, 2017), primarily due to the prevailing reality that larger corporations frequently exhibit economies of scale that pose challenges in replication (Roberts & Dowling, 2002). The risk faced by a firm can be categorized into two components: systematic and unsystematic (Velte, 2017). The debt ratio, expressed as a percentage, is obtained from Refinitiv (2022).

$$Debt\ Ratio = \frac{(Short\ term\ debt\ \&\ Current\ portion\ of\ long\ term\ debt + Long\ term\ debt)}{Total\ assets} * 100$$

Beta (Beta): Beta is a metric used to control for systematic risk across different dimensions, quantifying the extent to which a stock's price fluctuates in response to market movements (Refinitiv, 2022). A higher beta implies higher systematic risk, and investors generally demand a higher return for investing in riskier assets. As a result, companies with higher betas may have higher costs of capital, which can

influence their profitability and ultimately affect their ROA. The beta variable is extracted from Refinitiv and represents the covariance between the security's price movements and the market's price movements. Market price movements are estimated using the daily stock returns of all American companies. The formula employed for calculating beta in this analysis is presented as follows:

$$Beta = \frac{Cov(r_i, r_m)}{Var(r_m)}$$

Return on Invested Capital (ROIC): ROIC represents a financial indicator employed to gauge a company's profitability in relation to the capital it has invested in its operational activities. The incorporation of Return on Invested Capital (ROIC) as a control variable enhances the examination of financial performance by isolating the impact of capital efficiency. By quantifying a company's capacity to generate profits from its invested capital, ROIC facilitates the evaluation of whether discrepancies in financial performance can be ascribed to disparities in capital efficiency (Baird, Geylani, & Roberts, 2012). It serves as a valuable metric for investors and analysts to assess the effectiveness of a company in utilizing its invested capital to generate profits (Refinitiv, 2022). ROIC, extracted from Refinitiv (2022), can be computed using the following formula:

$$ROIC = \frac{(Net\ Income - Bottom\ Line + ((Interest\ Expense\ on\ Debt - Interest\ Capitalized) * (1 - Tax\ Rate)))}{Average\ of\ Last\ Year's\ and\ Current\ Year's\ (Total\ Capital + Short\ Term\ Debt\ \&\ Current\ Portion\ of\ long\ Term\ Debt)} * 100$$

Industry dummy variables (IND): These variables serve as an evaluative tool to assess the differential impact of industry codes on the environmental, social, and governance (ESG) performance of organizations. Recognizing the variations in stakeholder management and performance across different industries, the inclusion of industry dummy variables as control variables is imperative (Velte, 2017). This notion is supported by Fischer and Sawczyn (2013), who assert that the level of regulation and adherence to socially responsible standards can vary depending on the sector in which a company operates. In accordance with the Standard Industrial Code, specifically the TRBC Economic Sector classification, the sample enterprises were categorized into nine distinct industrial groups. For further details on the specific industry codes, please refer to Section 5.3.3 of the corresponding document.

4.3 Using panel data to develop model.

This study employs panel regression models to estimate the proposed hypotheses. The dataset utilized in this study encompasses observations spanning 18 years and encompasses a total of 219 companies, representing a structured panel data format. Panel data, also referred to as longitudinal data or cross-sectional time series data, combines elements of both cross-sectional and time series data (Stock & Watson, 2015). The utilization of panel data enhances the accuracy of estimations in this study and presents significant advantages over relying solely on time series or cross-sectional data (Sheytanova, 2014).

One notable benefit associated with the utilization of a panel data set lies in its capacity to account for unobservable variables that may vary across firms and years, provided an accurate modeling framework is employed (Stock & Watson, 2015). Due to this, panel data serves as a robust analytical tool, empowering researchers to control for individual heterogeneity.

In panel regression models, three fundamental models are essential to consider, as outlined by Stock & Watson (2015): Pooled Ordinary Least Squares (OLS), Fixed Effects, and Random Effects. Employing various tests in panel data regression is crucial for ensuring the validity of the model and obtaining reliable estimates. This contention is further supported by prior research conducted by Lo & Sheu (2007), Velte (2017) and Atan et al. (2018). To determine the most suitable model for our panel data set, we will employ a Poolability Test, a Breusch-Pagan Multiplier Test, and a Hausman Test. These tests help determine the appropriate model specification, identify heteroscedasticity issues, and choose between fixed effects and random effects models, leading to accurate and valid regression results in the analysis of panel data.

In order to provide readers with a comprehensive understanding of the structural characteristics of the three panel data models employed in this study (namely, pooled ordinary least squares (OLS), fixed effects, and random effects models), a discussion on their respective frameworks will be presented prior to delving into the assessment of model validity.

4.3.1 Pooled OLS model

The Pooled Ordinary Least Squares (OLS) model, referred to as the Pooled OLS regression or the Pooled Cross-Sectional Time Series model, serves as a fundamental linear regression model employed in the analysis of panel data. Within the Pooled OLS model, the panel data is combined, treating all observations as if they originate from a singular extensive cross-sectional dataset. Consequently, the dependent variables are pooled together, encompassing both cross-sectional and time-series observations (Brooks, 2014).

This model assumes that all individual entities possess identical intercept and slope coefficients, regardless of their distinctive characteristics or temporal periods. Essentially, it presumes the absence of individual heterogeneity or time-specific effects (Atan, Alam, Said, & Zamri, 2018). The mathematical representation of the Pooled OLS model is presented as follows:

$$y_{it} = \beta_0 + \beta_1 x_{1,it} + \beta_2 x_{2,it} + \cdots + \beta_k x_{k,it} + \varepsilon_{it}$$

In the context of the Pooled OLS, simple betas are employed due to their disregard for cross-sectional or time-sectional properties. This neglect can potentially introduce biased estimates and render inferences invalid. In cases where evidence of individual heterogeneity or time-specific effects is apparent in the data, more advanced panel data models such as fixed effects models or random effects models are frequently employed to account for these factors and obtain more reliable estimates (Brooks, 2014).

4.3.2 Fixed effects model

In contrast to the Pooled OLS model, the Fixed Effects (FE) model emerges as a panel data regression framework that accommodates individual-specific heterogeneity within the analysis of panel data. Its purpose is to address the presence of unobservable characteristics specific to individuals, which may exert an influence on both the dependent and independent variables (Atan, Alam, Said, & Zamri, 2018). To account for the variations across entities, the model incorporates a distinct intercept for each entity. These entity-specific intercepts capture the unobserved disparities within each entity that are not captured by the

control variables (Stock & Watson, 2015). The formulation of the fixed-effects model for k factors can be expressed as follows:

$$y_{it} = \alpha_i + \beta_1 x_{1,it} + \beta_2 x_{2,it} + \cdots + \beta_k x_{k,it} + \varepsilon_{it}$$

The primary rationale for employing the fixed-effects model lies in its capability to address unobserved heterogeneity (Sheytanova, 2014). Consequently, it assumes the existence of omitted variables in the panel data that vary among entities but remain constant over time (Stock & Watson, 2015). To ascertain the presence of fixed effects within the panel dataset, the Poolability Test is utilized. If individual-specific effects are identified, the Fixed Effects model is preferred over the Pooled OLS model. Furthermore, it is imperative to examine the potential presence of random effects before making a determination regarding the suitability of the Fixed Effects Model (Kunst, 2009).

4.3.3 Random effects model

The Random Effects (RE) model emerges as a panel data regression framework that encompasses both individual-specific heterogeneity and time-varying effects within the analysis of panel data. It acknowledges the existence of unobservable individual-specific factors that exhibit correlation with the independent variables, as well as time-varying effects that exert an influence on the dependent variable (Brooks, 2014). The key distinction between the fixed effects and random effects models lies in the assumption made by the random effects model regarding the random selection of all entities, resulting in a random individual effect rather than a fixed one, as seen in the fixed effects model (Greene, 2012).

In the Random Effects Model, it is assumed that the intercepts associated with each unit are drawn from a shared intercept, which remains consistent across all units and over the entire time span of analysis. Additionally, a random variable is introduced, which remains constant over time and serves as a measure of the random deviation between the intercept term specific to each entity and the global intercept term (Brooks, 2014). Thus, the representation of the Random Effects model can be expressed as follows:

$$y_{it} = \mu + \beta_1 x_{1,it} + \beta_2 x_{2,it} + \cdots + \beta_k x_{k,it} + \mu_{it}$$

To assess the presence of random effects within the dataset, the Breusch-Pagan Lagrange Multiplier Test is employed. If the variance of the individual-specific or time-specific errors is found to be nonzero, the Random Effects model is selected over the Pooled OLS model. The choice between the Fixed Effect Model and the Random Effect Model can be determined through the Hausman Test, which allows for the identification of the stronger effect and, consequently, the appropriate model choice (Park, 2011).

4.4 Validity

Based on the results of the model selection tests, it has been determined that a Fixed Effect Model is the most suitable approach for investigating the research questions at hand. This part of the thesis will focus on ensuring the reliability of the Fixed Effect Model and subsequently assessing the legitimacy of the obtained results. The results from the tests will be presented in section 6.0 Results.

4.4.1 Omitted Variable

When the omitted variable is both correlated with the dependent variable, and also correlates with at least one of the independent variables, omitted variable bias occurs. This creates a bias which results in a model with inconsistent estimations. In this thesis, the selection of both dependent and control variables is guided by previous literatures economic arguments, aiming to mitigate the possibility of omitted variable bias occurring (Orlitzky & Benjamin, 2001; Fischer & Sawczyn, 2013; Velte, 2017). The dependent variable's value typically falls along the regression line, which stipulates that the error term has a conditional mean of zero, according to the first premise of the Fixed Effect Model. The assumption implies that the absence omitted variable bias, and that the error term in the model is assumed to have an average value of zero (Stock & Watson, 2015) Additionally, it is significant to acknowledge the potential presence of omitted variable bias in our thesis, particularly in regard to the exclusion of the research and development (R&D) variable due to missing observations in the Refinitiv Eikon database. This omission may introduce bias in our analysis, as empirical evidence suggests a significant positive correlation between R&D investment and sustainability rankings (Fischer & Sawczyn, 2013).

4.4.2 Reverse Causality

A potential concern regarding the reliability of our findings is the issue of reverse causality, wherein a relationship exists between variables X and Y such that X causes Y, but Y also causes X. When examining the consequences of ESG performance, prior literature has employed various strategies to mitigate the problem of reverse causality (Waddock and Graves, 1997; Dhaliwal et al., 2011; El Ghoul et al., 2011; Cheng et al., 2014; Samet et al., 2018). Notably, Waddock and Graves (1997) found evidence supporting a bidirectional relationship between corporate social performance and preceding financial performance. The relationship between ESG performance and financial constraints can be seen from two perspectives. On one hand, a higher ESG performance by a firm may suggest lower financial constraints. On the other hand, lower financial constraints could be a driving factor behind a firm's higher ESG performance. It is important to note that the ESG score in year t, specifically t−1, is determined based on all available information from the previous fiscal year (Cheng et al., 2014). Understanding the connection between ESG performance and financial restrictions will be significantly impacted by the timing of revised ESG ratings and the release of yearly reports. By considering the temporal sequence of events, it becomes evident that the disclosed information within these reports provides a retrospective view of the firm's activities and events during the preceding fiscal year. In addition, it is worth noting that each company's ESG score is assessed relative to other entities within the same business category. Furthermore, it is significant to emphasize that our independent ESG variable is intentionally lagged by one period, serving as a precautionary measure against reverse causality. However, while the presence of reverse causality may introduce bias and inconsistency in the coefficients, addressing this issue falls outside the scope of this thesis.

4.4.3 Selection Bias

According to Stock and Watson (2015), sample selection bias refers to the presence of missing data due to a selection process which is associated with the dependent variable. Therefore, sample selection bias can pose a risk to internal validity when there are missing data that are related to the dependent variable, which can cause biased estimators. In the context of the Fixed Effect Model, when entities are randomly selected from the populations, the assumption of independent and identically distributed variables across entities holds true (Stock & Watson, 2015).

The selection of entities in our data set was based on availability of their obtainable ESG scores throughout the entire sample period, and not performed through random sampling. Consequently, this non-random selection process introduces the probability of selection bias in our data set, which could be a substantial concern. When data is included or excluded based on its availability, it will lead to distorted representation of the data, making the sample selection biased (Heckman, 1979). Fischer and Sawczyn (2013) propose that companies that report their ESG scores throughout the entire sample period may have done so with self-interest, with an intention to selectively disclose information on variables in which they outperform their competitors (Fischer & Sawczyn, 2013). This strategic behavior suggests that there is a potential incentive for businesses to portray a more satisfactory ESG profile, thereby biasing the reported data. Furthermore, companies may purposefully refrain from reporting ESG scores due to poor performance, and as a result, the sample may lack representation and be biased. Therefore, the generalizability of our findings is restricted to the US companies included in our sample, illustrating one of the impacts sample biases may have on the results.

4.4.4 Multicollinearity

One of the key assumptions in regression analysis is the absence of perfect multicollinearity, which occurs when there is a perfect linear relationship between two or more variables (Brooks, 2014). In the event of perfect multicollinearity, statistical software will issue a warning or exclude one of the perfectly correlated variables from the regression analysis, as this condition is rare in practice. However, imperfect multicollinearity, also referred to as near perfect multicollinearity, is a more common occurrence that leads to high R-squared values and inflated standard errors for individual coefficients. This implies that while the model may exhibit strong explanatory power, the individual variables may not contribute significantly to the regression analysis. Another challenge that arises in the presence of near multicollinearity is the issue of regression sensitivity. Dropping a single variable can have a substantial impact on the regression results, introducing instability and potential bias (Brooks, 2014). Additionally, near multicollinearity leads to wider confidence intervals and higher standard errors, resulting in less precise estimations and potentially inaccurate conclusions (Brooks, 2014). While detecting easy forms of multicollinearity can be achieved through examining the correlation matrix, certain types of multicollinearities, such as a linear relationship between multiple

explanatory variables cannot be easily identified using this approach (Brooks, 2014). The examination of the correlation matrix between the variables will be conducted in section 5.3.6 of the thesis.

4.4.5 Measurement Error

In this study, the Refinitiv database have been used in order to gather necessary data. Even though the Refinitiv database is broadly acknowledged for its credibility, as explicitly stated on their website "A trusted source of data and insights for journalists across the world", it is not exempt from potential inaccuracies and limitations. When data is inaccurately reported, or there are errors in collected data, can cause measurement error, which can lead to wrong results due to inconsistent estimators. However, as far as we can tell, there is no proof of data alteration or misuse in our data. Due to the lack of standardized method to measure ESG scores, it makes rating agencies uses various methods to compute ESG (Waddock & Graves, 1997). As a result, potential measurement of error in ESG evaluations could cause concern, and it will limit how far we can apply the results of our study. The ESG metrics acquired only from Refinitiv Eikon will be relevant to our findings in the conclusion.

The data description part later in the thesis goes into great depth about the measurement process Refinitiv Eikon utilized to determine their ESG rating. However, the larger issue of developing a widely acknowledged approach for evaluating ESG continues to be a subject of controversy and is an issue that still needs resolving.

4.4.6 Autocorrelation

In order to ensure the accuracy of standard errors and the efficiency of coefficient estimates, it is essential to consider the presence of autocorrelation. Ignoring autocorrelation can render the coefficient estimates inefficient, while they remain unbiased (Brooks, 2014). Therefore, it is crucial to ascertain whether the level of autocorrelation in the data will have an impact on the results, hence incorrect standard errors can lead to erroneous findings and conclusions. In a panel data setting, the Wooldridge Serial Correlation test is deemed suitable, and therefore has been for this study's dataset. Also, The Ljung-Box Q and the Durbon-Watson tests

are likewise alternative methods to detect if there is autocorrelation. The test result can be observed in the thesis's results section.

4.4.7 Large outliers

The likelihood of large outliers is another presumption for Fixed Effect Model. According to the presumption, the regressor and dependent variable both exhibit finite kurtosis (Stock & Watson, 2015). Although the term "outlier" is subject to interpretation, in practice it refers to a significant finding that, if disregarded, would significantly have an impact on estimates (Wooldridge, 2018). The presence of large outliers may be the result of data input errors, such as incorrect numerical values or incorrect decimal point placement. However, an outlier might also reflect a true observation that differs considerably from the majority of the sample in terms of attributes, if it is not a data input error (Wooldridge, 2018). Ultimately, the presumption of the presence of large outliers highlights the significance of being cautious and observant when handling our collected data. The descriptive statistics, section 5.3 table 2, provides essential information for our analysis. It presents key measures such as the minimum, maximum, median, mean, and standard deviation of the variables under consideration. After conducting a meticulous analysis of the descriptive statistics, we meticulously assessed each observation to detect any possible outliers or anomalous values. Based on this rigorous examination, we will determine if any factors necessitate exclusion from our analysis. However, this will be further discussed in 5.3.4.

5.0 Data

In this part of the study the data selection process will be presented. Firstly, the initial part introduces the employed data filtering and sample selection criteria utilized in obtaining the data sample. Then, the next part proceeds to delineate the specific data collected for the sample.

5.1 Sample selection and data filtering

The subsequent data filtering and sample selection parameters were implemented to acquire the final set of data samples:

Country of Exchange: This thesis focuses on companies that are listed in the United States and served as the country of exchange, listed on several of the major US exchanges, including NYSE and Nasdaq. The research and analysis carried out in this study focused on the unique context and dynamics of these companies inside the American market by using US-listed companies as the major reference.

Excluding Financial institutions: have been left out of prior similar research, citing the rationale that they operate under distinct regulatory framework compared to business in other industries (Velte, 2017). Additionally, financial institution's has unique business models, which may introduce variations in the impact of ESG scores (Eccles et al., 2014).

Excluding Companies: Additionally, excluding companies without ESG scores throughout the sample period was a vital step in ensuring the dataset's representativeness. This filtering procedure was imperative to mitigate potential selection bias and disregard entities that were deemed insignificant.

Lagged ESG: In the light of prior existing literature's recognition that ESG score does not consistently result in improved financial performance (Choi & Wang, 2009), along with previous research from Atan et al. (2018) and Velte (2017), we employ a one-year lag of ESG scores to examine the impact of ESG scores has on US's companies' future financial performance. Furthermore, by comparing the ESG performance scores from the preceding year (t-1) to the dependent variables' values in the current year (t), which spans from 2003 to 2022, we maintain the initial values of the dependent variables. Consequently, the dataset applied for estimating

the ESGE, ESGS, ESGG and ESGC scores ranges from 2003 to 2021, while data for other independent variables encompasses the period from 2003 to 2022.

Out of the initial sample data obtained from the Eikon Refinitiv (2022) database, 219 of a total of 13217 US corporations, which operates in 9 different industries in the US had comprehensive financial and ESG data spanning the period from 2003 to 2021. Initially, we set a time span from 2002-2022, but due to missing observations, and a relative low number of firms with reported ESG scores, the time period was reduced with one year to 2003-2022. By reducing the time period raises concern for potential selection bias to occur, as it's possible that the sample does not adequately reflect the relevant time period or the full population. Hence the excluded data may have distinct characteristics or patterns, it could induce bias into the evaluation of the association between financial performance and ESG scores. Therefore, the sample may not be fully representative.

5.2 Sample collection and description

This section provides an exposition on the methodology employed for acquiring the sample data pertaining to the dependent, independent, and control variables, elucidating the underlying rationale. Consequently, all regression variables have been sourced exclusively from Refinitiv (2022), owing to numerous substantial discrepancies encountered with data sample sets procured from other data collection agencies such as Sustainalytics, MSCI, Bloomberg, EcoVadis, and Morningstar.

5.2.1 Dependent Variable – ROA

The primary objective of this thesis revolves around investigating the potential value-enhancing effects of enhancing Environmental, Social, and Governance (ESG) activities within a firm. Consequently, the dependent variable in this study is financial performance, which is measured through Return on Assets (ROA). The selection of ROA as the financial performance metric stems from its ability to provide a comprehensive assessment of the overall financial performance of the firm. The specific formula employed for calculating ROA in this research can be found in section 4.2.1.

When deciding to evaluate financial performance, careful consideration was given to incorporating characteristics that encompassed all stakeholders, rather than solely focusing on shareholders. The aim is to obtain a financial metric that comprehensively captures the firm's capacity to generate financial performance, encompassing contributions from both equity and debt sources. Various alternatives, including accounting-based measures, perceptual measures, and market-based indicators, were evaluated during the analysis.

According to Orlitzky et al. (2003), accounting-based measures capture the firm's resource allocation and managerial capabilities, thereby reflecting the efficacy of internal decision-making processes. On the other hand, subjective perception measures, such as surveys assessing a company's financial success, are susceptible to significant measurement errors. Market-based indicators, such as share price, primarily target shareholders, and are influenced by market dynamics. The market value of a company can be influenced by shareholders' perceptions of shares and their buying or selling decisions (Orlitzky, Schmidt, & Rynes, 2003). Based on this information, it was evident that an accounting-based measure was the most appropriate choice.

5.2.2 Independent Variables - ESG Scores

ESG scores have been adopted as a measurement approach to assess the corporate responsibility of businesses, aligning with prior research in this area. The ESG scores utilized in this study were obtained from Refinitiv in 2022, focusing specifically on US firms. Selecting the most appropriate rating instrument posed a challenge due to variations in methodologies employed by different rating agencies, a topic thoroughly discussed in the literature review's section 2.3.

Previously known as ASSET4 before being renamed Thomson Reuters ESG score in 2016 and subsequently modified to Refinitiv ESG score in 2021, the ESG performance metric from Eikon provided by Refinitiv was chosen. Refinitiv's ESG rating was selected due to its possession of the largest global database of ESG ratings and its commitment to transparency in disclosing its calculation methodology. The lack of transparency has been identified as a contributing factor to the inconsistent impact of ESG ratings on financial performance (Orlitzky, Schmidt, & Rynes, 2003). Refinitiv, with a history dating back to 2002, presently

covers 10,000 firms, representing approximately 80% of the global market value (Refinitiv, 2022).

The ESG scores utilized in this study are derived from an aggregation of over 630 ESG metrics, which are further categorized into 186 underlying estimates based on factors such as comparability, industry-specific relevance, and availability of ESG data. These metrics are organized into ten categories, resulting in the calculation of pillar scores (Refinitiv, 2022). The environmental, social, and governance pillar scores are then utilized to determine the overall ESG score. Table 1 provides an overview of the assigned weights for each pillar and sub-category component in the estimation of the total ESG score.

Table 1: Weightings for Refinitiv ESG score

Pillar	Category	Weights	Sum of weights
Environmental	Emissions	0.15	0.44
	Resource use	0.15	
	Innovation	0.13	
Social	Community	0.09	0.31
	Human rights	0.05	
	Product responsibility	0.04	
	Workforce	0.13	
Governance	Shareholders	0.05	0.26
	CSR strategy	0.03	
	Management	0.17	

5.2.3 Control variables

The inclusion of various control variables in this study is motivated by their frequent utilization in previous research within the same field. Extensive literature exists that explores diverse control variables, yet our focus is on studies conducted by Orlitzky & Benjamin (2001), Fischer & Sawczyn (2013), and Velte (2017). Additionally, we have examined the research conducted by Choi and Wang (2009), where they provide an explanation for their choice of control variables as factors influencing profit persistence.

To incorporate risk factors into our analysis, we employ both systematic and unsystematic risk measurements. Accordingly, the debt-to-assets ratio (Debt Ratio) is used as a proxy for unsystematic risk, while the beta factor (Beta) serves as a

proxy for systematic risk (Fischer & Sawczyn, 2013). The relationship between organizational risk, stakeholder relationships, and financial performance has been supported by the research of Waddock and Graves (1997), thereby lending credibility to the inclusion of these control variables. Similarly, Velte (2017) also incorporated these control variables in his own research to account for financial risk. He argues that although higher ESG performance may indicate lower risk, it is imperative to consider risk factors in the analysis.

Following Velte's approach in his 2017 study, we adopt the natural logarithm of total assets as a measure of firm size in our investigation. The inclusion of firm size as a control variable is significant due to the potential of larger companies to generate greater revenue through economies of scale and enhanced learning capabilities compared to smaller firms, as suggested by Jang et al. (2013). Furthermore, Drempetic et al. (2020), as discussed in section 2.3 of the literature review, conducted research in this domain and revealed a robust positive correlation between larger firm size and measurements of ESG variables. This relationship can be attributed to the concept of organizational legitimacy. Consequently, unreliable findings may arise if the variables of company size and industry are not properly addressed.

The inclusion of Return on Invested Capital (ROIC) as a control variable serves to enhance the analysis of financial performance by isolating the influence of capital efficiency. By measuring a company's ability to generate profits from its invested capital, ROIC enables the assessment of whether variations in financial performance can be attributed to disparities in capital efficiency. This approach facilitates the differentiation of effects arising from other variables under investigation, thereby improving the accuracy and reliability of financial performance analysis. By incorporating ROIC as a control variable, a more comprehensive examination of the factors impacting a company's profitability is enabled, leading to informed decision-making and a deeper understanding of the drivers of financial success (Baird, Geylani, & Roberts, 2012).

Furthermore, previous studies have indicated that the industry in which companies operate can significantly influence the creation of diverse environmental, social, and governance (ESG) outcomes across firms. To account for this, an industry

dummy variable is incorporated in the analysis. Garcia et al. (2017) found evidence to support the notion that enterprises operating within contentious industries exhibit superior environmental, social, and governance (ESG) performance when compared to non-conventional firms. This variable has also been included in the studies of Fischer & Sawczyn (2013) and Velte (2017), where it is argued that a dummy variable effectively controls for the impact of industry. Additionally, the inclusion of the industry variable as a control variable is warranted as corporate social responsibility (CSR) initiatives are influenced by the nature of a company's goods (Jang, Lee, & Choi, 2013).

5.3 Descriptive Statistics

Table 2: Descriptive statistics

	Mean	Median	Max	Min	Std. Dev.	Numb. Obs
ESG	52.23	54.48	95.16	1.9	20.6	3648
ESGE	44.69	48.42	98.55	0	29.86	3648
ESGS	53.22	54.81	98.01	2.52	23.04	3648
ESGG	57.74	60.13	98.53	0.7	21.43	3648
ESGC	78.38	100	100	0.93	31.8	3648
ESGCOM	47.85	47.43	92.54	0.7	18.64	3648
ROA	7.44	7.28	72.69	-82.57	7.83	3648
Debt ratio	29.08	28.06	105.36	0.01	15.71	3648
Beta	1.09	1.01	9.05	-1.46	0.64	3648
size	15.27	15.16	19.84	9.99	1.17	3648
R&D	1,33	0,36	56.05	0	2.13	2168
ROIC	11.49	10.69	254.13	-276.02	15.77	3648

The table above display the descriptive statistics for the entire sample, including mean, median, maximum, minimum, standard deviation, and the number of observations. Since there was a lack of data, the year 2002 was disregarded.

The mean value for environment, social and govern pillar scores all represent another subcategory of ESG's mean value. The environmental mean value is lower than the other pillars, indicating potentially lower environmental factors in this category. Additionally, the higher standard deviation observed in ESGE implies a greater degree of variability in the ESGE scores, which indicates a wider variety of performance across firms in category. This can be explained by that some companies did have a ESGE pillar score of 0 throughout the sample period and still obtaining an overall ESG score, considering the weighting mechanism used to determine ESG scores, which was discussed in Table 1 of section 5.2.2. These remarks can be justified by the fact that socially responsible investing (SRI) has a

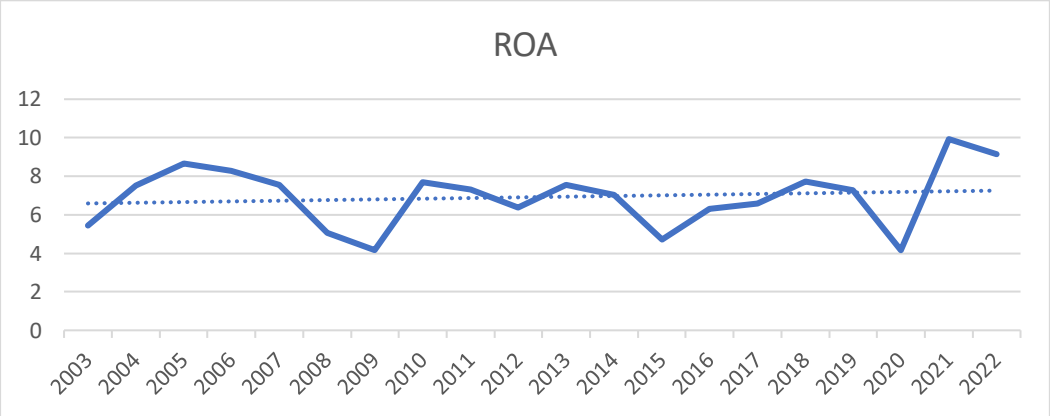
longer history than the particular emphasis on environmental concerns. Our study's sample period goes all the way back to 2003, when environmental concerns were still considered a relatively new trend. Therefore, this temporal disparity may introduce selection bias in the sample data, as companies that were early adopters of environmental practices may be overrepresented.

The term "ESGCOM" refers to Refinitiv's ESG combined score, which includes the impact of their controversies score. By considering both the ESGC and other ESG factors in the ESGCOM score, a more comprehensive evaluation of a company's environmental, social, and governance performance can be achieved (Refinitiv, 2022). The addition of the controversy score gives the assessment a new perspective and makes it possible to comprehend a company's ESG profile more comprehensively. In table 2, we observe that ESGCOM has a lower mean than ESG, this is because every ESGC score lower then 100 will have a negative impact on ESGCOM score (Refinitiv, 2022).

Furthermore, ROIC has high standard deviation and the sample data's large difference between the max and min values reveals a wide range in the ability of businesses to produce returns on their capital investment. On the other hand, the similar mean and median values suggests that the extreme values are not heavily skewing the overall distribution. The mean and median values for R&D expenditures show a positive trend, but the high standard deviation points to a wide range of R&D investments. Additionally, due to lack of R&D data, there are fewer observations, therefore it will be disregarded in the regressions.

5.3.1 ROA Mean

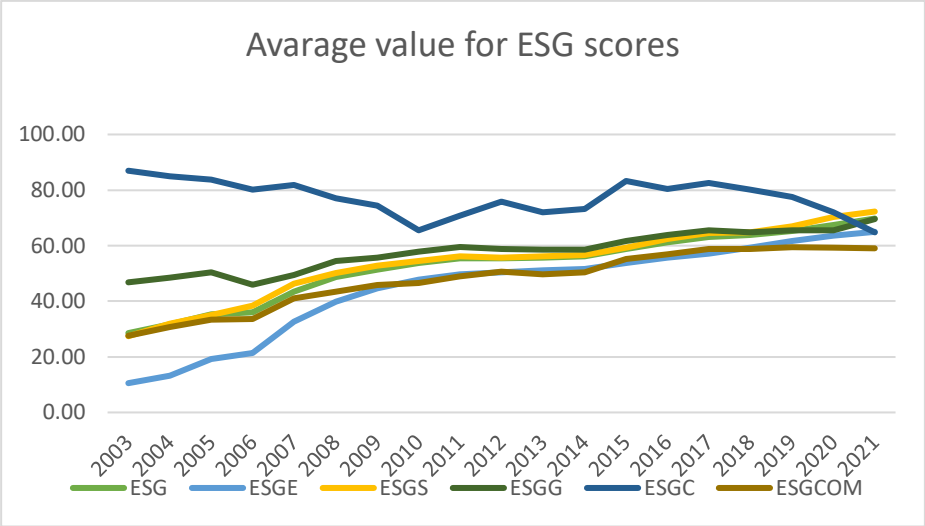
Figure 1: ROA mean



Examining the average ROA over the course of the sample period, 2003-2022, provides a straightforward univariate study of the dependent variable ROA. The average ROA values in the sample period show the profitability levels of the companies, and a higher ROA suggest that businesses are generating greater returns from their assets. The significant declines observed in the time period 2008-2009, and in 2020 can be attributed to the global financial crisis and the Covid-19 pandemic, as the normal trajectory of ROA typically follows a stable pattern. These fluctuations in ROA show the dynamism of a company's performance and can be affected by factors such as economic and market conditions.

5.3.2 ESG Mean

Figure 2: ESG Mean values



Prior to writing this thesis, we had a clear assessment that companies have had emphasis on ESG in recent years, and when examining the average ESG scores that becomes evident. In 2003 the average ESG score within our sample was 28.54, compared to 69.57 in 2021. Most notable from the average scores is the controversies score. We observe a there has been steady decrease between 2003 to 2010, and again from 2018 to 2021, which implies that there has been a decrease in company controversies score throughout the sample period. Furthermore, both the environment and social scores have increased on average yearly, while governance have had a steadier increase in comparison. Given the growing trend in corporate social responsibility and environmental initiatives (EY, 2017), which is in line with our observations.

5.3.3 Sample distribution

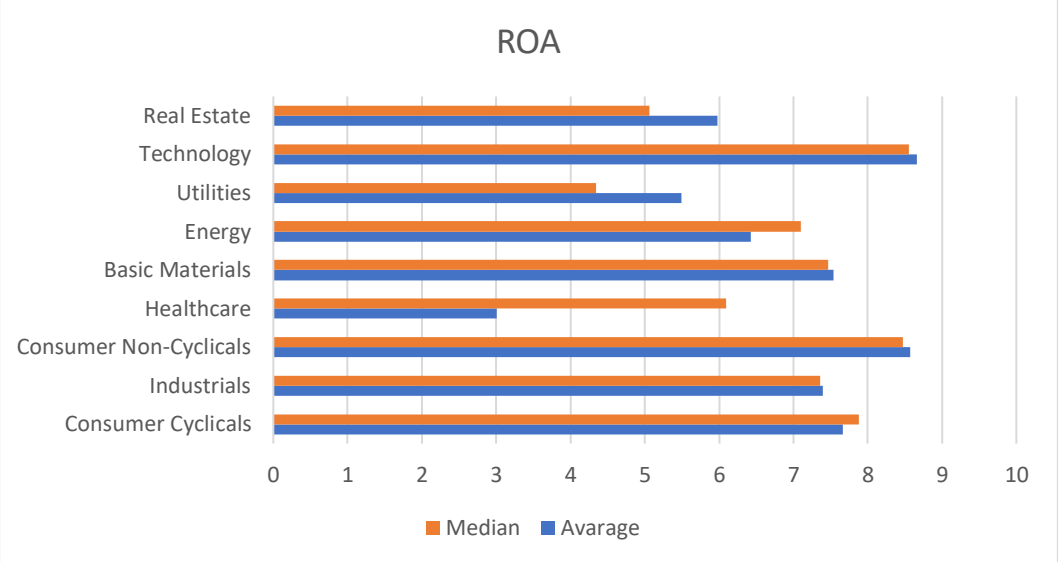
The table below presents the distribution of observations in the different industries, as mentioned earlier financial institutions are excluded from the sample.

Table 3: Industry sector distribution

Industry sector distribution	**Observations (N)**	**%**
Consumer Cyclicals	820	18,72 %
Industrials	620	14,16 %
Consumer Non-Cyclicals	560	12,79 %
Healthcare	560	12,79 %
Basic Materials	320	7,31 %
Energy	360	8,22 %
Utilities	360	8,22 %
Technology	660	15,07 %
Real Estate	120	2,74 %
Total	**4380**	**100 %**

5.3.4 ROA cross industry sample

Figure 3: ROA average, by industry across the sample period



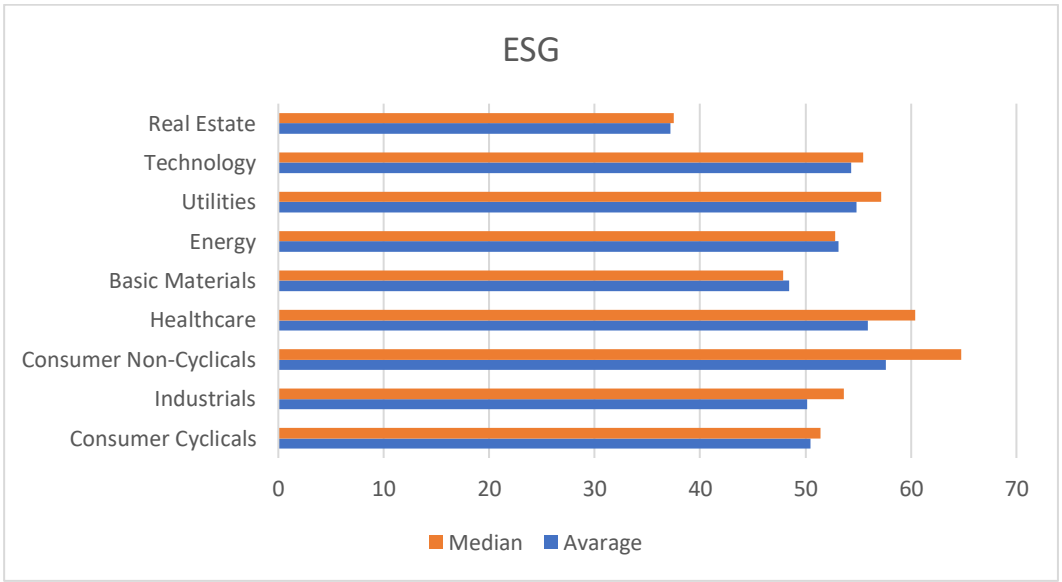
Moreover, to assess our observation it can be insightful to compare the median and mean of ROA between the diverse industries in our sample. By employing this approach, it will be simpler to identify potential outliers, as ROA within an industry is more similar across peers than overall. According to Brooks (2014), observations

that do not conform to the pattern of the data are outliers. If median and mean is significantly different from each other, then the distribution of ROA is unsymmetric. For the majority, we observe that industries have similar mean and median. In both the real estate and utilities sectors, ROA mean is slightly higher than the median, suggesting that the distribution of ROA values may have a positive skewness. This indicates that a number of firms in these industries may have exceptionally high ROA values compared to the others, which may impact the mean and causing it to be somewhat larger than the median.

On the other hand, the healthcare industry has a substantial higher median, 6.09, than mean, 3. The substantial difference suggests the possibility of extreme numbers or outliers that could have a downward effect on the mean. The median serves as a more reliable indicator of the central tendency in this situation since it is less vulnerable to the effects of outliers. As a result, the higher median indicates that most observations within the healthcare industry have relatively higher ROA values, but a small number of extreme values help to raise the mean. Therefore, the healthcare industry will be removed from the dataset, as the outliers could potentially drive the results for the sector. After removing the healthcare sector from our dataset, we are left with 190 companies, a 29-reduction compared to the original 219 companies.

5.3.5 ESG cross industry sample

Figure 4: ESG average, by industry across the sample period



The table above illustrates the differences in mean and median of ESG scores between the different industries, same approach as we did with ROA. Throughout the industries, there are no big differences between median and average. Due to there is a slightly higher median than mean in some industries, it suggests that the distribution of the ESG in these sectors re slightly skewed towards lower values. However, these outliers are not errors in the data, as it's simply because there is higher variety between ESG scores in those industries.

5.3.6 Correlation matrix

Within the table below, all variables examined in this thesis study are presented in a Pearson's correlation matrix. The correlation data within the matrix demonstrates a varied range of connections observed amongst the variables. This analysis shows the extent of the interrelationships between the variables by highlighting the varied degrees of correlation between them. The Pearson's correlation matrix will be used to detect potential multicollinearity in our data. If the correlation between two variables is greater than or equal to one, this is known as perfect multicollinearity (Stock & Watson, 2015).

Table 4: Correlation matrix

	ESG Score	ESGE Score	ESGS Score	ESGG Score	ESGC Score	ESG-COM	ROA	Debt ratio	Beta	size	R&D	ROIC
ESG	1	0,89	0,91	0,65	-0,29	0,87	0,1	0,07	0,05	0,46	0,26	0,12
ESGE	0,89	1	0,77	0,41	-0,27	0,77	0,05	0,07	0,07	0,45	0,24	0,08
ESGS	0,91	0,77	1	0,4	-0,3	0,78	0,1	0,08	0,06	0,44	0,26	0,12
ESGG	0,65	0,41	0,4	1	-0,14	0,59	0,09	0,04	-0,03	0,25	0,14	0,1
ESGC	-0,29	-0,27	-0,3	-0,14	1	0,14	-0,01	0,05	-0,03	-0,42	-0,27	-0,02
ESGCOM	0,87	0,77	0,78	0,59	0,14	1	0,1	0,1	0,05	0,27	0,1	0,12
ROA	0,1	0,05	0,1	0,09	-0,01	0,1	1	-0,05	-0,13	0,19	0,04	0,57
Debt ratio	0,07	0,07	0,08	0,04	0,05	0,1	-0,05	1	-0,07	-0,12	-0,09	-0,03
Beta	0,05	0,07	0,06	-0,03	-0,03	0,05	-0,13	-0,07	1	0,03	0,04	-0,03
size	0,46	0,45	0,44	0,25	-0,42	0,27	0,19	-0,12	0,03	1	0,41	0,22
R&D	0,26	0,24	0,26	0,14	-0,27	0,1	0,04	-0,09	0,04	0,41	1	0,05
ROIC	0,12	0,08	0,12	0,1	-0,02	0,12	0,57	-0,03	-0,03	0,22	0,05	1

Upon examining the table, a notable finding is the presence of nearly perfect multicollinearity relationship between the independent variables ESG pillar scores and ESG. Imperfect multicollinearity refers to when a strong, imperfect linear relationship between one or more independent variables (Brooks, 2014). Studenmund (2014) asserts that multicollinearity is likely present if the correlation exceeds 0,8 (Studenmund, 2014). Even though the correlation between both ESGE and ESGS scores and ESG exceeds 0,8, it is expected as the ESG score is a

composite of the pillar scores. However, the ESGG score does not have similar impact on ESG score as environmental and social pillars, due to the lower correlation between the variables. Additionally, there is a negative correlation between ESGC and ESG, which is unexpected.

Among our set of independent variables, ROIC exhibits the highest positive correlation with our dependent variable, ROA. Therefore, a strong association between ROIC and the profitability metric represented by ROA, is implied by our finding. The positive correlation indicates that as ROIC increases, there is a tendency for ROA to also increase. In other words, a higher level of ROIC is connected to improved financial performance as measured by ROA. Disregarding the correlation among the various ESG measures, the highest correlation is between ROA and ROIC, which is measured at 0.57. According to Brooks (2014) and Studenmund (2014), this is not at a level that raises concerns about the presence of multicollinearity.

Furthermore, our findings implies that smaller firms will have lower ROA than larger firms, as firm size is the next independent variable that demonstrates positive correlation. The ESG pillar scores display relatively small positive correlation with ROA, apart from controversies which is slightly negatively correlated. This implies that the ESG pillar scores have little overall impact on financial performance as assessed by ROA. Therefore, the total ESG score also shows almost no correlation with ROA, suggesting that it has little effect on the company's financial performance, contrary to our initial expectations. This may suggest that other elements that the ESG and the pillar scores do not account for could have a more significant influence on a company's ROA, which is a more concerning finding. Moreover, our findings deviate from the CAPM theory, which expect that a higher level of risk should ought to result in higher returns (Lintner, 1965; Markowitz, 1952; Sharpe, 1964), hence there is a negative correlation between the debt ratio and ROA in our sample. This implies that a high amount of debt within the sample companies may also have a negative effect on their ROA. A further intriguing finding, is that the environmental and social pillar scores strongly correlate with company size, suggesting that bigger businesses place more emphasis on addressing social issues and combating climate change, which leads to higher total ESG score for bigger firms.

6.0 Results

In the introductory paragraphs of this section, emphasis will be placed on the discussion and presentation of the panel data model tests expounded upon in the methodology chapter. These tests hold significant importance as they serve as the cornerstone for selecting an appropriate model. Subsequently, the ensuing paragraphs will provide a comprehensive report on the validity test findings, which were previously highlighted in section 4.0. Moving forward, attention will be given to detailing and debating the regression findings from the two respective portions. Ultimately, a comprehensive synthesis of all these constituent elements will culminate the section.

6.1 Model selection

This thesis employs three common models given the use of panel data: Pooled OLS Model, Fixed Effects Model, and Random Effects Model. To assess the suitability of these models, three distinct hypotheses were tested. The first test, known as the Poolability Test, compares a Pooled OLS model to a Fixed Effects model.
H0: Individual effects do not exist.
HA: Individual effects do exist.

The second test, the Bruech-Pagan Lagrange Multiplier Test, examines whether a Random Effects model is more appropriate than a Pooled OLS model by detecting the presence or absence of random effects in the model.
H0: The variance of individual-specific or time-specific errors is zero.
HA: These error variances are nonzero.

If the results from the aforementioned tests indicate that a Pooled OLS model is unsuitable, a Hausmann Test is conducted to determine the dominant effects among the fixed effects and random effects.
H0: Both the Fixed Effects model and Random Effects model can be employed.
HA: Only the Fixed Effects model is appropriate.

Each regression in both sections of the analysis underwent the three tests. The findings presented in Table 5 provide evidence for rejecting the null hypothesis in all three tests, thereby indicating that the Fixed Effects Model is the most suitable option.

Table 5: Model selection tests

Independent variable	***Poolability Test***	***Bruech-Pagan Langrange Multiplier Test***	***Hausmann Test***
ESG	Reject H0	Reject H0	Reject H0
ESGE	Reject H0	Reject H0	Reject H0
ESGS	Reject H0	Reject H0	Reject H0
ESGG	Reject H0	Reject H0	Reject H0
ESGC	Reject H0	Reject H0	Reject H0

6.2 Model Validity

As mentioned earlier in the thesis, R&D could not be included as a control variable because lack of available data. Empirical evidence suggests there is a significant positive correlation between R&D investment and sustainability rankings (Fischer & Sawczyn, 2013) Therefore, the result in the model's validity might reducing, as the exclusion of R&D could result in omitted variable bias. However, there is low risk of omitted variable bias in our results, since there is low correlation between ROA and R&D, as presented in table 4.

Moreover, the data description, 4.2, presented other possible threats for the model. As discussed in 5.3.5 correlation matrix, there is no discernible presence of multicollinearity between the variables. In accordance with the methodology outlined in section 4.4.7, a Wooldridge test for serial correlation was conducted. It suggests that the presence of autocorrelation does not significantly disturb our conclusions and findings. Furthermore, based on the analysis conducted, it was determined that the assumption of outliers in the Fixed Effect Model did not hold for all industries. This conclusion was reached by a thorough examination of the data revealed that discounting outliers, healthcare industry, was deemed necessary.

Furthermore, simultaneous causality is an issue, as it can be a probable danger to the reliability of our finding, as mentioned earlier in the thesis. There are still worries about the impact of the opposite directional effect. ESG scores for businesses with the resources to invest in ESG-improving initiatives may increase when such businesses achieve greater financial achievements. This highlights how results must be carefully interpreted and considered, contemplating the intricate interactions between ESG scores and financial performance. In order to isolate the impact of ESG score on financial performance, the introduction of a one-period lag

was put in motion, however potential influence of an opposite directional effect is not entirely eliminated from our findings. By testing the opposite direction with ROA lagged instead of ESG in the Fixed Effect Model, the results say that ESGE is statistically significant on a 10% significant level, while ESG, ESGE, ESGS, ESGG, ESGC are not statically significant on any level (Appendix 3). Additionally, all the test results in a negative adjusted r-squared, which implies that the independent variables do not have a meaningful relationship with the dependent variable.

Additionally, by looking on the relationship with no lag in either ESG or financial performance, by examining the Fixed Effect Models' results, neither ESG nor any of the pillar scores are statistically significant on any significant level (Appendix 4). By performing these tests, we aim to determine the presence of true causation in the link between ESG score and financial performance.

From a statistical perspective, the performed regression analysis identifies ESG score as a statistical cause, which will be presented later in the result section. Therefore, it is possible to identify ESG as the causal factor in our regression Fixed Effect Model. Nevertheless, from an economic standpoint, we cannot exclude the possibility of result distortion, although the impact appears to be more pronounced in the trend where ESG scores influences financial performance.

6.3 Regression Results

The outcomes of the regression analyses for the ESG scores and the pillars of the 190 US companies are shown in this part of the thesis. Overall, our findings indicate that ESG score has a statistically significant negative impact on financial performance. The results indicate that the potential value creation does not cover the investment costs that's needed for enhancing ESG activities. These conclusions substantiate the tenets of the shareholder theory, which suggests that enhancing a company's ESG score may have the potential to negatively impact its market value for firms in the US market. For all following discussion in the thesis, this economic rationale forms the primary foundation for our obtained results. There is a table presented in Appendix 2 which provides the interpretation of the significance code levels associated with the coefficients.

6.3.1 ESG Score

The first part of the regression results examines the connection between ESG score and financial performance, determined by ROA and ESG scores. Table 6 below displays findings in which ROA and ESG score were the dependent and independent variables in a Fixed Effects Model.

Hypothesis 1: Companies with higher ESG score are linked with higher financial performance in US market.
H0: There is no relationship between ESG score and financial performance.
HA: There is a relationship between ESG score and financial performance.

$$ROA_{it} = \alpha_i + \beta_1 ESG_{i,t-1} + \beta_2 Beta_{it} + \beta_3 Debt\ Ratio_{it} + \beta_4 Size_{it} + \beta_5 ROIC_{it} + \varepsilon_{it}$$

Table 6: ESG – Regression results

ROA	**Coefficient**	**Standard error**
ESG	-0.0223312***	0.0058384
Beta	-1.2024419***	0.2427754
Debt Ratio	-0.0657765***	0.0112183
Size	1.0469076***	0.2638460
ROIC	0.1772167***	0.0080112
Adjusted R²	0.051594	

Between ROA and the ESG score, the regression's anticipated outcome prior to writing this thesis was a positive significant connection. However, when examining the table above, the output from the regression reveals a negative relationship of -0.0223 on a 0.001 significance level between ROA and ESG. This implies that in most cases, a higher ESG score is related with a lower ROA, as the regression suggest that 99.99% of cases the null hypotheses will be rejected. From an economical point of view, it suggests that companies within the sample that have higher ESG scores tend to have weaker financial performance, as measured by ROA. This is a bit surprising, hence the low correlation between ROA and ESG as shown in table 4. By looking back at and examining “Table 2 descriptive statistics” we observe that ROA mean is 7.44%. The observed decrease of 0.0223 in ROA resulting from a one-point increase in the ESG score indicates a substantial consequence. Additionally, the adjusted R-squared of 0.051594, indicates that the independent variables approximately explain 5.15% of the variation in ROA, which is rather low.

The negative link between ESG score and next period financial performance support shareholder theory, as the regression results indicate that a higher ESG score destroys value, which does not comply with shareholders best interests. As mentioned earlier in section 3.2, the potential reduction in costs associated with poor stakeholder relationships is one of the main justifications for involving stakeholders in firm's decision-making procedures.

Stakeholder theory and value creation from raising the ESG score are not supported by a negative relationship between ESG score and ROA. However, according to stakeholder theory, the consideration and management of stakeholders can result in various long-term benefits for a company. These advantages include a lower cost of capital due to favorable contacts with debtors, increased community goodwill as a consequence of positive interactions with external stakeholders, and higher sales as a result of solid customer connections. Benefits as these may have a lasting impact beyond our studies on-year lag period.

Furthermore, our data implies that the firms' actions in our sample support stakeholder theory, hence the average ESG score has increased throughout the sample period, shown in Figure 2, which indicates a desire to improve ESG score. Therefore, the one-year lag to may not capture the long-term effects of higher ESG scores in the sample, as there is an increase in ESG related activities even though there is a negative relation between ESG and financial performance. An additional perspective is that managers may engage in opportunistic behavior, obtaining personal benefits through decision-making by prioritizing their own interests over those of shareholders (Jensen & Meckling, 1976). In this specific setting, it is plausible that such behavior may create a perception among peers that the emphasis on ESG issues outweighs the significance of financial performance.

Return on assets was chosen as the dependent variable, as discussed in 4.2.1. The main reasoning behind choosing ROA was that it's an accounting-based measure, which accurately reflects the financial performance of a company, and devoid the influence of market-based measures or perceptual metric errors (Jewell & Mankin, 2011). The negative significant relationship between ROA and ESG may suggest that a different dependent variable should have been chosen, due to the assumption that ESG activities are not beneficial short-term but in the long-term. Tobin's Q

could instead have acted as the dependent variable, however research claim that there is no connection between Tobin's Q and ESG scores (Velte, 2017).

6.3.2 ESGE Score

The environmental pillar score is the first pillar. In the regression, table 7, below, our regression is presented, which was decided by our expectations. Our expectations were based on several factors, but mainly market trends and empirical research. The Paris Agreement, which aims for emissions to reach 0 by 2050, businesses must realize the value of focusing on and enhancing their environmental footprint (UN, 2022). Furthermore, Velte's empiric research (2017) indicated that in the German market ESG exhibited a significant impact on Return on Assets. These factor the fundamental reasoning behind our expectations.

Hypothesis 2.1: Companies with higher environmental score are linked with higher financial performance in US market.
H0: There is no relationship between ESGE score and financial performance.
H1: There is a relationship between ESGE score and financial performance.

$$ROA_{it} = \alpha_i + \beta_1 ESGE_{i,t-1} + \beta_2 Beta_{it} + \beta_3 Debt\ Ratio_{it} + \beta_4 Size_{it} + \beta_5 ROIC_{it} + \varepsilon_{it}$$

Table 7: ESGE – Regression results

ROA	Coefficient	Standard error
ESGE	-0.0146317**	0.0048138
Beta	-1.1851070***	0.2430586
Debt Ratio	-0.0663965***	0.0112434
Size	1.0816454***	0.2677468
ROIC	0.1778321***	0.0080141
Adjusted R^2	0.05003	

The regression shows a negative relationship of -0.0146 on a 0.01 significance level between ROA and ESGE, which suggest that 99% of cases the null hypotheses will be rejected. The significance level differs from the ESG regression, as the ESGE null hypotheses gets rejected less. Even though table 4 suggest a weak correlation between the variables, the presence of statistical significance between ESGE and ROA may be due to other factors that are considered in the sample size or in the regression. Additionally, the independent variables are similar to the ESG regression, as well as the adjusted r squared.

Companies that prioritize environmental sustainability and proactively seek to enhance their environmental performance may face substantial initial expenses. These expenses may involve investments in environmentally friendly technologies, adherence to regulatory standards, and the transition to cleaner energy sources (Peterdy, 2023). The definitions for all activities encompassed within the three ESG pillar scores can be observed in appendix 5. Notably, activities that contribute to a higher environmental pillar score are those that improve resource utilization, reduce emissions, and foster innovation.

The awareness among investors and stakeholders regarding environmental issues and their impact on businesses has been steadily increasing. If market participants perceive a company's environmental performance unfavorably, it can lead to diminished valuation and restricted access to capital (Whysall, 2000). Industries with significant environmental footprints, such as energy, manufacturing, and natural resources, may encounter stricter regulations and potential penalties for non-compliance. Compliance costs and fines can exert pressure on financial performance and profitability, thereby establishing a negative association between the ESG Environment score and financial performance (UN Global Compact, 2014).

It is imperative to acknowledge that the outcomes obtained from our regression analysis diverge from the findings documented in previous scholarly literature. An empirical study conducted by Friede et al. in 2015 revealed that numerous other studies have documented positive correlations between environmental and financial performance. Guenster et al. (2011) also identified a positive relationship between these variables and argued against the existence of a trade-off, as they are inherently aligned.

6.3.3 ESGS Score

The objective of the social pillar is to document the social actions of companies, notwithstanding the usage of several ESG ratings. Human rights score, community score and workforce score make up the social pillar score (Interactive Brokers, 2023). Previous literature from Velte (2017) and Eccles. (et al., 2014) studied how financial performance is impacted by ESGS score, these have been a pivotal role in

shaping our expectations and hypotheses. Therefore, we anticipate similar outcomes for the US-based businesses in our sample.

Hypothesis 2.2: Companies with higher social score are linked with higher financial performance in US market.
H0: There is no relationship between ESGS score and financial performance.
H1: There is a relationship between ESGS score and financial performance.

$$ROA_{it} = \alpha_i + \beta_1 ESGS_{i,t-1} + \beta_2 Beta_{it} + \beta_3 Debt\ Ratio_{it} + \beta_4 Size_{it} + \beta_5 ROIC_{it} + \varepsilon_{it}$$

Table 8: ESGS – Regression results

ROA	Coefficient	Standard error
ESGS	-0.0154860**	0.0054682
Beta	-1.2170812***	0.2430606
Debt Ratio	-0.0671190***	0.0112273
Size	0.9950401***	0.2634025
ROIC	0.1778390***	0.0080180
Adjusted R^2	0.049676	

The regression shows a negative relationship of -0.015 on a 0.01 significance level between ROA and ESGS, which suggest that 99% of cases the null hypotheses will be rejected. This outcome differs from ESG, as the different statistical significance level suggest the null hypotheses for ESGS gets rejected less. The results suggests that companies within the sample that have higher ESGS scores tend to have weaker financial performance, as measured by ROA. As with the already mentioned scores, this is also surprising, due to the established low correlation between ROA and ESGS in our sample. The independent variables have similar values as the ESG score and pillars, as well as the adjusted r squared.

The negative relationship between the social pillar score and financial performance did not meet our initial expectations. It is not unrealistic to anticipate that companies would be able to increase return and efficiency, as well as recruiting better employees and reduce turnover rate by having better working environments and a good reputation for contributing to society (Buxton, 2023). Downing (1997) posited that mishandling stakeholders' interests can lead to damage to a company's brand, which would be a great cost for any business. One of the primary catalysts for conflicts with stakeholders is firms' involvements in activities that have an adverse

impact on the human rights score. However, due to the negative relationship between ESGS and ROA in our sample do not support these arguments.

The negative coefficient can perhaps be elucidated by recent developments in the US market, where customers have actively boycotted firms that have been involved in social activities that are not aligned with parts of the customer base, consequently impacting sales, and stock prices (Zhan, 2023). Thus, even though social activities generally have a positive effect on ESGS score, the inclusion of more politically charged and divisive social activities may cause damage to financial performance (Wall Street Journal, 2023).

6.3.4 ESGG Score

Strategy score, shareholder score and management score are what constructs the governance pillar score. The thesis anticipate that the governance pillar score will be positively related with financial performance. This is due to the concept of firms with bad governance will have possible large expenses arising from agency conflicts, compared to firms with presence of competent management who possess appropriate incentives to run the company efficiently.

Hypothesis 2.3: Companies with higher governance score are linked with higher financial performance in US market.
H0: There is no relationship between ESGG score and financial performance.
H1: There is a relationship between ESGG score and financial performance.

$$ROA_{it} = \alpha_i + \beta_1 ESGG_{i,t-1} + \beta_2 Beta_{it} + \beta_3 Debt\ Ratio_{it} + \beta_4 Size_{it} + \beta_5 ROIC_{it} + \varepsilon_{it}$$

Table 9: ESGG – Regression results

ROA	Coefficient	Standard error
ESGG	-0.0237578***	0.0051474
Beta	-1.2162348***	0.2425411
Debt Ratio	-0.0679526***	0.0111478
Size	0.9594248***	0.2612829
ROIC	0.1773255***	0.0079952
Adjusted R²	0.053522	

The regression shows a negative relationship of -0.023 on a 0.001 statistical significance level between ROA and ESGG. Similarly, to ESG and the other pillars

in the regression, the results suggest that companies with higher ESGG score tend to lead to weaker financial performance. The independent variables are also comparable to the ESG and ESGE regression results, as well as the adjusted r squared being rather low.

The negative relationship between ESGG and financial performance support Jensen & Meckling's (1976) arguments, that managers may take decisions based on personal benefits, instead of prioritizing what is optimal for the firm. Furthermore, companies can reduce their cost of capital by having stronger management oversight, with an aim to eliminate management nonproductive activities. This due to investors are willing to accept a lower return because stronger governance frequently results in better protection of the investors' money. Therefore, companies may experience an upturn in their operating results (Love, 2011). However, the result from the regression do not support this argument, as there is a negative coefficient between governance and ROA. Love (2011) further argues that firms may need to be at a governance equilibrium in order to have a positive effect on financial performance. Henceforth, the explanation for the negative significant relationship may be due to that the US companies in the sample selection have not achieved governance equilibrium.

6.3.5 ESGC Score

The controversy score has a negative impact on the total ESG score if companies are involved in controversies, and any controversy score below 100 will invariably exert a downward pressure (Refinitiv Eikon, 2022). The expectation for the controversy pillar score is that a lower score will have a negative impact on financial performance, as company controversies could lead to decrease in operating income. Whysall (2000) supports this expectation, as his research examined the connection and established that controversies exert a detrimental and substation influence on company performance.

Hypothesis 2.4: Companies with higher ESG Controversies score are linked with higher financial performance in US market.
H0: There is no relationship between ESGC score and financial performance.
H1: There is a relationship between ESGC score and financial performance.

$$ROA_{it} = \alpha_i + \beta_1 ESGC_{i,t-1} + \beta_2 Beta_{it} + \beta_3 Debt\ Ratio_{it} + \beta_4 Size_{it} + \beta_5 ROIC_{it} + \varepsilon_{it}$$

Table 10: ESGC – Regression results

ROA	Coefficient	Standard error
ESGC	-0.0087199*	0.0036432
Beta	-1.2616109***	0.2442730
Debt Ratio	-0.0719619***	0.0111694
Size	0.7886405**	0.2663002
ROIC	0.1792629***	0.0080015
Adjusted R²	0.049009	

The regression shows a negative relationship of -0.008 on a 0.05 significance level between ROA and ESGC, which suggest that 95% of cases the null hypotheses will be rejected. This outcome is in line with ESGS, but differs from ESG, ESGE and ESGG, as the different statistical significance level suggest the null hypotheses for ESGC gets rejected less. Most of the independent variables have similar values as the ESG score and pillars, as well as the adjusted r squared. However, size differs from the other regression results, as the value is considerably lower, as well as being statistically significant on a 0.01 level. This suggests, from an economic perspective, that the relationship between company size and ROA is not constant across all ESG pillars. It shows that additional factors connected to ESG pillars may have an impact on how business size affects financial success as measured by ROA. The overall negative relationship does not meet the thesis initial expectations.

The results contradict Whysall (2000) findings, as there is a significant negative relationship. One possible reason for the negative relationship could be that maintaining a high ESGC score could be expensive for companies, as firms may opt for more expensive options in various aspects of their operations, such as production, sourcing, or supply chain management. However, these findings do not meet our expectations, as one might assume that firms involved in controversies would lead to experience greater negative impact on their ROA compared the costs incurred by avoiding controversies altogether.

7.0 Conclusion

This master thesis sought to examine the connection between ESG score and financial performance in the US market. We were able to demonstrate that all the pillar scores that forms the total ESG score had a statistically significant negative impact on ROA. Based on these findings, we conclude that there exists a connection between ESG and financial performance in the US market.

By enhancing knowledge of the connection between ESG scores and financial performance, our study makes a significantly contribution to the field. To achieve this, we utilize the updated Refinitiv Eikon database which contains ESG scores. One of the main problems that has been a prominent discussion in previous research is the several ways of measuring ESG scores. The credibility of the Refinitiv instrument is bolstered by its objectivity and independency, further supporting the validity of our research findings. However, the lack of defined methodology for measuring ESG performance and the voluntary nature of disclosing factor variables are the main obstacles to ESG ratings. Thus, the measurement problem persists, hindering conclusive statements regarding the overall impact of ESG scores on financial performance. Therefore, we can only draw conclusions based on the specific relationship concerning financial performance and Refinitiv Eikon ESG scores in our study. In order to get more thorough results that can be used over a wider spectrum, future research is advisable to explore multiple sustainability measures.

The observed negative relationship indicates that, on average, firms tend to experience a decrease in ROA when they invest in activities intended to raise their ESG scores. This financial incentive may deter businesses from making an active effort to get higher scores in the different pillars. As a result, this implication may create obstacles for achieving more sustainable society, as firms may be more hesitant to allocate resources towards ESG-enhancing initiatives. Moreover, a notable concern with regards to our findings, is the weak correlation between ROA and the independent ESG variables within the sample. These results raise questions regarding the direct impact the ESG variables have on financial performance within our sample. The weak correlation implies that financial performance, measured by ROA, may not exhibit strong links with the ESG variables. Therefore, future studies may consider including other measurements as financial performance.

Though, it is important to note that our findings still suggests that ESG has its significance, as there's been an overall increase in average ESG scores throughout the sample period. The reasoning behind the increase can be attributed to stakeholder theory, where managers may breach trust given by shareholders in order to becoming recognized as socially responsible by investing in ESG activities. However, firms can also increase their reputation by investing in ESG activities.

Not many studies have revealed negative results, however previous studies have examined the association between ESG and financial performance yielded conflicting findings. The predictions of value creation put forth by stakeholder theory may fall short in covering the expenses associated with efforts aimed at enhancing ESG practices. Therefore, our findings align with the principles of shareholder theory, which posits that prioritizing the interests of stakeholders may lead to value erosion for companies. There may exist an optimal level of ESG rating that maximizes profitability, and deviating from this level could lead to negative consequences for firms. Furthermore, it is feasible that the value creation resulting from enhancements in ESG scores extends beyond the timeframe captured by our one-year lag. The disparities between prior research and our findings can be elucidated by the unique characteristics of the US market. Additionally, firms that already perform well in terms of ESG may experience diminishing marginal returns from further ESG improvements.

Finally, the omission of the Research and Development observations prevents us from considering this potentially significant control variable in our analysis. This is a concern for our model's validity, as the omission introduces the possibility of omitted variable bias. The lack of available data on R&D serves as an indicator that investigations based on small samples may be insufficient and warrant further attention. Therefore, it is crucial for future research to address the challenges regarding the lack of R&D observations we encountered and be mindful of these issues.

8.0 Bibliography

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9.0 Appendix

Appendix 1: List of companies, excluding financial and health sector.

SIGNET JEWELERS LTD	GENERAL MILLS, INC.	WHIRLPOOL CORP
FLUOR CORPORATION	WW GRAINGER INC	WILLIAMS COMPANIES
MONDELEZ	HALLIBURTON COMPANY	ADOBE INC
TAPESTRY INC	HASBRO INC	AMAZON.COM INC
UNITED STATES STEEL	HP INC	APPLIED MATERIALS
CONOCOPHILLIPS	HERSHEY CO	AUTODESK INC
KELLOGG COMPANY	ILLINOIS TOOL WORKS	BED BATH & BEYOND
RYDER SYSTEM, INC.	INT'L BUSINESS MACHS	BROWN-FORMAN CORP
BOEING CO	INTL FLAVORS&FRAGRAN	CINTAS CORPORATION
BRUNSWICK CORP	INTERPUBLIC GROUP	EBAY INC.
COCA-COLA	JABIL INC	FISERV INC
AVIS BUDGET GROUP	KB HOME	INTEL CORPORATION
CONSOLIDATED EDISON	KIMBERLY-CLARK CORP	INTUIT INC
MACY'S INC	KOHLS CORPORATION	KLA
GOODYEAR TIRE	LEGGETT & PLATT INC	MICROSOFT CORP
GENERAL ELECTRIC CO	LENNAR CORP	NETAPP INC.
FIRSTENERGY CORP	LOUISIANA-PACIFIC	PACCAR INC.
GENERAL DYNAMICS	LOWE'S COMPANI	PTC INC
HOME DEPOT, INC.	MGM RESORTS	PAYCHEX INC
ESTEE LAUDER CO	MANPOWERGROUP INC	QUALCOMM INC
MICRON TECHNOLOGY	MASCO CORP	SANMINA CORP
KROGER CO	MARRIOTT INT'L	STARBUCKS CORP
PARKER-HANNIFIN CORP	MATTEL INC	GEN DIGITAL INC
ALTRIA GROUP INC	MCCORMICK & CO INC	VERISIGN, INC.
EXELON CORPORATION	MOTOROLA SOLUTIONS	BERKSHIRE HATHAWAY
SOUTHERN CO	MURPHY OIL CORP	CONSTELLATION BRANDS
PROCTER & GAMBLE	NCR CORPORATION	COMCAST CORPORATION
ADVANCED MICRO	NABORS INDUSTRIES	FREEPORT-MCMORAN INC
ALBEMARLE CORP	NOV INC	AUTONATION INC
AMEREN CORPORATION	NEW YORK TIMES CO.	NISOURCE INC
AMERICAN ELECTRIC	NORDSTROM, INC.	VERIZON COMMUNICATNS
HESS CORPORATION	XCEL ENERGY INC	ATI INC
APT INVESTMENT & MGT	NUCOR CORPORATION	LUMEN TECHN
AUTOZONE INC	OLIN CORP	DEVON ENERGY CORP
AVERY DENNISON CORP	PPG INDUSTRIES INC	EOG RESOURCES, INC.
AUTOMATIC DATA PROC	PEPSICO, INC.	EXXON MOBIL CORP
BALL CORPORATION	PINNACLE WEST CAPTL	FEDEX CORP
BEST BUY CO INC	PITNEY BOWES INC.	HONEYWELL INTERNATNL
H & R BLOCK INC	PUBLIC STORAGE, INC	NEWELL BRANDS INC
BOSTON PROPERTIES	PULTEGROUP	PPL CORP
CABOT CORPORATION	RPM INTERNATIONAL	CENTERPOINT ENERGY
CMS ENERGY CORP	ROBERT HALF	TARGET CORP
CAMPBELL SOUP CO	ROCKWELL AUTOMATION	UNITED PARCEL SVCS

CSX CORPORATION	AT&T INC	TRANSOCEAN LTD
CARNIVAL CORP	ST JOE	COSTCO WHOLESALE
CHESAPEAKE ENERGY	SCHLUMBERGER NV	VIAVI SOLUTIONS
CLOROX CO	E W SCRIPPS CO	NVIDIA CORPORATION
CHEVRON CORPORATION	SEALED AIR CORP	LOCKHEED MARTIN CORP
CORNING INCORPORATED	SEMPRA ENERGY	3M COMPANY
MOLSON COORS BE	SNAP-ON INC	DOMINION ENERGY INC
BIG LOTS, INC.	SOUTHWEST AIRLINES	NORTHROP GRUMMAN
DARDEN RESTAURANTS	STANLEY BLACK	SIRIUS XM HOLDINGS
DR HORTON INC	SYSCO CORPORATION	JOHNSON CONTROLS INT
DILLARD'S INC	TERADYNE INC	WALGREENS BOOTS
DOVER CORP	TEXAS INSTRUMENTS	INTERNATIONAL GAME
EASTMAN CHEMICAL CO	TEXTRON INC	ITT INC
DUKE ENERGY CORP	MARATHON OIL CORP.	ASHLAND
EDISON INTERNATIONAL	UNION PACIFIC CORP	DXC TECHNO
EMERSON ELECTRIC CO.	RAYTHEON TECHNOLO	BAKER HUGHES CO
ENTERGY CORPORATION	VF CORP	WALT DISNEY
EQUIFAX INC.	VALERO ENERGY CORP	FERGUSON PLC
EQUITY RESIDENTIAL	VORNADO REALTY TRUST	OVINTIV
NEXTERA ENERGY	VULCAN MATERIALS CO	
FMC CORPORATION	WALMART INC	

Appendix 2: Significance codes (Regressions)

Significance. codes: '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Appendix 3: Financial performance$_{t-1}$ → ESG Score

ROA	Coefficient	Standard error
ESG	-0.0078233	0.0088989
Beta	-0.5316768.	0.2911643
Debt Ratio	-0.0243615.	0.0131238
Size	-0.2030168	0.3240243
ROIC	0.0480138***	0.0094942
Adjusted R^2	-0.11205	

ROA	Coefficient	Standard error
ESGE	-0.0118525.	0.0060768
Beta	-0.5049179.	0.2906067
Debt Ratio	-0.0216803.	0.0129585
Size	-0.0772523	0.3228953
ROIC	0.0473739***	0.0094966
Adjusted R^2	-0.11095	

ROA	Coefficient	Standard error
ESGS	-0.0067099	0.0079557
Beta	-0.5409692.	0.2902566
Debt Ratio	-0.0246468.	0.0130740
Size	-0.2188733	0.3191380
ROIC	0.0480196***	0.0094943
Adjusted R^2	-0.11207	

ROA	Coefficient	Standard error
ESGG	0.0063124	0.0074102
Beta	-0.5775455*	0.2901045
Debt Ratio	-0.0292695*	0.0127678
Size	-0.3651883	0.3068904
ROIC	0.0479979***	0.0094947
Adjusted R^2	-0.11207	

ROA	Coefficient	Standard error
ESGC	0.0068775	0.0048656
Beta	-0.5482906.	0.2894340
Debt Ratio	-0.0277869*	0.0126076
Size	-0.2644168	0.3017929
ROIC	0.0472441***	0.0095126
Adjusted R^2	-0.11161	

Appendix 4: Financial performance → ESG Score

ROA	Coefficient	Standard error
ESG	-0.0022566	0.0079605
Beta	-1.1963398***	0.2450177
Debt Ratio	-0.0698237***	0.0116340
Size	0.9388403 ***	0.2847805
ROIC	0.1794245***	0.0080081
Adjusted R^2	0.047362	

ROA	Coefficient	Standard error
ESGE	-0.0029218	0.0054703
Beta	-1.1913196***	0.2445586
Debt Ratio	-0.0693085***	0.0114879
Size	0.9650383***	0.2834356
ROIC	0.1792746***	0.0080129
Adjusted R^2	0.047422	

ROA	Coefficient	Standard error
ESGS	0.0012938	0.0071056
Beta	-1.2086315***	0.2443670
Debt Ratio	-0.0713052***	0.0115789
Size	0.8889000**	0.2803645
ROIC	0.1794193***	0.0080083
Adjusted R^2	0.047348	

ROA	Coefficient	Standard error
ESGG	-0.0049626	0.0066824
Beta	-1.1918575***	0.2438942
Debt Ratio	-0.0693675***	0.0113204
Size	0.9515055***	0.2685985
ROIC	0.1795852***	0.0080104
Adjusted R^2	0.0475	

ROA	Coefficient	Standard error
ESGC	0.0010587	0.0043519
Beta	-1.2017679***	0.2435779
Debt Ratio	-0.0707502***	0.0111676
Size	0.9153580***	0.2640631
ROIC	0.1792914***	0.0080273
Adjusted R^2	0.047356	

Appendix 5: Definition of pillar score factors

Score	Definition
Refinitiv ESG resource use score	The resource use score reflects a company's performance and capacity to reduce the use of materials, energy or water, and to find more eco-efficient solutions by improving supply chain management.
Refinitiv ESG emissions reduction score	The emission reduction score measures a company's commitment and effectiveness towards reducing environmental emissions in its production and operational processes.
Refinitiv ESG innovation score	The innovation score reflects a company's capacity to reduce the environmental costs and burdens for its customers, thereby creating new market opportunities through new environmental technologies and processes, or eco-designed products.
Refinitiv ESG workforce score	The workforce score measures a company's effectiveness in terms of providing job satisfaction, a healthy and safe workplace, maintaining diversity and equal opportunities, and development opportunities for its workforce.
Refinitiv ESG human rights score	The human rights score measures a company's effectiveness in terms of respecting fundamental human rights conventions.
Refinitiv ESG community score	The community score measures the company's commitment to being a good citizen, protecting public health and respecting business ethics.
Refinitiv ESG product responsibility score	The product responsibility score reflects a company's capacity to produce quality goods and services, integrating the customer's health and safety, integrity and data privacy.
Refinitiv ESG management score	The management score measures a company's commitment and effectiveness towards following best practice corporate governance principles.
Refinitiv ESG shareholders score	The shareholders score measures a company's effectiveness towards equal treatment of shareholders and the use of anti-takeover devices.
Refinitiv ESG CSR strategy score	The CSR strategy score reflects a company's practices to communicate that it integrates economic (financial), social and environmental dimensions into its day-to-day decision-making processes.