

The effect of ESG Scores on Corporate Financial Performance: Case study on South Africa

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Abstract

This study seeks to examine the relationship between environmental, social and governance (ESG) scores and firm performance: using both accounting and market-based measures of firm performance. This research is important because it allows for valuable insights for investors and the local government, enabling them to navigate the complex environment of ESG disclosure and financial performance. Although the bulk of the evidence suggests the existence of a positive relationship between ESG scores and firm performance, a few studies find a negative relationship. Further, most research primarily use the combined ESG score and thus ignore the fact that the effect of the ESG subcomponents may vary. Using a panel of 38 JSE-listed firms over the period 2010 to 2022, the results from this study suggest existence of a negative but insignificant relationship between ESG scores and firm performance; regardless of the measure of performance used. Similar results are also found for the ESG subcomponents. The results suggest that firms engaged in ESG activities experience a negative effect on their profitability and market value. This would suggest that the push for ESG efforts negatively affects JSE-listed firms' performance which aligns with some previous research. Therefore, JSE-listed firms should consider investing less in ESG practices to improve firm performance.

Keywords: environmental; social; governance, ESG; firm performance; CSR

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Lastly, I would like to thank God.

List of Abbreviations

ESG	Environmental Social and Governance
CSR	Corporate Social Responsibility
SRI	Social Responsibility Investment
CO ²	Carbon Dioxide
ROA	Return on Assets
ROE	Return on Equity
ROCE	Return on Capital Employed
ROS	Return on Sales
JSE	Johannesburg Stock Exchange
JALSH	JSE Africa All Share Index
BEE	Black Economic Empowerment
U.S.	United States
EU	European Union
OLS	Ordinary Least Squares
FE	Fixed Effects
RE	Random Effects
REM	Random Effects Model
FEM	Fixed Effects Model
VIF	Variance Inflation Factor
EP	Environmental Performance

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1. Introduction and Background

Globally, the use of Environmental Social and Governance (ESG) practices to measure businesses' non-monetary performance has gained popularity (Husnah 2023). ESG scores are a standardised measure of company performance in environmental responsibility (for example, carbon dioxide emissions (CO²) and water waste), social responsibility (for example, human rights and labour conditions), and governance responsibility, that is corporate information related to transparency and board independence (Lee, Raschke and Krishen 2023). A numerical score is employed to gauge a firm's effectiveness in handling ESG risk, with a higher score denoting more successful ESG risk management efforts. One main driver behind ESG practices is that prioritization of the well-being of all stakeholders helps an organization meet its long-term goals. However, of late, ESG scores have been used for several purposes. As a result, they have garnered interest from investors and government regulators mainly to evaluate the opportunities and risks of a particular firm (Li, et al. 2018).

However, ESG still has an obscure definition; some studies use Corporate Social Responsibility (CSR) or use the two interchangeably (for example, Humphrey, et al. 2012; Kang, et al. 2016; Kim, et al. 2019; Lech 2013). Cubas-Diaz and Martinez Sedano (2018) propose that over time, it became evident that CSR and other related terms had effectively transformed into ESG. However, CSR does not include governance as part of its framework, implying that CSR does not fully address ESG issues. studies that have looked at this topic in the past, mainly focus on the CSR effect on firm performance (For example, Jahmane and Gaies 2020 Ahmad, Mobarek, and Roni 2021, Kao 2023). A few papers have shown ESG scores effect on firm performance (For example, Chininga, Alhassan and Zeka (2023), Qu and Zhang 2023, Matemane, Msomi and Ngundu 2024). However there is limited evidence on the impact of ESG. Further, some studies use these terms interchangeably; perhaps because they focus on similar goals (For example, Kim, et al. 2019 , Miller, et al. 2020).

The interaction between firm performance and ESG scores (or ratings) is not straightforward considering available theoretical and empirical work (Aydoğmuş, Gülay and Ergun 2022). From a theoretical point of view, the stakeholder theory suggests that the chances a firm survives are contingent on its capacity to build strong relationships, create value for all stakeholders, and prioritize each stakeholder. Therefore, a firm's success is based on building good relationships and value-add for all stakeholders. Thus, from a stakeholder theory perspective, a strong ESG rating signifies alignment between business strategy and stakeholder

interests, which boosts a business' reputation and improves value for stakeholders, ultimately leading to improved business performance.

Conversely, the agency theory suggests the existence of multiple stakeholders inherently results in agency problems due to divergence in interests, with negative effects on corporate financial performance. To eliminate these, firms incur agency costs. ESG practices are projects or investments that require funds; therefore like any project or investment, they may result in negative cash flow, ultimately reducing profits (Calvo and Calvo 2018). The agency theory provides a framework in which managers might participate in ESG practices for personal motivations, such as enhancing their public image (Harper and Sun 2020).

On the other hand, Mittal, Sinha and Singh (2008) and Nollet, Filis and Mitrokostas (2016) discovered that firms rewarded by stakeholders for CSR or ESG practices demonstrated ESG practices surpassing a specific threshold (Li, Padmanabhan and Huang 2024). In the short run, there is an inverse relationship between ESG and financial performance, as the invested capital may not be substantial enough to put ESG at the desired level to be acknowledged and rewarded by stakeholders. Therefore, until that threshold is reached, the firm incurs losses from investing in these projects. Conversely, Meier, Naccache and Schier (2021) find an upside-down U-shaped association between ESG and firm performance, suggesting that excess investment in ESG practices does not result in improved performance.

Existing work can be grouped into three approaches: namely meta-analysis, portfolio studies, and panel data analysis. A few studies, such as Busch and Friede (2018), Khan (2022), and Kim (2019) have used meta-analysis. Meta-analysis seeks to analyse and summarize existing literature around ESG ratings to establish the general trend across various studies. Evidence from meta-analysis suggests that, in most instances, ESG scores positively affect firm performance. However, although meta-analysis provides evidence from a more comprehensive set of studies, which may improve accuracy as small studies are grouped, findings can be driven by the inclusion of poor-quality studies and the inability to eliminate publication bias (Eysenck 1994, Mazzola and Disselhorst 2019, Spector and Thompson 1991). Further, meta-analysis is only ideal if the goal is to understand the general trend in research without focusing on key drivers and policy implications for a phenomenon in a specific country or industry.

There is also research dedicated to assessing the stock performance of ESG-based portfolios. Mixed findings have been found in this area of the field (Lee, Raschke and Krishen 2023, Nirino, et al. 2021). Most research uses the Sharpe ratio and

other portfolio performance indicators to evaluate portfolio performance (for example, Abate, Basile and Ferrari 2021, Ferrat and Frederic 2022). Therefore, this method exclusively relies on market-based indicators of performance and often does not consider accounting-based indicators of firm performance. A significant drawback of this approach is the potential bias in results, in the sense that Socially Responsible Investing (SRI) performance depends on how skillful the fund manager is at asset management.

Most research on the link between ESG scores and firm performance employs the panel data regression approach (for example, Bruna, et al. 2022; Giannopoulos, et al. 2022). While several studies that utilize this approach direct attention to analyzing a single country, some research ventures into cross-country analysis where the examination extends to more than one nation (for example, Aydoğmuş, Gülay and Ergun 2022; Martínez-Ferrero and Frías-Aceituno 2015; Shaikh 2022). Although panel data is less comprehensive than meta-analysis; from a literature review perspective, it helps to develop and implement more reliable estimates and test complex behavioural models with less restrictive assumptions (Hsiao 2003). Panel data also allows for the analysis of both accounting-based and market-based measures of firm performance, providing a more comprehensive understanding of ESG's impact beyond the market-based perspective captured by the Sharpe ratio. Therefore, leaving the panel data regression approach as the best way of achieving the aim of this study.

This paper resembles research done by Rahi, Johansson and Lions (2024) and Hasan et al. (2022), who also apply a panel data regression model on a single country using both accounting and market-based measures of firm performance. They found that the ESG combined score and ESG factors had a significant positive effect on firm performance. Their results provide information for managers to divert more funds towards improving ESG practices (Aydoğmuş, Gülay and Ergun 2022). The current study is different from previous research because it uses a much longer timeline, whereas previous studies have used a timeline between two and five years, affecting their statistical significance. Nonetheless, more research should be carried out in developing economies. Moreover, ESG's impact on financial performance is challenging to determine due to the interchangeable use of various terms (CSR, SRI, Sustainability) that don't precisely align with the composition of ESG (see, for example, Kang, et al. 2016; Kim, et al. 2019).

An understanding of the impact of ESG practices on firm performance would be more relevant in a country like South Africa which has implemented social and governance initiatives over the recent past. For example, in February 2012, the South African Code for Responsible Investing was established, providing guidelines

and principles that underscore the importance of ESG considerations for investors (IODSA 2021). In addition, the King IV framework, released in 2016, provides firms with a well-developed governance paradigm that includes stakeholder inclusivity, ethical leadership, and corporate citizenship with the aim of improving corporate governance within South Africa (IoDSA 2016). Nonetheless, several South African firms have experienced governance issues that involved the mismanagement of millions of rands over the past years, for example, Sasol Lake Charles Chemicals Project, Enterprise Outsourcing Holdings, Steinhoff International, and Tongaat Hulett in 2019, 2018, 2017, and 2018, respectively (Obagbuwa, Kwenda and Akinola 2021). Additionally, regulatory measures have been implemented, including the Black Economic Empowerment (BEE) Act, aimed at solving the issue of inequality that is tied to South Africa's historical background (Johnson, Mans-Kemp and Erasmus 2019). Despite the limitations of initiatives like the King IV framework and perceived shortcomings in national policies like the BEE Act, South Africa has been actively trying to address ESG issues. Therefore, exploring the link between ESG and firm performance becomes important to understanding the effect of these efforts. In January 2021, Principles for Responsible Investing signatories increased by 18.9%, from 2,555 to 3,038, and global responsible investing portfolio assets grew by 12.3%, from US\$92.1 trillion to US\$103.4 trillion. Moreover, South Africa has over \$600 billion allocated to responsible investing, showcasing investors' focus on long-term returns via ESG strategies (Chininga, et al. 2023).

This study's objective is to examine the relationship between ESG scores and firm performance, using accounting and market-based performance measures and a set of firm-specific and control variables for South African listed firms from 2010 to 2022. Accounting-based measures are extensively utilized in past research and reflect a firm's fundamental capabilities. However, the main disadvantage could be that accounting based measures are historical and based on accounting regulations focusing on profit rather than cash flow (or liquidity) (Johnson, Mans-Kemp and Erasmus 2019). Therefore, market-based financial performance measures are centered on the investor's view of the firm's worth, which is shown by firms' stock prices; they are used to gauge investors' perception of companies' growth prospects based on the underlying fundamentals (Johnson, Mans-Kemp and Erasmus 2019). Therefore, this study's uses both accounting and market-based indicators of performance to examine the extent to which firm ESG scores affect performance, synonymous with past researchers' approach (Giannopoulos, et al. 2022; Hasan, et al. 2022). This study seeks to add on existing literature by exploring the subcomponents of ESG scores, setting it apart from most prior studies in the field. This will aid investors, and the government in understanding which areas (between environmental, social, and governance) South African listed firms should be investing more or less in.

This paper adds to prior research regarding ESG scores in a few ways. Firstly, it significantly contributes to the existing literature on the factors influencing firm performance in a developing economy like South Africa, where limited research has been conducted. The paper adds to the work of Chininga et al. (2023), and Evans et al. (2023) by examining this relationship in the case of South Africa using a panel regression model as the authors also did. Second, the effect of each of the ESG factors on company performance is examined to identify which sub-component has the most significant effect. Many studies ignore the effect each ESG dimension has on firm performance, as noted by Ademi and Klungseth (2022) and Hamrouni, Boussaada and Toumi (2019). Examining the impact of each subcomponent may help in assessing the applicability of previous conclusions that governance is the primary driver of financial performance, a trend identified in other studies (Velte 2017).

The following sections are organised as follows: Section 2 reviews the relevant theories and the existing empirical literature. Section 3 outlines the research methodology. Section 4 presents the data analysis and discussion of results. Lastly, section 5 focuses on the conclusion and recommendations for future research.

2. Literature Review

2.1 Introduction

This chapter provides a comprehensive review of the literature on ESG. It begins by examining the stakeholder and agency theory which serve as the foundational framework for this study. The discussion then transitions into a detailed analysis of ESG factors, beginning with studies that examine the impact of ESG on firm performance from an accounting-based perspective. This is followed by research that investigates the influence of ESG on market-based measures. Lastly, the analysis covers studies that combine both accounting and market-based metrics. The chapter then delves into research focused on each individual component of ESG. Key empirical studies are highlighted throughout this section.

2.2 Agency Theory

The agency theory explains the dynamic interaction between managers and shareholders while acknowledging potential conflicts of interest that might arise (Jensen and Meckling 1976, Hill and Jones 1992). Since there is a separation between management and ownership, conflict of interest may arise when managers prioritize their utility function over the interests of shareholders, giving rise to what is known as the agent problem, which may adversely affect firm performance. This theory suggests that such conflicts arise due to the misalignment of interests between managers and shareholders, with managers potentially focusing on their own interests, such as career advancement or personal prestige, rather than catering to shareholders' interests of maximizing shareholder value (Jensen and Meckling 1976).

To mitigate this misalignment, performance measurement mechanisms, such as performance-based incentives (e.g., bonuses and stock options), are introduced to align the interests of managers with those of shareholders (Jensen and Meckling 1976). Bonuses and stock options are designed to align managers' interests with those of shareholders by tying compensation to the achievement of specific, performance measurable goals (Jensen and Meckling 1976). However, these incentives come at an additional cost to the shareholders (Bebchuk and Weisbach 2010). Moreover, risk management becomes critical in ensuring that managers' actions balance risk appropriately, as managers tend to be more risk-averse than shareholders, who may prefer higher risk for greater returns. Performance incentives further help to bridge this gap by encouraging managers to take on calculated risks that align with shareholder interests, but they must be carefully structured to avoid short-termism and excessive risk-taking. The agency theory also emphasizes that while performance incentives may enhance alignment, they can introduce their own costs, leading to a trade-off between incentivizing managers and the firm's overall profitability.

The theory further suggests that managers want a good reputation for themselves and the company. This means making decisions that protect the company's image while also benefitting the shareholders. Nonetheless, managers might engage in ESG practices for personal motivations, potentially exceeding what is necessarily required, with the aim of enhancing their public image and reputation, receiving invitations to exclusive events, and building an elevated social network that can subsequently advance their careers (Harper and Sun 2020, Wu and Chang 2022). From an agency theory point of view managers want to ensure that the company's operations comply with regulatory requirements as it protects the managers' and owners' interests. However, self-interest may drive managers to engage in ESG activities rather than genuine compliance with regulatory requirements. Therefore, ESG efforts can represent a potential cost to a firm and may reduce a firm's overall financial performance if not carefully managed.

2.3 Stakeholder Theory

A stakeholder is described as any collective or person impacted by the operations or achievements of the firm's goals (Oruc and Sarikaya 2011). Examples of stakeholders include customers, employees, suppliers, creditors, the local community, the government, and shareholders. The stakeholder theory explains how stakeholder interests should be equally attended to by a firm (Oruc and Sarikaya 2011). According to the theoretical framework, when the interests of the interested parties are considered in firm decisions, it should result in better financial performance (Jamali 2008). The theory proposes that the primary objective of business should lie in forming good relationships and creating value for the interest groups involved.

Therefore, according to the stakeholder theory, firms that engage in ESG practices should enhance their accounting and market-based performance. Essentially, managers who take care of the environment and society and are transparent form better trustworthy relationships with stakeholders than managers who do not engage in these activities. According to Oruc and Sarikaya (2011), a firm's most competitive power is trust-based relationships with stakeholders. Consequently, from a stakeholder theory perspective, ESG efforts should allow firms to form good relationships with stakeholders, enhancing financial performance.

2.4 Evidence from studies that use accounting and market-based firm performance

Many studies have used accounting measures only as their yardstick for financial performance. Past research has leaned towards a favourable outcome between ESG and accounting-based measures of financial performance. Waddock and Graves (1997) investigated the effect of social responsibility on accounting measures (Return on Equity (ROE), Return on Sale (ROS), and Return on Asset (ROA)) on listed U.S. firms. Their findings showed that strong financial performance can enhance resource allocation in CSR. Consequently, a feedback loop is formed where firms prosper through ESG responsibility. Many earlier studies, including Bradgon and Marlin (1972), Bowman and Haire (1975), and Parket and Eibert (1975), have found similar results with only accounting measures used in their research.

Research has suggested that firms adopting ESG practices experience enhanced accounting performance, including increased sales growth. (Chung and Pruitt 1994). According to Bheenick, Brooks and Do (2023), literature has shown evidence of a favourable outcome for firms' sales when ESG activities are involved (see, for example, Nyame-Asiamah and Ghulam 2020, Tran and Pham 2022, Waheed and Yang 2019, Yu and Zheng 2020). Evidence has revealed a favourable outcome for firms' sales performance for small to medium sized enterprises when pursuing CSR activities (Waheed and Yang 2019). Likewise, Tran and Pham (2022) conducted an international study, and their results revealed a strong positive link amidst a time of market turbulence. Customer groups are the primary influence on firms' sales performance. Evidence has revealed that local community members have an upbeat attitude toward socially responsible firms (Pham and Tran 2020). Satisfied customers may prove to be loyal; this can be shown by a willingness to purchase goods at elevated prices and positive references for the firm by customers (Pham and Ahammad 2017). Essentially, firms that engage in ESG practices gain their customers' loyalty, allowing them to enhance their financial performance.

Another argument on why ESG positively affects firms' financial performance (on the accounting side) is lower debt cost (Eliwa, Aboud and Saleh 2021). Several studies have found an inverse association between interest expense and ESG (Apergis, Poufinas and Antonopoulos 2022, Li, Hu and Hong 2024, Priem and Gabellone 2024, Raimo, et al. 2021). In essence, the research shows an inverse correlation, indicating that as firms increase their investments in ESG practices, there is a corresponding decrease in the interest rates charged by creditors. Eliwa, Aboud, and Saleh (2021) and Gerwanski (2020) claim that the lower cost of debt stems from reduced information asymmetry and agency costs that come from disclosure of information, in this case, ESG disclosure. Bryl and Fijalkowska (2020) argue that firms that disclose information on their ESG practices help build trust with each stakeholder and are perceived to be less risky and more responsible.

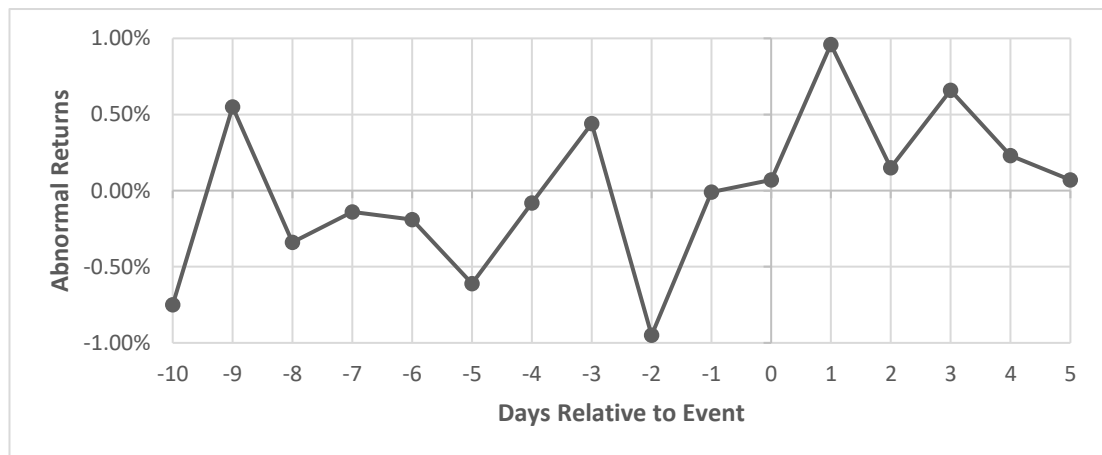
Studies carried out in the European (EU) space using accounting measures have mostly found a positive relationship (Baran, et al. 2022, Bruna, et al. 2022, De-Lucia, Paziienza and Bartlett 2020). Bruna et al. (2022) investigated 350 EU firms and revealed a significant positive link was present when a system that enforces the disclosure of financial performance is put in place. Similarly, De-Lucia, Paziienza, and Bartlett (2020) claim that this relationship is more evident when firms invest in diversity opportunities and environmental innovation policies. In contrast, Baran et al. (2022) revealed mixed results between ROA, ROS, and ROE with ESG scores for firms operating in Poland's energy sector. They concluded that the reason they had mixed results was because of the different requirements specified within the energy sector. Nonetheless, Chen, Song and Gao (2023) conducted a worldwide study and a favourable outcome in the relationship. Although mostly positive results have been found using accounting measures, no consideration is given to market performance.

Some studies have only used market performance measures (e.g., stock price) as a yardstick for financial performance. Recent research by Abate, Basile and Ferrari (2021), and Rompotis (2022) carried out in the EU, using the Capital Asset Pricing Model (or Jensen alpha) and the Sharpe ratio found that fund managers that invested in socially responsible firms had comparatively stronger portfolio performance than fund managers that did not. This proposes that firms that take part in CSR activities are found to be more attractive investments relative to firms that do not take part in CSR activities. Sladkova et al. (2022) carried out their research using the synthetic risk and reward indicator and concluded that ESG funds from the EU seemed to be performing better than traditional funds. In essence, the market performance of ESG companies was better than those of non-ESG-compliant firms.

Further analysis of market performance can be observed in the U.S. context. Several studies have been conducted in the U.S. and have mostly found favourable outcomes in the performance of ESG portfolios (Albuquerque, et al. 2020, Burchi 2019, Hartzmark and Sussman 2019, Pastor and Vorsatz 2020). Hartzmark and Sussman (2019) showed causal evidence funds grouped as low sustainability experienced \$12 billion in net outflows, and funds grouped as high sustainability experienced \$24 billion in net outflows after an economic shock. Pastor and Vorsatz (2020) find that active fund managers underperformed the index during the 2020 pandemic, whilst ESG fund managers performed well. These findings suggest that during a crisis, investors view sustainability favourably and consider it a necessity rather than a discretionary good.

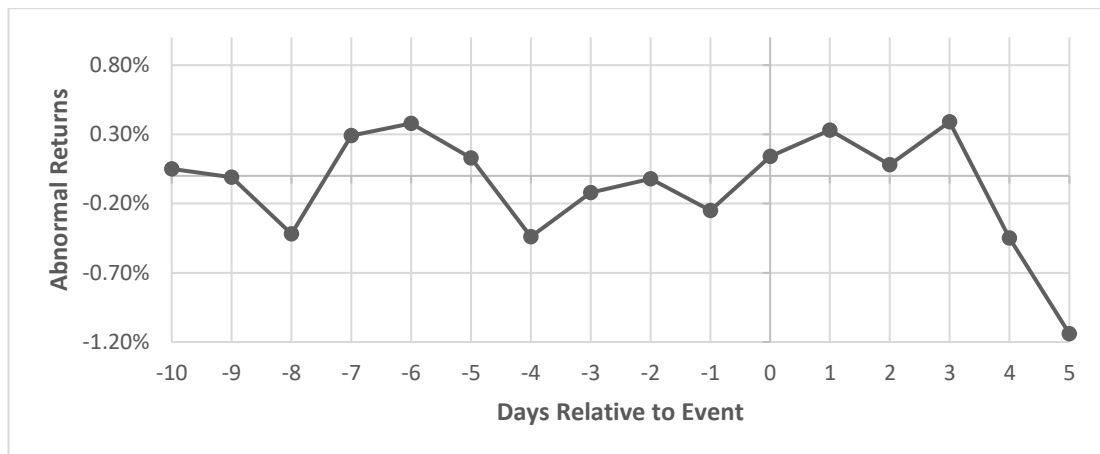
Several cross-country studies have been carried out on ESG funds' performance compared to conventional funds (Ding, et al. 2021, Helliar, Petracchi and Tantisantiwong 2022, Singh 2020). Overall, the authors found that fund managers who invested in ESG funds outperformed conventional fund managers. Nonetheless, Ferrat and Frederic (2022) carried out a study in the U.S. and the EU and found mixed results between ESG investment growth and equity returns. The authors discovered that a positive relationship only lasted briefly and found that, in the long run, a significantly negative relationship existed. Karim et al. (2016) found that the stock prices of firms that conducted themselves ethically outperformed firms that did not during the World's Most Ethical Companies announcement in 2007 and 2012, using a worldwide sample. Figures 1 and 2 show that after the announcement day (day 0), the market rewards firms that conduct themselves ethically through stock purchases and sell-off stocks of firms that haven't been as ethical (removed ethical firms). These results reveal that institutional and retail investors, in the short term, prefer to invest in companies that conduct themselves ethically.

Figure 1: Abnormal returns around the event date (ethical firms)



Source: Karim et al. (2016)

Figure 2: Abnormal returns around the event date (removed ethical firms)



Source: Karim et al. (2016)

Similarly, a positive picture is observed in South Africa from the handful of event studies conducted. Chetty, Naidoo, and Seetharam (2015) discovered that there was a positive short-lived effect of CSR announcements on firms included on the Johannesburg Stock Exchange (JSE) SRI index in 2004 and 2012. The authors claim that in the short term, the stock prices of companies incorporated on the JSE SRI index performed better than those of the firms excluded. In addition, the companies that exited the JSE SRI index during the announcements experienced a decline in their stock prices. Nyakurukwa and Seetharam (2023) mention that on the event date, significant abnormal returns are observed for ESG firms. On the other hand, Gladyssek and Chipeta (2012) revealed that the announcement of SRI index constituents did not affect those listed firms. The firms listed on the index did not outperform firms on the JSE Africa All Share Index between (JALSH) 2004 approaches, variables, and situational contingencies (Bahadori, Kaymak and Seraj 2021). Waddock and Graves (1997) claim that there is a possibility of finding a positive relationship between CSR and financial performance, or negative relationships, and lastly, no relationships depending on the performance metric used.

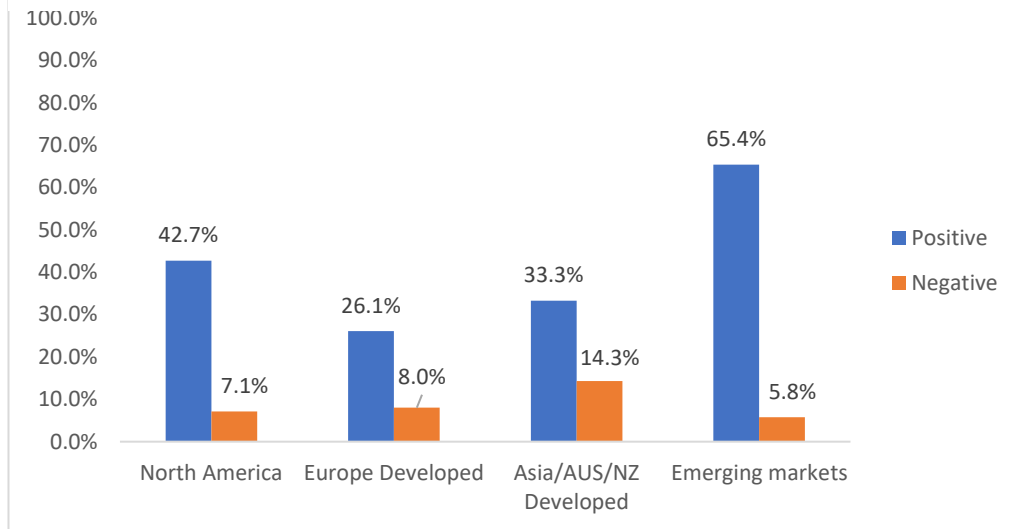
Accounting and market-based performance measures focus on different areas of financial performance and are each subject to specific biases (Johnson, et al., 2019). For this reason, most research investigates both aspects of financial performance. There is growing research on the association between ESG scores and financial performance, generally in the context of advanced economies. However, some studies have found a positive relationship between the accounting aspect and a negative relationship with the market aspect of financial performance and vice versa (for example, Giannopoulos, et al. 2022; Hasan, et al. 2022). Essentially, when both financial measures are used, a clearer picture can be shown of how ESG affects

firm performance and how stakeholders respond to ESG (Aydoğmuş, Gülay and Ergun 2022).

A few researchers have carried out an analysis using an international sample using regression analysis, revealing a positive impact (Aydoğmuş, Gülay and Ergun 2022; Bilyay-Erdogan and Oztukkal 2023; Shaikh 2022). Aydoğmuş, Gülay, and Ergun (2022) examined 1720 firms from Africa, the EU, the American continent, and Asia using panel regression. The authors discovered financial improvements in firms that implemented ESG practices. In addition, the ESG factors were all found to significantly push financial performance forward. Bilyay-Erdogan and Oztukkal (2023) examined the relationship between ESG and firm performance between 2007–2020. They first found normality across the different variables and thereafter carried out the Pearson correlation matrix to ascertain that there was no multicollinearity. The authors then ran a panel data regression, with the Hausman test claiming fixed effects as being the most appropriate model to be used. The paper had ROA and Tobin's Q as their dependent variables, with their controls variables consisting of size, leverage, age, and, sales growth. Similarly, these authors provided evidence that 22 emerging countries' ESG scores and ESG subcomponents drove performance up in both financial aspects. These discoveries are oriented with the stakeholder theory.

A study by Friede, Busch, and Bassen (2015) consolidated 2000 empirical studies pertaining to the relationship between ESG and firm performance. The authors' findings in the developed world revealed the shares of the positive findings as follows: North America (43%), Europe (26%), and Asia/Australia/New Zealand (33%). Figure 3 visually represents these findings, including findings from the emerging market. As can be seen, the results lean more towards a favourable association existing between ESG and firm performance in both developing and developed economies.

Figure 3: ESG and firm performance in different regions



Source: Friede, Busch and Bassen (2015)

As Figure 3 shows, some studies have found negative findings. Recent studies, including Buallay et al. (2020) and Duque-Grisales and Aguilera-Caracuel (2021), discovered a negative association between CSR and firm performance. Duque-Grisales and Aguilera-Caracuel (2021), using many multinational businesses from different regions in Latin America, revealed that such activities had a strong downward effect on firms' performance. Furthermore, the authors found that each ESG dimension had a negative relationship. Before Buallay et al. (2020) ran their panel data regression they carried out a myriad of tests to check whether the data met the assumptions of the model. The authors first found normality in the variables by carrying out the Jarque-Bera test. They also found stationarity by carrying out the Levin Lin and Chu unit root test, and subsequently the Pearson correlation matrix to ensure that the model would not suffer from multicollinearity issues. To examine collinearity of independent variables they calculated the variance inflation factors (VIF) and found that no multicollinearity between the independent variables. Thereafter, they carried out the Breusch-Pagan and Koenker tests and found determined that the model would not have heteroscedasticity. Lastly, the authors carried out a panel data regression, with the Hausman test claiming random effects regression as being the most appropriate model to be used. The authors used ROA, ROE, and Tobin's Q as their dependent variables, with country specific control variables. The results showed that banks located in Africa, engaged in CSR activities, performed poorly from a profitability and market value perspective.

Nonetheless, several studies on U.S.-listed firms have revealed a positive effect of CSR on firm performance (Alareeni and Hamdan 2020; Kim, et al. 2019, Miller, et al.

2020; Nguyen, Hoan and Tran 2022). Alareeni and Hamdan (2020) show that firms with more assets and high levels of financial leverage are likely to have greater levels of ESG investment. Kim et al. (2019) uncovered that CSR assurance service significantly affects the relationship; essentially, larger firms that have their CSR reports assured by external experts experience greater financial performance (Velte 2021). These results suggest that larger firms in the U.S. can earn the trust of stakeholders by improving their credibility and by investing more in ESG activities (Hendratama and Huang 2021).

Upbeat results are also found within the EU. Ahmad, Mobarek, and Roni (2021), Jahmane and Gaies (2020), and Rahi, Johansson, and Lions (2024) used different methodological approaches and found the presence of a pleasant financial outcome for firms engaged in ESG activities. Ahmad, Mobarek, and Roni (2021) in particular used panel data analysis in their investigation, with the Hausman test indicating the random effects regression as the most appropriate approach. The authors used size and leverage as their control variables in their paper to then find a positive relationship between ESG and firm performance. Evidence has been provided in Norway that the main stakeholder groups that motivate firms to commit to CSR activities are the owners, followed by customers (Ditlev-Simonsen and Wenstøp, 2013). These findings suggest that firms are mainly rewarded through higher revenues and stock prices by investors (market performance) and customers (accounting performance) for taking on social responsibility. However, the research cannot be generalised to all EU countries and is limited to the Norwegian context.

Results based on ESG in the developed world reveal that consumers who are aware of the firm's commitment tend to reward ESG efforts. However, based on the U.S. findings and other research, consumers must believe in the credibility of firms' ESG activities (Roberts, et al. 2022, Warmate, Eldaly and Elamer 2021). Essentially, when consumers perceive ESG activities as untrustworthy and lacking societal benefits, they tend to respond negatively. This disparity results in consumers developing an unfavourable perception of companies engaged in ESG practices that do not align with the implied societal benchmark (Carlos and Lewis 2018). Consequently, insufficient amounts of ESG might result in reputation problems for firms, in addition to the cost incurred to implement ESG activities. This may suggest that firms pursuing ESG activities have to put their best foot forward in order to derive the benefits.

This idea of sufficient amounts being invested can be corroborated by research done by Franco et al. (2020) on tourism and hospitality, which had varied results.

Before running the panel data regression the authors checked for multicollinearity by carrying out the correlation matrix. Thereafter, the authors checked for multicollinearity between the independent variables and found that there was none. The authors then used a panel data regression to carry out their research, with the Hausman test suggesting the random effects model as the most appropriate model to use. The authors used size and leverage as their control variables and ROE as their dependent variable. The authors found a U-shaped relationship existed between CSR and firm performance. The results suggested the hospitality firms needed to invest above a certain threshold to obtain a return on their ESG investment.

A lot of research has shown a positive financial outcome for businesses that engage in CSR activities in East Asian countries (Kao 2023, Mohammad and Wasiuzzaman 2021, Qu and Zhang 2023, Tao 2023). Qu and Zhang (2023) and Tao (2023) conducted their study in China, Mohammad and Wasiuzzaman (2021) in Malaysia, and Kao (2023) in Taiwan. Qu and Zhang (2023) uncovered that a stronger relationship is present according to how established a firm is, suggesting that larger ESG investments resulted in high firm performance. Tao (2023) carried out a panel data regression with ROA as one of the author's dependent variables, size and leverage as control variables. Likewise, The author revealed that the more investment devoted to ESG performance, the higher the firm's performance. Firstly, these findings reveal that stakeholders are aware of firms' ESG practices in East Asian emerging markets. Secondly, the findings suggest stakeholders reward bigger firms more, possibly because they have the capability to invest more resources into ESG activities than smaller firms. Hence, a claim can be made that larger firms benefit more from ESG investment.

Despite a few studies examining the relationship in South Africa, the results are mixed. Chininga, Alhassan and Zeka (2023) investigates the effect of ESG ratings on the financial performance of 40 JSE-listed firms from 2015 to 2019. Using a two-stage least squares regression to control for endogeneity, the study analyses accounting-based measures like ROA and ROE, and market-based measures such as Tobin's Q. The independent variables include overall ESG ratings and ESG dimensions. with firm size, debt-to-equity ratio, dividend pay-out ratio, market capitalization, and operating margin as controls. The results show that ESG ratings, particularly environmental initiatives, positively and significantly impact ROE and Tobin's Q, while social and governance factors have no significant effect.

Matemane, Msomi and Ngundu (2024) explore the relationship between ESG indicators and financial performance in JSE-listed firms over the period 2012 to 2022, using a sample of 67 companies. The paper uses a two-step system

Generalized Method of Moments (GMM) approach that analyses Return on Assets (ROA) as the dependent variable, with ESG composite scores and ESG subcomponents as the independent variables. The paper uses size and leverage as its controls variables. The paper's results reveals that ESG scores show no statistically significant effect on ROA. The findings suggest that ESG initiatives may not directly translate into financial gains as the stakeholder theory suggests.

Evans et al. (2023) examines the relationship between ESG factors and the financial performance of 13 JSE-listed mining companies from 2008 to 2020, using a two-way random effects panel regression analysis. The study uses ROA and ROE as dependent variables and overall ESG scores with its subcomponents as independent variables. The paper uses size and leverage as its controls variables. The findings reveal no statistically significant relationship between overall ESG scores and financial performance. However, specific subcomponents, such as human rights and CSR strategy, positively correlate with ROA, while emissions, environmental innovation, working conditions, and shareholder responsibility negatively affect performance. This suggests that while ESG as a whole may not impact financial outcomes, certain subcomponents can either enhance or detract from mining firms' profitability.

There have been a few studies that have provided an explanation for such negative findings (for example, Amin and Tauseef 2022; Naccache and Schier 2021; Nollet, Filis and Mitrokostas 2016). Notably, Nollet, Filis, and Mitrokostas (2016) conducted a regression analysis and unpacked a significant negative association between CSR and financial performance. However, the authors made a breakthrough in their research by showing that a U-shaped relationship was present instead of a negative one. This proof suggests the presence of a brief negative relationship and a more permanent positive one in the long run. In addition, the authors showed that only the g-score had that U-shaped relationship with financial performance, making it the main driver of improved financial performance. Conversely, Meier, Naccache, and Schier (2021) find an upside-down U-shaped association between CSR and a firm's profitability, suggesting that excess investment in ESG practices does not result in enhanced performance. This research is also supported by Amin and Tauseef (2022), who also found an inverse U-shaped relationship.

Some inconsistencies in results can be ascribed to the interchangeable use of terms. For example, a significant amount of research has used economic, social, and environmental dimensions to form their independent variable when researching sustainability (for example, Chang and Kuo 2008; Lo and Sheu 2007; Lourenço, et al. 2012). In contrast, some research on sustainability has used the ESG combination as an independent variable (for example, Abi , Li and Camara-Turull 2020, Miralles-

Quiros, Miralles-Quiros and Goncalves 2018, Qureshi, et al. 2020). Likewise, a significant amount of research based on CSR has used social and environmental dimensions to form the independent variable (for example, Griffin and Mahon 1997; Jeon and Gleiberman 2017; Miller, et al. 2020 and Wiengarten, et al. 2017). In contrast, some research on CSR has included governance, therefore forming an ESG combination as their independent variable (for example, Humphrey, et al. 2012; Kang, et al. 2016; Kim, et al. 2019 and Lech 2013). Based on the research discussed in preceding paragraphs and theoretical arguments, this study has constructed the following hypotheses:

H1. There is a positive relationship between the ESG disclosure scores and the individual measures of firm performance.

2.5 Subcomponents of ESG and their effect on corporate financial performance

2.5.1 Environment

Environmental responsibility is defined as activities by firms that reduce direct emissions from firms, reduce the usage of electricity, heat, and steam, and reduce indirect emissions (business travel in a company's value chain) (Armstrong 2020).

Zheng and Iatridis (2022) performed a meta-analysis regarding many articles involving thousands of companies and found favourable financial results for firms showing desirable environmental performance (EP). Similarly, Endrikat, Guenther, and Hoppe (2014) used the same approach and presented similar results. The authors claimed that the relationship is even stronger when environmental responsibility from firms is proactive rather than reactive.

However, some earlier studies in the developed world illustrate a negative relationship (Jaggi and Freedman 1992; Knowles-Mathur and Mathur 2000). A study conducted on U.S. listed firms further confirmed these claims by providing evidence of pulp and paper firms' performance declining due to improvements in pollution performance (Jaggi and Freedman 1992). Together, these studies suggest that the expenses associated with environmental responsibility surpass the generated revenue, leading to a decline in financial performance. A claim can be made that advancements in analysis techniques have taken place since these earlier studies.

Further proof is provided of a desirable outcome for firms involved in climate change objectives (for example, Das 2023, Homroy 2023, Mondal and Sahu 2023).

Das (2023) revealed that a proactive, environmentally friendly strategy dictates the outcome between emissions and firms' financial performance. Homroy (2023) found that CEOs with daughters were more likely to set environmentally friendly business strategies that would result in enhanced firm performance. The author claimed that a reduction in greenhouse gasses would lead to higher performance because of information advantage and operational efficiency.

Many studies have narrowed their focus and examined CO² emissions; most suggest that firms that engage in reduced CO² emissions experience improved financial performance (Capece, et al. 2017, Nguyen and Hens 2015, Xia, Chen and Zheng 2015, Zhu, Feng and Choi 2017). Overall, their findings showed that firms are a lot more aware of environmental policies, and those that adhere to the changing nature of these policies achieve enhanced firm performance. According to Siedschlag and Yan (2023), revenue pushes firms to improve EP. An assumption can be made that, locally and globally, environmentally friendly producers are the preferred suppliers by public and private entities when providing goods and services (Barbarossa and De Pelsmacker 2016). As such, companies that meet the requirements for higher environmental standards may have the opportunity to market their products and services to nations enforcing stringent EP standards, which enables improved financial performance (Ambec and Barla 2008).

Overall, the literature proposes that EP leads firms to a more favourable financial position. Based on the literature reviewed in this section, this paper has constructed the following hypotheses:

H2. There is a positive relationship between the environmental score and the individual measures of firm performance.

2 .5.2 Social

Social responsibility is defined as activities from firms that enhance employee engagement, inclusion, equity, diversity, professional growth, customer satisfaction, and community engagement (volunteer and philanthropic work) (Armstrong 2020).

Several studies conducted on both developing and developed economies have shown that workplace diversity improves firm performance and objectives (Armstrong, et al. 2010, Augustine, et al. 2016, Kundu and Mor 2017, Srikanth, Harvey and Peterson 2016). According to van Dick, van Knippenberg, and Hagele (2008) and van Knippenberg and Schippers (2007), diverse corporate teams may be

expected to perform better than homogeneous corporate teams as they are more inclined to delve into task-related information. Essentially, such an environment would facilitate less groupthink, and teams would examine information thoroughly, given that each team member would interpret information differently. This suggests that diverse teams will possess unique skills and knowledge and enable them to bring different perspectives to problem-solving (Harrison and Klein 2007).

Researchers have also analysed the effect of employing more women in the workplace. A large amount of research has found a positive outcome on firm performance from gender diversity (Goncalves, Gao and Rodrigues 2022, Jan 2022, Latukha, et al. 2022, Olivas, Mukhopadhyay and Frankwick 2022). Overall, the findings propose that women in top positions in the workforce positively affect the performance of the firms. Jan (2022) suggests that better representation of women results in better performance at higher levels; however, no effect is observed at lower levels of the workforce. Vlas et al. (2022) suggest that better management of a diverse workforce results in a more competitive firm, which ultimately enhances financial performance. The findings from these studies suggest that having a diverse workforce can lead to higher firm performance only if the diversity is well managed, as suggested.

Studies have also supported the idea of customer satisfaction playing a crucial role in the efficient and effective coordination of firm resources, improving overall financial performance (Beckers, van Doom and Verhoef 2017, Otto, Szymanski and Varadarajan 2020, Rubera and Kirca 2017). According to Anderson, Fornell, and Lehmann (1994), customer satisfaction positively relates to lowering transaction costs and increasing revenue. A claim can be made that these favourable results, stemming from high satisfaction levels, tend to positively impact both market and accounting aspects of financial performance. Otto, Szymanski, and Varadarajan (2020) support this idea by revealing that firms with satisfied consumers and loyal customers have more stable revenue, finances, and favourable growth prospects. The authors further add that these firms should be in a better position than their competitors to negotiate favourable terms of trade with suppliers. Research from Sorescu and Sorescu (2016) proposes that the establishment of friendly terms results in higher-than-average returns from stocks. Therefore, investment in the social dimension of ESG should result in higher stock prices and profitability.

Findings produced in recent research also provide information on how investment in employees produces favourable outcomes, such as innovative success (Liu, Sun and Zeng 2020, Mao and Weather 2019). Based on the empirical research provided in past research, this study has constructed the following hypotheses:

H3. There is a positive effect between the social score and the respective financial performance measure.

2.5.3 Governance

Social responsibility is defined as activities from firms that enhance governance structure and oversight and improve business ethics (Armstrong 2020).

Auditing is a part of good governance is a part of good corporate governance; research in both developing and developed economies has shown that overall, auditing mostly leads to enhanced corporate governance (Akbar, et al. 2016, Al-ahdal, et al. 2020, Rahman, Meah and Chaudhory 2019). According to Rahman, Meah, and Chaudhory (2019), larger internal auditing teams have a positive association with firm performance due to their capacity to incorporate members of different professional backgrounds, which might elevate problem-solving abilities and improve the decision-making of difficult challenges. Most research advocates for the idea that the autonomy in internal auditing, the frequency of audit committees' workshops, and the size of internal audits lead to better enhanced financial outcomes for firms (Hazaea, et al. 2020).

A few studies in both developing and developed economies have investigated the association between corporate transparency and firm performance. Of the handful of studies that have been carried out, a favourable outcome was determined when it came to firm clarity and openness to owners and firms' financial prosperity (Sadiq and Gebba 2022, Sharif and Ming Lai 2015). Similarly, Stiglbauer (2010) found that firms that were transparent with their endeavours with shareholders experienced higher market value. In addition, the results also revealed that information that's accurate and released on time enhances market performance. These results suggest that investors value openness from firms, which could be because transparency reduces information asymmetry and, in turn, creates trust.

Research from the developed sphere has also proposed that the board of directors can monitor the firm effectively if they are independent of management (Daud, et al. 2023, Kahloul, Sbai and Grira 2022, Sarkar and Sarkar 2018). An early study by Rosenstein and Wyatt (1990) uncovered that a firm that had more members on the board performed better. Research also illustrates that firms with an independent board of directors are more likely than others to disclose information that could enhance financial performance (Yekini, et al. 2015). This suggests that a board of directors with no close ties to the business represents their shareholders better by

making good decisions stock to enhance prices and improve profits. From the information provided, this study formed the following null hypothesis:

H4. there is a positive effect between the governance score and the respective financial performance measure.

3. Data and Methodology

3.1 Sample data

Data was collected on JSE-listed firms that started engaging in ESG activities in 2010 (or before) and continued with these activities until 2022. This study's observations began in 2010 to avoid too many structural breaks within the data (2007 financial crisis). At the beginning of the second half of each year, the Refinitiv database updates its data; this study uses annual data derived from the database. However, variables like the Return on Capital Employed (ROCE) and Tobin's Q are calculated manually, built upon data from the Refinitiv database. Many studies have also used annual data (for example, Aydoğmuş, Gülay and Ergun 2022, Qu and Zhang 2023, and Rahi, Johansson and Lions 2024). Refinitiv derives data from different sources for instance, yearly financial updates, other firm reports and firm websites (Aydoğmuş, Gülay and Ergun 2022). The information undergoes standardization, and evaluations are carried out, generating ESG scores to assist finance professionals in making informed decisions (Aydoğmuş, Gülay and Ergun 2022). In this regard, it can be viewed as a credible source of timely and accurate information that facilitates various financial activities.

The original sample comprised of 171 firms from the JALSH between 2010 and 2022. Firms' data had to be present for all variables from 2010 to 2022. Companies with no or missing information were excluded from the study. After the data cleaning, this study narrowed its sample size to 38 listed firms. The number of firms and timeline provide this study with 494-panel data firm-year observations.

3.2 Measures of firm performance

3.2.1 The Tobin's Q

A positive relationship between Tobin's Q and ESG; this study expects a similar result (see, for example, Qu and Zhang 2023; Rahi, Johansson and Lions 2024). Studies such as Qu and Zhang, and Rahi, Johansson and Lions 2024 used Tobin's Q as one of their dependent variable and found a significant positive relationship existed between ESG and Tobin's Q. It aids in ascertaining whether a firm is overvalued or undervalued to explain whether investors value the firms engaged in ESG activities. It is calculated as follows:

$$1. \text{ Tobin's_Q} = \frac{\text{Market Capitalization} + \text{Book Liabilities}}{\text{Total Assets Book Value}}$$

The Tobin's Q measures market worth compared to an accounting measure, so when Tobin's Q is 1, market worth and accounting value are equal. In essence, a Tobin's Q above 1 would reflect a stock being overvalued by investors, and a Tobin's Q below 1 would reflect an undervalued stock (Giannopoulos, et al. 2022). This makes Tobin's Q a great measure because it allows for the assessment of the association between firm value and operations.

3.2.2 Return on assets (ROA)

Similarly, a positive relationship is expected between ESG and ROA since many studies have found a similar result (for example, De-Lucia, Paziienza and Bartlett 2020; Tao 2023). Both studies conducted by De-Lucia, Paziienza and Bartlett 2020, and Tao 2023 found a significant positive relationship existed between ESG and ROA. According to the stakeholder theory, the profits experienced through ESG engagement outweigh the costs. ROA helps in assessing this claim. ROA is computed similarly to as follows:

$$2. \text{ ROA} = \frac{\text{Net Income}}{\text{Total Assets}}$$

As the equation suggests, ROA reflects how much a firm can generate profit using all its assets. The reason why this measure is used in this study is twofold. Firstly, it allows for assessing a firm's efficiency at converting expenditure into profits. Secondly, ROA captures the overall financial effect of a firm's operations, making it apt for examining the inclusion of ESG practices.

3.2.3 Return on capital employed (ROCE)

A positive relationship is expected between ROCE and ESG since some studies have found a similar result (for example, Zhao, et al. 2018). Zhao et al. (2018) used ROCE as one of their dependent variables and found a significant positive relationship existed between ESG and ROCE.

A firm with greater ROCE is assumed to generate more value from its investments. ROCE is calculated as follows:

$$3. \text{ ROCE} = \frac{\text{Earnings Before Interest and Tax}}{\text{Fixed Assets} + (\text{Current Assets} - \text{Current Liabilities})}$$

As the equation shows, ROCE captures how efficiently a firm generates profits with its own capital investments. It allows an assessment of how efficient a firm is at converting its capital investment into profits. This assessment would allow for a fair

analysis on if firms with elevated ESG scores also experiences superior monetary performance (before tax) in deploying its capital.

3.3 Independent variables

This paper uses the ESG combined score and the different dimensions, environmental, social, and governance, to capture companies' non-financial performance. Table 1 describes the Refinitiv ESG score range.

Table 1: ESG score range

Scoring intervals	Description:
0 to 25	Weak comparative ESG commitment and an inadequate level of transparency in sustainability data to the public.
>25 to 50	Satisfactory comparative ESG commitment and a moderate level of transparency in sustainability data to the public.
>50 to 75	Good comparative ESG commitment and above the middle level of transparency in sustainability data to the public.
>75 to 100	Great relative ESG commitment and a high level of transparency in sustainability data to the public.

Source: Thomson Reuters' Refinitiv Database

- I. Environmental score: This dimension uses fifty-seven (57) indicators to grasp how much a firm uses its resources to enhance its environmental responsibility. It looks at clean energy policies, employment of green energy, eco-friendly product creation, implementing actions for pollution control, and setting environmental benchmarks, among other factors (Aydoğmuş, Gülay and Ergun 2022). The final score is a weighted measure of the various environmental-related indicators and is interpreted as outlined in Table 1.

- II. Social score: This dimension uses sixty (60) indicators to grasp the magnitude to which a firm aligns its interests with the interests of the community in which it operates. It considers diversity in the workplace, safety, customer and employee satisfaction, and female employees, among other factors (Aydoğmuş, Gülay and Ergun 2022). The final score is a weighted measure of the various social-related indicators and is interpreted as outlined in Table 1.

- III. Governance score: This dimension uses forty-eight (48) indicators to grasp the magnitude firms' board members taking care of shareholder interests. It considers independent board members, transparency with shareholders, independent audit committees, and minority shareholder rights (Aydoğmuş, Gülay and Ergun 2022). The final score is a weighted measure of the various governance-related indicators and is interpreted as outlined in Table 1.
- IV. Overall score: The ESG combined score combines all three ESG dimensions and serves as a metric that evaluates a firm's ESG practices. The combination of each weighted dimension provides the collective performance of companies' sustainability practices. As such, the ESG combined score becomes an important proxy for measuring a firm's holistic effect on the environment, community, and investors. The final score is a combined weighted measure of the various scores-related indicators and is interpreted as outlined in Table 1.

3.4 Control Variables

This study uses two control variables found in past research that influence firm profitability and ESG performance (Aydoğmuş, Gülay and Ergun 2022; Giannopoulos, et al. 2022; Al Hawaj and Buallay 2022). These variables are all firm-specific control variables and consist of Size and Leverage.

Size is used as this study's control variable because larger firms can have enough resources to engage in more ESG activities, leading to higher ESG scores (Qu and Zhang 2023, Tao 2023). In addition, larger firms tend to be more profitable for many reasons such as economies of scale and market power. Adopting firm size as a control variable will minimize heterogeneity since the collected sample population will have a different variation of firms. This will ensure that the effects observed are not due to size differences between firms. Size is calculated as follows:

1) Size = Current assets + Long term assets

Leverage is incorporated in this study because firms can use debt financing to enhance the profit they generate (Alareeni and Hamdan 2020). Adopting Leverage as a control variable will allow for minimizing heterogeneity since the sample size will have firms with different capital structures. As such, controlling for Leverage would mitigate the confoundment observed in this study's results through

variations in capital structure. Leverage is calculated as follows:

$$2) \text{ Leverage} = \frac{\text{Total debt}}{\text{Total assets}}$$

Before running the panel data regressions, this study first ascertains which data model would work best with the current data (Aydoğmuş, Gülay and Ergun 2022). This study compares two static linear panel data models: the random effects model (REM) and the fixed effects model (FEM). The random and fixed effects are compared. For this comparison, the Hausman test is used.

3.6 Estimation Procedure (or Model estimation)

3.6.1 Pooled OLS regression model

The Pooled Ordinary Least Squares (OLS) model enables combining time-series and cross-sectional data (Laskar and Maji 2018). Below is the generalized version way of writing the model equations:

$$y_{it} = \beta_0 + \beta_1 X_{1,it} + \beta_2 X_{2,it} + \dots + \beta_k X_{k,it} + \gamma_1 Z_{1,it} + \gamma_2 Z_{2,it} + \dots + \gamma_m Z_{m,it} + \varepsilon_{it} \quad i = 1 \dots n; t = 1 \dots T \quad (1)$$

Where:

y_{it} are the dependent variables (financial performance) for firm i at time t .

X_{1it} and X_{2it} are the explanatory variables for firm i at time t .

$z_{m, it}$ shows the control variable for unit i at time t , e.g., firm size, and leverage.

γ_m represents the coefficients for the control variables.

β_0 is the intercept term.

β_1 and β_2 are the coefficients related to the independent variables (ESG and ESG factors)

ε_{it} is the error term for firm i at time t , showing the effects of unobserved factors.

There are three common assumptions of the pooled OLS regression model.

- 1) Homoscedasticity is assumed to be present in this model, meaning that the error term is thought to be fixed at all levels of the explanatory variable.

However, if the error term differs at different levels of the explanatory variable, then the results generated would be spurious.

- 2) Linearity between the dependent and explanatory variables is assumed to be present. This means that an increase in the explanatory variable results in a related change in the dependent variable. If a non-linear relationship exists, this would lead to biased results.
- 3) No autocorrelation is assumed with the error term across different timelines and observations. Essentially, the error term at time 1 is assumed to have no relationship with the error term at time 2. Autocorrelation/serial correlation occurs when the error terms are not independent, which leads to biases

The key limitation of pooled OLS is the assumption that there are no unobservable firm-specific effects. However, in real-world scenarios, firms are likely to have unique characteristics (e.g., differences in size, industry regulations, or corporate culture) that could influence both the independent and dependent variables. Ignoring these unobservable firm-specific effects violates the assumption of exogeneity, as the error term ϵ_{it} may be correlated with the independent variables X_{it} , leading to biased and inconsistent estimates.

To address the issue of unobservable firm-specific effects, this study employs panel data methodologies such as Fixed Effects (FE) and Random Effects (RE) models.

- 1) Fixed Effects (FE): The FE model controls for time-invariant firm-specific characteristics by allowing the intercept term to vary across firms. This effectively eliminates bias caused by unobservable heterogeneity by focusing solely on within-firm variation. The FE model assumes that these unobservable effects are correlated with the independent variables X_{it} , which resolves endogeneity caused by omitted variable bias.
- 2) Random Effects (RE): In contrast, the RE model assumes that the firm-specific effects are uncorrelated with the independent variables. This allows for the inclusion of time-invariant variables that might be excluded in the FE model.

By using FE and RE models, this study acknowledges and adjusts for heterogeneity between industries. For example, the mining industry may achieve higher ESG scores due to stringent policies on employee safety and environmental care, while a financial services firm may not face similar requirements, leading to systematically different ESG scores. These models ensure that the error term ϵ_{it} does not soak up firm-specific effects, thereby reducing biases.

However, it is important to note that while the FE and RE models improve the validity of the estimates, they treat the independent variables as weakly exogenous. This means they assume that there is no reverse causality or omitted time-varying confounders. If this assumption is violated, the models may still yield biased results, especially when the time period under study is short.

3.6.2 Random effects regression model

In a REM, heterogeneity between firms is assumed to be random, uncorrelated to the explanatory variable, and constant over time (Sani, et al. 2020). Heterogeneity is observed in the error terms (ϵ_{it}), which are distributed randomly across the cross-sectional units, accounting for any random effects that occur over time. The model can be expressed as follows:-

$$y_{it} = \mu + \beta_1 x_{1,it} + \beta_2 x_{2,it} + \dots + \beta_k x_{k,it} + (\alpha_i - \mu) + \epsilon_{it} \quad i = 1 \dots n; t = 1 \dots T \quad (2)$$

α_i the random effects (fixed over time but varies cross-sectionally).

ϵ_{it} the error term, which also encompasses the random effects and unobserved elements affecting the independent variable Y_{it} .

3.6.3 Fixed effects regression model

FEM considers heterogeneity by allowing for different intercepts for each firm using dummy variables. Fixed effects regression overcomes the drawbacks of the Pooled OLS model in this way. The different intercepts capture the different characteristics of each firm. The firm FEM is:

$$y_{it} = \alpha_i + \beta_1 x_{1,it} + \beta_2 x_{2,it} + \dots + \beta_k x_{k,it} + \epsilon_{it} \quad i = 1 \dots n; t = 1 \dots T \quad (3)$$

β_0 unknown intercept for each error term.

α_i firm error term.

ϵ_{it} overall error term

3.6.4 Hausman test

This study uses the Hausman test to ascertain which model is more appropriate for the given panel data between the FEM and the REM. The Hausman test can be expressed as follows:

$$H = (\beta^{RE} - \beta^{FE})' [Var(\beta^{RE}) - Var(\beta^{FE})]^{-1} (\beta^{RE} - \beta^{FE}) \quad (4)$$

Where:

$Var(\beta^{FE})$ is the variance-covariance matrix of the fixed effects model coefficients.

$Var(\beta^{RE})$ is the variance-covariance matrix of the random effects model coefficients.

Hypothesis:

H_0 : The random effects regression model is more appropriate for the panel data analysis.

H_1 : The fixed effects regression model is more appropriate for the panel data analysis.

Table 2: Random and fixed effects models estimators

Model/ Correct hypothesis	Random effects model used	Fixed effects model used
$H_0: Cov \alpha_i, x_{it} = 0$ Exogeneity	Consistent Efficient	Consistent Inefficient
$H_1: Cov \alpha_i, x_{it} \neq 0$ Endogeneity	Inconsistent	Consistent Possibly Efficient

Table 2 shows, the properties of the random and FEM estimators. When the REM is used appropriately is provides unbiased results. These results are considered unbiased, efficient, and consistent. However, the presence of correlation between the independent variable and error term produces inconsistent results. In this case a FEM would be required. As the table above shows, the fixed effects estimates are always consistent but less efficient relative to the random effects estimators.

When the results are produced for the Hausman test the chi-squared distribution with k degrees of freedom is compared to the critical values. The null hypothesis is rejected if Hausman statistic is bigger than the critical value. In essence, the error term would be correlated to the explanatory variable, implying that a FEM would be better for the panel data, therefore accepting the alternative hypothesis. Nonetheless, if a relationship exists between the error term in REM and the explanatory variable, the FEM would be more appropriate to use.

3.7 Hypothesis development

3.7.1 Primary hypothesis

This paper's aim is to find the association between ESG and the respective measures. The resulting model can be expressed as follows:

$$Y_{it} = \beta_0 + \beta_1 \text{ESG}_{it} + \beta_2 \ln \text{Size}_{it} + \beta_3 \ln \text{Lev}_{it} + \varepsilon_{it} \quad i = 1 \dots n; t = 1 \dots T \quad [\text{Model 1}]$$

Where:

Y_{it} are the dependent variables (ROA, ROCE, and Tobin's Q)

ESG_{it} ESG scores, as measured in Refinitiv

β_0 is the intercept term.

β_1 , β_2 and β_3 regression coefficients

Size Firm total assets measured in log

Lev Firm leverage is presented as a percentage.

ε_{it} random effects.

H₀: There is a positive relationship between the ESG disclosure scores and the individual measures of firm performance.

H₁: There is a negative relationship between the ESG disclosure scores and the individual measures of firm performance.

3.7.2 Secondary questions

This study's secondary questions are finding the relationship between ESG subcomponents and the respective financial performance measures (ROA, ROCE, and Tobin's Q). The resulting model can be expressed as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 \ln \text{Size}_{it} + \beta_3 \ln \text{Lev}_{it} + \varepsilon_{it} \quad i = 1 \dots n; t = 1 \dots T \quad [\text{Model 2}]$$

Where:

Y_{it} are the dependent variables (ROA, ROCE, and Tobin's Q)

X_{it} ESG subcomponents as measured in Refinitiv.

β_0 is the intercept term.

β_1 , β_2 and β_3 regression coefficients.

Size Firm total assets measured in log.

Lev Firm leverage is presented as a percentage.

ϵ_{it} random effects.

Several academic researchers have produced work suggesting that a corroborates a the existence of a positive relationship. However, there are a few negative and mixed results from prior research. By answering the hypotheses, this study will contribute to this field of research.

4. Discussion of Results

4.1 Industry Analysis

Table 3 shows the firms in each sector used in this study. As can be seen, most of the firms were in the materials sector, 6 in industrials, 10 in consumer goods, 4 in health care, and 3 in communication services. The total number of firms from the JALSH that engage in ESG activities is 38. This study's low number of firms can be attributed to the lack of available information regarding the JSE-listed firms from the Refinitiv database.

Table 3: Sector composition

Industry Code	Sector	Number of companies
1000	Materials	15
2000	Industrials	6
3000	Consumer Goods	10
4000	Health Care	4
6000	Communication Services	3
	Total	38

4.2 Descriptive statistics

Table 4: Adjusted Descriptive statistics

	lnROA	lnROCE	lnTobin's Q	ESG	E	S	G	lnLev	lnSize
Mean	2.946	3.185	0.182	60.37	53.7	65.1	61.69	2.75	17.46
Median	2.948	3.182	0.142	61.8	53.34	65.57	66.72	2.98	17.51
Minimum	1.91	3.11	-1.23	26.38	9.54	28.76	12.48	0	14.92
Maximum	4.05	3.27	1.71	89.27	95.47	95.18	97.54	3.98	20.76
Std. Dev	0.33	0.024	0.6	14.29	21.63	15	21.5	0.9	1.23
Skewness	0.2	0.35	0.255	-0.36	-0.078	-0.16	-0.44	-0.6	0.14
Kurtosis	3.09	3.1	2.42	2.26	1.91	2.28	2.1	3.5	2.52

The descriptive statistics are shown in Table 4. This study's data mostly contained high capitalization stocks such as Shoprite, Woolworths, and MTN group. According to Qu and Zhang, 2023, larger firms possess more resources to invest in comprehensive ESG strategies. This statement can be shown in table 4 which exemplifies that the mean for ESG and ESG pillars is above 50. According to Table 1, firms with a score greater than 50 but less than 75 have good comparative ESG commitment and are above the middle level of transparency in sustainability data to the public.

As the table shows, the mean and median of all variables are similar, which is a great sign for normality in distributions. In addition, the skewness for all variables is relatively close to zero, meaning that a bell-shaped distribution is present within each dataset. Likewise, the kurtosis for each dataset is close to or below 3. However, for InLev it is slightly above 3.

To achieve normal distributions, the following steps were taken:

- 1) Log variables: Appendix 2 shows the descriptive statistics by converting data to log-normal data - ROA, ROCE, Tobin's Q, and Size_ Leverage is also logged. Since ROA and ROCE had negative numbers, a number was added so that the minimum number would be 1 before logging could occur. For example, if the lowest number for ROA was -2, then 3 would have been added. Thereafter, the numbers were logged to produce InROA and InROCE. Logging data can help normalize skewed distributions and make them more closely resemble a normal distribution. However, normal distribution was not obtained for ROA and ROCE.
- 2) Tukey 2.2: This study addresses the rest of the outliers found in ROA and ROCE by implementing the Tukey 2.2 method, which involves removing data above a variable's upper limit and below its lower limit. The upper limit was obtained using the $Q3+2.2*(Q3-Q1)$ formula, and the lower limit was obtained using the $Q1-2.2*(Q3-Q1)$ formula. In this case, Q3 represents the upper quartile, and Q1 represents the lower quartile. Data that were found to be above the upper limit and below the lower limit in the respective variables were removed to obtain the normality of the data.

The pool size dropped significantly from 38 firms to 20 firms. This method allows for a more reliable analysis by ensuring that outliers, which may greatly influence statistical measures, are appropriately managed. Adopting such techniques contributes to the refinement of data quality and enhances the reliability of subsequent analyses. The normal distributions of each of the variables are provided in Appendix 3.

4.3 Correlations Among the Variables

Table 5 shows the Pearson correlation matrix for each variable (Aydoğmuş, Gülay and Ergun 2022). The correlation table illustrates a relationship between InTobin's Q and ESG at the 5% confidence level. Unsurprisingly, the combined and subcomponents of ESG show that they are strongly associated. Refinitiv adds the

each of the subcomponents to form the ESG score. This is why this study runs twelve different models to avoid multicollinearity. The table shows that lnROA and lnTobin's Q have a strong relationship of 0.634 at the 5% confidence level, which shows that they tend to increase together. This is also not surprising as both ratios are used to show financial performance. The table also shows that a relationship exists between firm size and ESG, implying as a firm grows the greater the ESG investment. Lastly, a relationship is observed between Leverage and ESG, implying that the more a firm borrows, the more ESG investing takes place.

Table 5: Correlation Matrix

	lnROA	lnROCE	lnTobi~Q	ESG	E	S	G	lnSize	lnLev
lnROA	1								

lnROCE	0.3970*	1							
	0	-----							
lnTobi~Q	0.6338*	0.4719*	1						
	0	0	-----						
ESG	-0.2612*	-0.1230*	-0.3465*	1					
	0	0.0475	0	-----					
E	-0.1461*	-0.084	-0.2836*	0.8419*	1				
	0.0184	0.1768	0	0	-----				
S	-0.2615*	-0.1453*	-0.3583*	0.8346*	0.6686*	1			
	0	0.0191	0	0	0	-----			
G	-0.2553*	-0.0859	-0.2469*	0.6137*	0.2304*	0.2777*	1		
	0	0.1673	0.0001	0	0.0002	0	-----		
lnSize	-0.2605*	0.0249	-0.1493*	0.3708*	0.4158*	0.4145*	0.0539	1	
	0	0.6894	0.016	0	0	0	0.3863	-----	
lnLev	-0.4111*	0.0489	-0.1317*	0.1942*	0.1263*	0.1627*	0.2217*	0.3657*	1
	0	0.4322	0.0338	0.0017	0.0418	0.0086	0.0003	0	----

Correlation analysis suggests weak and often negative relationships between ESG scores and financial performance metrics. This contrasts with the meta-analysis by Busch and Friede (2018), which identified predominantly positive correlations globally. Such divergence may highlight the importance of contextual factors, such as economic challenges and regulatory frameworks, in shaping the ESG-performance dynamic. For example, South Africa's King IV framework emphasizes governance but may not adequately incentivize environmental and social initiatives (IODSA, 2016).

Table 6 shows the ESG results from the VIF test. The information derived from this test serves to provide information on whether there is indeed a strong correlation between the independent variables. In this case, the VIF for each independent variable is above 10 (or close to 10), indicating that a strong relationship exists between, for example, ESG and each ESG dimension. These results are similar to those found in past studies (see for example, Aydoğmuş, Gülay and, Ergun 2022). In this case, the variables are used in separate models to avoid multicollinearity. The

Table 6: Variance Inflation Factors

Variable	VIF	1/VIF
ESG	56.98	0.01755
E	15.03	0.066522
S	11.17	0.089501
G	9.77	0.10231
Mean VIF	23.24	

4.4 Regression results

4.4.1 Hausman tests

The Hausman test is implemented to ascertain which regression model is more appropriate between the FEM and REM:

$$H_0 = Cov(\beta_i, x_{it}) = 0$$

$$H_1 = Cov(\beta_i, x_{it}) \neq 0$$

The outcomes from the Hausman test are summarized in Table 7 below:

Table 7: Hausman Test Results.

Dependent Variable	Test Summary	Chi-Square Statistic	p-Value
ROA	Fixed effects test	30.97	0.0000
ROCE	Fixed effects test	7.87	0.0196
Tobin's Q	Random effects test	3.52	0.1719

The test analyses the null hypothesis, revealing if REM is more suitable than FEM. The test findings, focusing on the three dependent variables ROA, ROCE, and Tobin's Q, are summarized in Table 7 above. As can be observed, the p-value is statistically significant at a 5% level for variables ROA and ROCE. Therefore,

rejecting the null hypothesis as REM is the most suitable approach. In contrast, the p-value is statistically insignificant at a 5% level for the variable Tobin's Q. Consequently, the null hypothesis cannot be rejected for Tobin's Q. This indicates that the REM is preferable when Tobin's Q is the dependent variable. Buallay et al. (2020), Franco et al. (2020), and Ahmad, Mobarek, and Roni (2021) find similar results from the Hausman test.

4.4.2 Primary hypothesis 1

The relationship between the ESG combined score and ROA was first examined using the FEM. Size and Leverage were used as control variables, and the results can be seen in Table 8:

$$ROA = \beta_0 + \beta_1 ESG_{it} + \beta_2 \ln Size_{it} + \beta_3 \ln Lev_{it} + \epsilon_{it} \quad i = 1 \dots n; t = 1 \dots T \quad [\text{Model 1a}]$$

Table 8 shows the findings of the fixed effects estimator, as the Hausman test indicated that the random effects estimator is inconsistent. All the tests and regressions were conducted in Stata.

Table 8: ROA Fixed Effects Regression Results

Variable	Coefficient	Prob.
Constant	2.384	0.017
ESG	-0.00167	0.37
lnSize	0.06454	0.274
lnLev	-0.1323	0.0000
R-squared	0.1248	
Prob (F-Stat)	0.0000	

Note: ** p-value is significant at the 0.05 level. *** p-value is significant at the 0.01 level

As shown in Table 8, the ESG combined score has a negative coefficient of -0.00167, meaning a negative relationship exists between ESG and ROA. Therefore, the null hypothesis of a positive relationship between ESG and ROA is rejected. These results are inconsistent with Qu and Zhang (2023) and Tao (2023), who found a positive relationship between ESG and ROA in China. A possible reason for this inconsistency could be the different sample pool sizes, time periods, and pool samples. This finding partially aligns with agency theory, which argues that ESG investments can increase operational costs, reducing short-term profitability (Calvo

and Calvo, 2018). However, the insignificant relationship suggests that South African firms may not yet derive substantial stakeholder rewards or competitive advantages from ESG practices, possibly due to immature ESG markets and inconsistent enforcement of regulatory standards.

When ESG scores and control variables are compared, the findings show that firm size has a weak effect ROA, similar to the ESG combined score (-0.00167). Additionally, the effect of Leverage is significantly greater than that of ESG. This study finds that ESG combined scores have an insignificant coefficient. The control variable Size has a positive insignificant effect on ROA. At the same time, Leverage has a significant negative relationship with ROA. The R-squared is 0.1248, indicating that the model is a weak fit for the data given. The predictors can explain roughly 12.48% of the variation in ROA. However, the F-statistic is significant, indicating that at least one of the predictors has a significant relationship with ROA. An F-statistic of 0.0000 indicates that the model works well with the given predictors rather than not having any predictors at all.

4.4.3 Primary hypothesis 2

The relationship between the ESG combined score and ROCE was examined second using the FEM. Size and Leverage were used as control variables, and the results can be seen in Table 9.

$$ROCE = \beta_0 + \beta_1 ESG_{it} + \beta_2 \ln Size_{it} + \beta_3 \ln Lev_{it} + \varepsilon_{it} \quad i = 1 \dots n; t = 1 \dots T \quad [\text{Model 1b}]$$

Table 9: ROCE Fixed Effects Regression Results

Variable	Coefficient	Prob.
Constant	2.95234	0.0000
ESG	-0.0000157	0.925
lnSize	0.014367	0.007
lnLev	-0.00133	0.497
R-squared	0.0095	
Prob (F-Stat)	0.0151	

Note: ** p-value is significant at the 0.05 level. *** p-value is significant at the 0.01 level

Table 9 shows the findings of the fixed effects estimator as the Hausman test indicated that the random effects estimator, is inconsistent. As shown in Table 9, ESG combined score has a negative coefficient of -0.0000157, meaning a weak

negative relationship exists between ESG and ROCE. Therefore, the null hypothesis of a positive relationship between ESG and ROCE is rejected. These results contradict Zhao (2018), who found a positive relationship between ESG and ROCE in China. In addition, this result (-0.0000157) also contrasts with studies in developed markets, such as those by Endrikat et al. (2014), which demonstrate positive outcomes from proactive environmental practices. Possible reasons are similar to those already mentioned in the previous paragraph.

When ESG scores and control variables are compared, the findings show that firm size has a weak effect on ROCE, similar to the ESG combined score (-0.0000157). Likewise, the effect of Leverage is also weak. This study finds that ESG combined scores have an insignificant coefficient. The control variable Size has a positive significant effect on ROCE. At the same time, Leverage has a negative insignificant relationship with ROCE. The R-squared is 0.0095, indicating the model is a weak fit for the data given. The predictors can explain roughly 0.95% of the variation in ROCE. However, the F-statistic is significant, indicating that at least one of the predictors has a significant relationship with ROCE. An F-statistic of 0.0151 indicates that the model works well with the given predictors rather than not having any predictors at all.

4.4.4 Primary hypothesis 3

The relationship between the ESG combined score and Tobin's Q was examined using the REM. Size and Leverage were used as control variables; the results are shown in Table 10.

$$\text{Tobin's Q} = \beta_0 + \beta_1 \text{ESG}_{it} + \beta_2 \ln \text{Size}_{it} + \beta_3 \ln \text{Lev}_{it} + \varepsilon_{it} \quad i = 1 \dots n; t = 1 \dots T \quad [\text{Model 1c}]$$

Table 10: Tobin's Q Fixed Effects Regression Results

Variable	Coefficient	Prob.
Constant	4.3717	0.0000
ESG	-0.00252	0.313
lnSize	-0.21272	0.0000
lnLev	-0.11751	0.0000
R-squared	0.0287	
Prob (F-Stat)	0.0000	

Note: ** p-value is significant at the 0.05 level. *** p-value is significant at the 0.01 level

Table 10 shows the findings of the random effects estimator as the Hausman test indicated that the random effects estimator is consistent. As shown in Table 10, ESG combined score has a negative coefficient of -0.00252, meaning that a negative relationship exists between ESG and Tobin's Q. Therefore, the null hypothesis of a positive relationship being present between ESG and Tobin's Q is rejected. These results are inconsistent with Qu and Zhang (2023) who found a positive relationship between ESG and Tobin's Q in China. When ESG scores and control variables are compared, the findings show that firm size has a weak effect on Tobin's Q, similar to the ESG combined score (-0.00252). Additionally, the effect of Leverage is significantly greater than that of ESG. This study finds that ESG combined scores have an insignificant coefficient on Tobin's Q. Both control variables are found to have significant effects on Tobin's Q.

The R-squared is 0.00287, indicating the model is a weak fit for the data given. The predictors can explain roughly 0.287% of the variation in Tobin's Q. However, the F-statistic is significant, indicating that at least one of the predictors has a significant relationship with Tobin's Q. An F-statistic of 0.0000 indicates that the model works well with the given predictors rather than not having any predictors at all.

The study reveals that ESG combined scores have insignificant coefficients, implying no significant impact on ROA, ROCE, and Tobin's Q. Notably, the control variables LnSize and LnLev stand out with highly significant effects on ROA, ROCE, and Tobin's Q.

4.4.6 Hausman tests

The Hausman test is implemented to ascertain which regression model is more appropriate between the FEM and REM:

$$H_0 = Cov(\beta_i, x_{it}) = 0$$

$$H_1 = Cov(\beta_i, x_{it}) \neq 0$$

The outcomes from the Hausman test were similar to those found in Table 7. As mentioned in the preceding paragraphs, the test analyses the null hypothesis, revealing if REM is more suitable than FEM. Appendix 4 has a summary of the findings of the ESG subcomponents and the respective financial measures.

The outcome for each ESG subcomponent with each respective financial measure is

mixed. In addition, the outcomes are insignificant across the different financial measures. However, Leverage has a significant negative effect on ROA and Tobin's Q, whereas size positively effects ROCE and Tobin's Q. The overall results indicate that ESG initiatives have limited positive impact on the financial performance of JSE-listed firms. This finding highlights the potential misalignment between ESG investments and stakeholder priorities in South Africa, as suggested by Johnson et al. (2019). From a theoretical perspective, the results align more closely with agency theory, which emphasizes the costs of ESG practices, than with stakeholder theory's emphasis on long-term value creation. However, since the results are insignificant this suggests that ESG investment is not substantial enough to affect financial performance. Matemane, Msomi and Ngundu (2024), and Evans et al. (2023) found similar studies.

4.5 Discussion of results

Table 11 below shows the coefficients retrieved from Models 1, 1a, and 1b.

Table 11: Summary of coefficients

	ROA	ROCE	Tobin's Q
ESG	-0.00167	-0.0000157	-0.00252
Inlev	-0.1323***	-0.00133	-0.1175***
InSize	0.0645	0.01437***	-0.2127***

The table above shows a consistent negative relationship between ESG combined and financial performance, inconsistent with most of the past literature (see, for example, Busch and Friede 2018). Busch and Friede (2018) performed a meta-analysis and concluded that there was a beneficial outcome for firms that engaged in ESG activities. In addition, these findings misalign with the results presented in Figure 3 that showed that literature in emerging markets mostly produced a favourable outcome between ESG and the financial outcome for firms. However, evidence has been provided of JSE SRI funds underperforming conventional funds, suggesting an inverse relationship between ESG engagement and financial outcome (Peerbhai and Naidoo 2022). Nonetheless, Model 1 (ESG-ROA), Model 1b (ESG-ROCE), and Model 1c (ESG-Tobin's Q) reveal that ESG practices result in lower profitability and market value for firms.

A significant amount of literature has pointed out that larger sized firms benefit more from ESG engagement (for example, Alareeni and Hamdan 2020, Kim, et al. 2019). Table 11 also shows that Size plays a big role in firms' profitability and market value. In addition, most literature has used size and Leverage as control variables (see, for example, Qu and Zhang 2023, Tao 2023). Past literature on the

impact of Size and Leverage on market value is mixed. For example, a significant negative relationship was found by Kim et al. (2019) between firm Size and the market value of firms. Other authors have also found a significant negative relationship between Leverage and firm market value (Fatemi, et al. 2018). In contrast, Aydoğmuş, Gülay and, Ergun (2022) find a significant positive relationship between Size and Leverage with firms' market value. Despite using these control variables, the results produced were negative.

According to the stakeholder theory, when the interests of all stakeholders are considered in business decisions, it should result in better financial performance (Jamali 2008). Stakeholder theory suggests that if JSE-listed firms invested in ESG scores, profits, and firm value would increase, suggesting the existence of a positive relationship. However, an inverse relationship seems to be the case in South Africa. The agency theory seems to explain the relationship between ESG scores and financial outcomes as the theory proposes the inverse relationship seen in Table 11.

The negative relationship between ESG and financial performance was insignificant at the 5% and 10% confidence levels. Firm heterogeneity has been shown to be a moderating element in the study of ESG and financial performance (see, for example, Tao 2023). Appendix 1 serves as a visual representation of firms' heterogeneity and how that could have potentially affected the level of significance in this study. In addition, the small sample size of 20 firms could have been another contributing factor to the insignificant relationship.

Table 12 below shows the coefficients retrieved from Model 2.

Table 12: Summary of coefficients

	ROA	ROCE	Tobin's Q
E-score	0.0001034	-0.0000769	-0.000181
S-score	-0.00179	-0.0198	-0.00403
G-score	-0.0017	0.0335	-0.000496

Table 12 shows results for the individual ESG factors; as such, the results can be broken down into three parts:

E-score: Table 12 shows that environmentally friendly firms are not rewarded as suggested by past research (Zheng and Iatridis 2022). According to Johnson, Mans-Kemp, and Erasmus (2019), South African institutional investors reportedly admitted to not placing much importance on the environmental and social aspects of firms' ESG efforts. Furthermore, a claim can be made that the lack of awareness

from stakeholders (local community and local consumers) and lack of concern from foreign importers could be the main reason for this inverse relationship.

S-score: Social responsibility has been increasing over the years, as shown in Appendix 1. The main reason for this upward trajectory could be the push for diversity within the workplace by the government through policies such as the BEE Act. However, as shown in Table 12, there is a negative relationship, which goes against the research on diversity and inclusion (see, for example, Latukha, et al. 2022, Mukhopadhyay and Frankwick 2022). It is worth mentioning that the potential reason for this relationship is poor diversity management within the workplace (Vlas, et al. 2022), which could suggest a lack of advancement or poor employee representation (Jan 2022).

G-score: Table 12 suggests that improvements in firm governance result in lower profits and firm value. This reveals that the G-score is not the main driver of positive outcomes, as suggested by research (Nollet, Filis and Mitrokostas 2016, Velte 2017). In addition, a claim can be made that the governance system implemented in South Africa causes harm to the bottom line of firms and market value.

Overall, the results for the ESG subcomponents are generally negative across each financial performance indicator, which contrasts with the findings of Chininga et al. (2023). There are only two positive relationships: that is, the E-score with ROA and the G-score with ROCE. Furthermore, the effects are all statistically insignificant. Unsurprisingly, these results are similar to those shown in Table 11 because the subcomponents are used to form the ESG combined score.

5. Conclusion

5.1 Research summary and conclusion

The study examined the relationship between the ESG combined score and financial performance. A sample of 38 firms from the JSE was examined between 2010 and 2022. The paper adds to the work of Chininga et al. (2023), Johnson, Mans-Kemp, and Erasmus (2019), and others by examining this relationship in the case of South Africa using a panel regression model. In addition, this study aimed to find the effect of each of the ESG factors on company performance to identify which sub-component had the most significant effect. One of the main arguments from the literature is that investment in ESG scores leads to enhanced financial performance, which aligns with the stakeholder theory. However, a counterargument is presented, which states that ESG investment adds more expenses and results in lower financial performance, which aligns with the agency theory.

The sample data initially consisted of 38 firms between 2010 and 2022 and was subsequently reduced to 20 firms because of the removal of outliers. The FEM was used to analyse the research objective and hypothesis. This study failed to find a positive relationship between ESG and financial performance, rejecting the null hypothesis and accepting the alternative. This ultimately means that ESG practices, in South African, reduce firms' financial performance. The negative relationship also reveals that South African stakeholders place less importance on ESG practices, therefore going against the stakeholder theory. Non-positive findings outside of South Africa exist between ESG practices and financial performance (see, for example, Buallay, et al. 2020, Giannopoulos, et al. 2022). The results of this study are similar to those of Fakoya and Malatji (2020), who found a negative relationship between ESG activities and ROE in South Africa. However, the bulk of the research leans to a positive relationship existing (see for example, Kao, et al. 2023; Rahi, Johansson, and Lions 2024). South Africa is still a developing country with high inequality, poverty, unemployment, and persistent socio-political challenges related to land reform, which may heavily influence the relationship between ESG and financial performance. However, using the FEM would have mitigated these external effects.

Based on the findings, ESG subcomponents mostly had a negative, insignificant effect on ROA, ROCE and Tobin's Q in South Africa at a 95% confidence level. These

results hold significance for policymakers, revealing that allocating resources to ESG (Environmental, Social, and Governance) initiatives influences the financial outcomes of listed firms operating in South Africa. Having consistent and localized country-specific data is crucial for informed policymaking, and this research endeavours to contribute to this matter.

5.2 Limitations

While this study enriches existing research by introducing additional literature on South Africa, it is essential to acknowledge its limitations. Among the approximately 400 listed firms on the JALSH, as per the Refinitiv database, approximately 171 firms were available, with only 38 remaining after data cleaning. Following the data-cleaning process, outliers were removed, which significantly lowered the number of firms from 38 to 20. This study's weak statistical power and the potential lack of reliability can be attributed to the small sample size. Past authors have also faced this limitation (for example, Giannopoulos, et al. 2022; Lee and Heo 2009).

5.3 Recommendations

A small sample was retrieved for this study using the Refinitiv database. A larger pool could be used in the future to help find statistical significance between ESG scores and financial performance.

A Chow test to examine if structural breaks exist within the data can be used in future research. Separating the data into groups based on periods would aid in examining if the hypothesis is maintained through the chosen timeframe. A more accurate conclusion can be obtained checking if the coefficients are equal. If the heteroscedasticity of error terms is high between separated samples, then this would lead to an affected significance level (Toyoda 1974).

In the future, when more data is available on the JSE-listed firms, researchers may consider examining ESG effects on sectors. A narrower approach would allow researchers to distinguish if different sectors are affected differently by ESG practices since each sector has different ESG policies.

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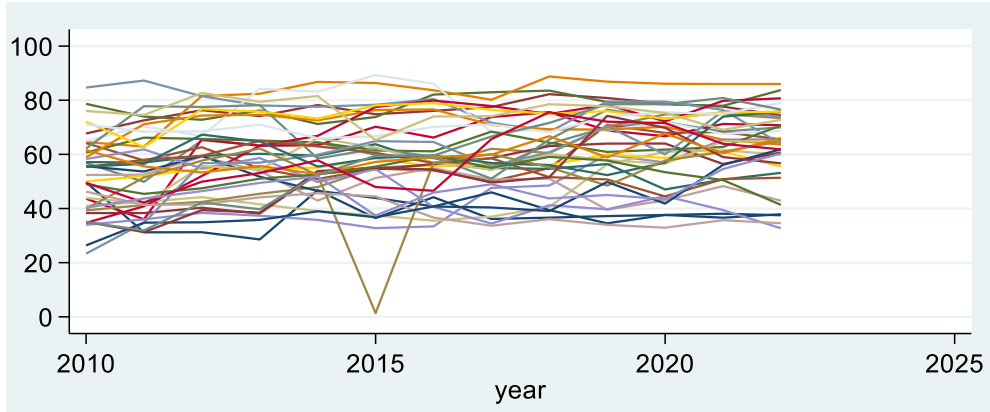
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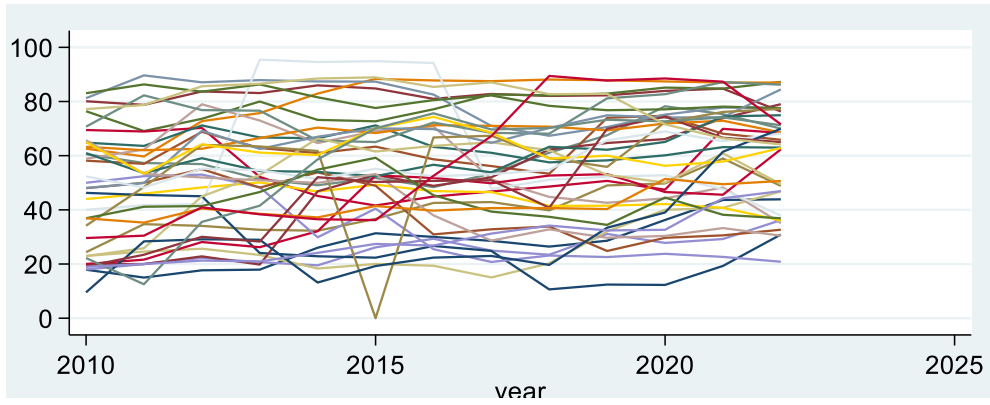
Appendices

Appendix 1: Variables time series

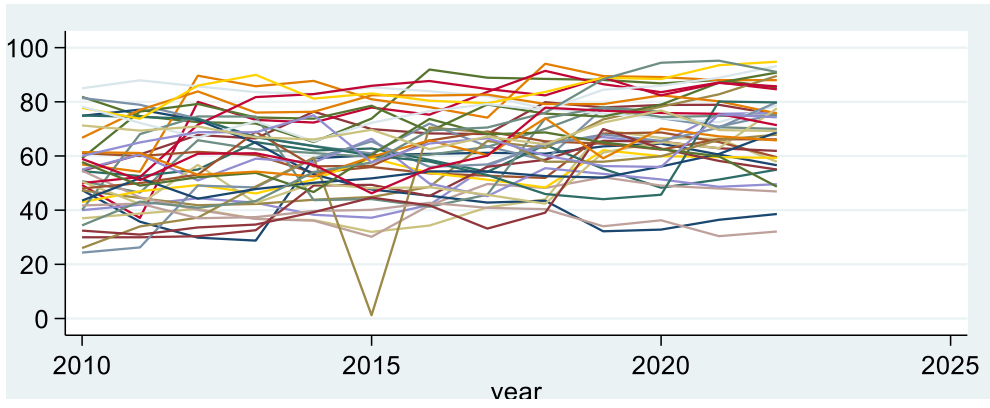
ESG combined score



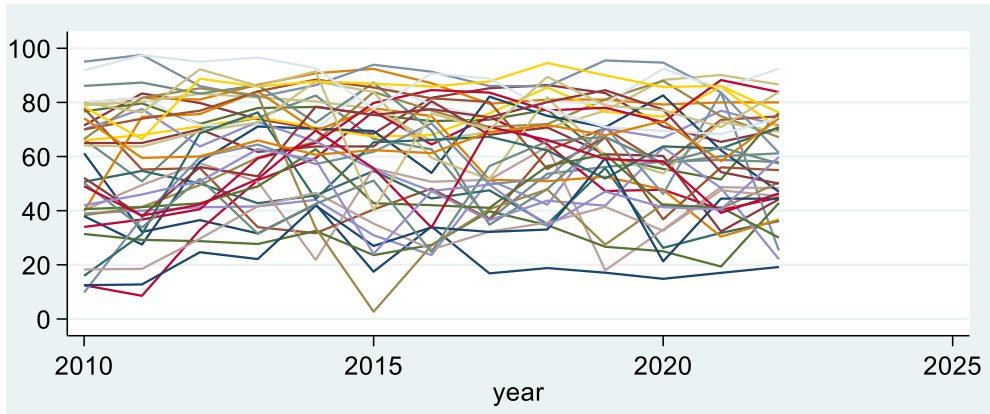
Environmental score



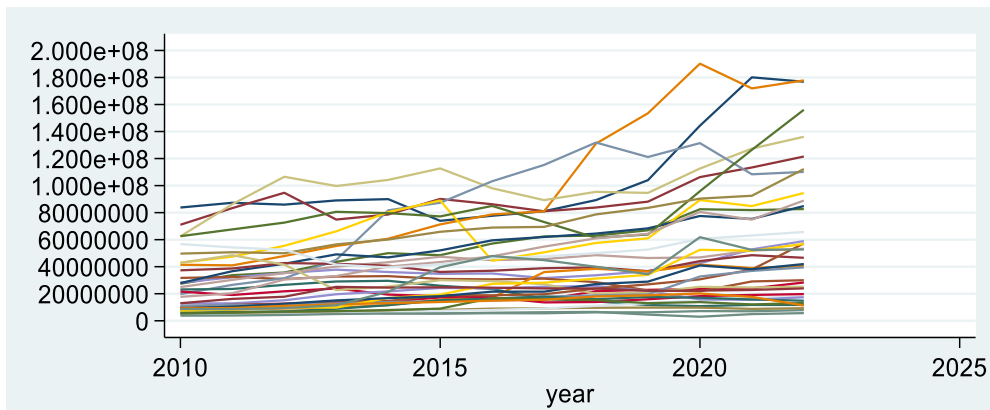
Social score



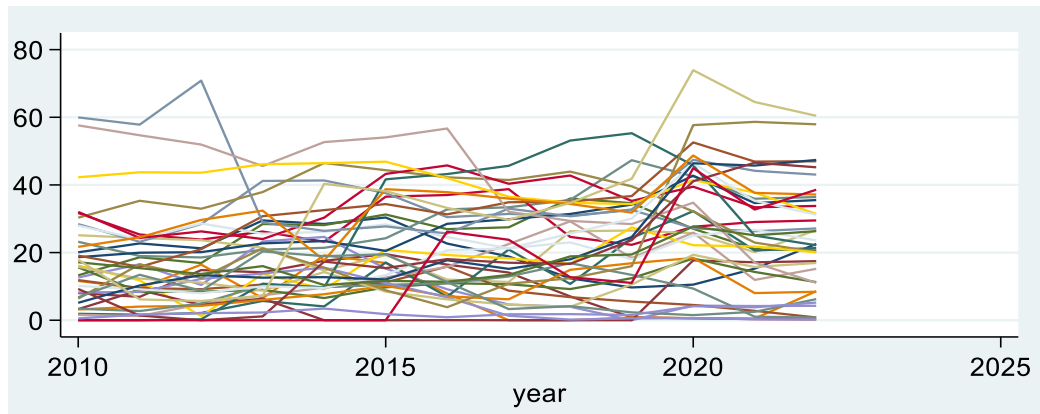
Governance score



Size (in rands)



Leverage



Appendix 2: Descriptive Statistics

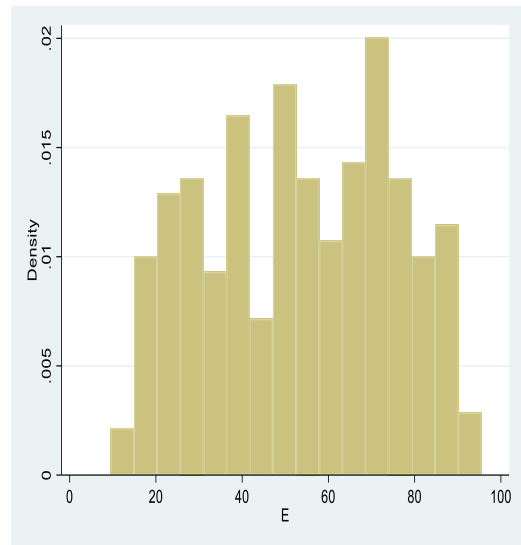
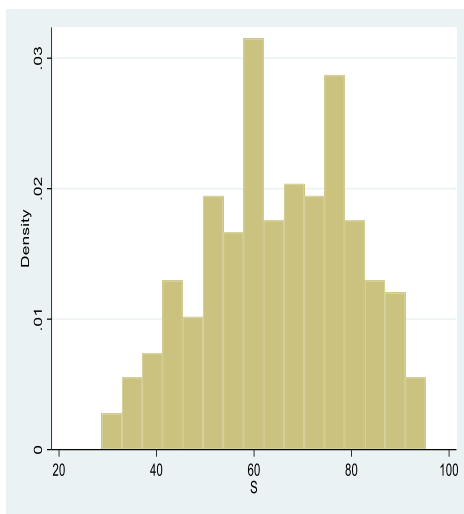
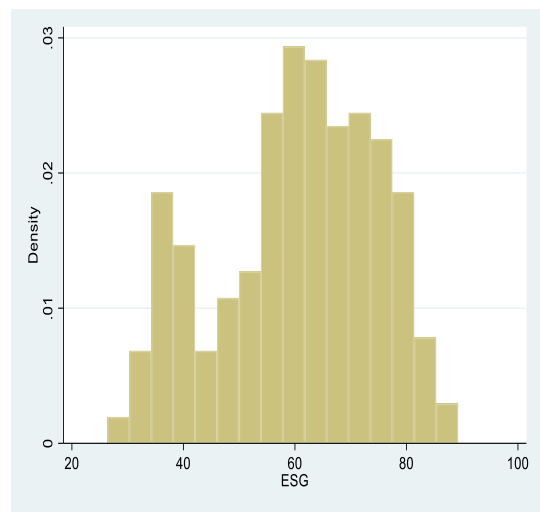
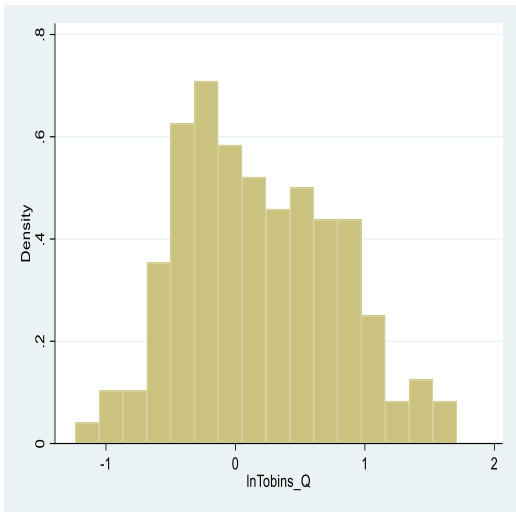
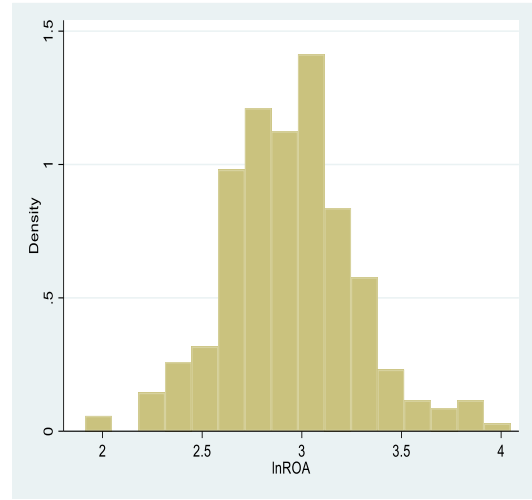
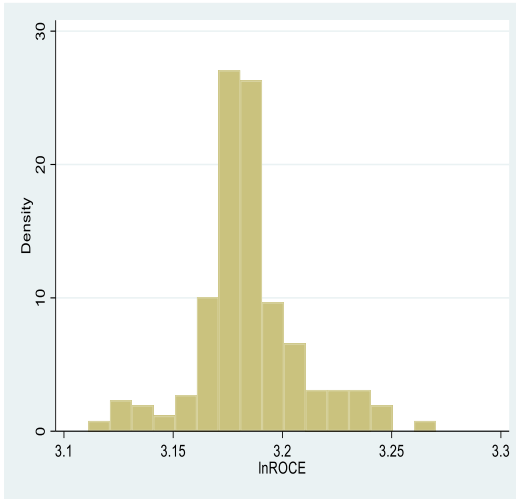
Table: Descriptive statistics (involving outliers)

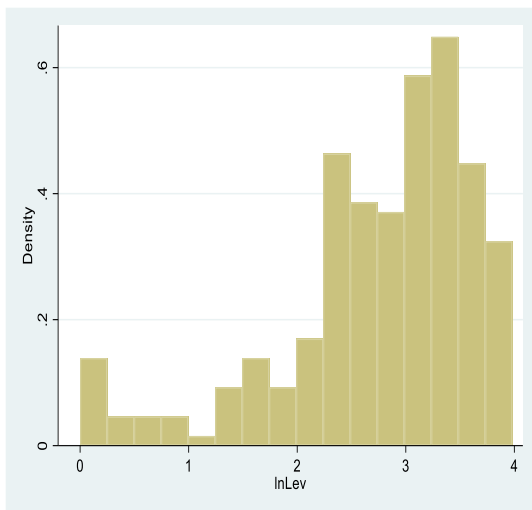
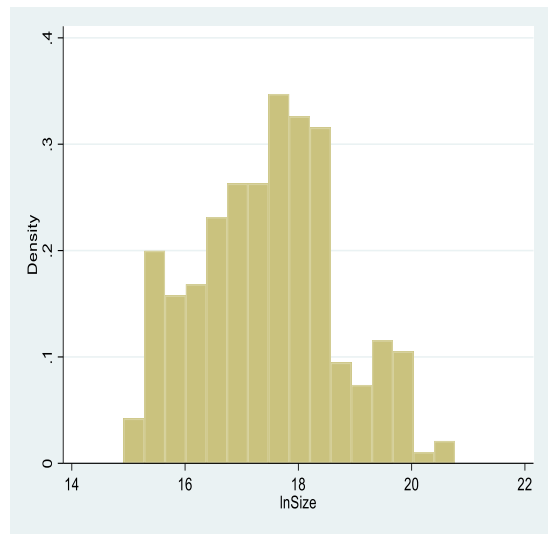
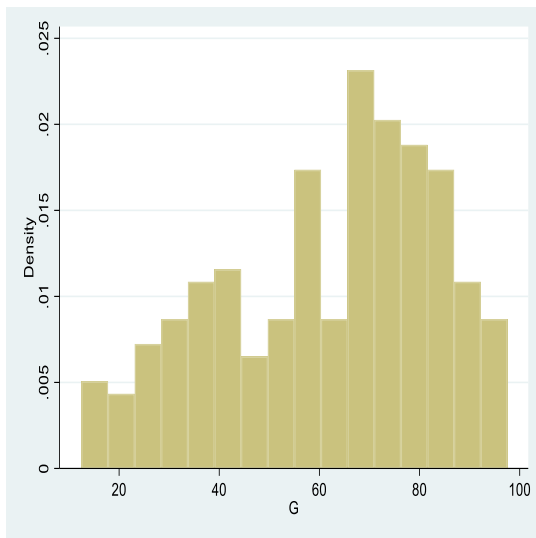
	ROA	ROCE	Tobin's Q	ESG	E	S	G	Lev	Size
Mean	8.40	0.998	1.5	59.21	53.99	62.3	60.27	20.79	62000000
Median	6.95	0.535	1.24	59.5	53.34	62.72	63.52	18.63	33700000
Minimum	-10.25	-22.7	0.215	1.36	0	1.21	2.69	0	3002727
Maximum	62.73	115.3	5.53	89.27	95.47	95.18	97.54	73.91	1040000000
Std. Dev	8.14	5.95	1.01	14.47	20.89	16.20	20.55	14.9	96900000
Skewness	2.17	14.69	1.34	-0.233	-0.13	-0.203	-0.387	0.65	4.8
Kurtosis	11.567	279.86	4.77	2.56	2.05	2.49	2.28	2.95	35.4

Table: Descriptive statistics (after logging)

	lnROA	lnROCE	lnTobin's Q	ESG	E	S	G	lnLev	lnSize
Mean	2.91	3.189	0.18	59.21	53.99	62.3	60.27	2.73	17.33
Median	2.9	3.186	0.22	59.5	53.34	62.72	63.52	2.98	17.33
Minimum	0	0	-1.54	1.36	0	1.21	2.69	0	14.92
Maximum	4.3	4.93	1.71	89.27	95.47	95.18	97.54	4.32	20.76
Std. Dev	0.388	0.19	0.68	14.47	20.89	16.20	20.55	1.01	1.07
Skewness	-0.653	-7.52	-0.101	-0.233	-0.13	-0.203	-0.387	-1.14	0.28
Kurtosis	9.89	166.6	2.44	2.56	2.05	2.49	2.28	3.42	2.88

Appendix 3: Variables' frequency table





Appendix 4: Regressions

ROA Fixed Effects Regression Results

The Table shows the results of the fixed effects regression analysis between ESG subcomponents, control variables, and ROA as the dependent variable. All variables are from the Refinitiv database. The standard errors are specified under variable coefficients.

	Dependent Variable: ROA		
	2a	2b	2c
E	0.0001034 (0.0013)		
S		-0.00179 (0.00168)	
G			-0.0017 (0.0012)
lnLev	-0.1329*** (0.0222)	-0.1346*** (0.0000)	-0.1337*** (0.0000)
lnSize	0.0571 (0.0597)	0.0689 (0.0593)	0.0644 (0.0584)

Note: ** p-value is significant at the 0.05 level. *** p-value is significant at the 0.01 level

ROCE Fixed Effects Regression Results

The Table shows the results of the fixed effects regression analysis between ESG subcomponents, control variables, and ROCE as the dependent variable. All variables are from the Refinitiv database. The standard errors are specified under variable coefficients.

	Dependent Variable: ROCE		
	2d	2e	2f
E	-0.0000769 (0.0001)		
S		-0.00198 (0.0232)	
G			0.0335 (0.015)
lnLev	-0.0011 (0.002)	-0.0013 (0.002)	-0.0013 (0.002)
lnSize	0.0150*** (0.0053)	0.0143*** (0.0053)	0.0143*** (0.0053)

Note: ** p-value is significant at the 0.05 level. *** p-value is significant at the 0.01 level

Tobin's Q Random Effects Regression Results

The Table shows the results of the fixed effects regression analysis between ESG subcomponents, control variables, and Tobin's Q as the dependent variable. All variables are from the Refinitiv database. The standard errors are specified under variable coefficients.

	Dependent Variable: Tobin's Q		
	2g	2h	2i
E	-0.000181 (0.00181)		
S		-0.00403 (0.0021)	
G			-0.000496 (0.015)
lnLev	-0.1177*** (0.0322)	-0.1212*** (0.03125)	-0.1188*** (0.0314)
lnSize	-0.23134*** (0.05341)	-0.1841*** (0.0545)	-0.229*** (0.04981)

Note: ** p-value is significant at the 0.05 level. *** p-value is significant at the 0.01 level