SUSTAINABILITY AND PROFITABILITY: ESG IMPACT ON FINANCIAL PERFORMANCE IN AFRICAN DEVELOPING COUNTRIES

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Abstract

This study examines both linear and non-linear relationships between Environmental, Social, and Governance (ESG) scores and the financial performance of companies in Africa. Using an unbalanced panel dataset from Refinitiv Workspace, it analyzes 211 companies operating in various African countries from 2010 to 2024, with annual reporting frequency. The analysis applies linear regression models to assess financial performance through both accounting-based indicators (ROA, ROE) and a market-based indicator (Tobin's Q). The findings reveal a significant negative relationship between overall ESG performance and all three financial metrics. Moreover, the inclusion of squared ESG terms shows a concave (inverted U-shaped) relationship for ROE and Tobin's Q, suggesting diminishing financial returns at higher levels of ESG performance.

Keywords: Environmental, Social and Governance (ESG); Corporate Social Responsibility (CSR); Financial Performance; Africa; Developing Countries.

1. Introduction

Environmental, social and governance (ESG) criteria are a set of standards that evaluate a company's operations and performance in relation to environmental management, social responsibility and ethical governance practices. The term ESG was first used in a report titled “Who Cares Wins”. This was initiated by the United Nations in collaboration with the Swiss government, endorsed by many financial institutions (IFC and the World Bank Group among others), and aiming to integrate ESG issues for investments into decision making (International Finance Corporation, 2004).

However, the roots of responsible investment go further back in time. During the 1960s and 1970s public awareness on environmental and social issues was growing. As a result, the first socially responsible investment (SRI) funds were created, which screened out stocks involved in controversial activities or sensible industries (Martini, 2021). During the 1980s SRI steadily evolved to corporate social responsibility (CSR). Companies began to acknowledge their responsibilities with their employees, communities and the environment, driven by events such as the Bhopal disaster of 1984, the Exxon Valdez oil spill in 1989 and the divestment campaigns against companies doing business in South Africa during apartheid (system of institutionalized racial segregation) (Townsend, 2020).

The following years saw a growing awareness of the importance of ESG issues among regulators and investors: The emergence of global initiatives like the Global Reporting Initiative (GRI) in 1997, which provided frameworks for sustainability reporting; the Millennium Development Goals (MDGs) in 2000, setting the stage for nations and corporations to discuss ESG factors; and the launch of the UN Principles for Responsible Investment (PRI) in 2006, providing institutional investors with a set of guidelines to incorporate ESG factors into their decision-making processes.

All of this has influenced the sustainability finance framework that we have today. First and foremost, the MDGs were replaced by the Sustainable Development Goals (SDGs) in 2015. These 17 goals are aligned with ESG principles, thus emphasizing the interconnectedness of corporate actions and broader societal challenges such as climate change and social inequality. Therefore, ESG was no longer a talking point but something that should be measured. In turn, the need for consistent and comparable ESG disclosures led to the creation of various reporting standards. In mid-2023, the International Sustainability Standards Board (ISSB) introduced the IFRS Sustainability Disclosure Standards, aimed at providing a unified set of standards for sustainability-related financial information and built on the preexisting Sustainability Accounting Standards Board (SASB) Standards and the Climate Disclosure Standards Board (CDSB) framework among others (IFRS Foundation, 2023).

But what is the situation in Africa on this global issue?

Environmental, social and governance (ESG) research in Africa has become a critical area of study that addresses the unique challenges and opportunities related to sustainable development on the continent. As companies increasingly recognize the importance of incorporating ESG principles into their operations, this not only improves corporate responsibility but also drives economic growth, attracting international investment. With a historical context rooted in community and ethical governance, Africa's ESG landscape

is characterized by grassroots movements, evolving regulatory frameworks, and a strong emphasis on sustainability and social justice, making it an important focus for academics and practitioners alike. Events such as the ESG Africa Conference exemplify the growing interest in these practices, providing platforms for knowledge exchange and collaboration among industry leaders (ESG Africa Conference, 2023).

However, there are still many challenges to face. Prevalence of development barriers such as political instability, corruption, tribal conflicts, climate change impacts, etc. have slowed down or even canceled the progress that could have been expected. For example, despite the large investment inflows received by the African continent in recent decades, total poverty has grown, meaning that the impact of the economic growth on income inequality in Africa has been low (UNCTAD, 2020a, b).

The African continent presents unique characteristics that are difficult to compare with those of any other region. According to Appiah-Konadu et al. (2022), one of the key aspects is the policy framework: the implementation of ESG reporting standards has become crucial to enhancing transparency and accountability in sustainable investments. In this regard, the United Nations developed a comprehensive model and action plan—the Investment Policy Framework for Sustainable Development (IPSFD)—to mobilize and attract investments. Several African countries, including South Africa, Nigeria, Kenya, and Ghana, have introduced national sustainable banking principles to support this transition (Dawood & Eldahan, 2020).

Africa also presents several peculiarities. It has a youthful and growing population, which is projected to double from approximately 1.2 billion in 2015 to about 2.4 billion by 2050 (AfDB/OECD/UNDP, 2015; United Nations, 2022). In 2023, fifteen African countries experienced economic growth rates above 5%, positioning the continent as the second-fastest-growing region after Asia (EY, 2023a). Despite being rich in natural resources, many African countries struggle to leverage them effectively due to persistent development challenges, particularly corruption, weak legislation, and fragile institutions (Obisie-Orlu, 2021). These shortcomings have often led to social unrest and communal violence across various regions.

Nevertheless, the continent holds immense opportunities. Its youthful and expanding population offers a demographic dividend that could significantly enhance productivity, consumption, and innovation. The continent's strong macroeconomic performance has made it an appealing destination for foreign capital, according to the Africa Attractiveness Report (EY, 2023a), although it still faces difficulties in mobilizing sufficient funds to meet all Sustainable Development Goals (SDG) targets. National Development Banks (NDBs), for instance, remain small and under-resourced to support large-scale investment (Begashaw, 2019). Furthermore, approximately 86% of the continent's active population works in informal sectors, lacking social protection and formal labor rights. This, coupled with a significant infrastructure deficit, makes Africa a region with great potential yet to be exploited. Unlocking this potential requires increased financial access for small and medium-sized enterprises (SMEs) operating in the informal sector, which are often excluded from commercial bank credit. Providing support to these enterprises would promote pro-poor growth and create opportunities for vulnerable groups, especially women and the youth.

Lastly, Africa's wealth of natural resources and critical minerals presents a strategic opportunity for companies to position the continent as a central player in global renewable energy supply chains (International Energy Agency, 2023).

All of this should be considered, in order to step up the region's progress towards the achievements of the global Sustainable Development Goals (SDGs) by 2030. Moreover, Africa has its own objectives with the Agenda 2063, a 50-year strategic framework for the socio-economic transformation of the continent, adopted in 2015 by the African Union (AU). The Agenda is built around a series of aspirations that strive for, a prosperous, integrated and peaceful Africa; good governance, justice and respect of human rights; strong cultural identity, common heritage, values, and ethics; and a people-driven development, especially for women and youth (African Union Commission, 2015).

In summary, ESG research in Africa represents a dynamic and evolving field that reflects the continent's commitment to sustainable development. As Africa continues to navigate the complexities of globalization and climate change, the importance of integrating ESG principles into business operations is expected to grow, positioning the continent as a vital player in the global sustainability discourse. The motivations behind ESG research in Africa are multifaceted, encompassing compliance with international standards, the pursuit of ethical responsibility, and the need to address critical socio-environmental issues such as climate change and inequality.

The objective of this paper is to assess the relationship between environmental, social, and governance (ESG) scores and the financial performance of companies in Africa. The study seeks to determine whether this relationship is positive, negative, or statistically insignificant. In addition, it examines the potential for a nonlinear relationship, acknowledging that the impact of ESG performance on financial outcomes may vary at different levels of ESG engagement.

To fulfill this, we will employ linear regression analysis to test our hypotheses using panel data obtained from Refinitiv Workspace. We will build different models in order to help us understand and quantify the magnitude of the relationship, if there is any, between Corporate Social Performance (CSP) and Corporate Financial Performance (CFP); paying special attention to the already mentioned problems of data scarcity and data heterogeneity among regions. The results of these models will allow us to reject or support the different hypotheses proposed, based on the significance of the regression coefficients. This methodological approach provides a comprehensive framework to understand the dynamics of how ESG affects business performance in Africa.

This study is relevant and holds potential value for both academics and investors for several reasons. First, Africa faces significant challenges and requires substantial resources to overcome them. In this context, understanding ESG (Environmental, Social, and Governance) performance is crucial, as these regions may benefit the most from improvements in these practices. Despite the growing attention to ESG in Africa, there is a limited body of research and a low level of understanding regarding the strengths and weaknesses of ESG performance in these areas. Rahdari (2016) argues that, while the CSR-CFP (Corporate Social Responsibility-Corporate Financial Performance) relationship may be less relevant in well-developed markets, this is not necessarily true for developing countries. Similarly, Roman et al. (1999) raised concerns about the lack of

studies in this context. Furthermore, research in Africa lags behind the rest of the world due to challenges, such as limited human capital, lack of funding and gender issues (World Economic Forum, 2024).

Second, while ESG practices are gaining momentum in Africa, the relationship between ESG initiatives and financial performance remains complex and inconsistent, as will be explored further in the literature review. The varying results reported across studies highlight the need for additional empirical research. This paper contributes to the literature by not only examining the linear relationship but also exploring potential nonlinear dynamics between ESG scores and financial performance.

Lastly, ESG and financial performance research across Africa remains limited, largely due to data constraints. Most existing studies are concentrated in South Africa—such as Chininga et al. (2024), which examines 40 JSE-listed firms using data from 2015 to 2019. In contrast, research covering other African regions and industries is still scarce. This study seeks to address that gap by expanding the geographic and sectoral scope, using the most recent data available.

Therefore, this study will explore the relationship between ESG performance and corporate financial performance (CFP) across African firms. Our main findings can be summarized as follows. We observe a negative association between overall ESG scores and financial performance, for both accounting-based measures such as ROA and ROE, and market-based measure Tobin's Q. The relationship between overall ESG performance with ROE and Tobin's Q is concave (inverted U-shaped), while ROA shows no evidence of nonlinear association. When looking at the individual ESG pillars, the Social score shows a statistically significant relationship with financial performance: it is negatively associated with ROA and ROE, and displays a concave (inverted U-shaped) relationship with Tobin's Q. The Environmental score exhibits a convex (U-shaped) relationship with Tobin's Q, but shows no significant association with ROA or ROE. Lastly, the Governance score shows a marginally negative relationship with ROA and Tobin's Q, and no significant association with ROE.

The following sections are divided as follows. The next section presents the literature review of the matter of interest; section 3 contains the hypothesis that will be tested and the data description; section 4 discusses the methodology that will be followed and the models used; section 5 presents the empirical results; and the last section presents the conclusion.

2. Literature Review

As mentioned before, ESG refers to the Environmental, Social, and Governance criteria that companies and investors use to assess an organization's impact and sustainability. The Environmental component focuses on how a company manages its interaction with the natural environment, including aspects such as carbon footprint, resource consumption, pollution, and biodiversity. The Social dimension evaluates the company's relationships with stakeholders such as employees, customers, suppliers, and local communities, considering issues like labor rights, diversity and inclusion, and social impact. Finally, the Governance pillar examines the quality of corporate management, including transparency, ethical conduct, board structure, and the protection of shareholder interests.

As mentioned, since 2015, with the Sustainable Development Goals (SDGs) and the Paris Agreement, regulation and interest in ESG have grown exponentially. However, interest in socially responsible investment (SRI) and corporate social responsibility (CSR) issues dates back much further, which is why there is a large amount of research work in these topics. Since the topic of ESG is broad and quite complex, we'll focus on research that seeks to identify a relationship between ESG criteria and corporate financial performance.

The search for a relationship between environmental, social, and governance (ESG) criteria and corporate financial performance (CFP) dates back to the early 1970s. Since then, academics and investors have published more than 2,000 empirical studies and several reviews on this relationship (Friede et al., 2015). Since there are so many studies, very different approaches have been used for the assessment of SRI performance, but we could divide them mainly into three groups (Lestari & Frömmel, 2024):

1) Analyzing the performance of green and SRI funds:

There is extensive research on the performance of SRI mutual funds based on their returns, yet the findings remain inconclusive. The majority of studies suggest that SRI mutual funds neither significantly outperform nor underperform the market. Since many distinctions can be made at the geographical level (by continent), at the sector level (by sensitive and non-sensitive), by development (developed or developing countries), and so on; we will briefly comment on some works and the different perspectives they provide.

The definition of "socially responsible" companies varies greatly. Socially responsible investors typically use a combination of inclusion (positive) and exclusion (negative) investment criteria. According to different criteria SRI funds could be classified into more specific: religious funds, green funds, human rights funds, etc.

Hamilton et al. (1993) is one of the earliest academic studies to use the phrase "doing well while doing good" in the context of corporate social responsibility (CSR) and financial performance. Interestingly, among the exclusion criteria for SRI funds at that time, companies with operations in South Africa were mentioned. This exclusion lasted from approximately 1982 to 1994. The paper concluded a neutral relationship existed, so investors could expect to lose nothing by investing in socially responsible mutual funds.

Diltz (1995) analyzed socially responsible investing (SRI) companies by creating their own portfolios with different ethical screening categories such as environment,

community outreach, military work, nuclear involvement, etc. This made the contrast more specific, analyzing each ethical problem and its impact separately. The results suggested that portfolios with good environmental, defense work and non-nuclear industries were outperforming their peers.

Moreover, following studies started to evaluate fund performance though a matched-pair analysis; this methodology helped to correct many of the biases that could be affecting on the success or failure of these funds. This is the case of Climent and Soriano (2011), who examined the performance of green US mutual funds for the period of 2001 to 2009, and found not significant differences between SRI and conventional mutual funds.

Despite using different methodologies that have evolved over time, the results are inconclusive. There are many variables that can affect the performance of mutual funds and not all of them are likely to be controlled (managerial skills or fees/expenses).

2) Analyzing the ESG performance of individual stocks:

Due to the proliferation of ESG topics in recent decades, information on the subject has also grown significantly. Market data providers play a key role in the expansion of socially responsible investment (SRI) databases. Notable examples of widely used databases include Refinitiv, MSCI, Bloomberg, and Morningstar. Some researchers avoid the compounding effect of fund managers' skills, fees, and transaction costs in assessing SRI performance using SRI Indices.

ESG ratings assigned to individual firms by data providers enable a more detailed examination of the relationship between sustainability performance and financial outcomes. This firm-level approach does not replace analyses conducted at the fund level but rather complements them by addressing a distinct research question: Does a higher ESG score correlate with stronger financial performance at the company level? The nature of this relationship may differ across contexts—it may be positive and linear, exhibit diminishing marginal returns, or, in certain cases, involve a trade-off with financial performance.

The body of empirical research examining the financial performance of socially responsible investments yields inconclusive results, with findings differing substantially depending on the sustainability data provider, the rating methodology used, and the type of financial instrument analyzed. This inconsistency highlights the complexity of measuring ESG performance. For example, while Albuquerque et al. (2020) shows that U.S. stocks with higher ES ratings have significantly higher returns, Bae et al. (2021) found no evidence that CSR affected stock returns during the crash period. However, the first study avoided capturing governance effect, and used data from an earlier and longer period, meaning that every detail in the choice of the sample and the methodology matters. Furthermore, building on the rating methodologies, it is important to note that ESG ratings often diverge significantly across different providers, as highlighted by Chatterji et al. (2016). Berg et al. (2022) further explain that such inconsistencies are largely driven by differences in the measurement techniques and scope applied by ESG rating agencies.

3) SRI performance based on mutual fund holding:

An alternative method to evaluate socially responsible investments focuses on analyzing the actual stock holdings of SRI mutual funds. This approach, initially developed by Grinblatt and Titman (1989), allows researchers to calculate gross returns—excluding management fees and transaction costs—offering a clearer picture of the impact of sustainable investment strategies. In the context of SRI, fund managers' selection of assets often reflects specific ESG criteria, such as positive or negative screening, making fund holdings a reliable proxy for sustainability-oriented investment behavior (Joliet & Titova, 2018). This method offers a closer link between ESG strategy and financial outcomes, complementing fund performance and ESG rating-based assessments.

Given the wide range of methods and the large body of research on the link between ESG and financial performance, some authors have tried to summarize the key findings in the field. One of the most cited studies is a meta-analysis by Friede et al. (2015), which reviews over 2,000 empirical papers. The study finds strong support for the idea that ESG investing can be good for business, in fact, approximately 90% of the studies reviewed identify a non-negative relationship between ESG factors and corporate financial performance (CFP). Notably, the evidence from emerging markets reveals a significantly higher proportion of positive outcomes compared to developed markets (65% versus 38%, respectively). The study also finds that non-portfolio studies (such as those analyzing firm-level data) show a higher percentage of positive ESG–CFP relationships, while portfolio studies (based on investment performance) tend to show neutral or mixed results.

Narrowing the scope to emerging markets, García et al. (2017) make a notable contribution by analyzing the ESG performance of firms within the BRICS nations (Brazil, Russia, India, China, and South Africa). Examining 365 non-financial companies across eight sectors, the study finds that firms operating in environmentally sensitive industries tend to demonstrate superior ESG performance. This may reflect efforts to enhance the transparency of their socio-environmental practices as a means of legitimizing their operations or reducing information asymmetry. However, the research also indicates that, in the context of emerging markets, there isn't a consistent positive association between ESG practices and financial performance. This finding underscores the complexities and unique challenges faced by companies in these regions, where institutional frameworks and market dynamics differ significantly from those in developed economies.

Looking at ESG research in Africa, there is still a lack of country-specific studies across most nations. However, the growing interest in sustainable development and responsible investment on the continent suggests that ESG research will likely grow in the future. Today, most ESG studies in Africa focus on understanding the nature of sustainable investments in the region, emphasizing the needs, specificities, and opportunities that can be found (Begashaw, 2019; Dawood & Eldahan, 2020; Obisie-Orlu, 2021; Appiah-Konadu et al., 2022).

While ESG research in Africa is expanding, South Africa remains the focal point due to its developed financial markets and comprehensive ESG reporting standards. Studies on

South Africa have predominantly employed quantitative methodologies to assess the effect of ESG ratings and their individual components (environmental, social, and governance) on financial performance. Studies in this context have yielded mixed results:

Some studies indicate a positive relationship; for example, Chininga et al. (2024) examined the effect of ESG ratings on the financial performance of 40 JSE-listed firms included in the FTSE/JSE Responsible Investment Index between 2015 and 2019, concluding that overall ESG initiatives enhance firm performance. Others, however, found no statistically significant relationship between ESG scores and financial performance. Du Toit et al. (2018) arrived at this conclusion by analyzing firms listed in the JSE Socially Responsible Investment (SRI) Index, while Evans et al. (2023) examined individual firms and suggested that the impact of ESG practices may vary depending on sector and firm size. Finally, Peerbhai & Naidoo (2022) observed a shift in the relative performance of socially responsible investment (SRI) funds over time. Specifically, SRI funds underperformed compared to non-SRI funds during the 2009–2013 period, while in the subsequent period (2014–2018), they either outperformed or showed no significant performance difference. This improvement is attributed to a potential learning effect, suggesting that SRI fund managers may have become more adept at integrating ESG criteria over time. These findings support the view that SRI funds can be appropriate for investors with long-term investment horizons.

In summary, based on the insights drawn from the existing literature and considering the constraints related to data availability, this study will focus on analyzing the relationship between ESG performance and financial performance at the firm level in African markets. We consider this approach the most suitable for exploring the existence of such a relationship. First, it enables a more direct and granular understanding of how ESG factors influence financial outcomes. Second, prior research has yielded encouraging findings in similar contexts. Finally, despite potential limitations, this study leverages the increasing availability of ESG-related data in the region to provide preliminary insights that may be valuable to both investors and academics.

As previously discussed, empirical research on ESG in Africa remains limited, and findings tend to vary considerably due to the multitude of influencing factors. Accordingly, it is challenging to predict the expected outcomes, specially, given the political and institutional challenges often present in developing countries. As highlighted by Jamali and Neville (2011), understanding the unique local dynamics, pressures, and stakeholder relationships is crucial to unlocking the full potential of Corporate Social Responsibility (CSR).

3. Hypothesis testing and data description

3.1. Hypothesis Testing

As mentioned, the aim of this study is to better understand the dynamics of how ESG affects business performance in Africa. In order to do so, we formulate the following generic hypothesis:

- ***Hypothesis 1:*** *The overall ESG performance of corporations has an impact on their financial performance.*
- ***Hypothesis 2:*** *The individual Environmental, Social, or Governance (ESG) scores of corporations each have an impact on their financial performance.*

These hypotheses, or similar ones, have been widely examined in the ESG–CFP literature. They enable the assessment of both the overall impact of ESG performance on financial outcomes and the specific effects of each ESG pillar (Environmental, Social, and Governance) separately. This disaggregated approach provides deeper insights into how each component may influence firm performance (Cheng et al., 2014; Sassen et al., 2016; Velte, 2017; Ting et al., 2019).

Moreover, in order to consider potential nonlinear effects in the relationship between ESG performance and financial outcomes, the models include squared terms for the overall, Environmental, Social, and Governance scores. This approach aligns with previous research by Athari et al. (2024), Bagh et al. (2024) and Li et al. (2024), who also incorporate quadratic ESG variables to capture more complex patterns in ESG–CFP dynamics.

- ***Hypothesis 1a:*** *The relationship between overall ESG performance and financial performance is non-linear.*
- ***Hypothesis 2a:*** *The relationship between individual Environmental, Social, or Governance (ESG) scores of corporations and financial performance is non-linear.*

3.2. Data description

3.2.1. Data Source

The data used in this study is obtained from the Refinitiv Workspace platform, formerly known as Thomson Reuters, now part of the London Stock Exchange Group (LSEG). Refinitiv provides comprehensive and standardized ESG and financial data on companies worldwide. All ESG and financial indicators used in the analysis originate from this single source, ensuring consistency and comparability across variables. The ESG data are based on publicly available information, including annual reports, corporate sustainability reports, stock exchange filings, and news sources. Refinitiv analysts assess and score companies on multiple ESG dimensions—Environmental, Social, and Governance—using a transparent, rule-based methodology that minimizes subjectivity. Financial data such as return on assets (ROA), return on equity (ROE), and market-based indicators are

collected directly from company-reported financial statements. This integrated database supports robust empirical analysis by providing standardized and audited data across both ESG and financial domains.

3.2.2. Data Sample

In this study, we will employ an unbalanced panel data approach to examine the relationship between ESG (Environmental, Social, and Governance) scores and financial performance for companies operating across various African countries. The data covers the period from 2010 to 2024, with annual frequency. The final sample consists of 211 firms headquartered in various African countries, with a significant concentration in South Africa, which accounts for 54.5% of the sample (115 firms). This reflects South Africa's more advanced stage in terms of corporate social responsibility practices compared to the rest of the continent. The remaining firms are distributed across 13 other countries, including Morocco (45), Egypt (29), Nigeria (6), Kenya (4), Uganda (3), Mauritius (2), and several others with one firm each, such as Ghana, Senegal, and Tunisia.

The decision to use an unbalanced panel is both practical and methodologically sound given the inconsistent availability of ESG and financial data across firms and countries within the region. Many African companies have limited or irregular reporting periods, and enforcing a balanced panel would lead to a significant loss of valuable information. This approach also allows the model to better accommodate heterogeneity across firms and time, which is especially important in emerging markets with diverse institutional and regulatory environments. Unbalanced panel data has been used in prior literature to address issues of uneven data availability across firms and time (Chang, 2015; Fu & Li, 2023). The econometric analysis is conducted through linear panel data regressions, using both fixed effects (FE) and random effects (RE) models to control for unobserved firm-specific heterogeneity.

Given South Africa's dominant representation, the sample can be viewed as a combination of a relatively mature ESG market and a broader set of emerging African economies, providing a more comprehensive regional perspective. Country-specific effects, such as differences in institutional development, regulatory frameworks, and ESG maturity, are accounted for through the model specifications used in this study, which incorporate fixed or random effects to control for unobserved heterogeneity at the country level.

3.2.3. Independent Variables

The independent variables consist of the Overall ESG score, along with the Environmental (E), Social (S), and Governance (G) pillar scores, all sourced from Refinitiv Workspace. These ESG metrics are commonly employed in empirical research on corporate sustainability and financial outcomes (e.g., Cheng et al., 2014; Sassen et al., 2016; Velte, 2017). By disaggregating the overall ESG score into its three pillars, we aim to evaluate the distinct contributions of each dimension to firm performance, following an approach widely adopted in the ESG literature. These scores are constructed using a transparent, rules-based methodology that evaluates up to 186 metrics across ten main ESG categories (LSEG, 2023). In Table 1 we define the variables used in this study.

Table 1
Variables definitions and sample

Variable		Description
Independent Variables	Overall ESG Score	Aggregate ESG score, provided by LSEG (Refinitiv Eikon), reflecting overall sustainability performance.
	Environmental Score	Environmental pillar score reported by LSEG.
	Social Score	Social pillar score reported by LSEG.
	Governance Score	Corporate governance pillar score reported by LSEG.
Dependent Variables	ROA	Return on Assets, sourced from LSEG.
	ROE	Return on Equity, sourced from LSEG.
	Tobin's Q	Simplified proxy for firm value (Market Capitalization / Total Assets). Data sourced from LSEG.
Control Variables	Firm Size	Natural logarithm of total assets, used as a proxy for firm size.
	Leverage	Financial leverage ratio (Total Debt / Total Assets).

- **Overal ESG Score:** The Overall ESG Score is an aggregate measure of a firm's ESG performance based on self-reported company data and publicly available information. It reflects the company's relative performance compared to peers in the same industry and it is calculated using a percentile ranking methodology. The score integrates 186 data points across 10 main categories and is scaled from 0 to 100, with higher values indicating stronger ESG practices and transparency.
- **Environmental Score:** The Environmental Score evaluates a company's performance and disclosure across 3 categories: Resource Use, Emissions, and Innovation. It covers 68 metrics that assess topics such as energy efficiency, greenhouse gas emissions, renewable energy usage, and environmental product innovation. Scores are normalized by industry to ensure comparability and material relevance.
- **Social Score:** The Social Score reflects how a company manages stakeholder relationships and social impact through 4 categories: Workforce, Human Rights, Community, and Product Responsibility. It is based on 69 metrics, including employee development, diversity, occupational health and safety, customer responsibility, and social supply chain policies. A higher score reflects stronger practices and transparency in social areas that influence both internal operations and external reputation.
- **Governance Score:** The Governance Score assesses the effectiveness and integrity of a firm's corporate governance across 3 categories: Management, Shareholders, and CSR Strategy. It incorporates 49 metrics, covering board structure, shareholder rights, executive pay, business ethics, and transparency in ESG strategy. High governance scores are typically associated with lower agency risks and greater accountability.

Squared terms of the independent variables—Overall ESG, Environmental, Social, and Governance scores—are included in alternative model specifications. This approach helps to detect the presence of a U-shaped or inverted U-shaped relationship, which suggests that the impact of ESG practices on financial outcomes may vary at different

levels of ESG engagement. The inclusion of squared ESG terms is consistent with prior studies that explore the possibility of nonlinear effects in ESG–CFP analysis (e.g., Athari et al., 2024; Bagh et al., 2024; Li et al. 2024).

3.2.4. Dependent Variables

Corporate Financial Performance (CFP) is measured using both accounting-based and market-based indicators. Specifically, Return on Assets (ROA) and Return on Equity (ROE) represent accounting measures, while Tobin's Q serves as the market-based measure. The indicators (ROA, ROE, and Tobin's Q) used in this study are consistent with previous ESG–CFP research (Velte, 2017; Hasan et al., 2022; Naeem et al., 2022). This mixed approach helps to better understand how ESG performance may affect different areas of financial performance.

- **Return on Assets (ROA):** ROA is an accounting-based measure calculated as net income divided by total assets. It reflects how effectively a company uses its assets to generate profit. ROA is widely used as an indicator of management efficiency and operational performance. Its inclusion helps evaluate whether ESG engagement correlates with improved resource utilization.
- **Return on Equity (ROE):** ROE is an accounting-based measure calculated as net income divided by shareholders' equity. It measures a firm's ability to generate returns on the capital invested by shareholders. As with ROA, this indicator is commonly employed in ESG-financial performance studies to assess profitability.
- **Tobin's Q:** Tobin's Q is a market-based indicator that compares the market value of a firm over the total physical asset value of that corporation. It reflects how the market values a firm relative to its book value and is sensitive to investor perceptions of intangible assets and future growth. Tobin's Q has been calculated as the total market capitalization of the firm divided by the total assets of the firm (Naeem & Çankaya, 2022).

3.2.5. Control Variables

To enhance the robustness and validity of the regression analysis, we include several control variables that are commonly used in the ESG–financial performance literature. The purpose of incorporating control variables is to isolate the effect of ESG scores on financial performance by accounting for other firm-specific and external factors that may simultaneously influence financial outcomes. Controlling for these factors reduces the risk of omitted variable bias and strengthens the interpretability of the estimated relationships between ESG performance and corporate financial performance (CFP). We include firm size as leverage as core control variables.

- **Firm size** is proxied by the natural logarithm of total assets, which reflects a company's scale and resource base. Larger firms tend to have greater access to capital markets, better risk diversification, and more established operational structures, which may influence both their ESG engagement and financial performance. This measure is widely used in the literature (Velte, 2017; Aouadi & Marsat, 2018; Fatemi et al., 2018) to capture the potential advantages that come with firm scale.

- **Leverage**, defined as the ratio of total debt to total assets, is included to account for the firm's capital structure and financial risk. Highly leveraged firms may face more financial constraints, affecting their ability to invest in ESG initiatives and influencing their profitability. Prior studies such as those by Nelling & Webb (2009) and Velte (2017) have included leverage as a key control variable when exploring ESG–CFP relationships.

4. Methodology

To investigate the potential relationship between a firm's ESG performance and its financial outcomes, and to test the hypotheses outlined in this study, we constructed and estimated a series of regression models. In line with a substantial body of prior literature, we incorporate lagged ESG variables, based on the premise that sustainability-related initiatives typically exert their influence on financial performance with a temporal delay (e.g., Manrique & Martí-Ballester, 2017; Atan et al., 2018).

This approach assumes that improvements in ESG performance require time to materialize into measurable financial outcomes, such as profitability or market valuation. Accordingly, the financial outcomes of firm i at time t are assessed in relation to its ESG performance at time t–1. This temporal structure allows us to better capture potential causality and mitigate concerns regarding reverse causality or simultaneity bias. The use of lagged ESG indicators is particularly appropriate given the characteristics of our dataset. Although the data availability for African companies remains limited in terms of both frequency and coverage, the annual reporting structure supports a lagged specification without significant loss of observations. By implementing a one-year lag, we strike a balance between methodological rigor and the practical constraints of our unbalanced panel data, while also aligning with theoretical expectations regarding the delayed impact of ESG efforts.

The regression models were formulated as follows:

- **Model 1**: This regression model seeks to assess whether overall ESG performance of corporations has an impact on their financial performance:

$$(1.1) \quad ROA_{i,t} = \alpha + \beta_1 ESGScore_{i,t-1} + \beta_2 ControlVariables_{i,t} + e_{i,t}$$

$$(1.2) \quad ROE_{i,t} = \alpha + \beta_1 ESGScore_{i,t-1} + \beta_2 ControlVariables_{i,t} + e_{i,t}$$

$$(1.3) \quad TobinsQ_{i,t} = \alpha + \beta_1 ESGScore_{i,t-1} + \beta_2 ControlVariables_{i,t} + e_{i,t}$$

- **Model 2**: This regression model seeks to assess whether the scores of each individual pillar of ESG (Environmental, Social and Governance) have an impact on the financial performance of firms:

$$(2.1) \quad ROA_{i,t} = \alpha + \beta_1 Environmental_{i,t-1} + \beta_2 Social_{i,t-1} + \beta_3 Goverannce_{i,t-1} + \beta_4 ControlVariables_{i,t} + e_{i,t}$$

$$(2.2) \quad ROE_{i,t} = \alpha + \beta_1 Environmental_{i,t-1} + \beta_2 Social_{i,t-1} + \beta_3 Goverannce_{i,t-1} + \beta_4 ControlVariables_{i,t} + e_{i,t}$$

$$(2.3) \quad TobinsQ_{i,t} = \alpha + \beta_1 Environmental_{i,t-1} + \beta_2 Social_{i,t-1} + \beta_3 Goverannce_{i,t-1} + \beta_4 ControlVariables_{i,t} + e_{i,t}$$

As aforementioned, squared ESG variables will be included in the models to explore potential nonlinear relationships between ESG scores and corporate financial performance. However, the inclusion of both original and squared terms introduced high multicollinearity, issue that was mitigated by mean-centering the ESG variables before squaring. Centering not only reduces multicollinearity, as can be seen in annexes I and II, but also improves the interpretability of interaction and nonlinear effects. This methodological adjustment is supported by Smith and Sasaki (1979), who proposed centering as an effective strategy for models involving polynomial terms or Kraemer & Blasey (2004) who also emphasized on the improvement of statistical inference in regression analyses. Including mean-centered and squared variables to the presented models:

- **Model 1a**: This regression model seeks to assess whether a non-linear relationship exists between overall ESG scores and financial performance of corporations:

(1.1.a) $$ROA_{i,t} = \alpha + \beta_1 Cent\_ESGScore_{i,t-1} + \beta_2 (Cent\_ESGScore_{i,t-1})^2 + \beta_3 ControlVariables_{i,t} + e_{i,t}$$

(1.2.a) $$ROE_{i,t} = \alpha + \beta_1 Cent\_ESGScore_{i,t-1} + \beta_2 (Cent\_ESGScore_{i,t-1})^2 + \beta_3 ControlVariables_{i,t} + e_{i,t}$$

(1.3.a) $$TobinsQ_{i,t} = \alpha + \beta_1 Cent\_ESGScore_{i,t-1} + \beta_2 (Cent\_ESGScore_{i,t-1})^2 + \beta_3 ControlVariables_{i,t} + e_{i,t}$$

- **Model 2a**: This regression model seeks to assess whether the scores of each individual pillar of ESG (Environmental, Social and Governance) have an impact on the financial performance of firms:

(2.1.a) $$ROA_{i,t} = \alpha + \beta_1 Cent\_ENV_{i,t-1} + \beta_2 (Cent\_ENV_{i,t-1})^2 + \beta_3 Cent\_SOC_{i,t-1} + \beta_4 (Cent\_SOC_{i,t-1})^2 + \beta_5 Cent\_GOV_{i,t-1} + \beta_6 (Cent\_GOV_{i,t-1})^2 + \beta_7 ControlVariables_{i,t} + e_{i,t}$$

(2.2.a) $$ROE_{i,t} = \alpha + \beta_1 Cent\_ENV_{i,t-1} + \beta_2 (Cent\_ENV_{i,t-1})^2 + \beta_3 Cent\_SOC_{i,t-1} + \beta_4 (Cent\_SOC_{i,t-1})^2 + \beta_5 Cent\_GOV_{i,t-1} + \beta_6 (Cent\_GOV_{i,t-1})^2 + \beta_7 ControlVariables_{i,t} + e_{i,t}$$

(2.3.a) $$TobinsQ_{i,t} = \alpha + \beta_1 Cent\_ENV_{i,t-1} + \beta_2 (Cent\_ENV_{i,t-1})^2 + \beta_3 Cent\_SOC_{i,t-1} + \beta_4 (Cent\_SOC_{i,t-1})^2 + \beta_5 Cent\_GOV_{i,t-1} + \beta_6 (Cent\_GOV_{i,t-1})^2 + \beta_7 ControlVariables_{i,t} + e_{i,t}$$

5. Empirical analysis and findings

5.1. Descriptive statistics

Before proceeding with the multivariate analysis to evaluate the hypotheses presented earlier, we first calculated the descriptive statistics that are shown in Tables 2 and 3. These tables provide an overview of the ESG scores and financial indicators for African companies that compose our sample.

Table 2

Summary Statistics

Variable	N	Mean	Std.Dev.	Min.	Max.	Median	IQR	Skewness	Kurtosis
Overall ESG	1610	47.88	17.49	3.98	89.27	48.40	25.30	-0.17	-0.53
Environmental	1610	43.43	23.32	0.10	98.02	41.57	38.67	0.20	-0.96
Social	1610	49.50	21.26	0.25	96.00	49.97	29.92	-0.14	-0.64
Governance	1610	51.99	21.49	2.39	97.46	51.78	34.79	-0.09	-0.94
ROA	1610	0.06	0.09	-0.58	0.80	0.05	0.07	0.83	11.52
ROE	1610	0.14	0.22	-1.74	1.38	0.13	0.16	-0.93	13.24
Tobins_Q	1610	0.87	0.98	0.00	9.55	0.55	0.87	2.82	12.18
Leverage	1610	0.89	1.88	0.00	45.74	0.50	0.68	11.26	215.10
Firm Size	1610	21.57	1.65	14.61	26.43	21.47	2.03	0.40	0.40

Table 2 presents summary statistics for the ESG scores and financial performance indicators of the sample firms. The Overall ESG score has a mean of 47.88, suggesting a moderate level of ESG performance across the sample. However, there is substantial variability among firms, as indicated by the wide range of values that goes from a minimum of 3.98 to a maximum of 89.27. This dispersion is further reflected in the relatively high standard deviation (17.49) and an interquartile range (IQR) of 25.30, which implies significant heterogeneity in ESG performance. The distribution of the Overall ESG score exhibits a slight left skew (skewness = -0.17), and a negative kurtosis value (-0.53), meaning that the distribution is flatter than a normal distribution and has lighter tails.

Analyzing the individual pillars of ESG, we observe that the Governance score has the highest mean (51.99), followed by the Social (49.50) and Environmental (43.43) pillars. This suggests that, on average, firms in the sample tend to perform better in governance-related criteria. However, it is important to note that, as shown in Table 4, certain companies have a fixed score of 50, likely due to insufficient disclosure, and this might inflate the results. Among the three pillars, the Environmental score exhibits the greatest variability, with a standard deviation of 23.32 and an IQR of 38.67. This suggests that environmental performance is more heterogeneous across firms compared to social and governance aspects.

Regarding the financial performance measures (CFP), Tobin's Q stands out due to its notable variability, with a standard deviation of 0.98, an IQR of 0.87, and a maximum value of 9.55. These figures indicate substantial differences across firms in terms of market valuation relative to their asset base. Similar high dispersion is observed in ROE, which ranges from -1.74 to 1.38, reflecting considerable variation in firms' return on equity performance. This is reaffirmed by the high kurtosis, indicating a heavy-tailed distribution.

Last but not least, the control variables show more stable distributions. While firm size skewness (0.39) indicates that most firms in the sample fall within a comparable range, high kurtosis of leverage (215.10) suggests that a few highly leveraged firms drastically affect the distribution.

Table 3

Pearson Correlation Matrix

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Overall ESG	1.000								
(2) Environmental	0.784	1.000							
(3) Social	0.884	0.678	1.000						
(4) Governance	0.650	0.235	0.347	1.000					
(5) ROA	0.046	-0.008	0.048	0.043	1.000				
(6) ROE	0.039	0.048	0.046	0.013	0.777	1.000			
(7) Tobins_Q	0.050	-0.036	0.013	0.075	0.583	0.401	1.000		
(8) Leverage	0.001	-0.022	0.005	-0.010	-0.163	-0.244	-0.114	1.000	
(9) Firm Size	0.349	0.472	0.384	0.068	-0.101	0.063	-0.262	-0.021	1.000

Table 3 shows the Pearson correlation Matrix for the variables used in the analysis. Among the ESG dimensions, the Social pillar shows the highest correlation with the Overall ESG score (0.884), followed by the Environmental (0.784) and Governance (0.650) scores.

Regarding the Corporate Financial Performance (CFP) indicators, ROA and ROE exhibit a strong positive correlation (0.777), which is expected since both are accounting-based profitability measures. In contrast, the correlation between accounting metrics and the market-based measure (Tobin's Q) is more moderate, reflecting the conceptual differences between profitability and market valuation.

Finally, leverage (Debt/Equity) is negatively correlated with all CFP metrics, especially with ROE (–0.244) and ROA (–0.163). This aligns with the view that more highly leveraged firms may face financial constraints or risk premiums that lower performance or valuation. However, ROE can be boosted through the effect of leverage, this means that in our sample high level of debt may be associated with financial underperformance.

Table 4

Summary Statistics (by country)

Country	Companies (Observations)	Overall ESG		Environmental		Social		Governance	
		Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
South Africa	115 (1302)	50.176	16.845	45.665	22.972	52.940	20.204	52.298	21.371
Egypt	29 (125)	33.215	18.868	30.558	25.084	27.962	18.672	46.711	24.201
Morocco	45 (120)	42.162	15.293	36.426	20.567	40.100	17.990	54.040	21.363
Nigeria	6 (19)	42.969	10.373	41.381	12.179	45.541	10.991	51.316	23.034
Uganda	3 (12)	40.498	15.742	28.054	20.008	48.482	24.024	49.630	21.285
Kenya	4 (11)	48.415	5.402	53.170	7.963	46.380	10.759	52.045	9.282
Mauritius	2 (6)	38.583	11.984	23.058	24.282	20.892	19.075	69.269	6.344
Zimbabwe	1 (6)	27.786	1.279	21.608	2.959	19.679	1.040	50.000	-
Togo	1 (3)	53.658	0.643	67.103	4.110	57.195	0.155	50.000	-
Tunisia	1 (2)	21.137	2.311	11.494	0.113	5.498	5.379	43.333	-
Botswana	1 (1)	13.722	-	4.130	-	0.254	-	50.000	-
Ghana	1 (1)	21.278	-	1.073	-	14.681	-	50.000	-
Ivory Coast	1 (1)	33.658	-	33.382	-	25.616	-	50.000	-
Senegal	1 (1)	42.605	-	37.204	-	40.982	-	50.000	-

To deepen our understanding of the dataset, Table 4 provides a detailed overview of ESG scores by country, highlighting substantial variability across regions and offering valuable insights into national differences in ESG practices.

Togo stands out as the highest-performing country in terms of overall ESG score. This is particularly surprising given that its neighbor, Ghana, ranks near the bottom of the sample, only ahead of Botswana. This notable disparity suggests potential positive selection bias, whereby some firms in lower-performing countries may significantly outperform their national average in ESG performance.

As previously mentioned, several companies report a Governance score of exactly 50. This recurrent value, especially among firms from smaller or less-represented countries, raises concerns about data completeness. However, no specific documentation from Refinitiv clarifies this pattern.

South Africa stands out as the country with the largest representation in the sample, showing solid ESG performance overall, particularly in the social and governance dimensions. Kenya also records strong ESG scores, especially in the environmental dimension, although its representation in the dataset is relatively small. In contrast, Egypt underperforms, particularly in environmental and social aspects, despite having one of the larger samples in the dataset.

To benchmark the ESG performance of African firms against developed economies, we compare our results with recent findings from OECD countries, which report an average Overall ESG score of 51.76 based on 17,979 observations over the period 2010–2021 using Refinitiv data (Dsouza et al., 2025). In our sample, South Africa stands out with a mean ESG score of 50.18, closely approaching the OECD average. This reflects the country's relatively advanced ESG disclosure practices and regulatory framework. In contrast, the rest of the sample presents a wider dispersion and generally lower ESG scores. For example, Egypt (33.22), Morocco (42.16), and Uganda (40.50), indicating that most African countries are still in the earlier stages of ESG integration.

5.2. Regression results

As said, in order to address the high multicollinearity detected, all ESG-related variables were mean-centered prior to their inclusion in the squared regression models. Moreover, and to ensure the reliability and robustness of our regression results, several steps were taken throughout the analysis. We first tested for individual effects using the F-test, which confirmed the necessity of fixed effects. Second, we conducted the Hausman (1978) specification test to choose between fixed and random effects specifications, a procedure also employed by Atan et al. (2018) and Naeem et al. (2022). In all cases, it indicated that the fixed effects model provided a more consistent and appropriate estimation; therefore, only fixed effects results are reported in the regression tables. Third, we applied Wooldridge's test for autocorrelation in panel data models, which indicated the presence of first-order serial correlation (Wooldridge, 2002). This method is also used in ESG-related studies (Manrique & Martí-Ballester, 2017; Naeem et al., 2022). Lastly, to address

potential violations of homoskedasticity and serial correlation, we conducted additional residual diagnostics (e.g., the White test), which confirmed the presence of heteroskedasticity and non-normality (White, 1980). To correct for these issues, we estimated robust standard errors using the Driscoll-Kraay specification. As originally proposed by Driscoll and Kraay (1998), and further elaborated by Hoechle (2007), this estimator is particularly appropriate for unbalanced panels like ours and provides robustness to heteroskedasticity, autocorrelation, thereby ensuring more reliable inference.

5.2.1. Hypothesis 1 and 1a: The impact of Overall ESG on CFP.

Table 5 presents the results from Models 1.1, 1.2, and 1.3, which analyze the relationship between overall ESG scores and corporate financial performance (CFP), measured respectively by ROA, ROE, and Tobin's Q, across a sample of 211 firms.

Table 5

Regression Results (Model 1: Overall ESG Performance)

Model and Dependent Variable	**Model 1.1 (ROA)**			**Model 1.2 (ROE)**			**Model 1.3 (TOBINS_Q)**		
Variable	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
Overall ESG	-0.00071	0.00017	0.00003 ***	-0.00130	0.00047	0.00546 ***	-0.01144	0.00201	0.00000 ***
Firm Size	0.00600	0.00622	0.336	0.02194	0.01203	0.06849 *	-0.48468	0.05385	0.00000 ***
Leverage	-0.00665	0.00334	0.04676 **	-0.04563	0.00779	0.00000 ***	-0.06233	0.02075	0.00271 ***
R-Squared		0.02783			0.13941			0.15608	

Notes: The results indicate the presence of significant individual effects, inconsistency of the random effects estimator, first-order autocorrelation, and heteroskedasticity. Model with Fixed Effects and Driscoll-Kraay (SCC) standard errors.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The coefficient for Overall ESG is negative and statistically significant at the 1% level for ROA, ROE and Tobin's Q. These results suggest that higher Overall ESG scores are consistently associated with lower levels of financial performance across both accounting-based and market-based measures. The negative relationship is stronger for ROE (-0.00130) than for ROA (-0.00071), indicating that ESG performance may be more linked to profitability. Tobin's Q shows a larger coefficient in absolute terms (-0.01144), despite its higher volatility, which could imply that market-based metrics may amplify the perception of ESG-related risks or benefits. The negative relationship between Overall ESG Scores and Corporate Financial Performance (CFP) measures in all three models, could mean that firms with higher ESG engagement may incur additional costs related to compliance, reporting, and sustainable investments, therefore reducing the short-term profitability.

This negative association contrasts with the positive and statistically significant relationship found in developed countries. For instance, Dsouza et al. (2025) report a positive coefficient for ESG scores in both their market-based (Tobin's Q = 0.005) and accounting-based (ROE = 0.0004) models across a large panel of OECD-listed firms from 2010 to 2021. These different results show that the link between ESG and financial performance can vary across regions, depending on factors such as institutional

development, the stage of ESG integration, sample characteristics, and methodological design.

Finally, control variables also show different implications depending on the financial performance indicator used. Leverage is negatively and significantly associated with the three metrics: ROA (significant at the 5% level), and ROE and Tobin's Q (both significant at the 1% level). This is consistent with traditional financial theory, which evidences that excessive leverage may increase financial risk and reduce profitability due to higher interest obligations. In contrast, firm size does not exhibit a significant effect on ROA, indicating that company scale, by itself, does not explain variations in this profitability metric within the sample. On the other hand, in the case of Tobin's Q firm size is highly significant and negative. This implies that larger firms tend to have lower market valuations, possibly due to lower growth expectations or structural inefficiencies. These results are consistent with the findings of Chininga et al. (2024), who argue that firms with more assets often show a lower ability to generate positive returns, particularly when income does not grow proportionally with asset accumulation. However, the relatively low R-squared value for ROA indicates that ESG explains only a small proportion of the variance in accounting-based financial performance.

In order to test for potential non-linear effects Models 1.1a, 1.2a, and 1.3a extend the analysis by incorporating a quadratic specification of overall ESG (centered). This allows us to examine whether the relationship between ESG and CFP changes direction at different levels of ESG performance. Results are presented in Table 6:

Table 6

Regression Results (Model 1a: Overall ESG Performance - Squared Variable)

Model and Dependent Variable	**Model 1.1a (ROA)**			**Model 1.2a (ROE)**			**Model 1.3a (TOBINS_Q)**		
Variable	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
Overall ESG_c	-0.00073	0.00017	0.00002 ***	-0.00134	0.00046	0.00327 ***	-0.01172	0.00201	0.00000 ***
Overall ESG_c^2	-0.00002	0.00001	0.07679 *	-0.00006	0.00002	0.00266 ***	-0.00036	0.00009	0.00013 ***
Firm Size	0.00502	0.00651	0.44103	0.01932	0.01241	0.11975	-0.50038	0.04928	0.00000 ***
Leverage	-0.00667	0.00335	0.04659 **	-0.04567	0.00780	0.00000 ***	-0.06258	0.02071	0.00257 ***
R-Squared		0.03301			0.14513			0.17385	

Notes: The results indicate the presence of significant individual effects, inconsistency of the random effects estimator, first-order autocorrelation, and heteroskedasticity. Model with Fixed Effects and Driscoll-Kraay (SCC) standard errors.
*** p < 0.01, ** p < 0.05, * p < 0.1

The results from Table 6 show that both the linear and squared term are statistically significant at the 1% level for ROE and Tobin's Q, with the squared term being negative in both cases. This indicates a concave (inverted U-shaped) relationship between ESG performance and financial outcomes: performance improves with ESG up to a certain point, after which it starts to decline. This suggests that excessive ESG investment might be perceived as inefficient or even detrimental, particularly by investors. In contrast, Model 1.1a (ROA) also shows a significant negative linear effect, but the quadratic term is only marginally significant at the 10% level, providing weaker evidence of non-linearity. Table 7 summarizes the coefficients for the linear and quadratic ESG terms across all three models.

Table 7

Summary of relationship by dependent variable for Overall ESG

Dependent Variable	(ROA)	(ROE)	(TOBINS_Q)
Overall ESG	Negative	Concave	Concave

Notes: With 95% Confidence Level (** $p < 0.05$) required to assume quadratic shape

The quadratic term is not statistically significant at the 5% level for ROA; hence, the relationship is interpreted as linear and negative. In the case of the other 2 CFP metrics, relationship is concave, and the turning point for the relationship with Overall ESG can be estimated, being approximately -11 (calculated as $\frac{-\beta_1}{2\beta_2}$) for ROE and -16 for Tobin's Q. Given that the mean Overall ESG score in the sample is 47.88, this implies that the maximum ROE and Tobin's Q is reached at an ESG score significantly below the sample average. This may reflect the regional ESG maturity level in Africa, where many firms lag behind global ESG standards. In this context, ESG investments may yield diminishing financial returns beyond a relatively modest threshold. That is, the benchmark for what constitutes "good" ESG practices may be lower than in more developed markets, and firms are not penalized as harshly for underperformance in ESG dimensions. Consequently, ESG efforts may be most financially impactful at earlier stages of adoption. Moreover, the observed sample mean of 47.88 may not be a reliable estimate for the broader African market, as the data outside South Africa is relatively limited. This suggests the presence of positive selection bias in ESG scores, which could mean that the true turning point lies closer to or even above the actual average ESG score in the region.

5.2.2. Hypothesis 2 and 2a: The impact of individual ESG Pillars on CFP.

Table 8 presents the results from Models 2.1, 2.2, and 2.3, which analyze the relationship between individual pillar ESG scores (Environmental, Social and Governance) and corporate financial performance (CFP), measured respectively by ROA, ROE, and Tobin's Q.

Table 8

Regression Results (Model 2: Individual Pillars ESG Performance)

Model and Dependent Variable	Model 2.1 (ROA)			Model 2.2 (ROE)			Model 2.3 (TOBINS_Q)		
Variable	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
Environmental	-0.00004	0.00016	0.81524	0.00037	0.00045	0.41025	0.00016	0.00166	0.92171
Social	-0.00048	0.00023	0.03484 **	-0.00134	0.00045	0.00307 ***	-0.01105	0.00271	0.00005 ***
Governance	-0.00023	0.00012	0.06895 *	-0.00050	0.00038	0.18793	-0.00138	0.00072	0.05400 *
Firm Size	0.00614	0.00638	0.33620	0.02220	0.01261	0.07858 *	-0.47469	0.05474	0.00000 ***
Leverage	-0.00666	0.00333	0.04557 **	-0.04566	0.00789	0.00000 ***	-0.06142	0.02024	0.00246 ***
R-Squared		0.02882			0.14239			0.16840	

Notes: The results indicate the presence of significant individual effects, inconsistency of the random effects estimator, first-order autocorrelation. and heteroskedasticity. Model with Fixed Effects and Driscoll-Kraay (SCC) standard errors.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Starting with the Environmental pillar, the results show no statistically significant relationship with any of the three financial performance indicators. The coefficients are small and non-significant, suggesting that environmental scores do not have a measurable impact on firm profitability or market valuation in this sample.

In contrast, the Social pillar exhibits a consistent and statistically significant negative relationship with financial performance. Specifically, the coefficient is negative and significant at the 5% level for ROA, and at the 1% level for ROE. These results indicate that higher social scores are associated with lower profitability and returns to equity. For Tobin's Q, the coefficient is also negative and statistically significant at the 1% level, implying a potential negative market valuation effect of social performance. A similar conclusion may be deduced from Overall ESG. This makes sense since Table 2 showed high correlation between Overall ESG and the Social score. Results may reflect the short-term costs or resource intensity of social initiatives in the African context, where social investments might not yet be fully valued by the market or immediately translated into financial gains.

The Governance pillar shows a weak significant negative relationship with ROA (p-value = 0.069) and Tobin's Q (p-value = 0.054), but no significant effect on ROE. These results suggest that better governance scores may be marginally associated with lower asset profitability and market performance, though the evidence is not robust across models nor highly significant.

Overall, the results suggest that within this sample, the Social pillar plays the most influential role among the ESG components, although its impact appears to be financially adverse in the short term.

Regarding the results for the control variables, results are very similar to those obtained for the Overall ESG Scores models. While leverage is negatively and significantly associated with all financial performance metrics, ROA, ROE and Tobin's Q. On the other hand, firm size is highly significant for Model 2.3 (with Tobin's Q as the dependent variable). The coefficient is negative suggesting that the market is penalizing for the size of the firm, the same way that happened for model 1.3.

In order to test for potential non-linear effects Models 2.1a, 2.2a, and 2.3a extend the analysis by incorporating a quadratic specification of the Environmental, Social and Governance individual pillars (all centered). Results are presented in Table 9:

Table 9

Regression Results (Model 2a: Individual Pillars ESG Performance - Squared Variables)

Model and Dependent Variable	Model 2.1a (ROA)			Model 2.2a (ROE)			Model 2.3a (TOBINS_Q)		
Variable	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
Environmental	-0.00007	0.00014	0.61542	0.00030	0.00041	0.46005	-0.00092	0.00164	0.57590
Social_c	-0.00045	0.00021	0.03108 **	-0.00125	0.00043	0.00340 ***	-0.01048	0.00244	0.00002 ***
Governance_c	-0.00023	0.00014	0.08430 *	-0.00052	0.00038	0.17672	-0.00133	0.00074	0.07323 *
Environmental_c^2	0.00000	0.00000	0.65633	0.00000	0.00001	0.96424	0.00014	0.00004	0.00015 ***
Social_c^2	-0.00001	0.00001	0.08552 *	-0.00003	0.00002	0.05466 *	-0.00027	0.00005	0.00000 ***
Governance_c^2	0.00000	0.00001	0.79669	0.00001	0.00001	0.50641	0.00001	0.00003	0.72671
Firm Size	0.00618	0.00633	0.32909	0.02212	0.01237	0.07396 *	-0.46970	0.05501	0.00000 ***
Leverage	-0.00676	0.00332	0.04212 **	-0.04595	0.00779	0.00000 ***	-0.06237	0.01934	0.00129 ***
R-Squared		0.03232			0.14596			0.18822	

Notes: The results indicate the presence of significant individual effects, inconsistency of the random effects estimator, first-order autocorrelation, and heteroskedasticity. Model with Fixed Effects and Driscoll-Kraay (SCC) standard errors.
*** p < 0.01, ** p < 0.05, * p < 0.1

The inclusion of squared terms for Environmental, Social, and Governance scores yields mixed results. Results suggest that nonlinear relationships may exist, particularly for the Social (p-value = 0.00000) and Environmental (p-value = 0.00015) pillars, but only with respect to market-based performance (Tobin's Q). In the case of accounting-based measures (ROA and ROE), relationship is significant for Social_c^2 but only at 10% confidence level. The overall explanatory power of the models slightly improves with the inclusion of the quadratic terms.

In terms of the linear variables, the results remain consistent with those presented in Table 8. The Social pillar continues to show a strong and statistically significant negative relationship with all three measures of financial performance (5% for ROA, and 1% for both ROE and Tobin's Q). This robustness across model specifications confirms the earlier finding that higher social performance is associated with lower short-term financial outcomes. The Environmental pillar remains mostly non-significant in its linear form. However, Governance shows a marginally significant negative relationship for ROA (p = 0.084) and Tobin's Q (p = 0.073), similar to what was observed in Table 9, suggesting a potential but limited role of governance practices in explaining accounting and market-based performance.

Table 10

Summary of relationship by dependent variable for Individual ESG Pillars

Dependent Variable	(ROA)	(ROE)	(TOBINS_Q)
Enivornmental	No relationship	No relationship	Convex
Social	Negative	Negative	Concave
Governance	Marginally Negative	No relationship	Marginally Negative

Notes: With 95% Confidence Level (** p < 0.05) required to assume quadratic shape

The inclusion of squared ESG terms reveals limited but notable nonlinear relationships with financial performance. Most prominently, the Environmental pillar shows a convex relationship with Tobin's Q, with the quadratic term highly significant. This implies that

firms with either very low or very high environmental scores tend to have higher market valuations, while those near the average see lower Tobin's Q. The turning point occurs around 3 points above the mean, suggesting that only strong environmental performers are rewarded by the market. For the Social pillar, concave relationship exists for Tobin's Q at a 95% confidence level. This indicates that moderate levels of social performance are associated with better outcomes, while very high social engagement may reduce financial returns. The Governance pillar, in contrast, shows no significant nonlinear effects, and its linear relationship remains weak and context-dependent.

6. Conclusions

The relationship between Environmental, Social, and Governance (ESG) performance and corporate financial performance (CFP) has been widely studied in recent years, with many meta-analyses, such as Friede et al. (2015), reporting a generally positive association. While the literature on emerging markets is gradually expanding, the African continent remains notably underrepresented in this field. This is largely due to Africa's unique socio-economic and institutional context (Appiah-Konadu et al., 2022), its relative underdevelopment in ESG practices, and the persistent scarcity of reliable data.

This study contributes to addressing this gap by examining the ESG–CFP nexus in Africa, based on a panel dataset of 211 firms from 2010 to 2024.

Our analysis yields several key findings. First, the results reveal a significant negative relationship between Overall ESG performance and all three financial metrics (ROA, ROE, and Tobin's Q). While the negative association is consistent across the board, the analysis of quadratic terms uncovers a more nuanced picture. Specifically, a concave (inverted U-shaped) relationship emerges for ROE and Tobin's Q, suggesting that ESG engagement can enhance financial outcomes up to a certain threshold, beyond which the marginal benefit declines. In contrast, ROA shows a linear and persistently negative association, with no evidence of non-linearity.

Second, among the three ESG dimensions, the Social score appears to be the most influential driver of financial performance. It shows statistically significant negative effects across all three financial indicators. Importantly, the quadratic term for Social is also significant—particularly for Tobin's Q—indicating a concave relationship, where moderate levels of social commitment correspond to higher market valuation than extreme levels. Meanwhile, the Environmental score shows no significant linear effect but does exhibit a significant positive quadratic relationship with Tobin's Q. This convex pattern suggests that firms with either very low or very high environmental performance may be more positively perceived by the market. On the other hand, the Governance dimension remains largely insignificant, with weak and inconsistent results and no indication of non-linearity.

Lastly, our analysis suggests that the financial benefits of ESG initiatives, when measured through the Overall ESG score, may decline after surpassing a certain threshold. The estimated turning point lies below the sample mean ESG score of 47.88. However, since the dataset is skewed toward South African firms—which are likely to have better ESG disclosures—this average may not reflect broader African realities. If ESG performance in less-represented countries is lower, the actual turning point might be closer to or even above their average scores. This would reinforce our findings, suggesting that ESG investments in many African markets may still offer financial gains up to a critical level, whereas excessive ESG engagement could be financially inefficient in the current stage of ESG development.

These findings offer valuable implications for academics and investors interested in sustainable finance in emerging regions. They underscore the importance of contextualizing ESG strategies according to regional development stages. In Africa, where ESG practices are still in early stages, moderate ESG investment appears to yield

the highest financial benefit. This aligns with previous arguments that the ESG–CFP relationship may be more relevant in developing economies (Roman et al., 1999; Rahdari, 2016).

Our results could be helpful for guiding resource allocation among investors and firms operating in African markets, as they highlight the financial trade-offs of ESG engagement. They also contribute to the scarce empirical evidence on ESG performance outside South Africa, helping to close important regional and sectoral research gaps. Lastly, the study provides a foundation for future work examining the nonlinear effects of ESG in underexplored contexts, where optimal ESG thresholds may vary significantly from global standards.

Looking forward some improvements and extensions could be of high value to build on this topic for future researches.

First and foremost, the dominance of South African firms in the sample limits the generalizability of the findings. Future studies should aim for a more balanced representation across African countries as ESG data becomes increasingly available. Furthermore, analysis should also incorporate geographical differentiation, since South Africa is years ahead of other countries such as Morocco, Egypt, or Nigeria, both in ESG implementation and data reporting. This could enable a dual-perspective framework to contrast early and late ESG adopters within Africa.

Second, it would be valuable to explore the implications of temporal heterogeneity in the sample. A 15-year panel, which includes periods of crisis such as the COVID-19 pandemic, may affect results by blending structurally heterogeneous time periods. Most of the studies reviewed tend to use shorter timeframes to examine this relationship, suggesting that while our extended period offers valuable insights, it may also introduce additional heterogeneity. As mentioned earlier, Peerbhai & Naidoo (2022) observed a shift in the relative performance of SRI funds between the periods of 2009-2013 and 2014-2018. Therefore, expanding the dataset to include more firms and reducing the time spam, particularly from underrepresented countries, could help mitigate this issue and support more balanced results.

Lastly, future work should account for industry-specific effects by differentiating between ESG-sensitive and non-sensitive sectors. This distinction is particularly relevant based on the findings by García et al. (2017), who, in their study of BRICS countries, observed that firms in environmentally sensitive industries tend to demonstrate higher ESG performance. Incorporating such differentiation in future research could provide a clearer understanding of how ESG factors influence financial outcomes across varying industrial contexts in Africa.

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Appendix

Regression Results (Model 1a: Mean-Centered Variables vs Non Mean-Centered)

Model 1a: Non Mean-Centered Variables				
Variable	Overall ESG	Overall ESG^2	Firm Size	Leverage
VIF	20.555	20.680	1.147	1.002

Model 1a: Mean-Centered Variables				
Variable	Overall ESG_c	Overall ESG_c^2	Firm Size	Leverage
VIF	1.168	1.027	1.147	1.002

Notes: VIF (Variance Inflation Factor), used to detect multicollinearity among the independent variables.
VIF values above 5 suggest a potentially problematic level of multicollinearity.

Regression Results (Model 2a: Mean-Centered Variables vs Non Mean-Centered)

Model 2a: Non Mean-Centered Variables								
Variable	Environmental	Social	Governance	Environmental^2	Social^2	Governance^2	Firm Size	Leverage
VIF	21.712	21.398	23.275	20.675	20.345	22.909	1.335	1.005

Model 2a: Mean-Centered Variables								
Variable	Environmental_c	Social_c	Governance_c	Environmental_c^2	Social_c^2	Governance_c^2	Firm Size	Leverage
VIF	2.117	2.046	1.155	1.311	1.270	1.031	1.335	1.005

Notes: VIF (Variance Inflation Factor), used to detect multicollinearity among the independent variables.
VIF values above 5 suggest a potentially problematic level of multicollinearity.

Table 5

Regression Results (Model 1: Overall ESG Performance)

Model and Dependent Variable	**Model 1.1 (ROA)**			**Model 1.2 (ROE)**			**Model 1.3 (TOBINS_Q)**		
Variable	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
Overall ESG	-0.00071	0.00017	0.00003 ***	-0.00130	0.00047	0.00546 ***	-0.01144	0.00201	0.00000 ***
Firm Size	0.00600	0.00622	0.336	0.02194	0.01203	0.06849 *	-0.48468	0.05385	0.00000 ***
Leverage	-0.00665	0.00334	0.04676 **	-0.04563	0.00779	0.00000 ***	-0.06233	0.02075	0.00271 ***
R-Squared		0.02783			0.13941			0.15608	
F-Test (p-value)		2.20E-16			2.20E-16			2.2E-16	
Hausman Test (p-value)		3.24E-04			1.98E-05			2.2E-16	
Wooldridge Test (-value)		1.40E-15			6.20E-05			1.76E-08	
White's Test (p-value)		2.20E-16			2.20E-16			2.2E-16	

Notes: The results indicate the presence of significant individual effects, inconsistency of the random effects estimator, first-order autocorrelation, and heteroskedasticity. Model with Fixed Effects and Driscoll-Kraay (SCC) standard errors.

*** p < 0.01, ** p < 0.05, * p < 0.1

Table 6

Regression Results (Model 1a: Overall ESG Performance - Squared Variable)

Model and Dependent Variable	Model 1.1a (ROA)			Model 1.2a (ROE)			Model 1.3a (TOBINS_Q)		
Variable	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
Overall ESG_c	-0.00073	0.00017	0.00002 ***	-0.00134	0.00046	0.00327 ***	-0.01172	0.00201	0.00000 ***
Overall ESG_c^2	-0.00002	0.00001	0.07679 *	-0.00006	0.00002	0.00266 ***	-0.00036	0.00009	0.00013 ***
Firm Size	0.00502	0.00651	0.44103	0.01932	0.01241	0.11975	-0.50038	0.04928	0.00000 ***
Leverage	-0.00667	0.00335	0.04659 **	-0.04567	0.00780	0.00000 ***	-0.06258	0.02071	0.00257 ***
R-Squared		0.03301			0.14513			0.17385	
F-Test (p-value)		2.20E-16			2.20E-16			2.2E-16	
Hausman Test (p-value)		3.22E-06			1.35E-05			2.2E-16	
Wooldridge Test (-value)		1.74E-15			8.39E-05			2.2E-16	
White's Test (p-value)		2.20E-16			2.20E-16			2.2E-16	

Notes: The results indicate the presence of significant individual effects, inconsistency of the random effects estimator, first-order autocorrelation, and heteroskedasticity. Model with Fixed Effects and Driscoll-Kraay (SCC) standard errors.

*** p < 0.01, ** p < 0.05, * p < 0.1

Table 7

Regression Results (Model 1: Individual Pillars ESG Performance)

Model and Dependent Variable	Model 2.1 (ROA)			Model 2.2 (ROE)			Model 2.3 (TOBINS_Q)		
Variable	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
Environmental	-0.00004	0.00016	0.81524	0.00037	0.00045	0.41025	0.00016	0.00166	0.92171
Social	-0.00048	0.00023	0.03484 **	-0.00134	0.00045	0.00307 ***	-0.01105	0.00271	0.00005 ***
Governance	-0.00023	0.00012	0.06895 *	-0.00050	0.00038	0.18793	-0.00138	0.00072	0.05400 *
Firm Size	0.00614	0.00638	0.33620	0.02220	0.01261	0.07858 *	-0.47469	0.05474	0.00000 ***
Leverage	-0.00666	0.00333	0.04557 **	-0.04566	0.00789	0.00000 ***	-0.06142	0.02024	0.00246 ***
R-Squared		0.02882			0.14239			0.16840	
F-Test (p-value)		2.20E-16			2.2E-16			2.2E-16	
Hausman Test (p-value)		3.97E-04			3.60E-05			2.2E-16	
Wooldridge Test (-value)		1.80E-15			6.51E-05			3.31E-08	
White's Test (p-value)		2.38E-14			2.20E-16			2.2E-16	

Notes: The results indicate the presence of significant individual effects, inconsistency of the random effects estimator, first-order autocorrelation, and heteroskedasticity. Model with Fixed Effects and Driscoll-Kraay (SCC) standard errors.

*** p < 0.01, ** p < 0.05, * p < 0.1

Table 8

Regression Results (Model 1: Individual Pillars ESG Performance - Squared Variables)

Model and Dependent Variable	Model 2.1a (ROA)			Model 2.2a (ROE)			Model 2.3a (TOBINS_Q)		
Variable	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
Environmental	-0.00007	0.00014	0.61542	0.00030	0.00041	0.46005	-0.00092	0.00164	0.57590
Social	-0.00045	0.00021	0.03108 **	-0.00125	0.00043	0.00340 ***	-0.01048	0.00244	0.00002 ***
Governance	-0.00023	0.00014	0.08430 *	-0.00052	0.00038	0.17672	-0.00133	0.00074	0.07323 *
Environmental^2	0.00000	0.00000	0.65633	0.00000	0.00001	0.96424	0.00014	0.00004	0.00015 ***
Social^2	-0.00001	0.00001	0.08552 *	-0.00003	0.00002	0.05466 *	-0.00027	0.00005	0.00000 ***
Governance^2	0.00000	0.00001	0.79669	0.00001	0.00001	0.50641	0.00001	0.00003	0.72671
Firm Size	0.00618	0.00633	0.32909	0.02212	0.01237	0.07396 *	-0.46970	0.05501	0.00000 ***
Leverage	-0.00676	0.00332	0.04212 **	-0.04595	0.00779	0.00000 ***	-0.06237	0.01934	0.00129 ***
R-Squared		0.03232			0.14596			0.18822	
F-Test (p-value)		2.20E-16			2.2E-16			2.2E-16	
Hausman Test (p-value)		1.02E-04			4.88E-04			2.20E-16	
Wooldridge Test (-value)		1.35E-15			6.33E-05			9.14E-08	
White's Test (p-value)		1.99E-15			2.20E-16			2.2E-16	

Notes: The results indicate the presence of significant individual effects, inconsistency of the random effects estimator, first-order autocorrelation, and heteroskedasticity. Model with Fixed Effects and Driscoll-Kraay (SCC) standard errors.

*** p < 0.01, ** p < 0.05, * p < 0.1