ESG and Corporate Financial Performance: Evidence from JSE-listed firms

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Declaration

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Abstract

Business is an incredible social construct of the world, consisting of firms that are part of and arise from society. However, businesses have come under increasing scrutiny from internal and external stakeholders over sustainable business practices. A sustainable business model creates a balance between integrity, equity and financial prosperity, the so-called triple-bottom-line. Environmental, social and governance issues (ESG) have become the modern-day proxy for sustainable business practices. The relationship between sustainable business practices and corporate financial performance is a relatively new but prominent area of research in practice and academia in South Africa.

This study explores the relationship between ESG disclosure performance and the corresponding corporate financial performance (CFP) for 70 sampled firms listed on the Johannesburg Stock Exchange (JSE) between the periods 2011 and 2019. In line with international and South African research, ESG in its composite and disaggregated form was considered against a select number of CFP metrics. Select accounting-, market- and quality-based CFP metrics were considered. Quantitative research methods were employed, using panel regression models to investigate the ESG-CFP relationship where ESG was the independent variable while the CFP metrics were individually considered as the dependent variables. All CFP data was obtained from Bloomberg and Bloomberg's proprietary ESG scores were used.

This study finds a statistically significant negative relationship between ESG and the selected CFP metrics. Upon disaggregating the ESG scores, it was evident that the E- and S-scores were also significantly and negatively related to the CFP metrics whilst the G-score was positively related to CFP, but it was not statistically significant.

The empirical evidence suggests that over a nine-year investment horizon, higher ESG disclosure performance detracts from firm fundamental and market performance. Further interpretation of the results in conjunction with the literature may suggest that ESG ought to be seen as an insurance policy against excessive underperformance during volatile periods and not a CFP enhancer. Therefore, being "over-insured with ESG" may lead to underperformance.

Keywords: ESG; corporate financial performance; corporate governance; social considerations; environmental practice

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List of abbreviations

ACWI	All Country World Index
B-BBEE	Broad-Based Black Economic Empowerment
BEE	Black Economic Empowerment
BLUE	Best Linear Unbiased Estimator
BRICS	Brazil Russia India China South Africa
CFP	Corporate Financial Performance
CRISA	Code for Responsible Investing in SA
CSR	Corporate Social Responsibility
EBIT	Earnings Before Interest & Tax
EPS	Earnings Per Share
ESG	Environmental Social Governance
FEM	Fixed Effects Model
GICS	Global Industry Classification Standard
IoDSA	Institute of Directors South Africa
IQR	Interquartile Range
JALSH	JSE Africa All Share Index
JSE	Johannesburg Stock Exchange
MSCI	Morgan Stanley Capital International
NOPAT	Net Operating Profit After Tax
OLS	Ordinary Least Squares
PRI	Principles for Responsible Investment
REM	Random Effects Model
ROA	Return On Assets
ROE	Return On Equity
ROIC	Return On Invested Capital
SRI	Socially Responsible Investment
SSEI	Sustainable Stock Exchange Initiative
UNEP	United Nations Environment Programme
VIX	Volatility Index
WACC	Weighted Average Cost of Capital

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Chapter 1: Introduction

1.1.Background

The integration of environmental, social, and corporate governance (ESG) factors into a firm's decision-making processes is widely referred to as responsible corporate management. ESG factors cover a wide range of concerns that are not often considered in financial analysis but may have financial implications. The "E" factor covers areas including, but not limited to, carbon footprints, greenhouse gas emissions and waste management. The "S" factor covers labour practices, workplace and board diversity, supply chain management, etc. The "G" factor covers the governing of the "E" and "S" factors – corporate sustainability oversight, board composition, executive remuneration, etc. The underlying principle behind ESG investing is being able to identify and quantify the intangible value possessed by ESG-compliant firms. These firms are believed to exhibit superior risk management practices that create long-lasting value for investors.

The term ESG was first introduced in a 2004 study by the U.N. Global Compact in partnership with twenty financial institutions titled *"Who Cares Wins"* (Knoepfel, I., and Compact UNG, 2004). The goal of this joint initiative was to establish ways to integrate ESG factors into capital markets. The study made the case that integrating ESG factors into capital markets makes good financial sense and leads to more sustainable firms and better outcomes for societies. This study and similar others such as the *"Freshfield Report"* (UNEP Finance Initiative, 2005) formed the backbone for the launch of the Sustainable Stock Exchange Initiative (SSEI) and Principles for Responsible Investment (PRI). Today the PRI is thriving with over 4300 signatories and over $110 trillion in assets under management. The PRI's mandate is to advance the amalgamation of ESG into decision-making and financial analysis through thought leadership, guidance, and engagement. The SSEI has grown over time with many exchanges, including South Africa's Johannesburg Stock Exchange (JSE), now mandating certain ESG disclosure.

The rise of ESG analysis has neither been linear nor smooth. Firms that have been hesitant to support the concept argue that their sole purpose is limited to the maximisation of shareholder wealth. This line of reasoning is based on the shareholder theory put forth by economist Milton Friedman (1962). Adam Smith proposed a similar view, stating that social responsibility requires corporations to consider environmental and societal concerns at the detriment of greater economic return (du Toit and Lekoloane, 2018).

Financial performance has been the primary foundation on which investors in South Africa have done investment analysis (IoDSA, 2016). Long-term value generation capacity of local enterprises is threatened by sustainability-related issues. Despite the fact that South African investors have begun to engage firms on ESG issues, there has been improvement in the recognition and integration of ESG factors into investment processes (IoDSA, 2016).

Post the King III report in 2011, a separate report, the Code for Responsible Investing in South Africa (CRISA), was issued to guide institutional investors on how to perform sustainable investment analysis. The report states that a narrow focus on the monetary benefits of investment opportunities is no longer appropriate and that ESG aspects should be given as much attention as they could have an impact on long-term sustainability and shareholder value creation.

1.2. Environmental, social, and corporate governance: South African context

Natural resource extraction, particularly mining, remains one of the largest industries in South Africa. Environmental issues for firms operating in the country relate to climate change, destruction of natural habitats, pollution, overfishing and a lack of clean water (Hebb *et al.*, 2015). Climate change will most likely have an outsized impact on the profitability of firms in the future therefore greater understanding of these aspects will enable firms to be proactive in dealing with them.

South Africa's socio-economic development has been hampered by its legacy of social injustice. Several regulatory remedies such as the Employment Equity Act and the Broad-Based Black Economic Employment Act have aimed at addressing the inequalities, although with little success. Furthermore, the HIV/AIDS epidemic continues to put significant strain on the country's social and economic development. As a result, businesses face greater direct and indirect costs, such as increased absenteeism and lower productivity (Hebb *et al.*, 2015).

South Africa's corporate governance framework is well developed. Under the guidance of the King IV framework, the key concepts of responsible value creation highlighted include ethical leadership, corporate citizenship, stakeholder inclusivity, sustainable development, and integrated reporting (IoDSA, 2016). Integrated reporting combines financial performance reporting and a separate sustainability report. South African integrated reports are governed by the Integrated Reporting Committee (IRC) of South Africa. Such reports should consider a

company's economic, environmental, and social elements. Financial, human, natural, manufacturing, relational, and social capital are among the six capitals of the business that firms are encouraged to report on (IoDSA, 2016).

1.3. Research problem

Interest from investors and other parties in ESG issues has risen significantly in recent years, and the current economic, public health, environmental and social justice crises have only intensified this focus (Bergman, Deckelbaum and Karp, 2020). This study assesses the business case for ESG through an exploration of the relationship between ESG disclosure performance and select Corporate Financial Performance (CFP) measures for 70 sampled firms listed on the JSE from 2011 and 2019. The measurement methodology of this relationship is still in its infancy and perpetually changing. Previous studies yield varying results and limited research has been done in emerging markets, including South Africa. This study will build upon the work done by Johnson, Mans-Kemp and Erasmus (2019) and several other authors by updating the study and providing additional insights.

1.4.Research objective

This study takes a multipronged approach in investigating the ESG-CFP relationship for JSE-listed firms between 2011 and 2019. A combination of accounting-, market- and quality metrics were used to capture a more holistic picture of CFP. The ESG component was considered in its composite and disaggregated form. As a point of clarity, this study did not attempt to investigate any causality between ESG and CFP.

1.5.Significance

Previous academic research on the ESG-CFP relationship has mainly been conducted in the developed markets context. As a result, their sustainable investing industry has also become developed. Despite the growing awareness of ESG practices in emerging markets, limited research has been conducted, including in South Africa. Because sustainability standards have yet to sufficiently evolve in emerging countries, most companies fail to handle ESG concerns in a systematic and focused manner (Heese, 2005; Jamali & Mirshak, 2007). There is

significant ESG activity in South Africa, yet sufficient research that investigates how this activity affects CFP is not. Therefore, this paper aims to add to the current collection of work by updating the dataset and incorporating various CFP metrics to determine a more comprehensive understanding of this relationship.

1.6.Methodology overview

70 sampled JSE-listed firms were analysed by conducting panel regressions over the 2011 to 2019 periods. In line with other research, the explanatory variable was ESG in its composite and disaggregated form, and various CFP metrics were individually considered as dependent variables. The ESG data was obtained from Bloomberg. The accounting-, market- and quality-based CFP metrics were also obtained from Bloomberg.

1.7. Study structure

The rest of this paper is organised as follows:

Chapter 2 explores the theoretical framework underpinning the ESG-CFP debate. In addition, empirical evidence and methodologies from previous research are summarised and discussed. This information is presented as a literature review.

Chapter 3 defines the variables, their measurement and control variables included in the empirical models as well as the rationale for why they were chosen. Furthermore, the research design and methodology used for selecting and processing data used in the study are provided. Lastly, the hypotheses tested in the study are also presented alongside the empirical models used.

Chapter 4 examines the data in depth and summarises the panel regression results. The descriptive statistics of the data are examined, as well as the correlations among the model's variables.

Finally, chapter 5 reviews and concludes the study.

Chapter 2: Literature review

2.1.Theoretical framework

The fundamental debate around business sustainability is based on the shareholder theory (Friedman, 1962) and stakeholder theory (Freeman, 1984) which differ in their approach toward shareholder and stakeholder value creation. Friedman's approach advocates for shareholder value maximisation through the increase of economic capital only. However, Freeman suggests that firms prioritise stakeholder value maximisation through the increase of economic, ecological, and social capital. The following subsections discuss these theories in detail.

2.1.1. Shareholder Theory

The orthodox belief is that the chief objective of any business corporation is the maximisation of financial value for its shareholders. Stakeholders such as employees, customers, suppliers, and greater society should never be prioritised over the needs of the shareholders.

Friedman's (1962) defence of the shareholder theory is famously encapsulated by a quotation from Capitalism and Freedom (1962, p. 133), *"… the use of corporate resources for any cause other than profit maximisation would constitute a form of theft"*. The arguments regarding the social responsibility of firms originate from neoclassical philosophy. The two axioms on which Friedman's defence rests are as follows. Firstly, morality ascribes to a person the right to use their freedom in whichever way they choose, given they do not violate this same right in others (Mansell, 2013). Secondly, the right to own property and to use this property within the limits of the first axiom (Mansell, 2013).

According to Friedman, corporate social responsibility does not exist because only individuals (and not corporate entities) can be said to have moral responsibilities (Mansell, 2013). In a free enterprise, a corporate manager is an agent of the owners of the firm, and he has direct responsibility to his employers (Mansell, 2013). That responsibility is to run the firm by their desires, which is normally to be as profitable as possible. The defence of the shareholder theory proceeds with a set of rights possessed equally by all individuals. Therefore, all participants in business, including stakeholders, have a responsibility to respect the rights of all individuals they transact with.

How do managers know what the *"desires"* of shareholders are? Friedman clarifies that to run a firm per the interests of shareholders normally means *"… to make as much money as possible*

while conforming to the basic rules of society, both those embodied in law and those embodied in ethical custom" (Friedman, 1962). The suggestion is that the purpose for which the firm is established underpins the objectives which the corporate managers must pursue.

2.1.2. Stakeholder Theory

The definition of stakeholder can be traced to Freeman's early definition of, *"being any group or individual who can affect or is affected by the achievement of the organisation's objectives"* (Freeman, 1984). This definition attracted researchers looking for a more socially responsible management theory. However, it has been criticised for its ambiguity with critiques such as *"Why should we espouse a theory of stakeholder management if all living things, inasmuch as they can affect the firm, must fall under the obligatory umbrella of management consideration?"* (Phillips and Reichart, 2000). This led to the question: Which stakeholders should firms pay attention to? Responses have ranged from a narrow view that stakeholders are those that yield power over firms (Frooman, 1999) to a broader view of stakeholders that includes the vulnerable (Argandoña, 1998).

The theory's primary intent was to offer a pragmatic approach to strategy that encouraged organisations to be cognisant of stakeholders to achieve long-term superior performance. The fundamental thesis of the stakeholder theory is that managers should act in the interest of all their constituents and not only their shareholders. The stakeholder theory is controversial in that it questions the mainstream assumption that the pursuit of profits is the only objective for managers, yet it is vital because it seeks to address the often-overlooked sociological question of how firms affect society and the ecological environment (Hinings and Greenwood, 2002).

In addition to its stakeholder management practices, a firm should also disclose financial and non-financial information in the most transparent way possible. Such practices increase the levels of transparency and reduce data asymmetries between the firm and stakeholders, thus minimising the perceived risk (Garcia, Mendes-Da-Silva and Orsato, 2017). A meta-analysis conducted by Orlitzky and Benjamin (2016) confirms such a proposition that better Corporate Social Responsibility (CSR) performance reduces idiosyncratic firm risk.

Stakeholder theory's greatest contribution lies not with firm efficiency but with firm effectiveness through enhanced legitimacy granted by society. Legitimacy is known to produce stakeholder support and create environmental stability which helps firms over the long term (Suchman, 1995). In short, by focusing on short-term financial incentives as the chief goal,

firms run the risk of long-term financial demise. However, if firms focus on long-term shareholder-stakeholder engagement, their operations will be sustainable over the long term.

2.1.3. Conclusion

Since Friedman's total rejection of CSR in 1962, the theoretical discussion surrounding the effectiveness of good corporate citizenship has evolved. He argued that appointed managers did not have the right to spend shareholders' capital on anything other than maximizing their wealth. The agency theory supported Friedman's position by suggesting that managers have incentives to overspend on CSR initiatives to enhance their personal corporate brands (Barnea and Rubin, 2010). This ultimately proposes that increasing CSR spending will inevitably lead to decreasing profits (and a source of inefficiency (Garcia, Mendes-Da-Silva and Orsato, 2017)) as corporate managers become distracted from their chief objective. With that said, the Friedman doctrine is not entirely supported by empirical evidence. Many compelling arguments have come forth on how investment in sustainable business practices can eventually translate into higher profits for shareholders. The idea of *"enlightened value maximisation"* stresses that a firm that takes into account different stakeholders' interests through *"strategic CSR"* will have the power to influence its competitive context favourably as it is consistent with the strategy chosen by profit-maximising firms (Jensen, 2001). Examples of such strategic CSR investments are reputation and risk management, cost-saving due to efficiency improvements, employee relations management and better access to finance (Nollet, Filis and Mitrokostas, 2016).

2.2. Empirical findings

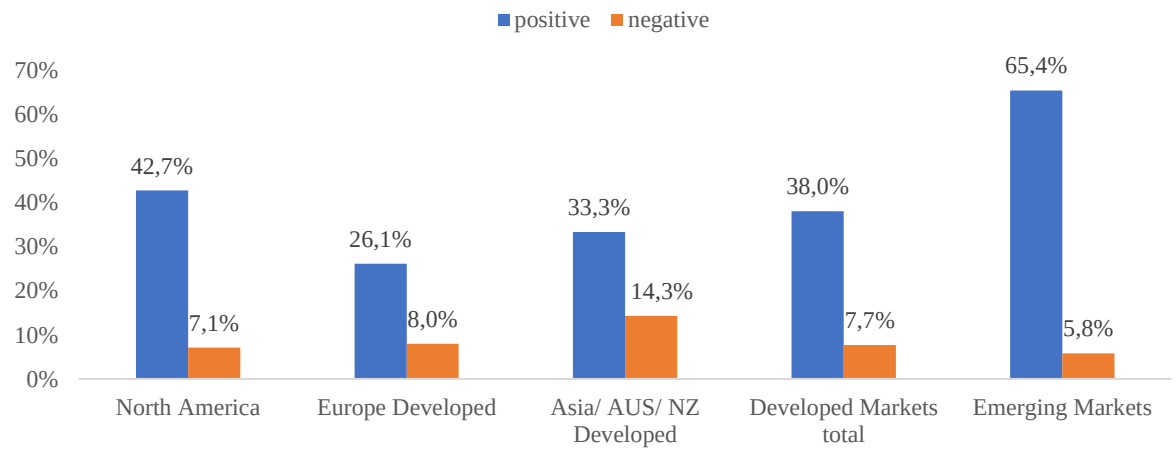
Evidence from the literature reviewed suggests that various terms have been broadly classified as ESG factors. Some of these include sustainability practices, socially responsible investment (SRI), sustainable investment, impact investing, CSR, and ethical investment. Cubas-Díaz and Martínez Sedano (2018) suggest that through time, it was apparent that CSR and other synonyms, in effect, had evolved into ESG. Numerous academic papers have studied the impact of ESG disclosure scores, separately and/or in combination, on CFP. The results are fragmented and inconclusive. This is mainly due to studies being conducted in different periods, regions, and using an array of different methodologies, therefore, producing varied results (Dalal and Thaker, 2019). Scholars and practitioners are unclear on the general effect of ESG including its measurement and robustness (Friede, Busch and Bassen, 2015). There is

research that analysed the potential differences in the ESG-CFP relationship across countries and regions. Overall findings are inconclusive, and some researchers have hypothesised that the ESG-CFP relationship across countries is affected by a higher humane orientation. Other researchers such as Friede, Busch and Bassen (2015) suggest that the ESG-CFP relationship in US equities is significantly higher compared to non-US equities. In contrast, there is research that also suggests that there are significantly higher ESG effects in emerging markets compared to developed markets (Golicic and Smith, 2013). Results from developed markets and emerging markets will be discussed below:

2.2.1. Developed Markets

Friede, Busch and Bassen, (2015) aggregated evidence from more than 2000 empirical studies covering the ESG-CFP relationship. From a vote-count study with a sample of 402 sub-studies with disclosed regional identifiers, developed markets excluding the United States of America and Canada (North America) exhibit a smaller share of positive results. The shares of the positive outcomes are as follows; North America (43%), Europe (26%) and developed Asia/Australia (33%) (see figure 1). It is apparent that from a developed market context, a significant proponent of studies are still yielding inconclusive results, but the research appears to be leaning more towards a positive ESG-CFP relationship.

Figure 1: ESG-CFP in various regions



Source: Friede, Busch and Bassen, (2015)

Nollet, Filis and Mitrokostas (2016) used Bloomberg's ESG Disclosure score covering the S&P500 universe from 2007 to 2011 and tested for linear and non-linear ESG-CFP

relationships. Results from their linear model suggest that a significant negative ESG-CFP (accounting-based CFP) relationship exists. However, their non-linear model found a U-shaped ESG-CFP relationship, concluding that in the longer run, ESG effects are positive. The findings imply that ESG engagement does not pay off immediately, but rather only after a certain threshold has been achieved. Nollet, Filis and Mitrokostas (2016) further posit that among their results is the fact that by disentangling the ESG Disclosure score into its sub-components, they found that the U-shaped relationship exists only between the governance sub-component and CFP. This paper is interesting as most research only tests for a linear ESG-CFP relationship, however, recent developments in microeconomic theory suggest making use of non-linear models (Nollet, Filis and Mitrokostas, 2016).

In context of the developed markets, a fragile consensus seems to be emerging, A meta-analysis of 170 empirical studies done between 1972 to 2007 by Margolis, Elfenbein and Walsh (2007) suggests a positive CSR-CFP (accounting- and market-based CFP). Despite this seemingly positive trend, there are still many papers finding either negative or inconclusive results. Margolis, Elfenbein and Walsh (2007) believe that the conflicting results may be due to inconsistencies in how the independent and dependent variables are defined, different samples, poor research designs and different time horizons. Baron (2001) posits that researchers should account for the distinction between strategic CSR and altruistic CSR to achieve more consistent results. Hillman and Keim (2001) followed this line of thought and examined this argument by subdividing CSR into strategic stakeholder management and social issues. They found that while strategic CSR is positively correlated with CFP, engagement in social issues has a negative relationship with CFP. The authors, therefore, conclude that aggregating the two types of CSR into a single measure may lead to ambiguous results. Unfortunately, though this separation is elegant in theory, in practice, it is very difficult to account for it accurately.

Borovkova and Wu -July (2020) using a correlation analysis on a dataset spanning over 2000 listed firms and nine years, observed that ESG performance of firms in the European Union, United States of America (USA), Australia and South-East Asia to be strongly correlated with their size. Therefore, larger firms had on average better ESG scores. They propose that investors should consider this feature in their investment strategies to avoid introducing undesired size effects that can tilt the portfolio towards larger firms. An interesting observation not stated in other papers is that Borovkova and Wu -July (2020) find that highly ESG scoring firms tend to have lower volatility and more consistent financial performance.

Several studies have looked at the impact ESG practices had on firms' risk and cost of capital. Dhaliwal et al. (2011) concluded that firms with a high capital cost in a given year received reductions in their cost of capital the following year provided they agreed to publicise their ESG practices. Serafeim (2015) reached similar conclusions stating that firms that prepared integrated reports had risk $\beta etas$ (as calculated by the Capital Asset Pricing Model) that were negatively correlated with the ESG indicators, illustrating that ESG disclosure results in less firm risk, and consequently, a lower cost of capital and higher profits.

2.2.2. Emerging markets

Wood (2010) believes that studying the CSR-CFP relationship is of no value and Rahdari (2016) agrees that these suggestions might apply to well-developed markets but not to emerging markets. He argues that because a few studies have been conducted in emerging markets and there is a lower level of understanding of the advantages and disadvantages, examining such a relationship might be valuable to the advancement of the subject. This is because firms operating in different countries are embedded in distinct institutional environments experiencing different degrees of coercive pressures to engage in CSR/ESG practices (Rahdari, 2016).

The pressure is mounting for less orthodox economic development in emerging markets. This includes improved ESG practices, particularly in BRICS (Brazil, Russia, India, China, and South Africa) firms. Such a trend is starting to take shape in the capital markets of South Africa and Brazil, which have introduced sustainability indices in their stock exchanges, providing visibility to listed firms that thrive in ESG practices. According to Friede, Busch and Bassen (2015), the emerging market's sample has a 65% positive outcome hit rate between ESG and CFP which is significantly higher than the developed markets share. The sample size is however significantly smaller than that used in the context of the developed markets which makes the results less robust.

Dalal and Thaker (2019) used annual ESG data of 65 listed Indian firms covering the period 2011-2017 to study the ESG-CFP relationship. The authors find that good ESG performance enhances CFP evaluated through accounting- and market-based metrics. This is in line with a meta-analysis conducted by Friede, Busch and Bassen (2015) that found a strong ESG-CFP relationship in emerging markets. However, a later study conducted by Kumar Jha and Rangarajan (2020) analysing the ESG-CFP linkage in the Indian context by looking at a sample of the top 500 firms over the period 2008-2018 contradicts the findings of Dalal and Thaker

(2019). The ESG subcomponents were considered at both aggregate and disaggregate level with the CFP metrics covering accounting- and market-based metrics. Their findings indicate no significant ESG-CFP relationship at the aggregate level. At the individual level, some negative associations are detected between ESG and CFP. Zhao et al. (2018) studied China's listed power generation firms to explore the ESG-CFP relationship. They find that good ESG performance can indeed improve CFP with the environment ESG sub-component having the strongest positive relationship with CFP because of the impact the industry has on the environment. These findings support the assertion made by Rahdari (2016) that firms face different coercive pressures when engaging in ESG matters.

South African research looking at the ESG-CFP relation is scarce. Previous research has mainly focused on corporate governance (Johnson, Mans-Kemp and Erasmus, 2019). This may be due to the country's advanced corporate governance framework provided by the King reports therefore, it is the first level of ESG integration. In a study by de Jongh et al. (2013), institutional investors were polled to see how important ESG factors were to them. Environmental and social issues were deemed *"less essential"* than corporate governance issues, according to the findings. Nonetheless, it is critical for businesses to engage with all three ESG subcomponents to secure long-term viability (Linnenluecke and Griffiths, 2010). Johnson, Mans-Kemp and Erasmus (2019) investigated the business case for ESG practices of selected JSE-listed firms between 2011 and 2016. By employing a variety of accounting-, market- and value-based CFP metrics, the authors conclude that ESG related risks are not homogenous across industries, therefore, managers must apply differentiated approaches to address the most crucial risks relevant to their operating environment. For example, they found a statistically significant (at 5%) positive relationship between the S-score and accounting-based earnings per share (EPS) for the consumer goods sector. Given the nature of this industry, it is logical that community connections, diversity, and consumer protection play a significant role in how these businesses run and make profits. Some authors have also employed the JSE Socially Responsible Investing (SRI) index as a proxy for CSR and ESG. Nkomani (2013) found that firms listed on the JSE SRI index underperformed non-constituent firms listed on the JSE for the period 2002-2012. Demetriades and Auret (2014) and du Toit and Lekoloane (2018) both report that there are no significant CSR-CFP associations between the periods 1995-2009 and 2009-2014 respectively. Chetty, Naidoo and Seetharam (2015) however, find significant CSR-CFP (EPS, ROA, and ROE) at the industry level for the period 2004-2013.

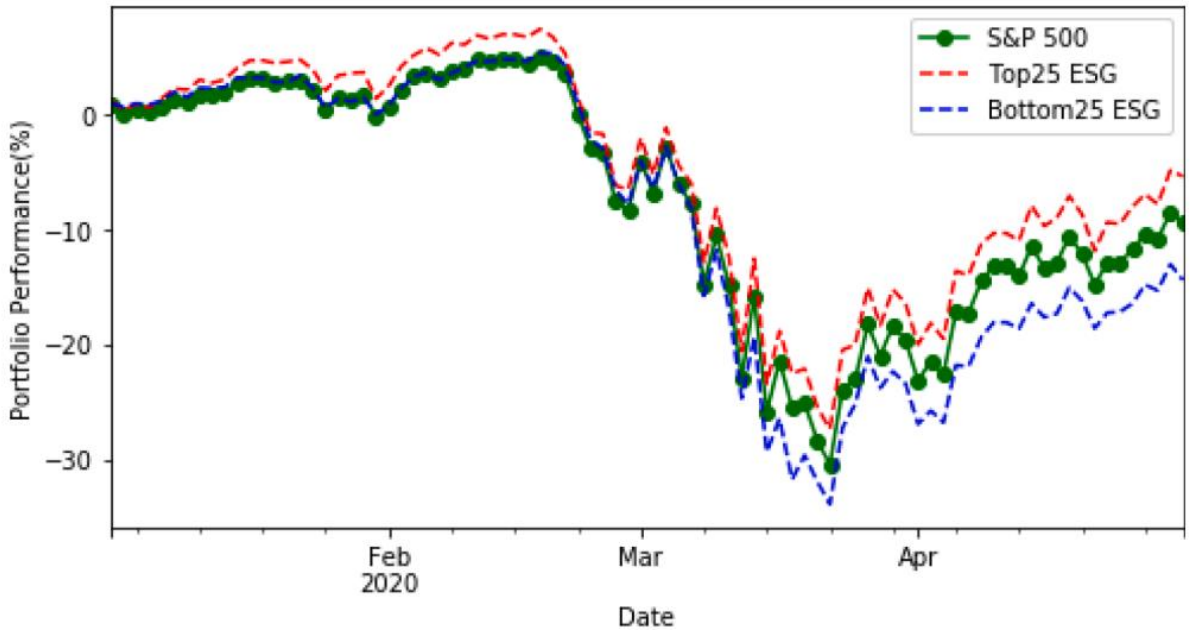
South African literature mainly focused on CSR that narrowly centred around environmental and social issues without accounting for corporate governance aspects.

2.2.3. Covid-19

As the novel Corona Virus (Covid-19) spread globally during the first quarter of 2020, financial markets turned extremely volatile globally. On March 16, 2020, the VIX index reached an unprecedented 83 score, with the second-highest registered score at 81 on November 20, 2008. Furthermore, during such volatile market conditions, ESG factors and investment strategies have garnered a lot of attention. It is worth mentioning that even before the pandemic, ESG investing was getting popular, with more investors becoming more selective about their portfolios by increasing their holdings of companies that align with their values related particularly to social and environmental issues (Díaz, Ibrushi and Zhao, 2021). They further posit that firms that neglect stakeholder relationships or lack efficient governance have significant "hidden risks". Demands for improved hate speech moderation on Facebook platforms, for example, resulted in advertising boycotts by several well-known corporations. As a result, a high ESG score may indicate a better possibility of avoiding such catastrophes, implying that ESG indirectly reflects a company's ability to manage stakeholder risks. Firms with higher ESG qualities are therefore predicted to be more robust during adverse market conditions under this premise.

Díaz, Ibrushi and Zhao (2021) focussed on the Covid-19 pandemic when examining ESG-CFP, with a sample of daily data from January 2020 to April 2020 spanning the S&P500. They created industry portfolios for each classification in the Global Industry Classification Standard (GICS). Firms in the top quarter (25%) ESG performance were included in the Top25 ESG portfolio and firms with ranks in the bottom quartile were included in the Bottom25 ESG portfolio based on Sustainalytics ESG scores. They observed that Top25 ESG outperformed the S&P500 index whereas the Bottom 25 ESG underperformed. Below is an illustration of their results.

Figure 2: ESG Portfolios vs S&P500

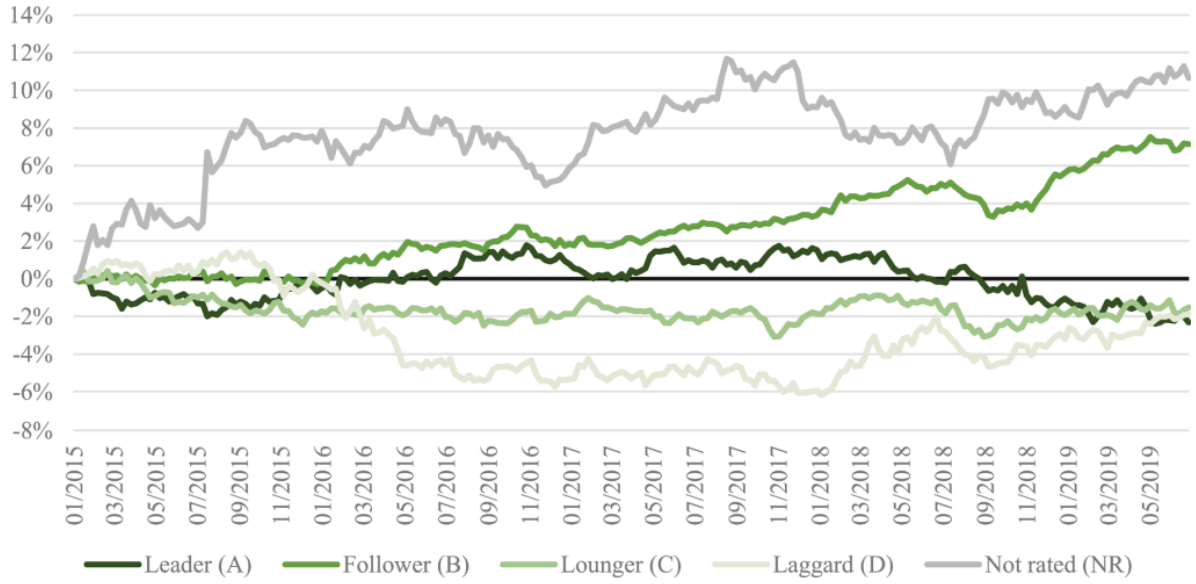


Source: Díaz, Ibrushi and Zhao (2021)

These findings suggest that ESG is essential to understanding factor investing in times of crisis. They also found that the social and environmental pillars were the main pillars driving the outperformance. Future research is therefore encouraged where their methodologies are applied to South African data.

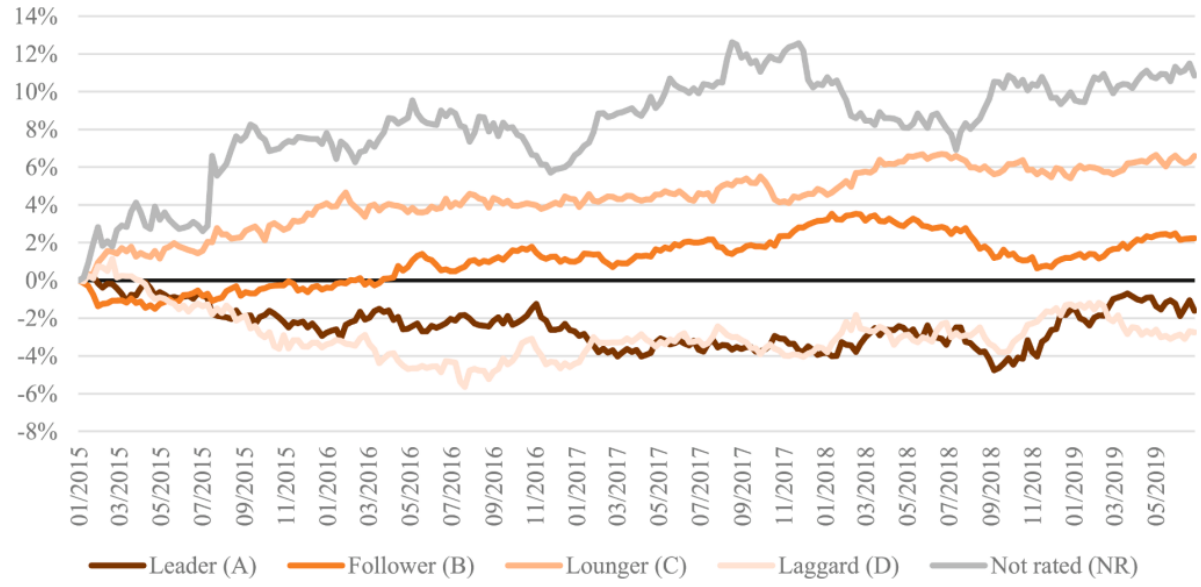
Naffa and Fain (2022) conducted a similar study to Díaz, Ibrushi and Zhao (2021) where they created ESG portfolios labelled Leader, Follower, Lounger, Laggard and Not rated based on their Sustainalytics ESG scores. The first four categories are in decreasing order of ESG quality with firms without ESG scores included under the "Not rated" category. They looked at returns in stocks in the MSCI ACWI between 2015 and 2019. They concluded that ESG leaders underperformed across the E, S and G factors relative to the other categories over the study period. This is most interesting as it suggests that best ESG practices may not be appreciated by investors during normal times but as evidenced by Díaz, Ibrushi and Zhao (2021), during periods of increased uncertainty, best ESG practices are rewarded by the market. The following three figures illustrate their findings.

Figure 3: Cumulative market-relative return of environment (E) factor portfolios



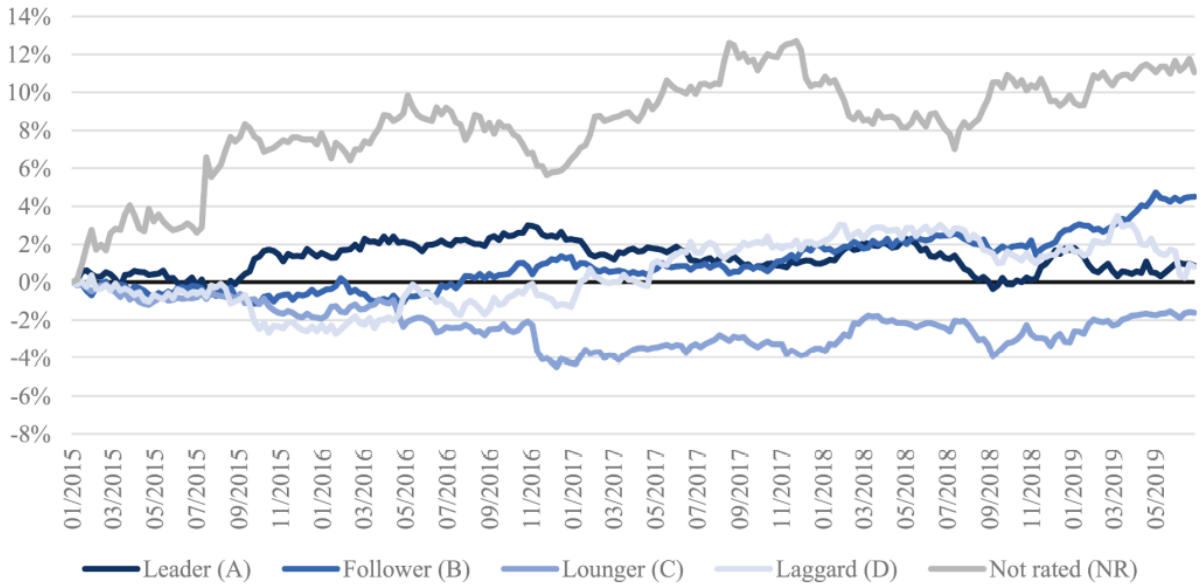
Source: Naffa and Fain (2022)

Figure 4: Cumulative market-relative return of social (S) factor portfolios



Source: Naffa and Fain (2022)

Figure 5: Cumulative market-relative return of governance (G) factor portfolios



Source: Naffa and Fain (2022)

2.2.4. ESG performance and firm size

It is worth discussing the influence a firm's size has on its ESG disclosure performance. Several scholars including Waddock, Graves and Carroll (1997), have developed a consistent set of theoretical arguments that firms with considerable slack resources are more responsive to stakeholder pressure relative to their peers with limited slack resources. Slack resources are defined as being financial, technical, and managerial resources that a firm can use at its discretion (Xiao *et al.*, 2018). Slack resource availability allows firms to experiment with new strategies without needing to make painful trade-offs. In the context of ESG, slack resources can free corporate managers from short-term management issues to long-term issues such as sustainability and ESG disclosure. This raises an interesting question: Is there an inherent benefit to larger companies with more resources because of the way the ESG score analyses corporate sustainability disclosure? Drempetic, Klein and Zwergel (2019) found a significant positive correlation between ESG and firm size. Larger firms can afford to allocate more resources for providing ESG data, however, is this also implying that larger businesses are more sustainable than smaller businesses, or are larger businesses simply better at sustainability reporting? Several researchers also challenge the universal effectiveness of slack resources in contributing to corporate social responsiveness. For example, Julian and Ofori-dankwa (2013) did not find a positive relationship between slack resource availability and CSR expenditure.

More literature is available that shows positive, negative, and inconclusive results. These inconsistent findings indicate that it is still premature to claim universal validity of slack resources theory. This study controlled for firm size to attempt to determine whether firm size has an impact on the ESG score.

Chapter 3: Data and methodology

3.1.Description of data

3.1.1. ESG overview

The Environmental, Social and Governance (ESG) performance of a firm is a concept that incorporates several qualitative dimensions. Environmental issues include, emissions and waste management, social performance may include workforce diversity and community involvement, and finally, governance captures issues relating to incorporate stakeholder engagement and board composition among others. Because of the broad and subjective nature of ESG, it is tricky to capture all these aspects and express them in just a few quantitative and coherent scores. This study used Bloomberg's proprietary ESG scores where the score ranges from "0.1" for firms that disclose the minimum required ESG data to "100" for those that disclose every data point collected by Bloomberg (Bloomberg, 2020). Firms not covered by their ESG group will show N/A and firms that do not disclose anything will show "0". Each data point is weighted by importance (e.g., greenhouse gas emissions carry greater weight than other data points). A consistent list of data points and weights applies across sectors and regions.

Bloomberg ESG data is collected from company-sourced public filings such as CSR reports, annual integrated reports, company sites and their proprietary survey that requests data directly from corporates (Bloomberg, 2020). The firm has analysed 11 800+ companies worldwide in more than one hundred countries, virtually covering the whole investible universe that discloses ESG information. No data is estimated meaning every data field has transparency that can be traced back to a company's document or filing. Bloomberg evaluates firms on the robustness of their disclosure on ESG criteria.

3.1.2. Governance (G) Scores

Under the G pillar, the themes of Board Composition and Compensation are core ESG issues than can have a material impact on firm performance. These issues can be further divided into a set of distinct sub-issues, leading to a clear taxonomy for data fields. The fields, sub-issues and issues all contribute to individual theme scores, and ultimately the G score. Tabled below is the G score framework and structure:

BOARD COMPOSITION			
Director Roles	**Diversity**	**Independence**	**Refreshment**
CEO Roles	Age Diversity	Board Leadership Independence	Board Refreshment
Chair Roles	Gender Diversity	Board Independence	Chair Refreshment
Board Roles			

Source: Bloomberg (2020)

EXECUTIVE COMPENSATION		
Incentive Structure	**Pay Governance**	**Pay for Performance**
CEO Incentive Plan Design	Compensation Board Oversight	Fixed Pay Alignment
Executive Incentive Plan Design	Gender Diversity	Variable Pay Performance
Executive Pay Equity	Say on Pay	
Executive Pay Linkages	Pay Policies	

Source: Bloomberg (2020)

G scores rely on data from profile-based and firm-based databases. Profiles based fields are updated near to real-time and derived from data linked to an executive's profile. Firm-based data points are updated annually and aligned to a firm's fiscal year-end. A mismatch may result in different outputs for similar fields at a specific point in time due to reporting lags.

Fields are scored individually and rolled up into the Sub-Issues, then feed into the major Issues, in turn, are folded into the two theme scores of the governance pillar score. Categories are mapped to numerical values, so that best practices attain a score of 7 and up and worst practices attain scores of 3 and below, with significant ground in between. Sub-Issue scores are aggregated in three different ways: a weighted generalised mean (p-mean); a simple mean and special cases like for Gender Diversity scores. Issue scores and theme scores are aggregated using weighted shifted p-means to reward general excellence and penalise less consistent performance. Factors such as firm age, board size, board structure and country of issue are also considered.

3.1.3. Environmental (E) and Social (S) Scores

E and S scores are derived from major sustainability reporting frameworks used by listed firms globally to highlight the most material sustainability issues. ESG data used consists of voluntary disclosures captured from direct primary sources (public filings) to ensure accuracy and consistency. The framework used does not assign weighting to the issues deemed to be

important, rather, Bloomberg has developed a three-part assessment to determine issue priorities:

- **Probability:** Each issue is assigned a ranking of high, medium, or low to represent the probability of the event materialising.
- **Magnitude:** Each issue is assigned a ranking of high, medium, or low to represent the potential severity of the event.
- **Timing:** Each Issue was assigned a classification of short-, medium-, or long-term. Short-term suggests that the financial impact can occur within 2 years. Medium-term indicates that the financial impact is more likely to occur in 2-5 years and long-term in 5–10 years.

Tabled below outlines the E&S score framework and structure:

ENVIRONMENTAL		**SOCIAL**	
Air Quality	**GHG Emissions Management**	**Community Rights & Relations**	**Occupational Health & Safety Management**
Air Emissions	GHG Emissions	Community & Human Rights	Fatalities
Air Emissions policies	GHG Emissions Policies	Community Relations	Health & Safety Fines
	GHG Regulation		Health & Safety Fines
Climate Exposure	GHG Target	**Ethics & Compliance**	Safety Incidents
Transition Risk		Business Ethics	
			Operational Risk Management
	Sustainable Product	Competitive Behaviour	
Ecological Impact	Green Product	Legal & Reg. Management	Operational Incidents
Ecosystem Protection			Operational Preparedness
		Labour & Employment Practices	
Environmental Fines	**Waste Management**		
Environmental Incidents			**Product Quality Management**
	Hazardous Waste Generation	Labour Actions	
	Hazardous Waste Recycling	Organised Labour	Product Quality & Safety
Energy Management	Waste Generation	Training	
			Social Supply Chain Management
Energy Consumption	Waste Recycling		
Renewable Energy Use			Supplier Social Compliance
	Water Management		
Env. Supply Chain Management			
	Wastewater		
Sustainable Sourcing	Water Use		
	Water Use Policies		

Source: Bloomberg (2020)

A parametric approach is used to score fields. For all field types, parameters are estimated empirically for peer groups, except for binary fields. Scores are computed for the current year's data using parameters that have been estimated from data that corresponds to the three years before the current year. Field Scores, roll up to Sub-Issue Scores, Issue Scores, and Pillar Scores. Generating a composite that reports performance across broader sustainability is complex, however, Bloomberg's proprietary approach attempts to reward consistent

performance and penalise uneven performance. E&S scores are updated annually and aligned with the firm's fiscal year-end.

3.1.4. Corporate Financial Performance (CFP) overview

For this study, CFP is measured using accounting-, market- and quality-based metrics. CFP is a form of evaluation of a firm's overall performance in categories such as revenue, expenses, profitability, assets, liabilities, and equity. It is calculated through various ratios that allow the user to unpack the exact details of a firm's operations. Below are brief definitions, discussions and formulas of the CFP metrics used in the study.

3.1.5. Accounting-based metrics

Accounting CFP metrics are backward looking metrics focusing on a firm's past performance and overall efficiency. They are often critiqued for being susceptible to manipulation through the modification of accounting methods and may be difficult to interpret across sectors (Cooper, 2017). Despite this, return on assets (ROA) and earnings per share (EPS) ratios are still widely used as measures of profitability (Martin *et al.*, 2009). ROA measures how well a firm has utilised its total assets to generate its net operating profit after tax (NOPAT) for a given period. EPS shows the total amount of earnings attributable to every ordinary shareholder of a firm for a given period.

Several studies have used at least one accounting-based metric as a measure of CFP. Nollet (2015); Saleh, Zulkifli and Muhamad (2011) as well as Chetty, Naidoo and Seetharam (2015) made use of ROA as their main accounting-based metric. Although popular, EPS growth moves quite closely with share price growth over the long term, therefore, it will be omitted from the study. This is due to share price growth being used as a market-based metric.

Below is the formula for ROA as applied in this study:

$$ROA = \frac{Net\ Income}{Total\ Assets}$$

3.1.6. Market-based metrics

Market CFP metrics are based on the value of a publicly traded firm's ordinary marketable shares. They reflect on the market's expectations about future performance and are less prone

to accounting manipulation. They are however affected by exogenous factors such as general investor confidence in the equity market at a point in time. The full extent of these exogenous factors cannot be captured by accounting-based metrics alone. Therefore, market-based metrics are more useful in capturing the effect of external factors (Eccles, Pillay 2009). With the same breadth, it would also be short-sighted to solely rely on metrics that are determined by market forces. Investors can act irrationally from time to time making market-based metrics unreliable. Share price growth is a purely market-based metric that accounts for the capital value in the share price of a listed firm. It is a popular measure used in many ESG-CFP studies including those by Nollet. (2016), Nkomani (2013) and Du toit (2018).

Below is the formula for share price growth as applied in this study:

$$SPg = \frac{P_1}{P_0} - 1$$

Where:

$SPg = Share\ price\ growth$

$P_1 = ending\ share\ price\ (End\ of\ year)$

$P_0 = initial\ share\ price\ (Beginning\ of\ year)$

3.1.7. Quality-based metrics

Quality CFP metrics remove accounting distortions and are believed to be improved measures compared to traditional performance measures (Johnson, Mans-Kemp and Erasmus, 2019). Such metrics account for a firm's cost of capital when attempting to forecast a firm's ability to create value (Erasmus, 2008). Return on invested capital (ROIC) was included in this study to assess shareholder wealth creation. The ROIC metric assesses the capital allocation skills of the firm's managers by comparing Earnings Before Interest and Tax (EBIT) to the amount of net operating capital employed. If ROIC is greater than a firm's weighted average cost of capital (WACC), then growth is profitable, and value is being added. Of the reviewed literature, only Johnson, Mans-Kemp, and Erasmus, (2019) made use of the ROIC metric. This study contributes to this gap in the literature by using an up-to-date data set. ROIC focuses on long-term sustainable value creation in a socially responsible context (Johnson, Mans-Kemp and Erasmus, 2019). Below is the formula for ROIC:

$$ROIC = \frac{EBIT * (1 - tax\ rate)}{Invested\ Capital}$$

Where:

$EBIT = Earnings\ before\ interest\ \&\ tax$

$Invested\ capital =$ net operational assets

To present a more complete picture of the ESG-CFP link, it is evident that a mix of financial measures must be included in this study.

3.1.8. Control variables

Firm size was included as a control variable because past studies show that large firms tend to have better ESG performance as discussed in section 2.2.3. Therefore, its influence needed to be modelled separately. Total assets, sales, and market capitalisation of equity are the most popular firm size proxies in empirical corporate finance research (Dang and Li Richard, 2015). For this study, the market capitalisation of equity will be used as a measure of firm size. This data will be sourced from Bloomberg.

3.2.Research Methodology

3.2.1. Research Paradigm

To assess the ESG-CFP relationship for JSE-listed firms, an epistemological position of positivism was adopted, which results in the collection and analysis of secondary quantitative data. The main aim of this research paradigm is to discover relationships that one can use to reasonably make accurate predictions about a subject. Positivists believe that knowledge is the result of empirical observation and see a clear separation between science and non-science (Bezuidenhout, Davis and du Plooy-Cilliers, 2014).

3.2.2. Sample selection

The population comprises all firms listed on the JSE for the period 2011 to 2019. Convenience sampling techniques were employed based on the availability of standardised Bloomberg ESG and CFP data. The sectors considered in this study were basic materials, financials, consumer

goods, consumer services, healthcare, technology, and telecommunications. The judgement criteria were as follows:

- A firm must have been listed on the JSE for at least two years prior to 2011 to ensure that there would be sufficient normalised and through-the-cycle data points for the statistical analysis.
- A firm's complete ESG disclosure score history had to be available on the Bloomberg database for the period 2011 – 2019.
- A firm's CFP data had to be available on the Bloomberg database for the period 2011 – 2019.

A complete list of the sample firms is provided in appendix 1.

3.2.3. Variables

In line with international and local researchers (such as Dalal and Thaker, 2019; Johnson, Mans-Kemp and Erasmus, 2019; Borovkova and Wu -July, 2020; Ahmad, Mobarek and Nawazesh Roni, 2021; Isil, Umut and Yener, 2021), ESG in its composite and disaggregated form was considered as the explanatory variable/s and the various CFP measures were the dependent variables. Firm size was included as a control variable because previous literature suggests that larger firms tend to have better ESG performance as discussed in section 2.2.3. The large variation in firm size was minimised by using the logarithm of firm market capitalisation.

3.2.4. Research design

Pooled Ordinary Least Squares (Pooled OLS), fixed and random effects panel regression analyses were conducted to assess the relationship between the dependent (CFP) and explanatory (ESG) variables. For robustness, I controlled for firm size due to smaller firms generally not having the same level of ESG consideration as larger ones as discussed in section 2.2.3. Market capitalisation of equity was sourced from Bloomberg and used as a proxy for firm size. All statistical analysis was carried out in Excel and E-Views 10.

3.3.Empirical models

3.3.1. Introduction

This study made use of panel data due to a combination of time series and cross-sectional observations being present in the sample. A short-balanced panel data structure is implemented where the number of firms is greater than the number of periods. Panel data gives us more informative data, more variability, less collinearity among the variables, and more degrees of freedom, therefore, more efficiency relative to other models (Hiestand, 2005). Three types of panel analytic models were used namely, Pooled regression model, Random effect model and Fixed effect model. The Hausman test was incorporated to decide statistically on the appropriate model to be used. It is also convention to model the remaining two models for the purpose of comparison (Hiestand, 2005). Finally, unit root tests are applied to check for stationarity and ensure model robustness. Below are descriptions and discussions of all the empirical models used in this study.

3.3.2. Pooled OLS regression model

For this model, researchers can pool all the time-series and cross-sectional data with no assumption on individual differences and run an OLS regression model.

$$y_{it} = \beta_0 + \beta_1 x_{1,it} + \beta_2 x_{2,it} + \cdots + \beta_k x_{k,it} + \varepsilon_{it} \quad i = 1, \dots n; t = 0, \dots T \qquad (1)$$

Where:

$y_{it} =$ Dependent Variable. In our case, the CFP indicator (i.e., RoA, depending on the specification for firm i at time t.)
$\beta_0 =$ Constant term
$\beta_1 =$ Regression coefficient
$x_{1,it} =$ Explanatory Variable of firm i at time t. In our case the control variable and ESG score which, depending on the specification, is either the composite ESG score or its three sub-components (E, S, G).
$\varepsilon_{it} =$ Contains both idiosyncratic error term μ_{it} and c_i which controls for unobserved firm and time effects such that $\varepsilon_{it} = \mu_{it} + c_i$.

Model assumptions:

- Regression coefficients are constant for both intercepts and slopes.

- Regressors are nonstochastic, i.e., the error terms are not correlated with the explanatory variables $Cov(\varepsilon_{it}, x_{it}) = 0$. This assumption allows us to be certain that our parameter estimates are unbiased and consistent.
- $\varepsilon_{it} \sim iid(0, \sigma_{\varepsilon}^2)$ which means that the error term is not autocorrelated and homoscedastic.

The Gauss-Markov Theorem (1825) states that if the above-mentioned assumptions are met, the OLS regression model is BLUE (best linear unbiased estimator). However, important to note is that the general assumption on the error terms is unrealistic. The theory assumes that all firms in the sample have the same characteristics. However, since panel data includes different firms with different characteristics, the likelihood of heterogeneity exists. Heterogeneity refers to unobserved firm-specific characteristics (fixed effects) such as corporate culture, management philosophy, location, etc. By lumping together these firms together with different characteristics in one Pooled OLS estimation, we camouflage the fixed effects. As a result, the firm-specific characteristics are subsumed in the error term, ε_{it}. This creates an endogeneity problem where the error term is correlated with one or more of the regressors: $Cov(\varepsilon_{it}, x_{it}) \neq 0$. This ultimately leads to estimated regression coefficients ($\hat{\beta}_i$) to be biased and inconsistent, leading to erroneous inferences. Fixed-effect and random-effect models both consider unobserved heterogeneity which remedies the shortcomings of Pooled OLS models.

3.3.3. Fixed effects regression model (FEM)

Fixed effects regression models solve the shortcomings of the Pooled OLS discussed above by explicitly considering the effect of firm heterogeneity. It accounts for heterogeneity by allowing different intercepts, one for each firm in the pooled sample data by using dummy variables. The differences in these individual intercepts capture the unique characteristics of the firms (fixed effects). The Pooled OLS (equation 1) is modified below to consider these fixed effects.

$$y_{it} = \beta_{0i} + \beta_1 x_{1,it} + \beta_2 x_{2,it} + \cdots + \beta_k x_{k,it} + \varepsilon_{it} \quad i = 1, \dots n; t = 1, \dots T \qquad (2)$$

Where:

$\beta_{0i} =$ Fixed effect that varies across firms but is fixed over time.

3.3.4. Random effects regression model (REM)

The REM is also called the error components model because individual effects are randomly distributed across the cross-sectional units, therefore, to capture the individual effects, the regression model is specified with an intercept term representing an overall constant term (Hiestand, 2005). The REM incorporates firm heterogeneity (μ_i) within the error term (ε_{it}) rather in the dummy variables (as in the FEM model), while allowing intercept (β_0) that is common to all firms: $\beta_{0i} = \beta_0 + \mu_i$. By making these adjustments, we end up with a construct that states that the firms we are analysing are a random sample from a much larger population of similar firms with a common intercept β_0.

$$y_{it} = \beta_0 + \beta_1 x_{1,it} + \beta_2 x_{2,it} + \cdots + \beta_k x_{k,it} + (\mu_i + c_{it}) \qquad (3)$$

Where:

$\mu_i =$ Unobserved heterogeneity (firm-dependent error term that is fixed over time but varies cross-sectionally). Measures the random deviation of each firm's intercept from the common intercept β_0.

$c_{it} =$ Idiosyncratic error term

3.3.5. Hausman test for endogeneity

The distinction between the FEM and REM is crucial in panel data analysis. Panel data gives considerable advantages over cross-sectional and time-series data; however, the specification of the model is of great importance for obtaining consistent results. The Hausman test specifies whether FEM or REM should be used. It can be used if under the null hypothesis one of the compared models gives consistent and efficient results and the other – is consistent but inefficient, and under the alternative hypothesis, the first model must produce inconsistent and the second model – consistent (Sheytanova, 2014).

The general form of the Hausman test statistic is:

$$H = \left(\hat{\beta}^{RE} - \hat{\beta}^{FE}\right)' [Var\left(\hat{\beta}^{RE}\right) - Var\left(\hat{\beta}^{FE}\right)]^{-1} \left(\hat{\beta}^{RE} - \hat{\beta}^{FE}\right) \qquad (4)$$

Where:

$\hat{\beta}^{RE} =$ Vector of coefficient estimates for the REM

$\hat{\beta}^{FE} =$ Vector of coefficient estimates for the FEM

Null and alternative hypothesis:

H_0: The correct model is REM. There is no correlation between the error term and the explanatory variables in the panel data model.

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

H_1: The correct model is FEM. The correlation between the error term and the explanatory variables in the panel data model is statistically significant.

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

The statistic is compared with the critical values for the χ^2 distribution for k degrees of freedom. The H_0 is rejected if the Hausman statistic is larger than its critical value.

When executed correctly, REMs produce BLUEs, meaning they are consistent, efficient, and unbiased (Sheytanova, 2014). However, if there is a correlation between the error term of the REM and the explanatory variables, its estimates would be inconsistent, making the FEM the preferred model over REM. β_0 from equation 3 might be correlated with the explanatory variables in the REM if there are omitted variables, to which the FEM is more robust. FEM estimates are always consistent but are inefficient compared to the REM estimates (Sheytanova, 2014). These properties of panel data models are tabled below:

Table 1: The properties of REM and FEM estimators

Correct Hypothesis	REM used	FEM used
$\boldsymbol{H_0 = Cov(\beta_i, x_{it}) = 0}$	Consistent	Consistent
Exogeneity	Efficient	Inefficient
$\boldsymbol{H_1 = Cov(\beta_i, x_{it}) \neq 0}$	Inconsistent	Consistent
Endogeneity		Possibly Efficient

3.3.6. Panel unit root test

Unit root measure tests for stationarity for variables in a panel and is useful in analysing the time-series behaviour of the panel. Non-stationary variables can lead to spurious correlations when used in panel modelling therefore, we must be certain that they are stationary to ensure our models are robust and not biased.

The methodologies developed by Levin, Lin and Chu (2002), Im, Pesaran and Shin (2003) and the Fisher-type test proposed by Maddala and Wu (1999) and Choi (2001) are regarded as the first-generation unit root tests for panel data. The first-generation models assume that the cross-section units are independent and identically distributed (i.i.d.) (Das, 2019). Unit root tests are carried out after estimating the following univariate model:

$$y_{it} = \mu_i + \emptyset_i y_{it-1} + \varepsilon_{it} \qquad (5)$$

Where:

$i = 1,2, \dots, N$ represent cross-section units (companies), for each cross-section unit $t = 1, 2, \dots T$ time series observations are available

$\mu_i =$ fixed effects

$\varepsilon_{it} =$ assumed to be i.i.d. across the cross section-units

Null and alternative hypothesis:

H_0: Series has unit root (non-stationary)

$$\rho_i = 0 \forall i$$

H_1: Series has no unit root (stationary)

The null hypothesis is the same for all first-generation models, with the difference being the heterogeneity considered under the alternative hypothesis (Das, 2019). Furthermore, if H_0 cannot be rejected, it must be differenced to see if stationarity is achieved after 1st differencing.

3.4.Hypothesis Development

To best determine the ESG-CFP relationship, three main hypotheses and sub-questions have been developed, each corresponding to a different CFP metric. The dependent variables used are overall ESG scores and sub-components of the ESG scores. To test the different hypotheses, separate models are required. All models follow the basic panel regression form ($y_{it} = \beta_0 + \beta_1 x_{1,it} + \beta_2 x_{2,it} + \cdots + \beta_k x_{k,it} + \varepsilon_{it}$) with slight modifications specific to the variables used.

3.4.1. Main hypotheses

The objective is to assess the ESG-CFP relationship using the CFP metrics as the dependent variable and the composite ESG as the independent variable whilst controlling for the firm size effect. Below is the model used:

$$y_{it} = \beta_0 + \beta_1 ESG_{1,it} + \beta_2 Mkt_{2,it} + \varepsilon_{it} \quad i = 1, \dots n; t = 1, \dots T \qquad [Model\ 1]$$

Where:

y_{it} = Corresponding CFP metric (ROA; SPg; ROIC)
β_0 = Constant term
β_1 = Regression coefficient
$ESG_{1,it}$ = ESG score as measured by Bloomberg
$Mkt_{2,it}$ = Firm market capitalisation measured in log millions of South African rands log(ZARm)
ε_{it} = idiosyncratic error term

H_0: There is no significant linear relationship between a firm's ESG performance and the respective CFP.
H_1: There exists a significant linear relationship between a firm's ESG performance and its respective CFP.
Alternatively: $H1_0: \beta_{ESG_{1,it}} = 0 \quad \& \quad H1_A: \beta_{ESG_{1,it}} \neq 0$

3.4.2. Sub-questions

For further analytical insights Model 1 is expanded by disaggregating the ESG score into its E, S and G components to produce the following model:

$$y_{it} = \beta_0 + \beta_1 E_{1,it} + \beta_2 S_{2,it} + \beta_3 G_{3,it} + \beta_4 Mkt_{4,it} + \varepsilon_{it} \quad i = 1, \dots n; t = 1, \dots T \qquad [Model\ 1A]$$

Where:

y_{it} = Corresponding CFP metric (ROA; SPg; ROIC)
β_0 = Constant term
β_1 = Regression coefficient
$E_{1,it}$ = Environmental score as measured by Bloomberg
$S_{2,it}$ = Social score as measured by Bloomberg

$G_{3,it}$ = Governance score as measured by Bloomberg

$Mkt_{2,it}$ = Firm market capitalisation measured in log millions of South African rands log(ZARm)

ε_{it} = idiosyncratic error term

3.4.3. Statistical significance

The p-values for each coefficient represent the hypothesis as stated below:

> H_0: $\beta = 0$ ∴ No relationship can be found between the explanatory variable and the dependent variable.
>
> H_1: $\beta \neq 0$ ∴ A relationship can be found between the explanatory variable and the dependent variable. This hypothesis is two-sided, allowing for a positive or negative relationship.

The F-statistic for the overall significance of the regression is stated below:

> H_0: A model with no independent variable fits the data as well as the model used in the regression analysis.
>
> H_1: The model used in the regression analysis fits the data better than a model with no independent variables, containing only an intercept.

Chapter 4: Results

4.1. Descriptive statistics

Table 2: Descriptive characteristics of variables (including outliers)

	ROA	*SP g*	*ROIC*	*E*	*S*	*G*	*ESG*	*LN(MKT)*
Mean	0,068	0,088	0,124	34,342	50,114	61,426	44,675	10,672
Standard Error	0,004	0,015	0,009	0,552	0,554	0,287	0,405	0,061
Median	0,055	0,032	0,113	34,884	51,273	62,5	45,614	10,515
Standard Deviation	0,098	0,388	0,231	13,851	13,912	7,212	10,163	1,529
Range	1,532	3,742	5,578	67,864	79,561	42,854	49,174	8,283
Minimum	-0,324	-0,83	-4,732	2,679	8,772	39,286	19,008	6,612
Maximum	1,208	2,913	0,845	70,543	88,333	82,14	68,182	14,894
Count	630	630	630	630	630	630	630	630

As is typical when handling financial and market data points, outliers are often present. It is important to minimise their impact to provide a consistent data set that is not based on skewed data. Outliers exist due to coding errors, inconsistent accounting adjustments and extraordinary events and/or extraordinary corporate action that leads to data deviating considerably from its mean. Two ways of potentially dealing with outliers is either assigning the outlier/s a lower weight (Winsorisation) or removing them completely.

The Winsorise technique was first introduced by Dixon (1960), who attributed it to Charles P. Winsor. It involves applying a multiple to the outlier/s to get them back into a predetermined upper and lower bound. Du Toit and Lekoloane (2018) applied Winsorisation of 5% in their study that investigated CSR and financial performance for JSE-listed firms. It must be noted that the drawback to Winsorising is the addition of bias into the results, although the bias may be less than if you had simply removed the outliers.

The removal of outliers can be done via the Tukey 2.2 rule. This is based on multiplying the Interquartile Range (IQR) by a factor of 2.2 to determine the lower of upper bound of values to be included in the sample. Hoaglin and Iglewicz (1987) found this method to be robust in identifying outliers however the rules are only applicable for data that is normally distributed.

For the study, Winsorisation was used in an effort to maintain a balanced panel for the regression analysis. In line with du Toit and Lekoloane (2018) Winsorising of 5% was applied

to reduce the extreme values. Table 3 below presents the descriptive statistics after adjusting for outliers.

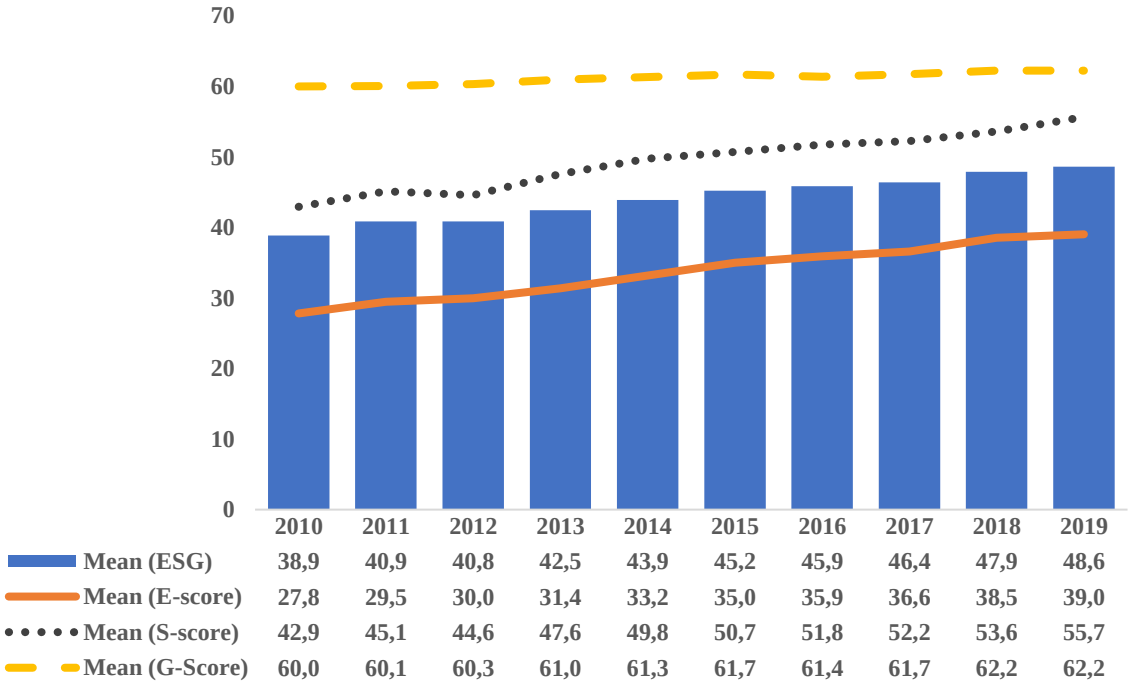
Table 3: Descriptive characteristics of variables (adjusted for outliers)

	ROA	*SP g*	*ROIC*	*E*	*S*	*G*	*ESG*	*LN(MKT)*
Mean	0,067	0,068	0,129	34,342	50,114	61,426	44,675	10,672
Standard Error	0,003	0,011	0,004	0,552	0,554	0,287	0,405	0,061
Median	0,055	0,032	0,113	34,884	51,273	62,5	45,614	10,515
Standard Deviation	0,067	0,287	0,099	13,851	13,912	7,212	10,163	1,529
Range	0,265	1,095	0,381	67,864	79,561	42,854	49,174	8,283
Minimum	-0,038	-0,429	-0,017	2,679	8,772	39,286	19,008	6,612
Maximum	0,227	0,667	0,364	70,543	88,333	82,14	68,182	14,894
Count	630	630	630	630	630	630	630	630

It is evident that after winsorising at the 5% level, the standard deviation of all the CFP metrics was reduced significantly. The logarithm of the market capitalisation values, which was measured in millions of South African Rands, was taken due to extreme values contained in the dataset to create a normally distributed market capitalisation dataset. Please refer to appendix 2 for the distributions. This normalised data set is more consistent and less skewed.

Figure 6 below illustrates the trends identified in the mean scores of the composite ESG and disaggregated disclosure scores for the 70 sampled firms. It further illustrates how a change in the individual E, S, and G components contributed to the change in the composite ESG disclosure score over time.

Figure 6: ESG average scores through time



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Mean (ESG)	38,9	40,9	40,8	42,5	43,9	45,2	45,9	46,4	47,9	48,6
Mean (E-score)	27,8	29,5	30,0	31,4	33,2	35,0	35,9	36,6	38,5	39,0
Mean (S-score)	42,9	45,1	44,6	47,6	49,8	50,7	51,8	52,2	53,6	55,7
Mean (G-Score)	60,0	60,1	60,3	61,0	61,3	61,7	61,4	61,7	62,2	62,2

Environmental issues were the least disclosed ESG matter over the study period. With humanity facing catastrophic climate change impacts, it is vital for companies to consider disclosing more environmental information so they can be held accountable and ensure environmental sustainability. In contrast, the S-score exhibited an increasing trend over the research period. This is understandable given the South African socio-economic context. It is expected that certain aspects such as BEE, B-BBEE, and poverty alleviation would receive considerable attention from listed companies and their disclosure. South Africa's corporate governance structure for listed companies is well-developed. This is evidenced by the relatively high governance disclosure score even by global standards.

When comparing the disaggregated ESG scores to the composite ESG score, it becomes clear that the E- and S-scores mostly contributed to the uptrend in the composite score over time. The G-score remained relatively high and stable therefore the marginal contribution to the overall increasing trend of the composite ESG score was smaller.

Figure 7: Sample sector weights

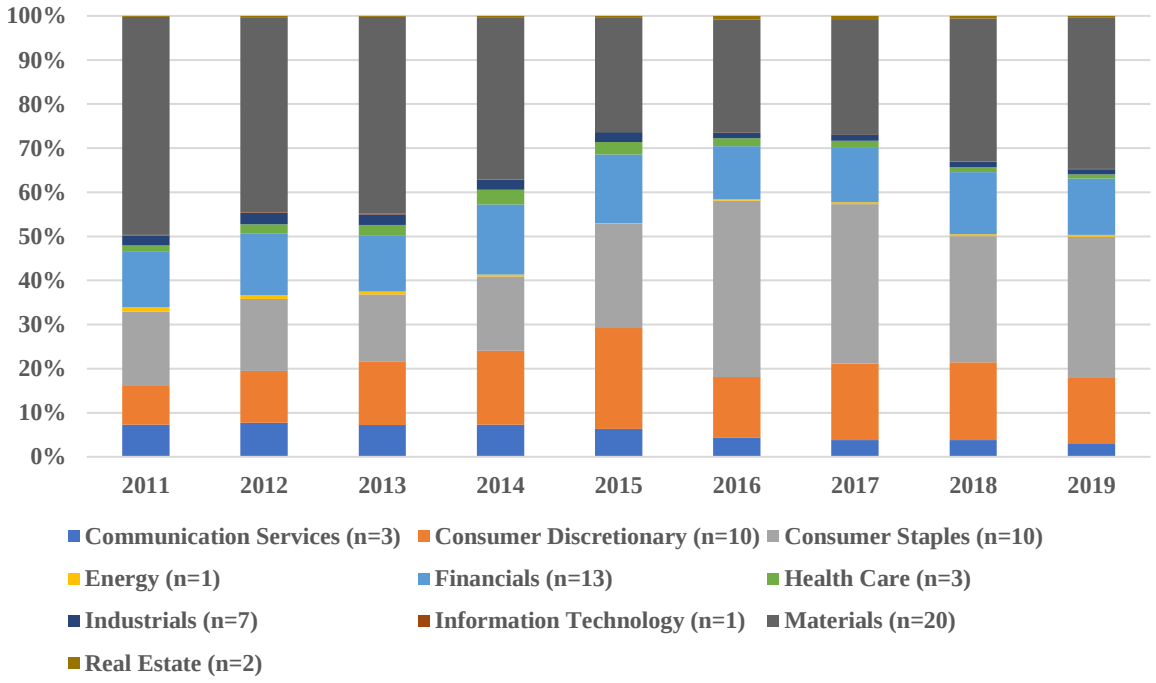


Table 4: January 2022 JALSH sector weights

	January 2022 weights on the JALSH (%)
Communication Services	5.6
Consumer Discretionary	15.9
Consumer Staples	7.3
Energy	0.7
Financials	16.9
Health Care	1.8
Industrials	4.0
Information Technology	9.8
Materials	35
Real Estate	3.1

Source: Standard Bank CIB

Figure 7 highlights the sectors that make up the sample and their weights over the study period. Table 4 highlights the sectors that make up the JSE All Share Index (JALSH) as of January 2022. A brief analysis concludes that the sample is reasonably representative of the JSE All-share Index (JALSH) by sector weights and hence the South African equity market. One significant disparity is in the consumer staples sector which can be attributed to Anheuser-Busch InBev and British American Tobacco which had an outsized effect on the 10 consumer staples firms in the sample due to their +R1 trillion valuations.

Table 5: Unconditional correlations among variables

Correlation Matrix	*ROA*	*SPg*	*ROIC*	*E*	*S*	*G*	*ESG*	*Ln(Mkt)*
ROA	1							
SPg	***0,189804	1						
ROIC	***0,728977	***0,220364	1					
E	***-0,20993	**-0,08176	***-0,29811	1				
S	-0,03931	**-0,09468	***-0,10481	0,431653	1			
G	***-0,21771	-0,05807	***-0,26999	0,541543	0,275337	1		
ESG	***-0,18962	**-0,09683	***-0,26944	0,934669	0,692491	0,636439	1	
Ln(Mkt)	***0,1044	***0,1432	0,0042	***0,3284	**0,0994	***0,2921	***0,3243	1

P-values: * p < 0,1; ** p < 0.05; *** p < 0.01

Table 5 presents the unconditional correlations between the different variables computed using the pooled OLS methodology. ROA and ROIC have the highest correlation of 0,729 and are significant at the 1% level of confidence. This was to be expected given how similar the inputs are; however, it was worth modelling them separately because ROIC considers the financial leverage of a firm whereas ROA only considers the asset base in the denominator. ESG in its composite and disaggregated form has weak correlations ($\rho < \pm 0{,}3$) and is generally negative with the three CFPs. This was an early indication that higher ESG disclosure may not lead to greater financial performance. The ESG scores are quite strongly correlated amongst themselves which is also to be expected. It is important to note that the high degree of statistical significance in the correlations may be biased due to the large sample and small effect sizes.

4.2. Panel regression results

4.2.1. Hausman tests

The Hausman test was applied to establish the most appropriate model for each equation and was based on the following hypothesis as described in Chapter 3, subsection 3.3.5:

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

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

The results from the Hausman tests performed on the three main models are presented below:

Table 6: Hausman test outputs for models 1; 2; and 3

	Chi-Sq. Statistic	Prob.
ROA	18,83444	0,00008
SPg	44,68894	0,00000
ROIC	12,37279	0,00206

At the 1% level of significance, the null hypothesis for the ROA, SPg and ROIC models was rejected. This means that the fixed effects model was required to capture the individual firm effects by specifying the regression model with an intercept term that was common to all firms.

4.2.2. Panel root test

Unit root measure tests for stationarity for variables in a panel and are useful in analysing the time-series behaviour of the panel as discussed in Chapter 3 subsection 3.3.6.

Table 7: Panel root test

	LLC t-Statistics	IPS W-Statistics	ADF - Fisher Chi-Square
E	-23,459	-4,332	233,642
S	-21,046	-5,685	240,903
G	-12,898	-3,446	210,253
ESG	-13,040	-2,438	212,756
Mkt	-13,253	-3,723	229,882
ROA	-11,104	-3,169	220,840
SPg	-10,235	-7,591	312,544
ROIC	-12,348	-3,204	243,298
Note:	all the statistics above are rejected at 1% significance level		
LLC:	Levin, Lin and Chu test		
IPS:	Im, Pesaran and Shin test		
ADF:	Augmented Dickey-Fuller test		

The results of the panel unit root tests reported above in table 7 show that the independent and dependent variables were conclusively and consistently stationary. The series assumptions employed were the inclusion of a constant (i.e., intercept) and tested in level.

4.2.3. Main hypothesis 1

The ESG-ROA relationship was examined where the ESG score was the explanatory variable and ROA was the dependent variable. The logged market capitalisation of firms was included

as a control variable. A fixed-effects model was applied as per the Hausman test. The regression output is provided below:

$$ROA_{it} = \beta_0 + \beta_1 ESG_{1,it} + \beta_2 Mkt_{2,it} + \varepsilon_{it} \quad \text{[Model 1]}$$

Table 8: Model 1 regression results

Variable	Coefficient	Prob.
Constant	-0,20368	0,00001
ESG	-0,00151	0,00000
Mkt	0,03168	0,00000
R-squared	0,68057	
Prob (F-Stat)	0,00000	

The ESG coefficient is small and with a negative relationship with ROA. The ESG-ROA relationship is statistically significant at the 1% level therefore we reject the null hypothesis that in fact, no relationship exists between a company's ESG and its ROA. The small magnitude is proxied by referencing the pooled OLS correlation matrix in Chapter 4 subsection 4.2 where we find that ESG has a weak (r=-0,19) and significant (at 1%) negative correlation to ROA.

The market capitalisation control variable coefficient is also small and with a positive relationship with ROA. The correlation (r=0,10), although significant at the 1% level, is also weak.

The R^2 of 0,681 is an indication that the variables contained in the panel regression model have strong explanatory power, that is, 68.1% of the variation of ROA can be explained by explanatory variables ESG and Mkt. The F-test is significant at the 1% inferring that the inclusion of the explanatory variables fits the data better than a model containing no explanatory variables.

In conclusion, there is sufficient evidence to reject the null hypothesis that no relationship exists between ESG and ROA.

4.2.4. Main hypothesis 2

The ESG-SPg relationship was examined where ESG was the explanatory variable and SPg was the dependent variable. The logged market capitalisation of firms was included as a control variable. A fixed-effects model was applied as per the Hausman test. The regression output is provided below:

$$SPg_{it} = \beta_0 + \beta_1 ESG_{1,it} + \beta_2 Mkt_{2,it} + \varepsilon_{it} \quad \text{[Model 2]}$$

Table 9: Model 2 regression results

Variable	Coefficient	Prob.
Constant	-1,75459	0,00000
ESG	-0,00884	0,00002
Mkt	0,20895	0,00000
R-squared	0,18595	
Prob (F-Stat)	0,00019	

Consistent with the regression results from model 1, the ESG coefficient is small, negative, and significant at the 1% level of confidence in relation to SPg. This is consistent with the weak correlation (r=-0,09) found in the pooled correlation matrix in Chapter 4 subsection 4.2. Therefore, the null hypothesis of no relationship existing between ESG disclosure and SPg can be rejected. The logged market capitalisation coefficient is positive and significant at the 1% level of confidence. Furthermore, the magnitude is also small (r=0,14) however, unlike in models 1 and 2, Mkt's magnitude is greater than ESG's in this instance.

The model has low explanatory power with a R^2 of 0.186. The F-test is significant at the 1% inferring that the inclusion of the explanatory variables fits the data better than a model containing no explanatory variables.

In conclusion, there is sufficient evidence to reject the null hypothesis that no relationship exists between ESG and SPg. However, we note that model 2 is not reliable at explaining the ESG-SPg relationship due to its low explanatory power.

4.2.5. Main hypothesis 3

The ESG-ROIC relationship was examined where ESG was the explanatory variable and ROIC was the dependent variable. The logged market capitalisation of firms was included as a control variable. A fixed-effects model was applied as per the Hausman test. The regression output is provided below:

$$ROIC_{it} = \beta_0 + \beta_1 ESG_{1,it} + \beta_2 Mkt_{2,it} + \varepsilon_{it} \quad \text{[Model 3]}$$

Table 10: Model 3 regression results

Variable	Coefficient	Prob.
Constant	-0,11044	0,06389
ESG	-0,00253	0,00000
Mkt	0,03302	0,00000
R-squared	0,73135	
Prob (F-Stat)	0,00000	

The ESG coefficient is small and displays a negative relationship with ROIC that is significant at the 1% level of significance. The coefficient's magnitude as measured by the pooled OLS correlation matrix in Chapter 4 subsection 4.2 is small at r=-0,27 while the Mkt coefficient is even smaller at r=0,004. Furthermore, the model's explanatory power is strong with a 0.73 R-squared and a statistically significant F-statistic.

In line with model 1, we reject the null hypothesis that in fact, no relationship exists between a company's ESG and its ROIC. These findings suggest that better ESG activities and subsequent disclosure create additional costs that hinder the firm's ability to earn returns on capital employed.

4.3. Further analysis

This section unpacks models 1, 2 and 3 to disaggregate the ESG scores into their component parts to measure their relative impact on the CFP metric. This exercise is valuable because the

growth in the individual ESG scores over the study period has not been synchronous. The models are labelled as 1A, 2A and 3A whilst the CFP metrics are labelled ROA2, SPg2 and ROIC2. The regressions models are specified below:

$$ROA2_{it} = \beta_0 + \beta_1 E_{1,it} + \beta_2 S_{2,it} + \beta_3 G_{3,it} + \beta_4 Mkt_{4,it} + \varepsilon_{it} \quad i = 1, \dots n; t = 1, \dots T \quad [Model\ 1A]$$

$$SPg2_{it} = \beta_0 + \beta_1 E_{1,it} + \beta_2 S_{2,it} + \beta_3 G_{3,it} + \beta_4 Mkt_{4,it} + \varepsilon_{it} \quad i = 1, \dots n; t = 1, \dots T \quad [Model\ 2A]$$

$$ROIC2_{it} = \beta_0 + \beta_1 E_{1,it} + \beta_2 S_{2,it} + \beta_3 G_{3,it} + \beta_4 Mkt_{4,it} + \varepsilon_{it} \quad i = 1, \dots n; t = 1, \dots T \quad [Model\ 3A]$$

4.3.1. Hausman tests

The Hausman test was applied to establish the most appropriate model for each equation and is based on the following hypothesis as described in Chapter 3, subsection 3.3.5:

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

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

The results from the Hausman tests performed on the three sub-models are presented below:

Table 11: Hausman test outputs for model 1A; 2A; and 3A

	Chi-Sq. Statistic	Prob.
ROA2	36,80167	0,00000
SPg2	45,37508	0,00000
ROIC2	22,66230	0,00015

At the 1% level of significance, the null hypothesis for the ROA2, SPg2 and ROIC2 models was rejected. This means that the fixed effects model was required to capture the individual firm effects by specifying the regression model with an intercept term that was common to all firms.

4.3.2. Summary of results

Table 12: Summary of sub-model regression results

	ROA2	SPg2	ROIC2
Constant	-0,24750	-1,70611	-0,15968
E-score	***-0,00074	-0,00295	***-0,00139
S-score	***-0,00065	**-0,00351	***-0,00079
G-score	0,00052	0,00300	0,00037
Mkt	***0,03185	-0,21064	***0,03313
R-squared	0,68444	0,18680	0,73367
Prob(F-stat)	0,00000	0.00031	0.00000

P-values: * p < 0,1; ** p < 0.05; *** p < 0.01

From a high-level analysis of the sub-models, it is apparent that the E- and S-scores generally have a negative relationship with the CFP metrics with the E-score seemingly having the largest negative coefficient. The G-score's relationship is positive with the CFP metrics however this relationship is not statistically significant even at the 10% level of confidence. This finding is warranted provided that G-scores have been relatively flat over the study period. The E-, S- and G-coefficients were not significant at the 1% level of confidence in relation to the SPg2 CFP metric which suggests that these factors are not the main drivers of share price growth. This is further supported by the weak R-squared statistic.

4.3.3. ESG portfolios' market performance vs JALSH

This sub-section illustrates how various ESG portfolios borne from the study sample performed cumulatively on a daily basis from January 2011 to April 2022. The cumulative market returns go beyond the study's timeframe to highlight the effects of Covid-19 and were benchmarked against the FTSE/JSE Africa All Shares Index (JALSH). The portfolios were constructed as equal-weight portfolios classified by their ESG disclosure quality as rated by Bloomberg. Leader portfolios had the top 33% of companies with the highest respective composite or disaggregated ESG disclosure scores. Lounger portfolios had the middle 33% and the laggard portfolios had the bottom 33%. To normalise the data, the average ESG score for each firm over the study period was considered in constructing the portfolios. The full list of constituents

is attached under appendix 3. Below are illustrations of their performance followed by a discussion.

Figure 8: ESG Portfolios vs JALSH

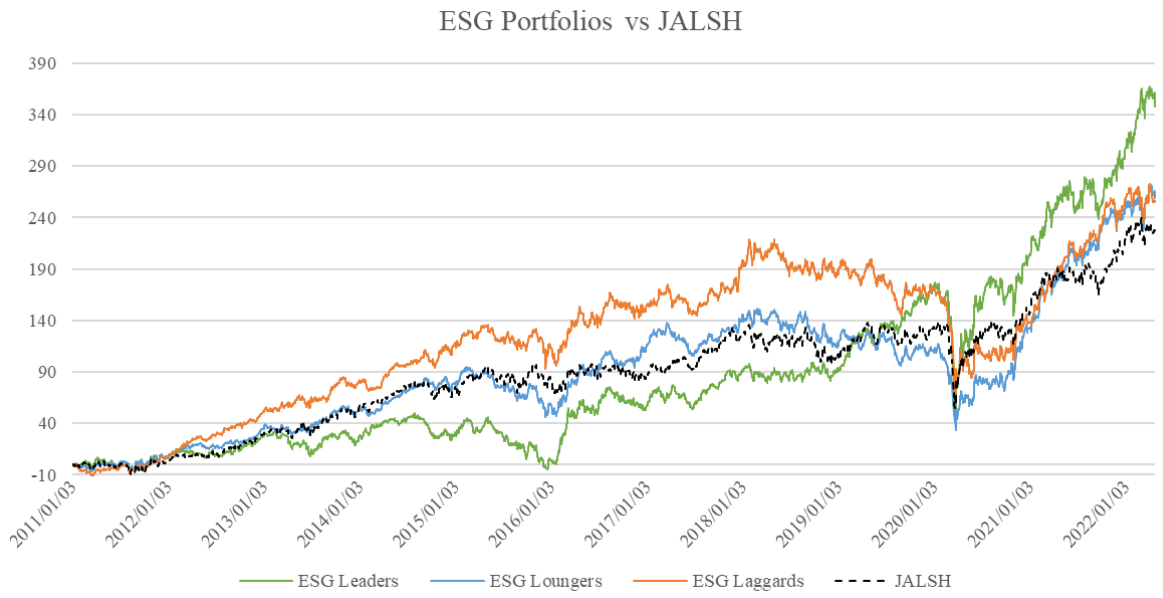


Figure 9: Environmental Portfolios vs JALSH

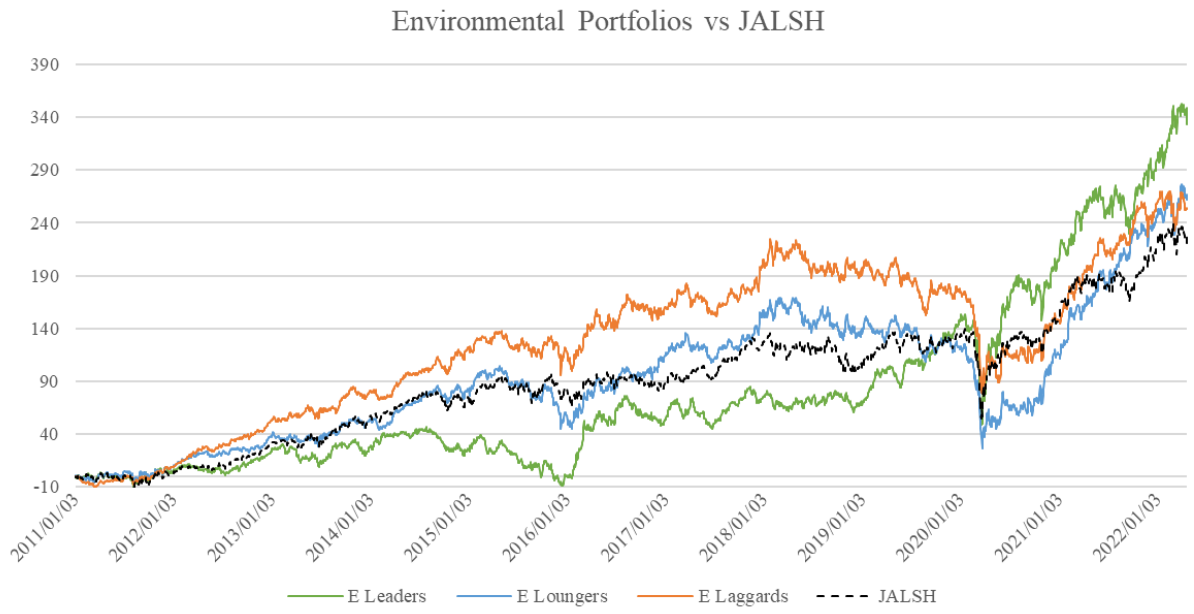


Figure 10: Social Portfolios vs JALSH

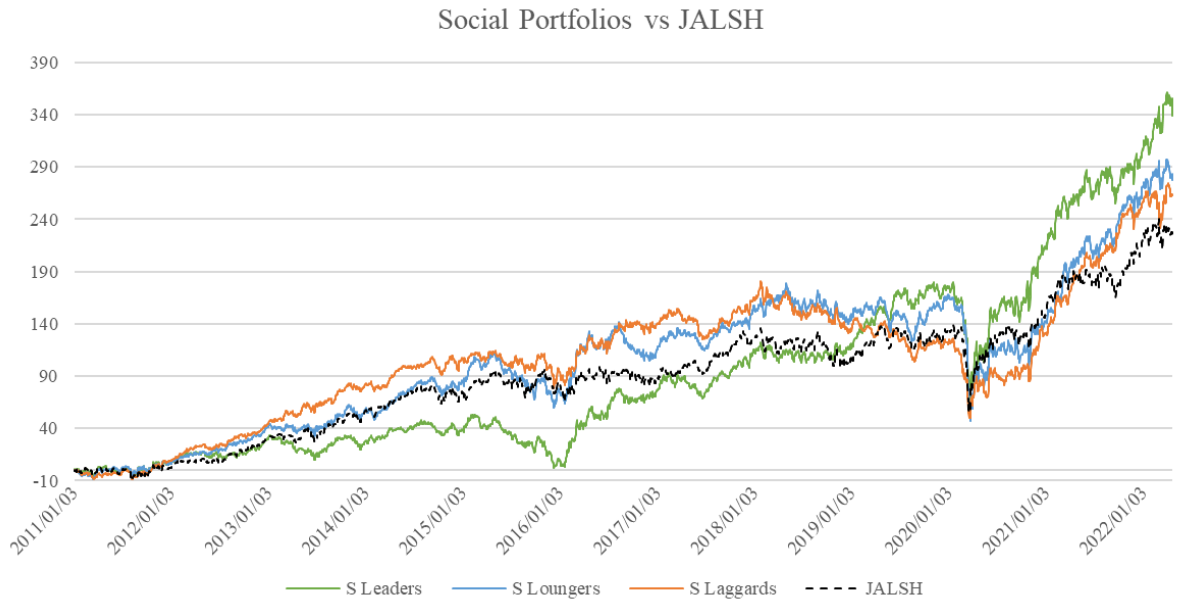
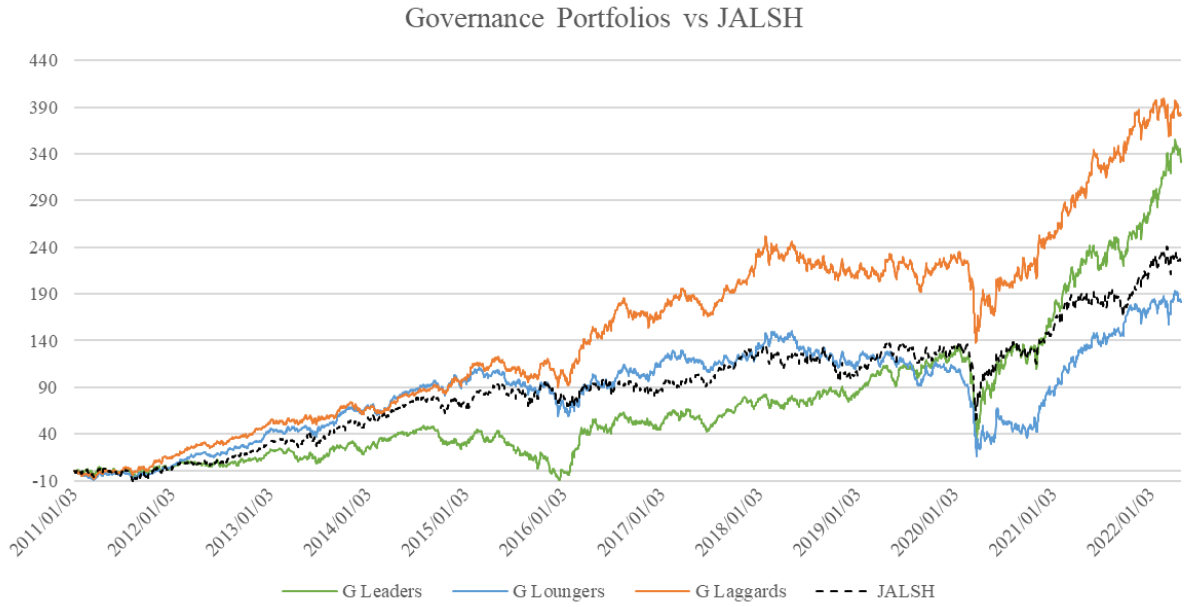


Figure 11: Governance Portfolios vs JALSH



Figures 8-11 depict the market-relative returns of the ESG portfolios. In line with findings by Naffa and Fain (2022) and Díaz, Ibrushi and Zhao (2021), generally, it appears that prior to the Covid-19 pandemic the ESG leader portfolios underperformed peers and the market but strongly outperformed after the initial market crash of March 2020. This may be an indication

of the premise that firms with stronger ESG characteristics are expected to be more resilient during volatile market conditions.

Analysis of the returns of the Environmental Portfolios in figure 8 shows that prior to the pandemic, the laggard portfolio outperformed the leader portfolio with the lounger portfolio tracking the market. Environmental issues were least reported among the ESG issues over the study period, perhaps due to the complexities and costs associated with its integration and disclosure. Therefore, implying that firms that invested heavily in environmental issues suffered worse fundamental performance which ultimately led to market underperformance compared to companies within the lounger and laggard portfolios.

The market returns between the Social portfolios in figure 9 have the smallest spreads relative to the E, G and ESG portfolios. The leader portfolio once again underperformed pre-covid and subsequently outperformed after the March 2020 market crash. Noteworthy is the gradual improvement in the leader portfolio over the 2016 to 2019 period whilst the lounger and laggard portfolios stagnated.

The market returns of the Governance portfolios in figure 10 were very interesting. The laggard portfolio outperformed lounger and leader portfolios before the Covid-19 pandemic and after the March 2020 market crash. According to Bauer, Guenster and Otten, (2004) good corporate governance lead to higher investor trust as they view well-governed firms as less risky, requiring a lower expected rate of return. This is in contradiction with the results found in figure 11.

When inspecting the constituents of the ESG portfolios, it was apparent that the leader portfolios had an outsized exposure to the materials sector, particularly mining companies. This is a reasonable finding provided that their operations have a significant impact on the environment and society. As a result, they are required to report extensively on ESG matters which gives them high ESG disclosure scores. Therefore, it is worth pointing out that the performance of the ESG Leader Portfolios may have had more to do with the sectoral dynamics over the study period than any ESG-related matters.

4.4. Discussion

Models 1; 2; 3: The ESG-CFP relationship

A consensus is emerging when it comes to examining the ESG-CFP relationship. The coefficients from the regressions are summarised and discussed below.

Table 13: Summary of ESG coefficients

Panel		ROA	SPg	ROIC
Panel A	Composite ESG	-0,00151	-0,00884	-0,00253
	Market Cap	0,03168	0,20895	0,03302

ROA is a historical accounting-based metric of CFP. Model 1's panel regression results suggest that higher ESG disclosure leads to lower ROA however the magnitude is small. This implies that ESG negatively impacts a firm's ability to earn a return from its asset base. The impact flows through the income statement via higher costs associated with ESG activities whereas the asset base remains unchanged. Nollet, Filis and Mitrokostas (2016) in their paper investigating the ESG-ROA relationship covering the S&P500 from 2007 to 2011 also found a significant negative relationship. Interestingly, their non-linear model found a U-shaped ESG-ROA relationship, suggesting that over the longer run, ESG effects are positive. Our findings contradict the stakeholder theory, which states that increased stakeholder engagement through a commitment to good ESG practises leads to increased long-term profitability. It, however, supports the agency theory that stipulates that increasing CSR (ESG) spending will inevitably lead to worsening profits and a source of inefficiency (Garcia, Mendes-Da-Silva and Orsato, 2017) as corporate managers become distracted from their chief objective of profit maximisation.

Share price growth reflects the market's expectations about the current and future performance of a publicly listed firm. As a market metric, its growth rate is often affected by exogenous factors such as general investor confidence at a point in time. The findings imply that firms that invested in better ESG disclosure, were not rewarded accordingly by the market. This could be because of investors caring more about financial metrics and not rewarding firms for sustainable practices in their pursuit of short-term gains. One probable cause is that South African investors are either unaware of or unconcerned about a company's ESG performance.

This is an important point because Bloomberg ESG disclosure scores are not publicly available therefore, their impact on the market's perception may be very limited.

ROIC is a quality metric used to assess shareholder wealth creation through efficient capital allocation. In line with model 1, the results imply that increased ESG disclosure hampers efficient capital allocation through the income statement. Interestingly, the negative impact of ESG is higher on ROIC than ROA which may indicate that higher ESG performers are more indebted.

As discussed in the literature review section, Friede, Busch and Bassen (2015) aggregated evidence from more than 2000 empirical studies covering the ESG-CFP relationship. Their emerging markets sample had a 65% positive outcome hit rate between ESG and CFP which is significantly higher than the developed markets share and is somewhat in contradiction to this paper's findings. South Africa specific ESG-CFP research is thin therefore, more studies are encouraged to enable the aggregation of evidence over time to build a consensus for the South African market reflecting its unique fundamentals.

Models 1A; 2A; 3A: The ESG-CFP relationship

Table 14: Summary of disaggregated ESG coefficients

Panel		**ROA2**	**SPg2**	**ROIC2**
Panel B	E-score	-0,00074	-0,00295	-0,00139
	S-score	-0,00065	-0,00351	-0,00079
	G-score	0,00052	-0,00300	0,00037
	Market Cap	0,03185	0,21064	0,03313

Environmental matters (E-scores) were the least disclosed ESG aspect over the study period as depicted in Figure 2. Based on the low and almost stagnant E-scores, it appears that firms in the sample gave limited attention to its disclosure. The E-score's statistically significant negative relationship with ROA2 and ROIC2 may suggest that the costs required to incorporate sound environmental initiatives have a negative impact on balance sheet efficiency. Due to the E-SPg2 relationship being negative but statistically insignificant, this implies that

environmental matters may not be sufficiently factored in by investors in the market. Again, this may be attributed to information asymmetry because Bloomberg ESG scores are not publicly available.

Social matters (S-scores) displayed an increasing trend over the research period as depicted in Figure 2. This is expected given the socio-economic context of South Africa where issues like B-BBEE, poverty and HIV are prevalent. The S-score had a statistically significant negative relationship with all the explanatory variables. According to Richardson and Welker (2001), a possible explanation for this negative relationship is that corporate socially responsible investments are consistently negative net present value projects that contribute to overall risk. It must be noted that proponents of responsible corporate behaviour highlight the potential long-term cost savings and strategic advantages of ESG (Johnson, Mans-Kemp and Erasmus, 2019).

Governance matters (G-scores) remained relatively high and stable as a result of South Africa's well-developed corporate governance framework for listed firms. Most interesting is that the G-score was positively related to all the CFP metrics however, it was not statistically significant even at 10% confidence level. This may be because of the high but stable G-score progression over the research period. Therefore, the ESG impact mainly came from E- and S-scores making the G-score impact statistically insignificant. Although insignificant, the results suggest that firms with high governance disclosure are better capital allocators and rewarded favourably by the market through higher valuations.

Chapter 5: Conclusion

5.1. Review of study

The overarching goal of this study was to explore and examine the ESG-CFP relationship to determine if it pays to be "good". The paper focused on a sample of 70 firms listed on the JSE between 2011 and 2019. It was motivated by current debates around the impact of ESG integration on firm performance with strong arguments for and against. South African research on the topic is still very scarce, which further motivated us to conduct this study to add to the existing body of knowledge. The ESG scores were sourced from a Bloomberg terminal and we believe that their ESG scoring methodology is objective, robust and best-in-class at the time of writing.

ESG fundamentals in South Africa are quite unique and listed firms have faced increasing scrutiny over their ESG policies. As such, it has become an increasingly important factor for investors to consider. Over the study period, this study found statistically significant evidence that a negative relationship exists between ESG performance (as measured by Bloomberg) and corporate financial performance (measured using ROA, SPg and ROIC) of the 70 sampled JSE-listed firms between 2011 and 2019. When looking at the ROA and ROIC models, we imply the notion that ESG activities are negative net present value projects that drag on overall profitability whilst the asset base remains unchanged, resulting in poorer returns. We also yield to the notion that higher ESG performance may provide a superior return over a longer period than the period under consideration. This raises an interesting question; how long are investors willing to wait for these investments to play out? When considering the SPg model, although showing a statistically significant negative ESG-CFP relationship, we found it to be unreliable because of its low explanatory power highlighting that ESG score movements are not (yet) a key component of share price movement. This leads us to believe that majority of market participants may still not be factoring in (or aware of) ESG performance in their investment decisions. When disaggregating the ESG scores, we found that the E- and S-scores had negative and significant relationships with the CFPs while the G-score had a positive but statistically insignificant relationship with the CFPs. This finding is reasonable given that the G-score has remained relatively flat over the study period with the growth in the composite ESG score being driven by the E- and S-scores.

We note the level of consistency across the different models which suggests that over the study period, the negative relationship is robust. As shown by Díaz, Ibrushi and Zhao (2021), high

ESG performance may protect against extreme downside risk during volatile periods while Naffa and Fain (2022) show that high ESG portfolios underperform during “normal times”.

In conclusion, the practical implication of this study’s results combined with insights from the literature review is that ESG performance ought to be seen as an insurance policy and not a CFP enhancer. Over-insurance can be described as having coverage in excess of the value of the possible loss that the insured can experience. We believe that this is the effect ESG performance has on investment portfolios. Too high ESG performance in a portfolio may be a drag on its fundamental and market performance. A balance must be struck between high ESG performing firms and perhaps lower ESG performing firms to preserve overall portfolio performance.

5.2. Limitations

Bloomberg ESG scores objectively measure a firm’s disclosure level as discussed in Section 3.1.1. None of the data is estimated meaning every data field has transparency that can be traced back to a firm’s document or filing. The limitation is that actual corporate ESG actions are not measured which may allow firms with superior disclosing capabilities to artificially inflate their ESG scoring. This limitation is somewhat mitigated by the fact that increased disclosure inherently forces firms to then improve on those disclosed metrics due to increased ESG scrutiny.

Obtaining a sufficient dataset was a limiting factor as the panel was quite short containing nine years’ worth of complete data. This was mainly due to Bloomberg ESG scores only being available from 2010 onwards for JSE-listed firms. A longer panel is more likely to assist in the discussion of the impact ESG has on long-term firm sustainability and profitability. Furthermore, the sample included only those firms that remained listed throughout the period and for which ESG data was available. This means that the sample suffers from survivorship bias. The model used has its shortcomings. The fixed-effects model has assumptions that need to be met. Although it controls for most of the omitted-variable bias, it limits what the user can estimate by being unable to control for variables that vary over time. Furthermore, there is a large margin of error in the process of selecting and cleaning the sample data and deciding on the appropriate model which explains why there is general inconsistency in the literature.

This study made use of market capitalisation as the only control variable which may have limited the model's accuracy. Several authors including Johnson, Mans-Kemp and Erasmus (2019) included a financial leverage control variable in addition to market capitalisation. This paper attempted to capture the leverage effect by modelling ROA-ESG and ROIC-ESG relationships separately. Furthermore, information may have been lost by using the logarithm of the firms' market capitalisation to deal with the extreme tails.

5.3. Avenues for further research

Future researchers are encouraged to consider a longer study period when investigating the ESG-CFP relationship. Additionally, sectoral studies may provide insights as ESG risks may not be homogeneous across sectors. More measures of CFP such as earnings per share can be explored to broaden the body of knowledge. Standardisation of regression coefficients may be applied to future research in order to better understand the magnitude of ESG factors on the dependent variable.

~ end ~

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Appendices

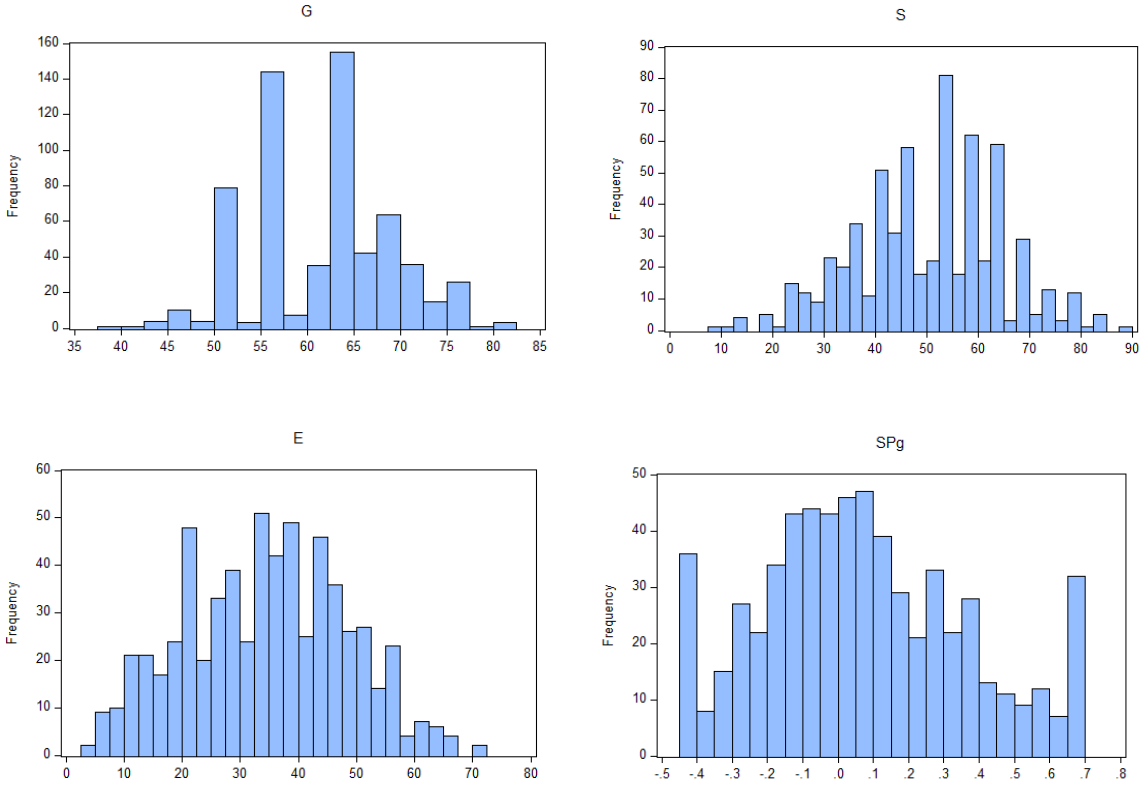
Appendix 1: List of firms in the study

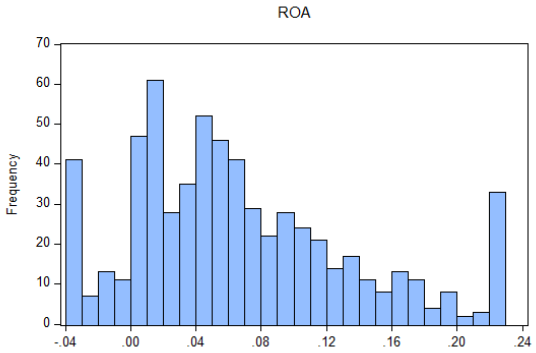
Ticker	Name	Industry	Sector
ABG	Absa Group	Banks	Financials
ADH	Advtech	Diversified Consumer Services	Consumer Discretionary
AFE	AECI	Chemicals	Materials
ARI	African Rainbow Minerals	Metals & Mining	Materials
AEL	Altron	IT Services	Information Technology
AMS	Anglo American Platinum	Metals & Mining	Materials
AGL	Anglo American PLC	Metals & Mining	Materials
ANG	AngloGold Ashanti	Metals & Mining	Materials
ANH	Anheuser-Busch InBev SA/NV	Beverages	Consumer Staples
ACL	ArcelorMittal South Africa	Metals & Mining	Materials
APN	Aspen Pharmacare Holdings	Pharmaceuticals	Health Care
ARL	Astral Foods	Food Products	Consumer Staples
AVI	AVI	Food Products	Consumer Staples
BAW	Barloworld	Trading Companies & Distributors	Industrials
BHP	BHP Group PLC	Metals & Mining	Materials
BVT	Bidvest Group	Industrial Conglomerates	Industrials
BTI	British American Tobacco	Tobacco	Consumer Staples
CPI	Capitec Bank Holdings	Banks	Financials
CFR	Cie Financiere Richemont SA	Textiles, Apparel & Luxury Goods	Consumer Discretionary
CLH	City Lodge	Hotels, Restaurants & Leisure	Consumer Discretionary
CLS	Clicks Group	Food & Staples Retailing	Consumer Staples
DSY	Discovery	Insurance	Financials
DRD	DRDGOLD	Metals & Mining	Materials
EXX	Exxaro Resources	Oil, Gas & Consumable Fuels	Energy
FSR	FirstRand	Diversified Financial Services	Financials
TFG	Foschini Group	Specialty Retail	Consumer Discretionary
GLN	Glencore PLC	Metals & Mining	Materials
GFI	Gold Fields	Metals & Mining	Materials
GND	Grindrod	Transportation Infrastructure	Industrials
HMN	Hammerson PLC	Equity Real Estate Investment Trusts (REITs)	Real Estate

HAR	Harmony Gold Mining Co	Metals & Mining	Materials
HYP	Hyprop Investments	Equity Real Estate Investment Trusts (REITs)	Real Estate
IMP	Impala Platinum Holdings	Metals & Mining	Materials
IPL	Imperial Logistics	Air Freight & Logistics	Industrials
INL	Investec	Capital Markets	Financials
JSE	Johannesburg Stock Exchange	Capital Markets	Financials
KIO	Kumba Iron Ore	Metals & Mining	Materials
LBH	Liberty Holdings	Insurance	Financials
LHC	Life Healthcare Group Holdings	Health Care Providers & Services	Health Care
MSM	Massmart Holdings	Food & Staples Retailing	Consumer Staples
MTM	Momentum Metropolitan Holdings	Insurance	Financials
MNP	Mondi PLC	Paper & Forest Products	Materials
MRP	Mr Price Group	Specialty Retail	Consumer Discretionary
MTN	MTN Group	Wireless Telecommunication Services	Communication Services
MUR	Murray & Roberts Holdings	Construction & Engineering	Industrials
NPN	Naspers	Internet & Direct Marketing Retail	Consumer Discretionary
NED	Nedbank Group	Banks	Financials
NTC	Netcare	Health Care Providers & Services	Health Care
NPH	Northam Platinum Holdings	Metals & Mining	Materials
OCE	Oceana Group	Food Products	Consumer Staples
OMN	Omnia Holdings	Chemicals	Materials
PAN	Pan African Resources	Metals & Mining	Materials
PIK	Pick n Pay Stores	Food & Staples Retailing	Consumer Staples
PPC	PPC	Construction Materials	Materials
REM	Remgro	Diversified Financial Services	Financials
RLO	Reunert	Industrial Conglomerates	Industrials
SLM	Sanlam	Insurance	Financials
SNT	Santam	Insurance	Financials
SAP	Sappi	Paper & Forest Products	Materials
SOL	Sasol	Chemicals	Materials
SHP	Shoprite Holdings	Food & Staples Retailing	Consumer Staples
SBK	Standard Bank Group	Banks	Financials
SUI	Sun International	Hotels, Restaurants & Leisure	Consumer Discretionary
SPG	Super Group	Specialty Retail	Consumer Discretionary

TKG	Telkom SA SOC	Diversified Telecommunication Services	Communication Services
TBS	Tiger Brands	Food Products	Consumer Staples
TRU	Truworths International	Specialty Retail	Consumer Discretionary
VOD	Vodacom Group	Wireless Telecommunication Services	Communication Services
WBO	Wilson Bayly Holmes-Ovcon	Construction & Engineering	Industrials
WHL	Woolworths Holdings	Multiline Retail	Consumer Discretionary

Appendix 2: Study variables' frequency tables

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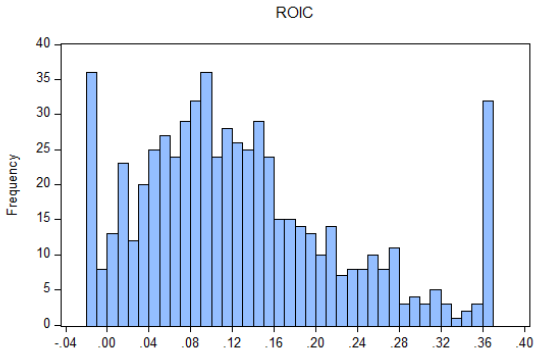
.04
.08
.12
.16
.20
.24


ROIC
Frequency
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35
30
25
20
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.00
.04
.08
.12
.16
.20
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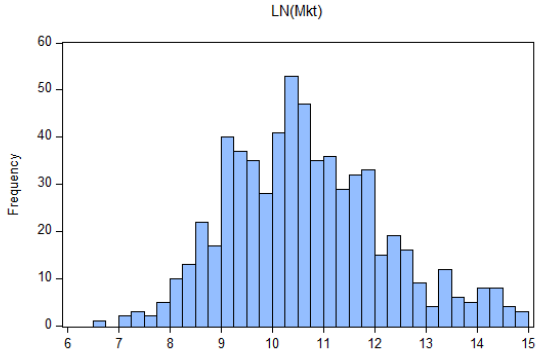
.28
.32
.36
.40


LN(Mkt)
Frequency
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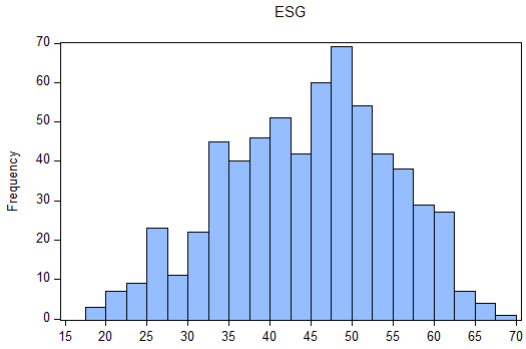
40
30
20
10
0
6
7
8
9
10
11
12
13
14
15


ESG
Frequency
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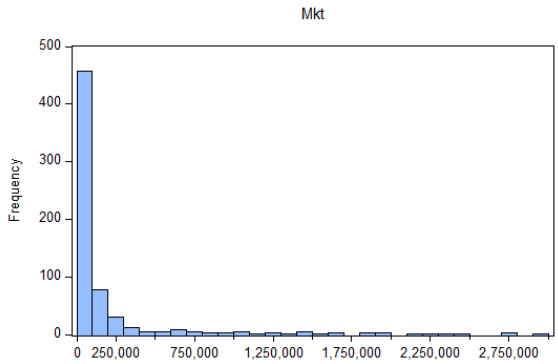
30
20
10
0
15
20
25
30
35
40
45
50
55
60
65
70


Mkt
Frequency
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400
300
200
100
0
0
250,000
750,000
1,250,000
1,750,000
2,250,000
2,750,000

Appendix 3: ESG Portfolios

Leader Portfolios				Lounger Portfolios				Laggard Portfolios			
E	**S**	**G**	**ESG**	**E**	**S**	**G**	**ESG**	**E**	**S**	**G**	**ESG**
MNP	NED	AGL	MNP	SBK	TRU	BAW	DRD	PAN	SHP	AFE	FSR
SOL	ARI	MNP	SOL	EXX	BHP	APN	EXX	SLM	OMN	DRD	TRU
GLN	KIO	BHP	BHP	BAW	CLH	AEL	APN	FSR	SUI	SNT	MUR
BHP	LBH	GFI	NED	WHL	VOD	MTM	GND	TBS	ACL	ARL	IPL
ANG	CLS	HAR	KIO	OMN	MSM	SAP	CFR	MUR	CFR	SHP	REM
GFI	RLO	INL	GLN	REM	HAR	IMP	TKG	SUI	BTI	CFR	CLH
HMN	AMS	ANG	AGL	DSY	GLN	RLO	SAP	TRU	PPC	CLS	SHP
AMS	IMP	SLM	GFI	MSM	HMN	ABG	ABG	CLH	BVT	SUI	SUI
KIO	OCE	SBK	AMS	SAP	ANG	LHC	MSM	CPI	WBO	PAN	PAN
AGL	TBS	BTI	ANG	CLS	MTN	TKG	TFG	AFE	AVI	EXX	MRP
BTI	AGL	KIO	IMP	LBH	APN	HMN	AEL	SNT	GND	NPN	NTC
IMP	EXX	MUR	ARI	ACL	MRP	VOD	RLO	MTM	PAN	MTN	SNT
HAR	TKG	NED	HMN	ABG	SOL	IPL	OMN	PPC	DSY	MSM	PPC
GND	BAW	GLN	HAR	IPL	NPH	CLH	DSY	SHP	SNT	JSE	CPI
INL	AEL	AMS	INL	TKG	INL	FSR	SLM	MRP	IPL	WBO	MTM
NED	SBK	WHL	SBK	HYP	SLM	OCE	VOD	SPG	MTM	PIK	AFE
NPH	WHL	ANH	BTI	MTN	FSR	AVI	HYP	NTC	PIK	TBS	LHC
CFR	TFG	ARI	WHL	AVI	NTC	OMN	ACL	JSE	AFE	TRU	BVT
OCE	SAP	SOL	OCE	ARL	ARL	HYP	MTN	BVT	NPN	SPG	WBO
ANH	DRD	NTC	ANH	VOD	MNP	TFG	PIK	NPN	ADH	MRP	JSE
DRD	ANH	LBH	LBH	AEL	CPI	PPC	ARL	WBO	JSE	ADH	SPG
ARI	HYP	DSY	CLS	TFG	LHC	GND	TBS	LHC	SPG	BVT	NPN
APN	ABG	ACL	NPH	RLO	MUR	REM	AVI	ADH	REM	CPI	ADH
PIK	GFI	NPH	BAW								