Gordon Institute of Business Science
University of Pretoria

The financial cost of ESG investing in the Johannesburg Stock Exchange (JSE)

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A research project submitted to the Gordon Institute of Business Sciences, University of Pretoria, in partial fulfilment of the requirements for the degree of Master of Business Administration.

02 November 2021

Abstract

ESG investing, through the theme of Principles of Responsible Investing, is widely gaining popularity and acceptance by investors globally and in South Africa. The increase in ESG investing opportunities has resulted in critical viability and economic value-add questions in the investment fraternity. An opportunity has become available for ESG rating agencies to prepare and provide ESG ratings for investment purposes. The process impacts investees, firms in this case. The investors require clarification and certainty regarding the financial costs and benefits of ESG investing in JSE.

The study aimed to determine the financial cost of ESG investing in the JSE. The study was divided into two parts. Firstly, the study investigated if a high ESG rating offered better financial returns than a low ESG rating portfolio. Secondly, the study investigated if a high ESG rating performed better than the benchmark market portfolio, the All Share Index. Thirdly, the study examined if ESG rating data from two different ESG data providers translated to the same financial returns in the JSE. Lastly, the study investigated if ESG rating data from two different agencies correlated in the JSE. Using ESG data from Refinitiv and Bloomberg, the analysis was based mainly on the graphical time series technique and supported with statistical tests.

The study found that a high ESG rating portfolio performed poorly compared to a low ESG portfolio. The high ESG rating portfolios outperformed the All Share Index from 2015. The financial returns from ESG data of Refinitiv and Bloomberg tracked differed. Finally, the ESG rating data from Refinitiv and Bloomberg exhibited a moderate to strong correlation.

Accordingly, recommendations and future research work are provided and detailed in the report.

Keywords

ESG, ESG investing, ESG rating, Financial returns (CAGR), ESG rating agency

Keywords Definitions

ESG – Acronym for Environment, Social and Governance.

ESG investing – investment with consideration of ESG issues.

ESG rating – ESG rating or score is a rating given to a firm by a rating agency following evaluation of the firm's performance on ESG issues or dimensions.

- High ESG rating – high ranked or top ranked, best ranked, or best performing ESG score given by rating agency.
- Low ESG rating – low ranked or bottom ranked or worst ranked or worst performing ESG score given by rating agency.

Financial returns – investment financial gains or losses over a given period. For this study, financial performance is measured by cumulative annual growth rate (CAGR).

- CAGR – compound annual growth rate, a measure of investment returns compounded annually over multiple years.

Portfolio – a basket of companies put together selected on similar ESG rating score. For this study, quintile portfolios are generally employed.

ESG rating agency – the organisation responsible for evaluating and rating firms, for example, Refinitiv and Bloomberg.

Declaration

Declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

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List of Acronyms and Abbreviations

CAGR	Compound annual growth rates of return
CECP	Chief Executive for Corporate Purpose
CRISA	Code for Responsible Investing in South Africa
CSR	Corporate Social Responsibility
ESG	Environment, Social and Governance
GIBS	Gordon Institute of Business Sciences
HEPS	Headline Earnings Per Share
JSE	Johannesburg Stock Exchange
IR	Integrated Reporting
ISS	Institutional Shareholder Service (rating agency)
MTP	Modern portfolio theory
PIC	Pension Investment Corporation
PRI	Principles of Responsible Investing
RI	Responsible Investing
ROA	Return on Assets
ROE	Return on Investment
SI	Sustainable Investing
SPSS	Statistical Package for the Social Sciences
SRI	Socially Responsible Investing
UN	United Nations
UNGC	United Nations Global Compact

1. Chapter 1: Introduction to Research Problem

1.1 Research Title

The Financial Cost of ESG Investing in the Johannesburg Stock Exchange (JSE).

1.2 Introduction

Having worked for seventeen years and gained exposure in the petroleum, chemicals, oil and gas industry in South Africa, I have grown to realise the devastating extent to which the industry's operational activities impact the environment. In the last few years, I have witnessed several business restructuring initiatives that have left a trail of social devastation due to the resulting unemployment, loss of both personal spending and corporate social responsibility (CSR) injection in the community. I have worked for a corporate that has been rebuked for poor governance issues resulting in massive share price depreciation in a few days. Coming up with solutions for such challenges is the responsibility and obligation of the South African broader fraternity, including the academia, business community and the corporate.

Incorporating the triple bottom line philosophy in the business strategies is crucial because the approach simultaneously accounts for the planet, people, and profit in business strategic decision-making. The environment, society and governance (ESG) approach is another form of triple bottom line framework (Gillan et al., 2021) gaining popularity. One way of implementing and reaping the full benefit of ESG practices is the promotion of ESG investing in the Johannesburg Stock Exchange (JSE). Large fund managers, such as Black Rock, are the main drivers of the ESG investing philosophy. The largest humanitarian organisation, United Nations (UN), fully supports the ESG principles.

ESG investing can improve environmental protection, inspire climate change awareness and encourage emissions policy compliance, address socio-economic challenges like inequality, diversity and inclusion, and restore good corporate governance culture in South Africa. For ESG investing prosperity, it should exploit the already existing framework in governance codes and the legislation. Considering that wide acceptance and embracing of ESG investing is inevitable, it is imperative to understand the financial cost of ESG investing in the JSE.

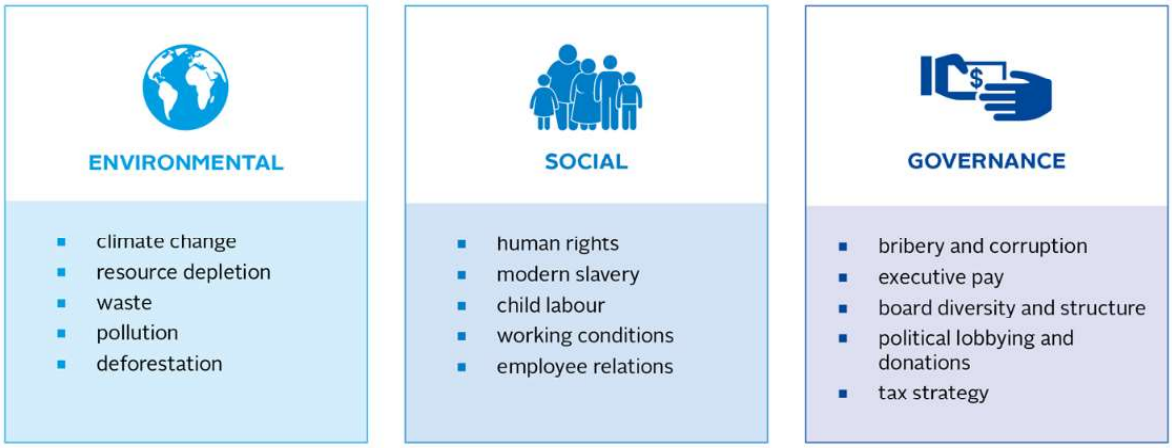
1.3 Background to the research problem

Investment strategies are shifting away from focusing on the maximum financial returns for the shareholder to accommodating broader business stakeholders as required by ESG principles. ESG investment has gained support because of the potential for financial returns. Secondly, large pension fund firms need to preserve the planet to prevent erosion of savings, and that fiduciary duty requires the inclusion of ESG matters (R. G. Eccles & Klimenko, 2019). While some investors may still choose conventional investment methods, a significant investment community is likely to shift to ESG investing in the JSE. In South Africa, King code, CRISA code and Regulation 28 advocate and mandate for ESG investment (Bowmans, 2021). That said, JSE investors do not know the financial cost and/or possible benefits of the ESG investing approach.

1.3.1 Defining "ESG" and Related Pillars

"ESG" stands for Environment, Social and Governance. Each of the three pillars of ESG has its focus areas.

Figure 1: UN PRI Typical ESG Issues (PRI, 2020)



a) Environmental Pillar

The Environmental pillar focuses on issues like mitigation of climate change and reduction of greenhouse emissions; reduction of air and water pollution; decrease in natural resources depletion; promotion of renewable energy and energy efficiency; encouragement of biodiversity protection; waste management and hazardous material use (Tucker & Jones, 2020). Climate change sees no borders, so South Africa is not

immune to the catastrophic environmental impact. Preservation of the planet is non-negotiable.

One aspect of climate change is global warming, which is the rise of global temperature resulting from emissions of gases from burning fossil fuels like coal, oil and gas (NASA, 2020). The global warming temperature rise of as low as 4°C has dire consequences for the planet. The sea levels will rise about one metre, increasing extreme weather patterns like flooding, drought, heatwaves, and frequent natural disasters (The World Bank, 2012).

Climate change is a massive threat to humanity, which can be averted, but we all need to act now. The Paris Agreement is a significant step towards preventing an accelerated and uncontrolled ravaging climate change. The objective of the pact is to limit global temperature change to 2°C or less (WEF, 2016). The agreement requires all participating governments to disclose mitigating efforts every five years (WEF, 2016), making the pact actionable and trackable. ESG investing products are increasingly employed to measure companies' commitment and actions towards climate change mitigating efforts (OECD, 2021). While ESG investing is not a complete solution, it is one step towards mitigating the climate change tragedy. Through the cooperation of the corporate and the integration of ESG in investment decisions, the world is better placed to address the climate change threats.

b) Social Pillar

The Social pillar focuses on relationship factors such as diversity and inclusion, human rights; labour standards; income and inequality; and alcohol and standards (Tucker & Jones, 2020). The relevant stakeholders include the community, suppliers, and customers (Henisz et al., 2019). While South Africa has a solid constitution to bolster human rights protection and upheld labour laws, the lack of addressing less legislation-driven aspects such as diversity, inclusion, and inequality remain a grave concern.

South Africa, disappointingly, has the highest GINI coefficient in the world at 0.63 (The World Bank, 2021), the measure of stubbornly and shockingly high inequality. The World Bank (2021) attributes inequality to sustained economic exclusion. Professor Ranchhold from the University of Cape Town has identified high unemployment as the primary factor that perpetuates the inequality in the country, where blacks and women are the

worst affected (Davids, 2021). The unemployment rate in South Africa is currently at a record high of 34.4% (Stats SA, 2021). COVID-19 pandemic has worsened the inequality outlook in the country.

If South Africa is to flourish, the inequality issue must be addressed, and ESG has a meaningful role to play. With policies such as the Black Economic Empowerment in force, the inequality has not abated. King code promotes integrated thinking between business and social aspects, a key element to addressing inequality (IOD SA, 2017). The JSE had mandated the use of King code to all listed companies in South Africa (KPMG, 2012), a move likely to offer massive support to enhance ESG investment. The existence of King code is the facilitator and enabler of ESG investing in South Africa (Taplin & Killian, 2021). ESG investing is a necessary instrument to help address social inequality in South Africa.

c) Governance Pillar

The Governance pillar encompasses the company's internal factors such as systems, procedures, controls and decision making (Henisz et al., 2019). Typical issues include board diversity and inclusion, fraud, bribery and corruption, accident and safety management, whistle-blower programs, and the like (Tucker & Jones, 2020).

South Africa has witnessed numerous corporate governance failures in the last few years. In December 2017, a dual-listed blue chip South African company, Steinhoff's share price catastrophically collapsed by 85% from just over R52.00 within days after an accounting fraud was uncovered involving several company executive directors (Naude et al., 2018). The corporate scandal wiped off over R200 billion from the stock market, inflicting severe financial damage to various pension fund portfolios, including the shareholder Pension Investment Corporation (PIC). Shortly after, the Durban-based and JSE listed Tongaat Hullett was found to have overstated earnings with about R4 billion in 2018. The ex-CEO and several other executives were involved in the fraud (Business Insider SA, 2020). EOH, Multichoice, Gold Fields and Sasol are other JSE firms that also contributed to pension fund portfolio losses after respective share price collapses due to corporate governance failures (Business Insider SA, 2020). This is a horrific picture of financial losses due to poor corporate governance.

Appropriate application of King code is essential for ESG investment to thrive in South Africa. The introduction of integrated reporting through King III in 2009 addressed the presented means to measure companies' ESG performance (Viviers, 2014), and this impact of the King code. It can be argued that all the recent corporate scandals took place in the full existence of King code and under the JSE mandatory enforcement of the code. While the code outlines the best tools and robust systems for governance (IOD SA, 2016), the code may not correct the personal moral compasses of executives with a mission to commit fraud. However, integrated reporting, as required in King code, was found to boost policies of business ethics (Corvino et al., 2020). The success of ESG investing relies on good corporate governance in South Africa.

1.3.2 Background of ESG Investing

In 2000 the United Nations (UN), under the leadership of Kofi Annan, initiated United Nations Global Compact (UNGC). The initiative was described as a "call to companies to align strategies and operations with universal principles on human rights, labour, environment and anti-corruption, and take actions that advance societal goals" (UNGC, 2021). The pact was grounded on ten principles with the end goal to preserve the planet, end poverty and create a better life for humankind.

The 2004 UGC report, "Who Care Wins", documented the terms "ESG" and "ESG Investing" for the first time. The purpose of the report was to align financial institutions with the changing world through the formulation and implementation of a plan for the integration of ESG issues in the investment decision process (R. G. Eccles et al., 2020). UNGC was now defining the role of the financial market on addressing sustainability issues through ESG investing. ESG investing can be defined as "investment practices that integrate a consideration of ESG issues" (N. S. Eccles & Viviers, 2011)

The role of ESG investing was further refined and advanced through the launch of the Principles of Responsible Investing (PRI) initiative in 2006. The PRI was developed and driven by global institutional investors to increase awareness about ESG issues in the investment fraternity at large (Kim & Yoon, 2020). The six principles of PRI are as follows (PRI, 2020):

- The incorporation of ESG in the investment process,
- Active ownership and incorporation of ESG in policies and practices,
- Seeking disclosure on ESG issue from business to which investment is made,
- The promotion of acceptance and implementation by the investment community,
- Collaboration for effective implementation of the principles,
- Regular reporting on activities and progress on implementing the principles

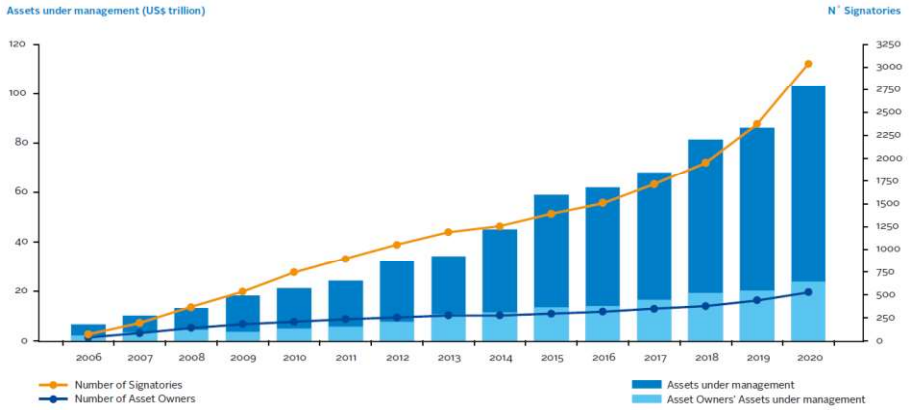
ESG investing is based on the principle of environmental preservation, societal impact and business good governance (Drucker, 2009). The purpose of ESG investing may range from investing for pure financial returns to social returns. Financial returns are typically similar to conventional investing, except ESG investing incorporates environmental, social and company governance issues (Boffo & Patalano, 2020). Some investors use ESG investing as a tool for sustainable financing tool.

1.3.3 ESG Investing – The Rise, Ecosystem and Investment Strategies

a) The Rise of ESG Investing

While ESG investing was first included in the investment evaluation criteria in 2006 (Atkins, 2020), the investment style has seen aggressive growth. The number of PRI signatories pledging for the ESG principles grew from 63 ($6.5 trillion) in 2006 to over 3000 signatories in 2020 (PRI, 2020) (Atkins, 2020). As schematically shown in **Figure 2**, the ESG signatory adoption exponentially grows from $6.5 trillion to $110 trillion in 15 years. Eccles & Klimenko (2019) confirmed that ESG issues were no longer secondary considerations but became the main factors for investment portfolios.

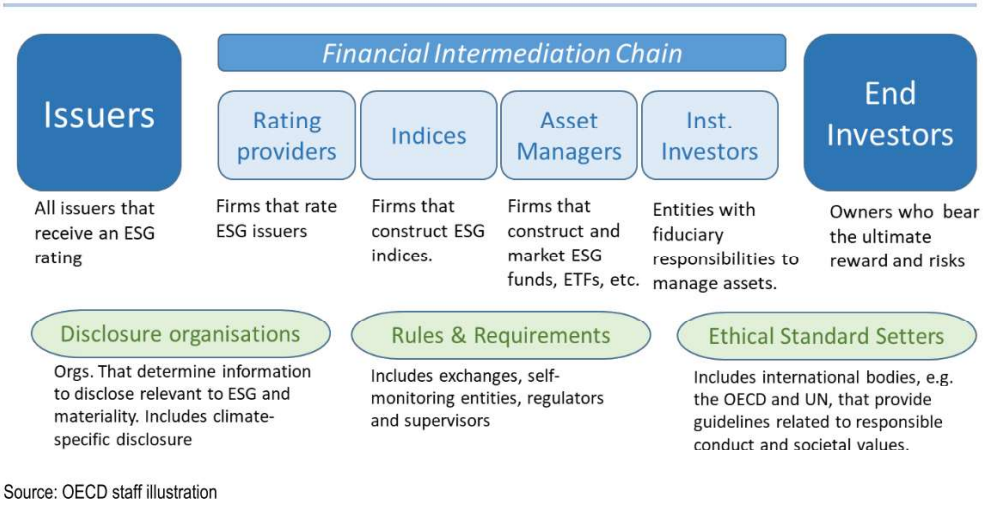
Figure 2: Assets under management & signatories growth trend (PRI, 2020)



b) ESG Investing Ecosystem

As shown in **Figure 3**, the key role players in the ESG investing environment include investors, financial institutions, businesses or companies, ESG rating agencies (Boffo & Patalano, 2020). Rating agencies are participants of interest in the ecosystem because they provide valuation and rating of companies or "issuers" based on their ESG disclosure and performance. The ESG rating score is vital because it is influential to significant investment decisions.

Figure 3: "ESG financial ecosystem" (Boffo & Patalano, 2020)



Source: OECD staff illustration

1.4 Research Problem

ESG investing, through the theme of PRI, is widely gaining popularity and acceptance with investors globally and in South Africa (Steyn & Viviers, 2020). The increase in ESG investing opportunities has resulted in critical viability and economic value-add

questions in the investment fraternity. An opportunity has become available for ESG rating agencies to prepare and provide ESG ratings for investment purposes. The process impacts investees, firms in this case. The investors require clarification and certainty regarding the financial costs and benefits of ESG investing in JSE.

1.4.1 Academic Need for Research

Like any style of investing, ESG investing needs to prove its worth. A basic academic line of questioning will probe how ESG investing adds value to any portfolio (Hvidkjær, 2017). In the global setting, various approaches have been taken in academia to address this question. The dominant area involves investigating the relationship between ESG performance and financial returns (Bansal et al., 2019) (Friede et al., 2015). The reaction of firms towards ESG scores and news has been studied as well (Serafeim & Yoon, 2021) (Clementino & Perkins, 2020). In an integrated global economy, it is necessary to gain an insight and understanding of similar issues in the JSE context.

Several academic studies have been carried out to determine the relationship between ESG performance and firms performance in the JSE setting (Ball, 2021; Johnson, 2020; Naik & Ward, 2017). However, the findings showed that more research is necessary because only a limited number of meaningful relationships were established. Uncertainties include lack of consistent outperformance (Naik & Ward, 2017), conflicting outcomes between accounting and market based metrics (Ball, 2021), some JSE sectors performing better than others (Johnson et al., 2019), and individual "ESG" pillar giving better returns than the composite or aggregated "ESG" (Mans-Kemp, 2014). As long as academic research work has not established a trend with some degree of consistent relationship and predictability, further research is justified.

The primary input into ESG investing decision process is the ESG ratings. The quality and comparability of ESG data are questionable. The nature of the relationship between rating agencies appears heterogeneous and inconsistent (Gibson et al., 2020). To add to the uncertainly, ESG rating scores from different rating agencies showed different abilities to forecast or predict financial returns (Serafeim & Yoon, 2021). While the relationship between ESG rating agencies has been studied in the global setting, a similar academic investigation is necessary for the JSE universe.

1.4.2 Practical Need for Research

Globally, ESG investing features prominently in business megatrends. Understanding of risks and opportunities of ESG financial issues is one of the significant elements according to a global non-government organisation called Chief Executive for Corporate Purpose (CECP) (Kotsantonis et al., 2019). While investors believe there is long term financial performance and value in ESG material issues, risks associated with the initiative have not been well identified and quantified (Kotsantonis et al., 2019). The study of determining the financial cost of ESG investing should offer some insight into the financial risks associated with the ESG investing.

The second global factor is that ESG investing has gained wide acceptance and exponential growth in the last 15 years. Driving factors behind ESG investing interest growth include "size of investment firms", "financial returns", "growing demand", "evolving view of fiduciary duty", "ESG activism by investors" (R. G. Eccles & Klimenko, 2019). The PRI, which advocates for the ESG investment approach, is widely gaining investors' acceptance globally and in South Africa (Steyn & Viviers, 2020). Considering the interconnected nature of the global economy, the case for better understanding this investment style is compelling in the South African context.

ESG investing touches on sensitive and major macro issues in South Africa, especially the environmental element and associated emissions, and social challenges of inequality, diversity and inclusion. Appropriate framing and application of ESG investing have the potential to encourage and offer some solutions to these challenges. If the financial cost or benefit of investing in the JSE is established, ESG investing can address the pressing macro issues in South Africa.

At the investment sector and company level, South Africa has been at the forefront of designing governance structures that encourage a suitable environment for ESG investing. PRI principles form the foundation of the workings and guidelines of both King code and CRISA code. Coming from these codes is the integrated reporting philosophy that arguably spearheads the incorporation and participation of JSE firms in ESG investing. From an active investment perspective, what is the value to unlock regarding ESG investing in the JSE. The research is in a position to answer this question.

1.5 Research Purpose and Objectives

The study aims to determine the financial cost to ESG investing in the JSE from investors' perspectives. The study is particularly valuable for active portfolio management strategies. The research is divided into two parts.

The first part of the research focuses on the financial opportunity cost of investors choosing ESG investing over other typical investment options. By using graphical time series, the study will determine: 1) If high ESG rating portfolios give better returns than low ESG ratings in the JSE, 2) If high ESG rating portfolios give better returns than benchmark portfolios in the JSE.

The second part of the research focuses on the ESG rating score and associated agencies. ESG rating data is the primary ingredient in the ESG investing decision process. There is a significant cost associated with acquiring ESG information (WallStreetPrep, 2021). The study will determine: 1) Whether ESG data from the different ESG rating agencies result in the same financial returns in the JSE, 2) Whether ESG data from different ESG rating agencies correlate in the JSE.

By gaining insight and understanding the above relationships, the study will inform ESG investors in the JSE on whether investing on high or low ESG portfolios is important and whether there is a need to spend money on multiple ESG data providers.

1.6 Significance of the Study

Several academic studies have been carried out on CSR, SRI and ESG investing in the JSE. However, no clear and meaningful relationships have been established, for example, between ESG disclosure and firm financial performance (Naik & Ward, 2017). Knowing the cost or benefits of ESG investing is an essential lever to influence the decision of investors.

ESG investing is important because it indirectly advances environmental issues, e.g. climate change, emissions, pollution, etc. There is also a potential to address socio-economic challenges, and also corporate governance is upheld. The investment style can address multiple national challenges, but the success depends on the adoption of

ESG investing in the JSE. Insight regarding the financial cost and benefit is crucial, and it may provide support to the above challenges.

The component of the study investigating whether ESG score from different rating agencies yield similar financial returns will be beneficial for issuers and investors. While sufficient evidence has been accumulated globally, the set of findings from this study will be JSE specific. No previous work on ESG rating divergence in the JSE has been noted in the literature, so it will be important to see how the JSE rating fare compared to the world. The value add for investors is to know whether sourcing data from one agency is adequate or not for investment decisions.

The role players in the ESG investing ecosystem will variably benefit from the study. The direct beneficiaries of the study are active and passive investors because the question of financial returns will be answered. The research will clarify whether one set or multiple sets of ESG data are necessary for investors' ESG investment decision-making. The companies receiving ESG rating scores will learn what good or poor rating means for their financial returns.

1.7 Scope of the research

The research focuses on analysing the financial cost of ESG investing in the JSE. The timeline for the analysis stretches back to the inception of ESG reporting for each company analysis, typically 2008. Johnson, Mans-Kemp, & Erasmus (2019) recommended that research of this nature should use data over the long term, consistent with durations expected for investment returns. As part of the analysis of the financial cost of ESG investing, the researchers analysed the effect of using ESG data from different ESG rating agencies on the financial returns.

1.8 Conclusion

Early evidence suggests that ESG investing encourages businesses to pursue good environmental standing, reach out to broader stakeholders in addition to shareholders and finally focus on governance discipline. Although it may be argued that conventional investment styles perform better than ESG investing strategies, some literature cast doubt on whether conventional tools outperform ESG strategies. If ESG investing is not nurtured, South Africa may lose out of an opportunity of unlocking economic value and

positioning of sustainability roadmap. A better understanding of ESG investing is key to its success.

2. Chapter 2: Literature Review

2.1 Introduction

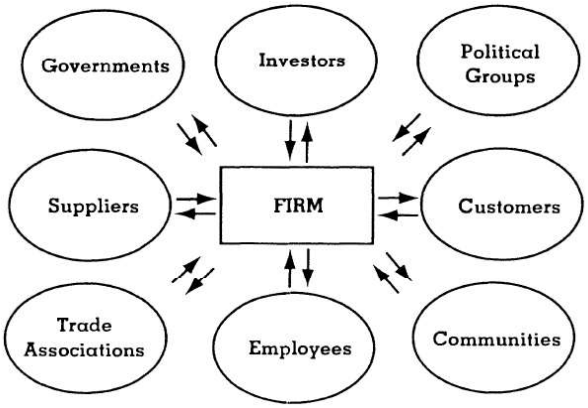
The purpose of this study is to determine the financial cost related to ESG investing in the JSE. Based on problem formulation, the research will focus on the financial costs of investing related to company performance and ESG rating. The literature review will delve into the following themes: financial cost of investing, stakeholder theory as basis of ESG investing, definition and assessment of ESG investing, evaluation of ESG framework in the JSE and broader South Africa, discussion of essential elements for portfolio construction and evaluation of available tools for determining financial returns. Finally, the literature review with examine the ESG rating concept and ESG rating agencies.

2.2 Theoretical Underpinnings of ESG Investing

Stakeholder theory underpins the study of the financial cost of ESG investing in JSE. In this study, the financial cost relates to financial gain or loss for investing in the ESG rated portfolio, compared to the conventional portfolio.

Through Freeman's work of 1984, stakeholder theory defines a relationship between a firm and external stakeholders (Mainardes et al., 2011). A stakeholder is “any group or individual who can affect or is affected by achieving the organisation’s objectives” (Freeman, 2004). As noted, an important mutual, two-way and reciprocal relationship exists between the stakeholder and the firm (Rezaee et al., 2019) (Tullberg, 2013).

Figure 4: Typical Illustration of the Stakeholder Theory (Donaldson & Preston, 1995)



Stakeholder theory is appropriate for studying the financial cost of ESG investing in the JSE. The research work of Peng and Isa (2020) found evidence of a strong association between ESG dimensions and the stakeholder theory. The three pillars of ESG have two-way relationship with external stakeholders. In the context of the study, stakeholders of a firm include financial institutions, fund managers, investors, employees, suppliers, customers and the community. Stakeholder theory advocates for the idea that firms that have healthy relationships with stakeholders "will function more effectively and create more value" for stakeholders (Kessler, 2013). Clear identification of the stakeholders, establishment and maintenance of good relationships will likely positively influence the company's performance. In the stakeholder theory, "the success of a company is very dependent on smooth cooperation with its stakeholders" (Tullberg, 2013). There is a two-way relationship between composite "ESG performance" and the respective stakeholders, and the relationship is directly proportional to the performance success of the firm.

2.3 ESG Investing

2.3.1 Definition

ESG Investing is essentially Responsible Investment which can be defined as "Investment practices that integrate a consideration of ESG issues with the primary purpose of delivering higher-risk-adjusted financial returns" (N. S. Eccles & Viviers, 2011). **Figure 1** summarises the pertinent E – environment, S – social and G – governance issues from UN PRI perspective. The primary differentiator of "ESG Investing" from sole financial investing is the ESG issues making a framework for identifying medium to long term risks and opportunities (Boffo & Patalano, 2020).

A large part of the literature uses the following terminology interchangeably in the context of ESG investing: SRI (Socially Responsible Investing), RI (Responsible Investing), SI (Sustainable Investing), CSR (Corporate Social Responsibility), CSI (Corporate Social Investing) and ESG (Environment, Social and Governance). This report primarily uses the "ESG" term. The use of the other terms interchangeably is not employed unless explicitly stated.

2.3.2 What Conforms to ESG Investing?

Meeting ESG rating criteria is an essential ingredient for qualifying for ESG investment. Firms with no ESG rating score from agencies are at risk of being excluded from the investment domain (Zumente & Lāce, 2021). Investors rely on the third part of ESG data for investment decision making. Many rating agencies have become available to offer ESG rating data for a wide range of investment needs (Cornell & Angeles, 2020). Without an ESG rating, a firm may not participate in the ESG investment. Importantly, like any investment considerations and decision criteria, ESG investing is scrutinised and evaluated on the nature of economic value created (Hvidkjær, 2017).

2.3.3 ESG Investing Strategies

Several ESG investing strategies exist. 1) Positive screening – investments selected based on meeting internationally set standards; 2) Best-in-class – selection of best companies using a set criteria (J. P. Morgan, 2016); 3) Negative screening – exclusion of specific sectors or companies from portfolios 4) ESG integration strategy systematically blends ESG risk and opportunities in a portfolio (Inderst & Stewart, 2018); 5) Active ownership – active engagement in the company to positively influence and address ESG issues (MSCI, 2018) (Rayer, 2017); 6) Thematic investing – themed and linked to sustainability criteria; and 7) Impact investing – direct investment to achieve environmental, social and financial returns (J. P. Morgan, 2016).

The most common ESG investing strategies include positive screening, best-in-class ESG integration, thematic investing and active ownership (MSCI, 2018) (Rayer, 2017). Investors need to understand the seven strategies. Notably, the best-in-class can be adapted for a wide range of criteria, including selecting firms with better or improving ESG performance (CFA Institute, 2015). It can be argued that if ESG rating scores are known for JSE firms, a best-in-class strategy can be employed as an investment strategy separating the best ESG performance from the bad.

2.3.4 Passive vs Active Investment Management

Between 2007 and 2017, the US witnessed a massive $1.3 trillion shift of ownership from massive shift from active management to passive management (Lynn S. Paine & Suraj Srinivasan, 2019). Deliberating this strong trend from the biggest world economy

is vital for South Africa and the ESG investing in the JSE because of the interconnectedness of the world economy. While ESG investing is relatively new, is it ready to transition to passive management?

Passive investment largely depends on the tracking of ESG indexes, and decision making resides with the index (Rathbones, 2017). Each index may have its own sets of rules or criteria for selecting constituents making up the index. In the JSE, there are at least two ESG indices, FTSE/JSE, formed in 2015 and the MSCI ESG index.

Active management focuses on outperforming the market or benchmark portfolio (Rathbones, 2017), though "through discretionary security selection" (Sushko & Turner, 2018). This means fund managers or investors set out criteria for identifying stocks meeting specific criteria, for example, high ESG performance. Active management offers flexibility and better risk management (Rathbones, 2017), which gives the fund managers complete control.

While there is a strong trend pointing towards a shift from active management to passive management, the ESG framework in South Africa is inclined towards active management. According to Duuren, Plantinga, & Scholtens (2016) traditional fund managers prefer to introduce ESG investing gradually while gaining a better understanding about the ESG investment style, and this aspect may allow a phase-in approach for South African fund managers

2.4 ESG Investing Framework in the JSE and Broader South Africa

The rise of ESG investing or even Responsible Investing in South Africa has centred around specific historical political and economic events. Transitioning into democracy made it necessary for South Africa to review its position concerning the global economic world after lifting sanctions and creating an environment that allows broader participants in economic activities. The bolstering of governance was vital to achieving the desired transition. Governance is central to corporate or government sound decision making. King code, CRISA code, Regulation 28, and Integrated Reporting underpin framework for ESG investing in South Africa.

2.4.1 King Code

In 1994, during transitioning from apartheid regime to democracy, South Africa launched a voluntary King code to address corporate governance issues and incorporate wider stakeholders. King code was the brainchild of the King Committee. The committee was mandated to … The first version of King focused on transparency of finances. In 2002, King II introduced the requirement for reporting on sustainability and ESG issues. King III in 2009 introduced integrated reporting of financial performance and ESG issues in one report. King IV published in 2016 enforced the principle of "apply and explain" (Songi & Dias, 2019).

Based on the description of the purpose and application of King code, a position can be taken that the existence of King code enables an environment conducive to ESG investment in South Africa. Viviers & Els (2017) also found that the King code had a significant favourable influence on responsible investing in South Africa.

King promotes the availability of ESG material, including climate change information, in the public domain as part of integrated reporting. All sectors of South African business are naturally encouraged to incorporate climate and environmental aspects in their strategy. South Africa is one of the global polluters regarding emissions from coal-burning for power generation and fuel manufacturing. The code helps business matters affecting climate and environmental preservation. This is because principle three of King requires that leadership takes accountability for sustainability and ESG issues (IOD SA, 2016).

From the social pillar perspective, the principles of the code advocate for the integration of the business with community and society. An environment where the business has realised the need to reach out to the community, and respective social challenges now exists through King code. The code acted as a catalyst for the business's evident growth of CSR interventions, especially as reported by JSE listed firms (Ackers & Eccles, 2015).

Some of the code's objectives include "promoting corporate governance" and "encouraging transparent and meaningful reporting to stakeholders". The code encourages the business to demonstrate the inclusion of community and social factors through integrated thinking, being part of society, stakeholder inclusivity and good corporate citizenship (IOD SA, 2016). Corporate governance contributes to the financial

bottom line because good governance generally positively affects financial returns (Dzingai & Fakoya, 2017).

2.4.2 Code for Responsible Investing in South Africa (CRISA)

While King code stipulates principles for the business in a broader sense, Code for Responsible Investing in South Africa (CRISA) was launched in 2011 to deal with responsible investment-specific issues for **institutional investors**. CRISA encompasses five principles, and the code was adapted from the UK Stewardship Code (Olatubosun & Nyazenga, 2020). Like King code, the premise of CRISA is based on the UN PRI philosophies of driving sustainability and ESG material inclusions in investment decision making.

Admittedly, the five principles of CRISA are sound and should create an environment conducive for ESG investing with good economic value. However, there is no evidence suggesting a positive contribution of the current form CRISA. The voluntary nature is seemingly slowing the adoption of the code by institutional investors. The effect of the existence of the code may only be visible over time. Education and training should be made available to the business (Deloitte, 2014) for CRISA to gain traction and deliver the ESG value.

2.4.3 Regulation 28 for Pension Fund

Legislative levers are available to encourage ESG investment. In 2011, Regulation 28 of the Pension Funds Act was amended for Pension Funds to “consider any factor that may materially affect the sustainable long-term performance of the asset they are invested in or plan to invest”, including those of ESG nature (Bowmans, 2021). Retirement funds invest over R2.3 trillion yearly, making them well placed to drive the sustainability agenda to the companies receiving the investments (Deloitte, 2014). It is important to note that the fund manager’s decision process should consider and decide whether a long-term investment is well placed. The regulation may be deemed as not binding after all.

2.4.4 Integrated Reporting

Integrated Reporting (IR). IR is a “concise communication about how an organisation’s strategy, governance, performance and prospects” (IR, 2021). The JSE requires listed

companies to adopt and communicate through IR (KPMG, 2012). The JSE listed companies use the IR vehicle to communicate the ESG issues.

Integrated Reporting is a big boost and value add to the ESG investment fraternity. Such a lucrative investment environment may attract foreign investment into the JSE. A recent study on integrated reporting and ESG performance found a strong association between the integrated reporting quality and the ESG performance of JSE firms (Mans-Kemp & van der Lugt, 2020). The study utilised third part ESG data, Bloomberg, for the top 100 JSE firms between 2013 and 2018. Integrated Reporting is such a crucial ingredient for ESG investment to thrive.

Integrated reporting has obligated the business to recalibrate its moral compasses for the better of ESG. The mandatory Integrated Reporting resulted in a positive relationship between business ethics policies and environmental disclosure (Corvino et al., 2020). Firms operating and doing business on good moral ground are more likely to make decisions that consider and favour environmental and social matters. Integrated reporting fuels the ESG investment environment.

Integrated reporting helps investors utilise non-financial information more effectively. Integrated reports can capture the relevant and material information, and the reports can ensure consistency, reliability, comparability and authenticity (IIRC & Kirchhoff, 2020). The easier it is for investors to interpret non-financial data, the more likely it is for ESG investors to grow. Integrated reporting increases the pool of potential ESG investors.

In conclusion, both King code and CRISA are voluntary codes based on UN PRI philosophies to foster the culture of ESG incorporation in governance practices for both the public and private sector in South Africa. While King code has gained traction and impacted both locally and internationally, CRISA still has room for improvement. Unlike King code, which principles are intended for business-wide, the scope of CRISA focuses on institutional investors. Institutional investors are entrusted with fiduciary duties and substantial capital for investment, and sustainability and long-term returns significantly matter most. CRISA's role is essential. Through King Code, Integrated Reporting has been an outstanding tool in communicating the ESG material issues.

South Africa has sound legal practices and robust governance systems to form a suitable framework for ESG investing.

2.5 Portfolio Construction

A portfolio is a “group of financial assets such as shares, stock, bond, debt instruments, cash equivalent”, to maximise returns and minimise losses and risks (Kapoor, 2014). Instruments appropriate weight is important to avoid imbalance that may be caused by price value or price change (Gallant, 2021). The success of a portfolio hinges on a suitable holding period. Commonly used holding periods strategies include perioding rebalancing and buy-and-hold strategy (Fahmy, 2014).

2.6 The Financial Cost of Investing

The comparison between the “control” portfolio against the market portfolio determines the cost of investing. The cost of socially responsible investing (SRI) is the difference in financial returns between SRI and non-SRI portfolios (Minor, 2007) (Adler & Kritzman, 2008) (Blanchett, 2010). The difference in financial performance between ethical and non-ethical portfolios yielded the cost of investing in ethical stocks (Bauer et al., 2002).

ESG data is essential for investment decision making in the context of ESG investing. There is a cost associated with the preparation for the company and acquisition for the investors (Cappucci, 2018). The investors acquire the data from ESG rating agencies. The implication is that the financial cost of ESG investing in the JSE is determined by (partly) working out the positive or negative financial returns between ESG informed and non-ESG informed portfolios.

2.7 Financial Returns

Financial returns refer to profit gained or loss incurred from an investment. Various financial metrics have been used in past studies investigating the relationship between ESG performance and financial returns. Accounting based metrics such as ROA, ROE, HEPS were utilised by (Mans-Kemp, 2014; Nkomani, 2013) are easier to use because the data is readily available in financial reports or financial databases. Compound annual growth rate (CARG) was employed for financial returns in several studies (Cronjé, 2019; Muller & Ward, 2013; Taljaard et al., 2015; Viljoen, 2016).

CAGR is the “mean annual growth rate of an investment over a specified period longer than one year” (Wayman, 2021). CAGR is the preferred measure of returns over the

accounting metrics because of the compounding effect over time, typically ignored by other metrics (Gupta, 2017).

2.8 ESG Rating and ESG Rating Agencies

ESG rating is the “evaluation of a company based on a comparative assessment of their quality, standard or performance on environmental, social or governance issues” (SustainAbility, 2018). The process subjects firms to the assessment and allocation of an ESG rating score by rating agencies.

ESG rating from third parties is increasingly becoming a piece of essential information for ESG investing. Access to correct and credible ESG information is essential considering the gravity of the decisions to be made.

Leading market rating agencies include Sustainalytics, RepRisk, Thomson Reuters, Refinitiv, Bloomberg, S&P Global, ISS and MSCI (Atkins, 2020) (Huber & Comstock, 2017). Two of these rating agencies will form part of the argument and analysis of this study, and these agencies will be discussed in detail. Refinitiv and Bloomberg are the selected agencies because the author has access to their ESG rating scores, and these agencies formed part of the analysis of the study.

Refinitiv provides a wide range of financial data for over 9 000 companies worldwide, including ESG data for some JSE firms. Refinitiv’s ESG data availability dates back to 2002 (Refinitiv, 2021). The Environmental pillar accounts for resource use, emissions and innovation. The Social pillar considers workforce, human rights, community and product responsibility (Refinitiv, 2021). Lastly, the Governance pillar incorporates factors such as management, shareholders and CSR strategy (Refinitiv, 2021). The scoring method utilises verifiable and publicly available data, typically from annual reports, a stock exchange filing information, company websites, etc.

Bloomberg provides ESG data for over 11 800 companies worldwide, including ESG data for some JSE firms. The ESG rating agency has been compiling and providing ESG data since 2006 (Bloomberg, 2021). The Environmental pillar accounts for gas emissions, impact of climate change, various form of pollution, waste management and disposal, green energy, and resource depletion. The Social pillar considers supply chain, political contributions, diversity and inclusion, human rights, various forms of

discrimination and community relations (Bloomberg, 2014). Bloomberg collects data from publicly available sources, such as sustainability reports, annual reports, market communicated information, company websites, third-party research, etc. (FrameworkESG, 2014), and includes surveys requesting information from companies via a survey (Bloomberg, 2014).

Table 1: Comparison Across Prominent ESG Rating Agencies, adapted from (FrameworkESG, 2019) (Boffo & Patalano, 2020)

	Refinitiv	**Bloomberg**
Scale	D- to A+ (0 to 1)	0 to 100
Data source	Publicly available information	Publicly available information
Company submission considered?	No evidence of the company providing input	Yes
Categories/themes across pillars	10	18
Frequency of reviews	Annual (31 December)	Annual (31 March)
Index in the JSE	No	No

Both rating agencies cover a wide range of companies ranging from 9 000 to over 11 800 companies an investment community. This is arguably a vast ESG modelling experience across the two agencies. While both agencies utilise publicly available information, Bloomberg supplements sourcing of information with a survey. The ESG issues considered and the rating methodologies employed are not similar between the two rating agencies. In all likelihood, the differences in themes and analysis approaches will lead to inconsistent ESG scoring outcomes across the agencies.

ESG rating agencies have come under criticism because ESG data from different rating agencies is not comparable. Serafeim and Yoon (2021) found that ESG rating scores from different rating agencies showed different abilities to forecast or predict financial returns. The inability to forecast consistently across agencies further undermines the comparability factor between ESG rating agencies. ESG ratings from different providers

will likely fail to give a reliable indication of investment returns. It is difficult to tell which ESG data provider will yield favourable ESG investment returns in the JSE.

Moreover, there is no legal body that regulates the industry of ESG rating agency hence the fertile environment for conflicting ESG data. As noted above, each agency devises its own assessment rules and methodologies. Standardised ESG approaches and methodologies to the evaluation of companies do not exist (Escrig-olmedo et al., 2010). In the absence of governing structure, participants are likely to continue making their own rules resulting in even broader confusion. As long the rating agencies are not operating from a standardised framework, the ESG rating score divergence will persist.

The nature of the relationship between any two rating agencies is heterogeneous and inconsistent. The correlation between Bloomberg and MSCI ESG rating data was positive and relatively low at 0.316 (Gibson et al., 2020), and 0.27 (Zumente & Lāce, 2021). However, MSCI and Bloomberg related differently to other agencies such as ISS QS, RobecoSAM and Sustainalytics (Zumente & Lāce, 2021). The more ESG data is available and quality of publicly available information is improve, the more evident is the divergence (Kotsantonis & Serafeim, 2019). Investors are likely to struggle with making important investment decisions with the conflicting ESG data. The existence of such divergence in the JSE should be verified.

Insufficient details on rating methodologies possibly explain variation in ratings. Different approaches in rating scope, calculation weightings and measurement indicators are the source of the divergence in ESG rating (Berg et al., 2020). From experience of this study information on how rating agencies rate firms is not available in the public domain. The lack of transparency across rating agencies makes it difficult for ESG data users to compares agencies and understand how firms are evaluated (Escrig-Olmedo et al., 2019) (Veenstra & Ellemers, 2020). Standardised reporting approach should circumvent ESG rating divergence.

2.9 Previous Studies on ESG Investing in the JSE Context

As noted in Chapter 1, the terminology for investment for the good cause or Responsible Investment has evolved. The following sections will review studies and research work for ESG and similar investment themes, such as “CSR”, “SRI” and/or “Impact Investing” in the JSE.

2.9.1 ESG specific studies in the JSE

A defined trend between ESG disclosure and financial performance has not been established in the JSE. Naik & Ward (2017) studied the relationship between ESG disclosure and financial performance measured using CAGR, for the Top 100 JSE firms between 2014 and 2017, using graphical time series and nonparametric statistical test. The findings showed: 1) High ESG disclosure portfolio neither showed consistent share returns nor outperformed low ESG disclosure portfolio, 2) The All Share Index outperformed high ESG disclosure portfolio in the JSE (Naik & Ward, 2017). The inconclusive results are problematic for investors and businesses. Unless there is unpublished work, further research is necessary to determine the relationship between ESG and financial returns.

Choosing a specific financial measure in evaluating the impact of ESG rating is critical for avoiding paradoxical outcomes. Inconclusive evidence was found between ESG rating and financial performance for 90 JSE firms between 2012 and 2019 (Ball, 2021). In this study, while share price return shows a positive relationship with ESG performance, accounting measures depicted a negative relationship (Ball, 2021). The investor perspective should probably be assessed using market-based measures.

Focusing on one pillar from the three components of ESG uncovers economic investment value. Mans-Kemp (2014) investigated the relationship between corporate governance (G) and the financial performance of firms in the JSE. The study employed ESG data from Bloomberg. The analysis approach utilised regression methods. The study's findings indicated positive relationships between corporate governance (G) and financial performance (Mans-Kemp, 2014). Selection of the right ESG pillar may translate to financial returns in the JSE. Attempts to embark on a single pillar may pose a dilemma and raise questions for the investment strategies, such as how and why any pillar should be selected ahead of the others.

ESG improves access to investment capital for the JSE listed firms. Johnson (2020) measured the cost of capital using WACC to study its relationship with ESG disclosure for JSE firms between 2011 and 2018. The key finding, while consumer goods and service firms showed a significant negative relationship between ESG disclosure and WACC, the industrial firms showed a positive relationship. Investors may be more

inclined to respond to the ESG behaviour of industrial firms because of the sector's more visible social and environmental impact. Better accessibility to investment capital reduces the cost of capital. ESG performance makes JSE certain firms attractive from the investment perspective.

The combination of specific JSE sectors and ESG pillars maximise financial returns for investors. Another study investigated the relationship between ESG rating and accounting, market and value-based measures Johnson et al. (2019). Investors will typically lean towards market-related tools for investment evaluation, so interpretation of the result is restricted to market performance measures. The study utilised ESG data from a third party, Bloomberg, for JSE firms between 2011 and 2016. No meaningful relationship was established between ESG and the investigated performance measures. However, certain ESG pillars yielded meaningful relationships. The E-rating scores showed a significant negative association with EY ratio for the analysed firms in the consumer goods sector. While the S-rating scores showed a significant positive relationship with consumer services firms, the S-rating had a significant negative relationship with TSR[1] of the overall sample (Johnson et al., 2019). ESG rating performance yet again fails to demonstrate a clear relationship with financial performance.

ESG rating stature does not translate to financial returns alone but generates interest for institutional investors. A study by Moikwatlhai (2019) investigated whether incorporating ESG issues by the JSE firms resulted in the attraction of long-term investors. The study utilised Thomson Reuters ESG rating data between 2012 and 2016 using statistical correlation tools. The findings showed no meaningful relationship between ESG rating scores and long term investors (Moikwatlhai, 2019). It can be argued that the five-year data is not sufficient for accurate measurement of long terms investment. Additional research is necessary to determine the relationship between ESG performance and key stakeholders of ESG investment.

In concluding this section, more studies from the above discussion have focused on the relationship between ESG rating and the firm's financial performance. The studies have not successfully established a meaningful relationship between ESG rating and financial

[1] TSR = returns to shareholder over a specific period

performance. At best, the results were inconclusive, as noted with the work of (Naik & Ward, 2017) and (Moikwatlhai, 2019).

2.9.2 CSR/SRI studies in the JSE

The ESG index in the form of Socially Responsible Investing Index (SRII) has not consistently outperformed the JSE All Share Index. The SRII provided better returns over JSE All Share between 2004 and 2007 but statistically significance of the results was limited to 2004 only (Gladysek & Chipeta, 2012). Even after 2007, there was no evidence of sustained performance. Bondera (2014) found no significant differences in returns between SRII and JSE All Share Index between 2004 and 2013. Investors seeking financial returns would have questioned the motive to switch to ESG investing if the uncertainty persisted.

Determining the relationship between impact investing and financial performance in the JSE has uncertain cause of action for companies and investors. Nkomani's (2013) investigated the relationship between Corporate Social Responsibility (CSR) and financial performance for JSE firms between 2002 and 2011. No meaningful relationship between CSR and financial returns was found in general, but some minimal causality was noted on stock returns. There was no confirmation if the results could be attributed to companies in the Socially Responsible Investing Index (SRII). Responsible investing, as an investment style for financial returns, is probably not working in the JSE. A separate study confirmed the lack of relationship between firms' listing in the JSE's Socially Responsible Investing Index (SRII) listing and financial performance between 2009 and 2014 (Du Toit & Lekoloane, 2018). Impact investment, to some extent, offers a trade-off between returns and impact (Mogapi, 2016).

Correct selection of investment portfolio or index has a potential to provide financial returns. An extract from a JSE presentation suggests an outperformance of the responsible investment index, JSE Responsible Index Top 30, over SWIX All Share Index (Soobramoney, 2019). The sustained outperformance is evident between 2015 and 2018 (Soobramoney, 2019). This evidence suggests that investors should improve understanding and insight on the ESG investment styles.

Figure 5: Responsible Investment Top 30 vs SWIX All Share, Adapted from (Soobramoney, 2019)

2.10 Conclusion

Clearly, the literature and scholars remain divided on whether the ESG initiative translates to financial returns. The conflicting role of ESG rating agencies may be exacerbating the confusion on ESG issues. These claims lead to a question: What does it take for a company to acquire an ESG rating status? Are there lost opportunities or hidden costs incurred by a business while embarking on ESG issues that possibly do not yield acceptable financial returns for shareholders and investors? Are investors worse off with an ESG portfolio compared to the market portfolio?

3. Chapter 3: Research Questions and Hypotheses

The study sought to determine the financial cost of ESG investing in the JSE between 31 December 2008 and 30 June 2021.

3.1 Research Question 1 – Returns Between High and Low ESG Rating

The premise of the stakeholder theory is that a firm that satisfies its stakeholders will create more value for itself and the stakeholders (Kessler, 2013). So firms with high ESG performance are likely to have improved financial returns because of the positive relationship between ESG performance and value added (Signori et al., 2021). Value add associated with ESG performance includes an opportunity for lessened regulations, cost reduction and improved firm productivity (Henisz et al., 2019). A firm's ESG performance is directly propositional to the financial performance of the firm. Based on this argument, the ESG performance of firm results in a varying degree of financial performance. Accordingly, the following research question and related hypothesis were developed:

Research Question 1: Does a high ESG rating portfolio give better financial returns than a low ESG portfolio in the JSE?

In order to answer the question, five portfolios were created using the ESG performance data of a firm in the JSE. The supporting hypothesis is as follows:

H_1: High ranked ESG portfolio has higher returns than a low ranked ESG portfolio

H_1: Returns of Q1 > Returns of Q5, or Q1/Q5 > 1

Where,

Q1 is the high (first) ranked ESG portfolio in term of performance, and

Q5 is the low (fifth) ranked ESG portfolio in terms of performance

3.2 Research Question 2 – Returns Between High ESG Rating and Market Returns

The argument from the previous research question holds in this section too. Stakeholders theory suggests that satisfied stakeholders' outcome should translate to financial returns (Kessler, 2013). In the ESG setting, stakeholders could include environmentalist, social sphere and governance perspectives. High ESG rating signals stakeholder satisfaction in this context. The adoption of ESG investing in South Africa is heavily dependent on active investment management. Outperforming the market is the primary focus of an active investment management strategy (Rathbones, 2017). Consequently, the following research question and related hypothesis were developed:

Research question 2: Does a high ESG rating portfolio give better financial returns than the market or the JSE All Share Index?

In order to answer the question, five portfolios were created using the ESG performance data of a firm in the JSE. The supporting hypothesis is as follows:

H_2: High ranked ESG portfolio has higher returns than ALSI portfolio

H_2: Returns of Q1 > Returns of J203T,

Where,

Q1 is the (first) top ranked ESG performing portfolio, and

J203T is the All Share Index portfolio

3.3 Research Question 3 – Returns Between ESG Ratings from Different Rating Agencies

ESG rating agencies have come under criticism because ESG data from different rating agencies is not comparable. Serafeim and Yoon (2021) found that ESG rating scores from different rating agencies showed different abilities to forecast or predict financial returns. The inability to forecast consistently across agencies further undermines the comparability factor between ESG rating agencies. ESG ratings from different providers will likely fail to give a reliable indication of investment returns. It is difficult to tell which ESG data provider will yield favourable ESG investment returns in the JSE. Consequently, the following research question and related hypothesis was developed

Research question 3: Do ESG ratings from different rating agencies yield the same financial returns in the JSE?

The extent to which ESG rating agencies disagree in the JSE is unknown. The financial performance of similar portfolios but from different rating agencies are compared. The related hypothesis is as follows:

H_3: Similar ESG portfolios from different ESG rating agencies do not give the same returns

H_3: Returns of Portfolio from (ESG data 1) ≠ Returns of Portfolio from (ESG data 2)

3.4 Research Question 4 – Correlation of ESG Ratings from Different Rating Agencies

There is no legal body that regulates the industry of ESG rating agency hence the fertile environment for conflicting ESG data. Each agency devises its own assessment rules and methodologies. Standardised ESG approaches and methodologies to evaluate companies do not exist (Escrig-olmedo et al., 2010). In the absence of governing structure, participants are likely to continue making their own rules resulting in even broader confusion. As long the rating agencies are not operating from a standardised framework, the ESG rating score divergence will persist. The nature of the relationship between any two rating agencies is heterogeneous and inconsistent. The relationship between any two ESG rating agencies' data sometimes correlates, and the next combination shows no relationship (Gibson et al., 2020) (Zumente & Lāce, 2021). Accordingly, the following research question and related hypothesis were developed:

Research question 4: Do ESG rating scores from different rating agencies converge in the JSE?

H_4: There is no relationship between ESG rating scores given by different rating agencies in the JSE

H_4: ESG score 1 does not correlate with ESG score 2

4. Chapter 4: Research Methodology

4.1 Introduction

The purpose of this research was to quantify the financial cost of ESG investing in the JSE. In order to answer the research questions, the study was divided into two parts. The first part determined the relationship between the ESG rating and the financial performance of the listed firms. The second part determined the relationship between ESG ratings from two different rating agencies and whether this influences financial returns.

The study aimed to answer the following research questions:

Research question 1: Does a high ESG rating portfolio give better financial returns than a low ESG portfolio in the JSE?

Research question 2: Does a high ESG rating portfolio give better financial returns than the market or conventional portfolio in the JSE (ALSI)?

Research question 3: Do ESG ratings from different rating agencies yield the same financial returns in the JSE?

Research question 4: Do ESG rating scores from different rating agencies for the JSE firms converge?

4.2 Research design

4.2.1 Philosophy

Research philosophy can be defined as the “system of beliefs and assumptions about the development and nature of knowledge” (Saunders & Lewis, 2018). The research approach adopted positivism because the study sought to objectively determine the financial cost of ESG investing in the JSE. Positivism is appropriate because it emphasises the objectivity aspect (Frey, 2018b).

4.2.2 Approach to theory development

Theory development seeks to determine a “relationship between two or more concepts or variables” (Saunders & Lewis, 2018). The selected approach for the research is deduction because it involves testing the formulated theoretical proposition through the

research process (Saunders & Lewis, 2018). In establishing the financial cost of ESG investing in the JSE, the research determined relationships between “ESG rating” and “financial performance”.

The second part of the research established the association between “ESG rating scores” from different agencies. The association was determined using two methods. The first method employed graphical time series representation, and the second method employed a statistical correlation test.

4.2.3 Strategy

In order to answer the research questions, the research strategy utilised readily available secondary data from trusted third-party databases. The first type of secondary data required for the study was the companies’ ESG rating scores for the listed firms. The first ESG data set, from Refinitiv, was readily available in the Eikon database accessed via GIBS’ Information Centre subscription. The second ESG data set, from Bloomberg, was requested from GIBS’ Information Centre.

The second type of data required for the study was the financial information typically found in the annual financial statements. The Style Engine database supplied the financial performance data (Muller & Ward, 2013). The Style Engine is a proprietary database used with the permission of the owners. The available secondary data in the Style Engine was found appropriate and adequate for the study because it contained financial returns, including share price performance, for the JSE firms matching the ESG rating data. Similar to this research, several studies have employed the Style Engine data for measuring financial performance (Taljaard et al., 2015) (Viljoen, 2016) (Naik & Ward, 2017).

4.2.4 Time horizon

The study adopted the longitudinal time horizon because longitudinal studies measure the same variable over time (Schindler, 2019). The study measured JSE firms financial performance over time between December 2008 and June 2021. The effect of the varying ESG score was studied over the same period. A similar study determining the effect of ESG disclosure on financial performance also adopted the longitudinal time horizon (Naik & Ward, 2017).

4.2.5 Methodological choices

Quantitative research process is suitable for quantifying the financial cost of ESG investing in the JSE because the method puts emphasis on the "quantity of a phenomenon" (Schindler, 2019). The study sought to generalise the financial cost of investing in the ESG portfolio in the JSE, and quantitative research is suitable because the statistical findings may be generalised (Dawson, 2007).

4.3 Population

The focus of the study was on the ESG investing in the JSE. The nature of the study restricted the population to the firms listed in JSE. For the study to answer the research questions, the identified JSE firms were required to have an ESG rating score available from reputable ESG rating agencies, Refinitiv and Bloomberg, for the period suitable for the study, 31 December 2008 until 30 June 2021.

4.4 Unit of analysis

The study sought to determine the financial cost of ESG investing by observing and measuring a firm's financial performance in relation to the ESG rating. The unit of analysis was the JSE firms' CAGR (compounded annual growth rate).

4.5 Sampling method and size

The non-probability purposive sampling method was adopted because the study required firms fitting specific criteria (Schindler, 2019). The researcher selected the top 139 JSE firms for the study.

For the **primary** and **secondary** research objectives, the selected firms complied with the following criteria:

- Listed in the JSE
- Had at least one ESG rating set from a reputable ESG rating agency between 2008 until June 2021
- Had financial data in the Style Engine database from 2008 until June 2021

In the above criteria, the Refinitiv and Bloomberg ESG data was selected because it was comprehensive, and it covered the full range of the study period from 2008 until June 2021 as required in the study. The total number of firms meeting the above criteria

was 113 and 110, respectively. The reason for excluding the other firms from the list of 139 was the lack of ESG rating data from Thomson Reuters.

4.6 Measurement instrument

A measurement instrument is a "tool for collecting data on a study's variables", which may include surveys (Schindler, 2019). The secondary data for the study were ESG rating scores and financial performance. As criteria for the secondary data to meet the needs of the study, the following was required:

- The data had to be of the JSE listed firms.
- The ESG rating score had to be the overall score and not a subcomponent of three ESG pillars because the scope of the study focused on the overall ESG performance.
- The ESG rating score for the firms had to cover the selected time range for the study, i.e. between 2008 and 2021.
- The second set of ESG data had to cover at least four consecutive years to enable meaningful comparison between two rating agencies. The few years for the second set was expected due to limited access to ESG data.
- The financial performance data is the firms' share price and had to cover the selected time range for the study.

4.6.1 Research Construct 1 – ESG Rating of Firms

In order to determine the financial cost of investing in the JSE, all firms in the JSE with ESG rating scores were pooled and ranked in the order of good to poor performance. The study created five equally weighted portfolios, or quintiles, similar to past prominent graphical time-series research work of Muller and Ward (2013) on measuring financial performance in the JSE stocks. The five portfolios were created using the ESG rating of the firms per quarter between 2008 and 2021. The portfolio was re-evaluated and re-balanced every quarter.

4.6.2 Research Construct 2 – Financial Performance

- Financial Performance (Portfolio/Portfolio Construction/Market Portfolio)

In order to determine the performance on the ESG based portfolio, a link to financial performance was introduced. The growth of the portfolio was measured by the share price performance of each constituent in the portfolio. Total earnings from each quarter were carried over to the period.

A portfolio holding period of three months was selected to accommodate changes in ESG ratings and financial reporting that happen at different times during the year. The All Share Index (ALSI / J203T) represented the market portfolio or the benchmark. No specific criteria were implemented to manipulate the ALSI performance.

4.6.3 Research variables

The development of the research question defined the data essential for the research. The hypothesis gave insight into the variables necessary for the study. The relevant variables for the research were from the two constructs of “ESG rating” and “financial performance”. The study focused on the measure of financial performance in relation to the ESG rating change. Therefore, the financial performance and the share price or CAGR represented the dependent variable as its performance “dependent” on the ESG rating variation. Conclusively, the ESG rating (ESGR) score is the independent variable over time. The applicable variables are summarised in the following table.

Table 2: Summary of Independent and Dependant Variables

	Independent Variable(s)	**Dependant Variables(s)**
RQ 1	ESGR score of JSE firms	Financial performance, CAGR
RQ 2	ESGR score of JSE firms	Financial performance, CAGR
RQ 3	ESGR score of JSE firms from various agencies	Financial performance, CAGR
RQ 4	ESGR score from various agencies, e.g. ESG score from Refinitiv	JSE firms receiving ESG rating score

4.7 Data collection

The data necessary for the study were ESG rating scores and the financial performance of the JSE firms.

Table 3: Summary of data collection sources and application for the study

Database / source	Data type	How the study uses the data	Research question affected
Eikon/ Refinitiv Eikon	ESG rating score from the Refinitiv rating agency, mainly between 2008 and 2021	The ESG rating scores were used to create several ESG quintiles (portfolios).	RQ 1 RQ 2 RQ 3 RQ 4
Bloomberg	ESG rating score from the Bloomberg rating agency, mainly between 2008 and 2021	The ESG rating scores are used to create several ESG quintiles (portfolios).	RQ 1 RQ 2 RQ 3 RQ 4
Style Engine database (based on annual financial reports of the firms)	JSE companies' financial performance data	The purpose is to establish the relationship between the ESG portfolios (quintiles) and financial performance.	RQ 1 RQ 2 RQ 3 RQ 4

4.7.1 ESG Rating Scores

The ESG rating data was collected from two different rating agencies, Refinitiv and Bloomberg. The purpose of Refinitiv's and Bloomberg's ESG rating data set was to address Research Question 1 and Research Question 2 by determining the relationship between ESG rating score and financial performance. Research Question 3 was addressed by comparing the financial returns between portfolios generated using data from the two rating agencies. Research Question 4 was addressed through a statistical correlation tool between the two rating agencies.

The first set of ESG data was collected from the Refinitiv's Eikon database accessed via GIBS' subscription. The database allowed downloading of the rating scores in MS Excel

per firm. The data was collected for the period ranging from 2008 to 2020. The collected data covered 118 JSE firms, but not all of these firms had data for the entire duration of 2008 to 2020. Refer to **5.1.1** for descriptive statistics for the data.

The second ESG data set was sourced from Bloomberg's database. GIBS' Information Centre provided the information. The rating scores were supplied in MS Excel listing the JSE firm. The data was collected for the period ranging from 2008 to 2020. The collected data covered 110 JSE firms from the list of 138. However, not all of these firms had data for the entire duration of 2008 to 2020. Refer to section **5.1.1** data distribution during the period.

The scale for Refinitiv's ESG score ranged from best the performance rating of A+ to the worst performance rating of D–. Although the scores were supplied in the letter conventions, each letter denomination was equivalent to a numeric range. For example, A+ was equivalent to the range of 0.92 and 1 (Refinitiv, 2021), see **Table 4**. To compare to other rating agencies, the ranges were averaged to a single value and then scaled to 100. Even though averaging to a single value from such as wide range may introduce an error, the approach was deemed acceptable for the purpose of the study. Bloomberg's ESG scores were supplied on a scale of 100 and adopted without any modifications.

Table 4: Refinitiv ESG Scoring Scale Adapted from (Refinitiv, 2021)

Rating	A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-
Lower limit	0.92	0.83	0.75	0.66	0.58	0.50	0.42	0.33	0.25	0.16	0.08	0
Upper limit	1	0.92	0.83	0.75	0.66	0.58	0.50	0.42	0.33	0.25	0.16	0.08
Average	0.95	0.875	0.792	0.708	0.625	0.541	0.458	0.375	0.292	0.208	0.125	0.042
Scaling to 100	95	87.5	79.2	70.8	62.5	54.1	45.8	37.5	29.2	20.8	12.5	4.2

4.7.2 Financial Performance Data

The financial data employed the historical financial performance data of the JSE firms from the Style Engine database, approach previously utilised for the JSE firms' financial performance studies by (Muller & Ward, 2013), (Taljaard et al., 2015), (Viljoen, 2016) and (Naik & Ward, 2017).

The Style Engine database was constructed by (Muller & Ward, 2013), and this study utilised the information with the owners' permission. The databases incorporated financial information such as earnings including historical dividends of the top 160 JSE firms starting from 1986 (Muller & Ward, 2013). In keeping up with firms' financial information accuracy, the database is regularly updated. Additionally, data for dirms companies that survive and remain listed.

For this study the important variables were the firms share price, total accumulated dividends and accounting earnings. The earnings were calculated daily and reported quarterly to accommodate different reporting dates for various firms in the JSE. The scale of measurement for the share price is the ratio.

4.8 Data Analysis Approach

4.8.1 Analysis Approach for Research Question 1, 2 and 3

In order to address the research questions, a graphical time-series analysis was employed. The analysis utilised the proprietary software packages associated with the Style Engine, the investment style-based database. New portfolio quintiles were created in each quarter and financial performance, CAGR, measured and reported quarterly. The graphical representation of the returns over time provided a schematic depiction of the financial performance for visual assessment, comparability and interpretation.

a) Portfolio creation

The software created five equally weighted portfolios, or quintiles, similar to past renowned graphical time-series research work on measuring financial performance in the JSE stocks. The five portfolios were created by ranking ESG ratings of the JSE firms between 2008 and 2021. The top-ranked performing quintile portfolio was given a denomination of Q1, and the bottom-ranked portfolio was denominated as Q5. The portfolios were re-evaluated and re-balanced quarterly. In the creation of the portfolios, efforts were made to get even distribution across the five portfolios as much as possible.

Table 5: Illustration of Quintile Portfolio Construction

Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
20% (1/5) of firms with the **best/top** ESG rating	20% (1/5) of firms with the 2nd best ESG rating	20% (1/5) of firms with the middle ESG rating	20% (1/5) of firms with the 2nd last ESG rating	20% (1/5) of firms with the **worst/bottom** ESG rating

b) Financial returns calculation and comparison

Financial performance for each portfolio was measured daily but reported quarterly or every three months. At the end of each quarter, the portfolio's performance was rebalanced, and earnings carried over to the next period in the form of cumulative returns. The financial returns were calculated using the following equation.

Total earnings = annual earnings + dividends + share price growth

In order to enable comparison across the five created portfolios, CARG was employed because the tool is a good indicator for accurate prediction of investment portfolio that is likely to fluctuate over time (Wayman, 2021). The use of CARG is consistent with the business practices because investors and portfolio analysts track portfolio performance through CARG (Rajeswari, 2020).

$$\text{CARG} = \left(\frac{Last\_Earnings}{First\_Earnings}\right)^{\left(\frac{1}{n}\right)} - 1$$

$$\text{CARG} = \left(\frac{Last\_Earnings}{First\_Earnings}\right)^{\left(\frac{365.25}{Final\ date - Initial\ date}\right)} - 1$$

Where *n* is the number of investment periods.

c) Graphical time-series plot

The time series employed a 2D dimensional plot, where the x-axis and y-axis represented the study period and the financial returns (CARG), respectively. The Style-Engine software plotted the performance of each quintile of the five portfolios, Q1 to Q5, for the duration of the study. Similarly, the J203T benchmark portfolio was plotted on the same graph.

The software generated a relative line graph for performances of Q1 and Q5 to answer Research Question 1. Another relative line graph for the performance of Q1 and J203T was included to answer Research Question 2. There was one time series for Refinitiv's and another one for Bloomberg's ESG data.

Research Question 3 was answered by comparing the performance of Refinitiv's and Bloomberg's respective portfolios, e.g. Refinitiv's portfolio Q1 to Bloomberg's portfolio Q1.

d) Statistical test for difference for financial returns

T-test and regression statistical tools have been extensively employed for measuring the significance of differences of financial returns. Previous similar studies determining financial returns utilised the t-test (Bondera, 2014) and OLS regression (Malatji, 2019) for measuring the differences. In line with the literature, this study considered a test for difference tool.

Normal distribution of the financial return data, CAGR, was the key assumption and indicator of a suitable statistical test tool. The assumption was tested using the Shapiro-Wilk method because it is a powerful technique for data sample size ranging between 30 and 5000 (Razali & Wah, 2011). The null hypothesis for Shapiro-Wilk that data is normally distributed is accepted if the Sig. value or p-value greater than 0.05 (Mishra et al., 2019). Refer to section **5.2.2** for the results of CAGR for the Bloomberg's portfolios.

The normality test results provided guidance on whether parametric or non-parametric test was suitable to test for difference between two portfolios. From section **5.2.2**, the CAGR results deviated from properties of normal distributed data. Non-parametric technique was therefore applicable for the financial returns of the portfolios. Mann-Whitney U was adopted for testing differences financial returns between two ESG portfolios at a time, because Mann-Whitney U is an excellent test where T-test is precluded (Nachar, 2008). Mann-Whitney U is capable of determining differences between two independent groups (Milenovic, 2011). The capability of Mann-Whitney U test aligns with the examination of two portfolios at a time as follows:

- Portfolio Q1 against portfolio Q5 for Research Question 1 for each ESG data,

- Portfolio Q1 against the benchmark portfolio J203T for Research Question 2 for each ESG data,
- Refinitiv portfolios Q1 with Bloomberg portfolios Q1 to answer Research Question 3, and
- Refinitiv portfolios Q5 with Bloomberg portfolios Q5 to answer Research Question 3.

While the Mann-Whitney U technique was sufficient for portfolio pair-wise comparison which conforms to the scope of the study as discussed above, a technique capable of evaluating the relationship across all five portfolios at once was beneficial for the study. Kruskal-Wallis is statistical test method for difference of three or more independent groups (Ostertagová et al., 2014). The null hypothesis is that independent samples are the same based on ranking analysis, and the conditions for Kruskal-Wallis include at least one ordinal variable, independent groups, similar data distribution and random sampling (Schmidt, 2012).

For the comparison of the five independent portfolios, the portfolio groups make the "independent variable" and investment time or period was the "dependant variable" which is ordinal. The CAGR portfolio performance data met the condition for Kruskal-Wallis, and therefor was adopted. Kruskal-Wallis results for the portfolios constructed from the Bloomberg ESG data are provided in **Appendix 1** (f).

e) Bootstrapping statistics for financial returns

In addition to the above statistical approached, bootstrapping was employed verify the visual significance of the graphical time series results.

Bootstrapping technique takes the universe of the ESG portfolio and then construct random portfolios and then calculate CAGR for these combinations 100 times. The aim was to generate the extreme cases (max and min) and the mean. Bootstrap can be successfully used with any statistical analysis for inference (Boos, 2003).

The actual graphical time series were then overlaid on the bootstrap extreme cases or distribution envelope. run 100 random combination of the JSE firm and genera cases

4.8.2 Analysis Approach for Research Question 4

Research Question 4 examined the relationship between ESG rating scores between the rating agencies, and this differs from Research Question 3, which examined the differences in financial returns due to different rating agencies.

Other similar research studies determining the convergence of ESG rating agencies have employed the Pearson correlation approach (Gibson et al., 2020) (Christensen et al., 2021) and unspecified correlation tools (Dorfleitner et al., 2015) (Zumente & Lāce, 2021). In line with the literature, the correlation approach was adopted for the study.

Normal distribution is a crucial assumption for the commonly used correlational testing techniques. The assumption was tested to preserve the accuracy and reliability of the study (Ghasemi & Zahediasl, 2012). Shapiro-Wilk method was employed to verify ESG data normality (Mishra et al., 2019). This is because the method is a powerful technique for normality test for all sample sizes greater than 30 c For a small sample size, less than 30, the Shapiro-Wilk is not as accurate, but it is the best available technique so far (Razali & Wah, 2011). The null hypothesis for Shapiro-Wilk is that data is normally distributed. The Sig. value or p-value greater than 0.05 suggests the hypothesis should be accepted (Mishra et al., 2019). Refer to section **5.3.2** for the Shapiro-Wilk test results for ESG rating data for both Refinitiv and Bloomberg.

The outcome of the normality test determined whether a parametric or non-parametric test should be used for correlation test. For normally distributed ESG data, Pearson correlation test was employed because it is suitable for parametric data (Hauke & Kossowski, 2011). Spearman correlation was employed for the non-normally distributed ESG rating data, because the technique is widely used for non-parametric data (Frey, 2018a). The literature varied on the interpretation of the strength of the correlations, this study adopted the following guidance for the coefficients interpretation: 0.40 – 0.69 means moderate correlation, and 0.70 – 0.89 means strong correlations (Schober & Schwarte, 2018) (Akoglu, 2018).

Both Pearson correlation and Spearman correlation tests were employed for the study. Refer to section **5.3.3** for the results.

4.9 Data Quality

The study employed secondary data, so the reliability and validity tests were thus excluded from the data quality analysis and discussion. Subject selection, history and testing play a role in the credibility of research (Saunders & Lewis, 2018). The substantiation of the credibility of the secondary data was based on the assessment of who collected the data, the purpose of the data, the nature of raw information and how it was collected and the consistency of the data (Stewart & Kamins, 1993).

4.9.1 Credibility of ESG Rating Data

a) Refinitiv

The first set of ESG data was sourced from Refinitiv's database called Eikon. The data was originally collected and prepared by Refinitiv, an agency that has been supplying the data since 2002 (Refinitiv, 2021). In order to prevent external tempering of the information, the data is protected with appropriate security standards, policies and practices against malware(Refinitiv, n.d.).

In line with the current study, the data was collected, sorted and presented as firms ESG disclosure or rating score. The ESG performance for each firm is calculated using publicly available information from annual reports, company websites, stock exchange filings, etc. To ensure the recency of the data, the information is reviewed and updated every second week (Refinitiv, 2021) (Huber & Comstock, 2017).

The ESG score is supported by raw data collection directly linked to the three ESG pillars. The environment pillar collects data for measuring innovation, emissions and resource use. Indicators on workforce, product responsibility, human rights and community is collected for the social pillar. CSR strategy, management and stakeholders data is collected for the governance pillar (Refinitiv, 2021). The data is collected from companies' annual reporting, websites and listing filings with data processing employing algorithmic techniques and human interventions (Refinitiv, 2021).

b) Bloomberg's Data

The second set of ESG data for the current study was sourced from Bloomberg's database. The raw data was collected by Bloomberg. In line with the current study, Bloomberg collected the firms' raw data for evaluating and rating their ESG

performance. The ESG rating score is mainly used for investment purposes. The data collection process focuses on eighteen themes across the three pillars of ESG. Each pillar covers six themes. Bloomberg's methodology collects data from annual reports, CSR reports, firm websites and by means of company completed survey (Bloomberg, 2014).

4.9.2 Credibility of Financial Performance Data

The financial performance data was sourced from the Style Engine database. Muller and Ward (2013) collected the data of JSE listed companies. The purpose of collecting the data was to analyse financial performance measures for various investment styles by measuring the impact by quantifying the annualised returns for each style (Muller & Ward, 2013). The database was created using the share price data of the listed companies in the JSE between 1986 and 2011. The information was acquired from financial statements and INET, the provider of financial data (Muller & Ward, 2013).

Muller and Ward proved the consistency and credibility of the databases using two approaches. Firstly, they created an equally weighted index using data from the Style Engine database for the period between 1994 and 2011. The constructed index successfully tracked the J203T, confirming the accuracy of the database's data. Secondly, random quintile portfolios were created and successfully demonstrated that the database and methodology had no biases (Muller & Ward, 2013).

4.10 Limitations of Methodology

The overall limitation was that the study was restricted to the JSE firms, with South African specific factors. A different environment could have yielded a different outcome. Secondly, other factors not related to the ESG rating could have influenced the financial performance of the analysed portfolios.

4.10.1 Methodology Limitation

Transactional costs are excluded from the cumulative returns, as these are deemed negligible (Muller & Ward, 2013). Additionally, the transactional cost will not have an in the determination of the differences of the financial returns between quintiles. All quintiles will be subjected to the same costs. In reality, if the costs are included, the returns would be slightly less.

The study purposively selected the top JSE companies, primarily for a high likelihood of ESG rating availability and better liquidity. No consideration was taken into account with regards to the type of sectors in the JSE. The study was unable to offset bias, if any, associated with sectors in the JSE.

Refinitiv's score are provided in a letter convention, and each letter represented a numerical range. For numerical analysis, the study assumed the average value of the range. In reality, the score could be higher or lower than assumed.

Mann-Whitney U method was used for evaluation of difference between two selected portfolios. When using SPSS, the method tends to auto-correct data. The extent and effect of data auto-correction was not accounted for.

4.10.2 Data Limitation for Research Question 1, 2 and 3

The availability of the ESG rating data was the limiting factor regarding the number of firms for the analysis. While the study targeted 138 companies, the final sample sizes were reduced to 113 and 110 for Refinitiv and Bloomberg, respectively. Refer to section **5.1.1**.

4.10.3 Data Limitation for Research Question 4

In order to answer the research question probing the divergence of ESG rating agencies, a minimum of two data sets was required. The agencies were required to have rated the same firms at the same time. As a result of this requirement, sample sizes for respective years incurred reductions. Refer to section **5.3.1**.

4.11 Ethical Clearance and Data Storage

Before any data could be gathered for the study, ethical clearance was sought, and it was granted by the research committee of the Gordon Institute of Business Sciences. Refer to **Error! Reference source not found.** for approved Ethical Clearance. Data collected by the researcher, ESG rating reports, was stored in the Google drive facility provided by GIBS. The second storage option was using a USB or/an external hard drive in the care of the researcher. The storage plan complied with the requirement of a minimum storage period of 10 years.

5. Chapter 5: Results

The purpose of this chapter is to discuss the results following analysis performed for the four research questions. The layout of this chapter follows the order of the four research questions and related hypotheses.

The research questions for the study were summarised as follows:

Research question 1: Does a high ESG rating portfolio give better financial returns than a low ESG rating portfolio in the JSE?

Research question 2: Does a high ESG rating portfolio give better financial returns than the market or JSE All Share Index?

Research question 3: Do ESG rating scores from different rating agencies give the same financial returns in the JSE?

Research question 4: Do ESG rating scores from different rating agencies converge in the JSE?

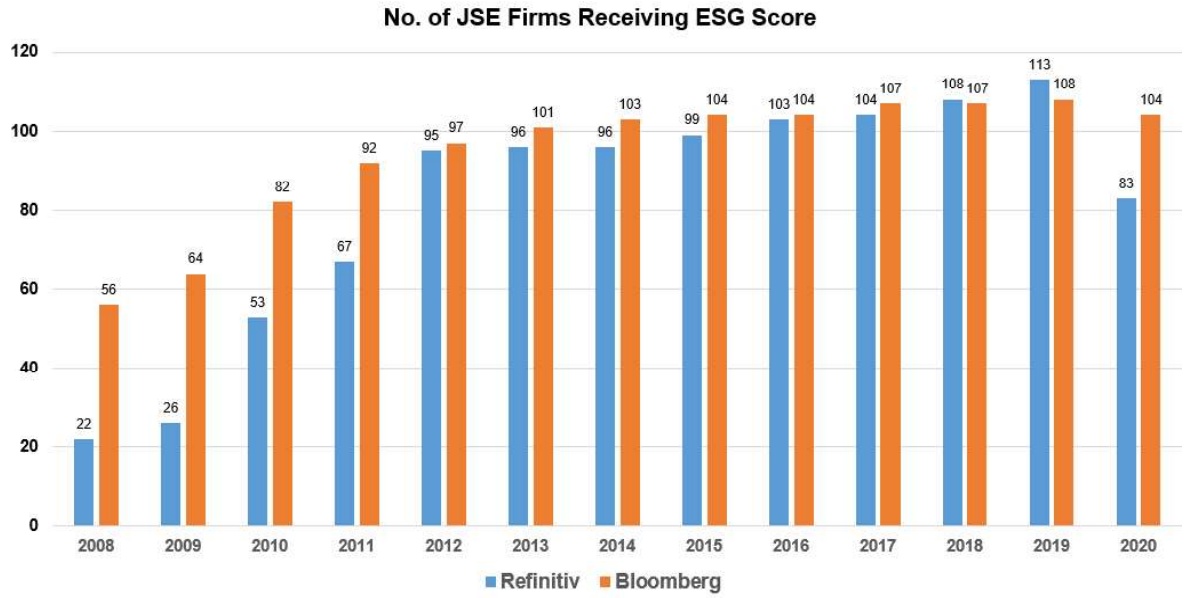
5.1 Results for Research Question 1 and 2

5.1.1 Descriptive Statistics for ESG Rated JSE Firms

These two research questions were addressed using Refinitiv's and Bloomberg's data. The study focused on the time frame ranging from December 2008 to June 2021. **Figure 6** summarises and compares the number of the JSE firms that received the ESG ratings from Refinitiv and Bloomberg. The bar chart option was selected for the ease of comparison and ability to depict the trend.

Figure 6 shows that between 2008 and 2009, there were only 22 and 26 JSE firms that received ESG rating from Refinitiv. Bloomberg was also on the lower end with 56 and 64, respectively. There was a substantial increase of the number of firms receiving ESG rating in the JSE from 2008 until levelling off in 2012. The numbers remained with minimal variations between 2013 and 2019. There was evident fall in the number of firms rated by Refinitiv in 2020.

Figure 6: Number JSE Firms with ESG Rating Scores



5.1.2 Descriptive Statistics for Quintile Portfolios

The purpose of this descriptive statistics is to give an idea of the number of constituents that made up the portfolios. This nature of statistics paints a picture of how portfolio makeup compared between Refinitiv and Bloomberg.

Five quintile portfolios were created and rebalanced quarterly based on the ESG ranking score. There were 51 quarters between 31 December 2008 and 30 June 2021. **Table 6** summarises the minimum, mean and maximum number of constituents of JSE firms making up the Refinitiv and Bloomberg ESG portfolios. The means are relatively comparable between Refinitiv's and Bloomberg's portfolios. But standards deviations are not comparable.

Table 6: Descriptive Statistics for Portfolio from Refinitiv and Bloomberg ESG Data

	N	Minimum	Maximum	Mean	Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Statistic
RefinitivEsgPortfolioQ1	51	4.00	23.00	16.37	5.85
RefinitivEsgPortfolioQ2	51	4.00	23.00	16.45	5.80
RefinitivEsgPortfolioQ3	51	3.00	23.00	16.29	5.92
RefinitivEsgPortfolioQ4	51	4.00	23.00	16.45	5.80
RefinitivEsgPortfolioQ5	51	4.00	23.00	16.37	5.85
BloombergEsgPortfolioQ1	51	10.00	19.00	17.29	2.19
BloombergEsgPortfolioQ2	51	10.00	20.00	17.39	2.29
BloombergEsgPortfolioQ3	51	10.00	20.00	17.31	2.38
BloombergEsgPortfolioQ4	51	10.00	20.00	17.39	2.29
BloombergEsgPortfolioQ5	51	10.00	19.00	17.29	2.18

Figure 7 shows median of the Refinitiv ESG rating scores, schematic representation of the five portfolios general variation of the quality of rating. The median for all five portfolios seems to have remained in same ranges for most of the study period. Notably, the portfolios do not cross because the quarterly review and rebalancing of the quintile portfolios.

Figure 7: Median Refinitiv's ESG Rating Scores

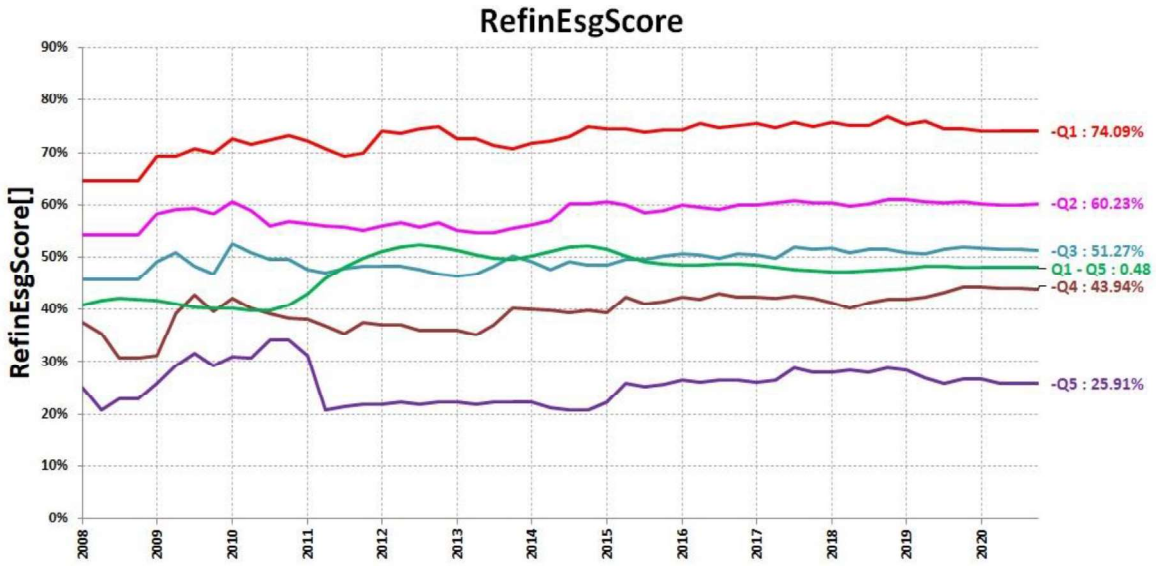
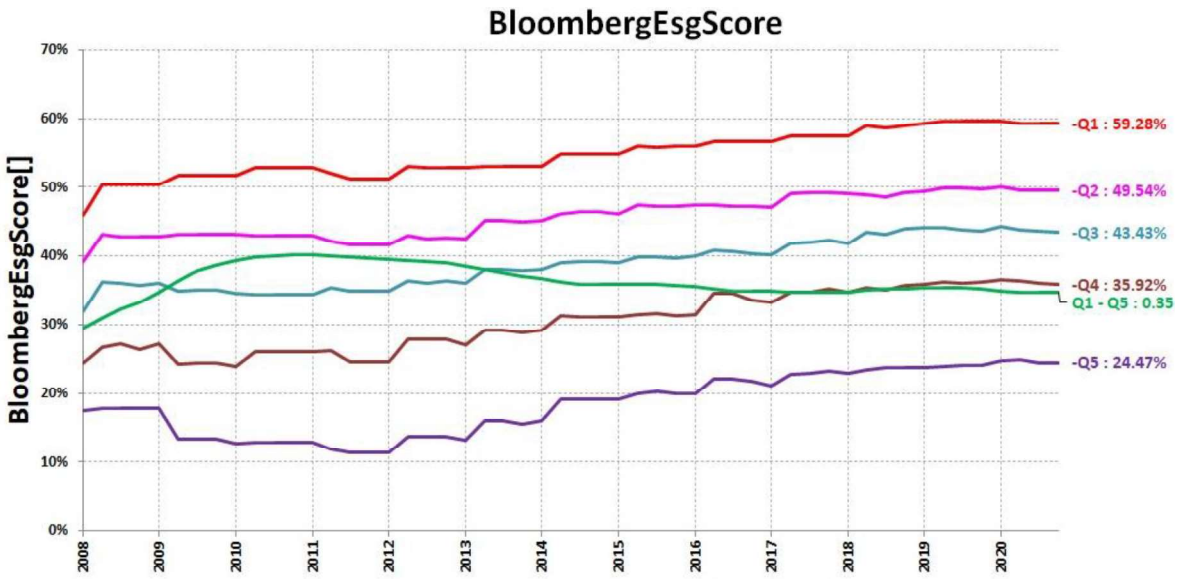


Figure 8 shows median of the Bloomberg ESG rating scores schematic representation of the five portfolios. The median for all five portfolios seems to have trended upwards from around 2012. Notably, the portfolios do not cross because the quarterly review and rebalancing of the quintile portfolios.

Figure 8: Median Bloomberg's ESG Rating Scores



The one notable aspect is that the median score of Q5's is relatively comparable between Refinitiv (25.91%) and Bloomberg (24.47%). However, for the rest of the quintile portfolios, the mean ESG score of Refinitiv is generally higher than Bloomberg's. Another notable aspect is that Bloomberg's ESG ratings have visibly trended higher than Refinitiv's over time. But the means of Bloomberg have generally been lower than Refinitiv's.

5.1.3 Descriptive Statistics for Financial Returns

The table below summarises the basic descriptive statistics for the financial returns of the five portfolios. The purpose of the descriptive statistics is to show high level comparison across portfolios. The focus is on high ESG rating portfolio Q1s, low ESG rating portfolio Q5s and JSE All.

As noted above, N of 151 represents the number of lognormal returns accumulated monthly over the period. For both Refinitiv and Bloomberg, ESG portfolio Q1s (1.68 and 4.86) have lower variances than portfolio Q5 (2.54 and 6.99).

Table 7: Results for Descriptive Statistics for Refinitiv's and Bloomberg's Portfolio Returns

	N	Range	Min.	Max.	Mean	Std. Deviation	Variance
RefinitivEsgPortfolioQ1	151	5.53	0.87	6.40	2.82	1.29	1.68
RefinitivEsgPortfolioQ2	151	3.14	0.79	3.93	2.49	0.71	0.50
RefinitivEsgPortfolioQ3	151	3.46	0.77	4.23	2.82	0.94	0.88
RefinitivEsgPortfolioQ4	151	5.05	1.00	6.05	3.45	1.42	2.00
RefinitivEsgPortfolioQ5	151	5.96	0.81	6.77	3.49	1.59	2.54
BloombergEsgPortfolioQ1	151	4.86	0.91	5.77	0.88	0.77	4.86
BloombergEsgPortfolioQ2	151	3.27	0.86	4.13	0.90	0.81	3.27
BloombergEsgPortfolioQ3	151	3.10	0.98	4.08	0.87	0.76	3.10
BloombergEsgPortfolioQ4	151	2.29	0.86	3.15	0.66	0.44	2.29
BloombergEsgPortfolioQ5	151	6.99	0.93	7.92	1.95	3.79	6.99
JSE Allshare	151	3.71	0.86	4.57	0.93	0.86	3.71

5.1.4 Financial Performance (CAGR)

The time series results are graphically depicted in **Figure 9** and **Figure 10**. For the benefit of understanding the chart, the layout and details on the graph are explained in this section. The horizontal axis indicates the study's time frame from the last quarter of 2008 until the end of June 2021. The vertical axis indicates the compound annual growth rate (CAGR) on a logarithmic scale with a base of one. The various line graphs labelled "Q1" to "Q5" represent the five portfolio quintiles. Portfolio Q1 is the top (best) ESG rating portfolio, and Q5 is the bottom (worst) ESG rating portfolio.

There are two important line graphs in **Figure 9** and **Figure 10**. The first line graph is labelled as "Q1/Q5" (the dark green). The line graph represents relationship between "Q1" and "Q5". The comparison of "Q1" and "Q5" effectively addresses Research Question 1, whether a high ESG rating (Q1) performs better than a low ESG rating (Q1). The slope of the line graph gives interpretation of the relationship. A positive slope for line graph "Q1/Q5" shows the outperformance of Q1 over Q5. A flat slope indicates neutral performance. A negative slope for line graph "Q1/Q5" shows underperformance of Q1 over Q5.

The second line graph is labelled as “Relative to J203T” (the dark green line graph). The line graph represents relationship between “Q1” and “J203T”. The comparison of “Q1” and “J203T” effectively addresses Research Question 2, whether a high ESG rating (Q1) performs better than the All Share Index.

The slope of the line graph gives interpretation of the relationship. A positive slope for line graph “Relative to J203T” shows the outperformance of Q1 over J203T. A flat slope indicates neutral performance. A negative slope for line graph “Relative to J203T” shows underperformance of Q1 over J203T.

a) **Research Question 1 – “Q1” vs “Q5”**

Research question 1: Does a high ESG rating portfolio give better financial returns than a low ESG rating portfolio in the JSE?

The results shown in **Figure 9** and **Figure 10** are measuring the same aspect, i.e., whether high ESG rating yield better financial returns than low ESG returns. The difference is that the ESG data is sourced from two prominent ESG rating agencies, Refinitiv and Bloomberg.

The financial performance results of the first ESG rating agency, Refinitiv, are shown in **Figure 9**. The line graph is labelled as “Q1/Q5” (the dark green), is relatively flat between December 2008 and the first quarter of 2011. From this point, “Q1” underperformed “Q5” until December 2015. The positive slope from December 2015 until January 2019 signals outperformance of Q1 over Q5. Between January 2019 and June 2021, the average slope was negative, suggesting that Q1 underperformed Q5. During the study period, the high ESG rating portfolio (Q1 = 15.8%) underperformed the low ESG rating portfolio (Q5 = 16.5%), **Figure 11**.

The financial performance results of the second ESG rating agency, Bloomberg, are shown in **Figure 10**. The line graph is labelled as “Q1/Q5” (the dark green) showed a negative slope between December 2008 and December 2015. This period shows underperformance of Q1 over Q5. Evidence of outperformance of Q1 over Q5 can be noted between June 2016 and March 2021. During the study period, using Refinitiv ESG data, the high ESG rating portfolio (Q1 = 14.6%) underperformed the low ESG rating portfolio (Q5 = 15.4%), **Figure 11**.

The financial results for the study period are shown in **Figure 11**. Even here, the focus is on Q1 and Q5.

b) Research Question 2 – "Q1" vs "J203T"

Research question 2: Does a high ESG rating portfolio give better financial returns than the market or JSE All Share Index?

The results shown in **Figure 9** and **Figure 10** are measuring the same aspect, i.e., whether high ESG rating yield better financial returns the JSE All Share Index. The difference is that the ESG data making up portfolios is sourced from two prominent ESG rating agencies, Refinitiv and Bloomberg.

From **Figure 9**, the slope of line graph labelled "Relative to J203T" (light green line graph) measures the relationship between "Q1" and "JSEAllshare". The relatively flat slope between December 2008 and December 2014 signals neutral performance of "Q1" over the "JSEAllshare". The negative slope during 2014 signals underperformance of "Q1" over "JSEAllshare". The average slope between December 2015 and June 2021 is positive, signalling outperformance of "Q1" over "JSEAllshare".

Figure 10 shows results constructed from ESG data of Bloomberg. Similarly, the slope of line graph labelled "Relative to J203T" (light green line graph) measures the relationship between "Q1" and "JSEAllshare". Between December 2008 and the first quarter 2012, the slope is flat indicating neutral performance. The average slope between the middle of 2012 and December 2015 is negative, showing underperformance of "Q1" over "Relative to J203T". The average slope between December 2015 and June 2021 is positive, showing overperformance of "Q1" over "Relative to J203T".

During the study period, using Refinitiv ESG data, the high ESG rating portfolio ("Q1" = 15.8%) outperformed the JSE All Share Index ("JSEAllshare" = 12.7%), **Figure 11**. Using the Bloomberg's ESG data, the high ESG rating portfolio ("Q1" = 14.6%) outperformed the JSE All Share Index ("JSEAllshare" = 12.7%), **Figure 11**.

Figure 9 below shows representation of financial performance of five portfolios constructed using ESG data from Refinitiv.

Figure 9: Graphical comparison of financial performance of the Refinitiv's ESG portfolios

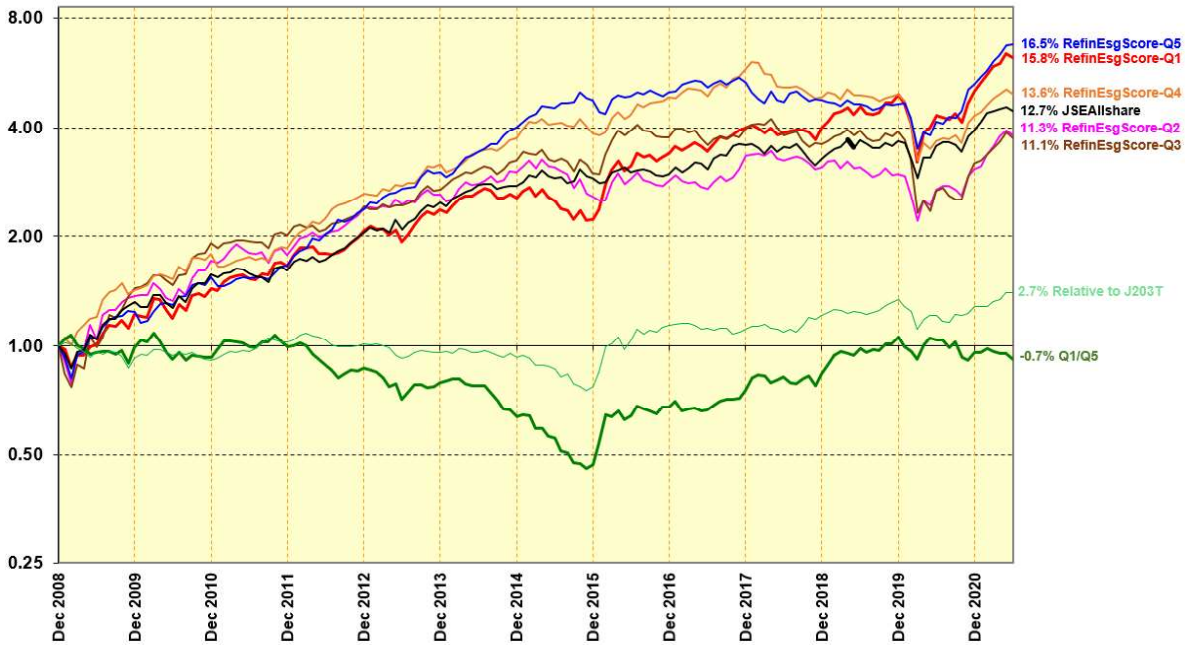


Figure 10 below shows representation of financial performance of five portfolios constructed using ESG data from Bloomberg.

Figure 10: Graphical comparison of financial performance of Bloomberg's ESG portfolios

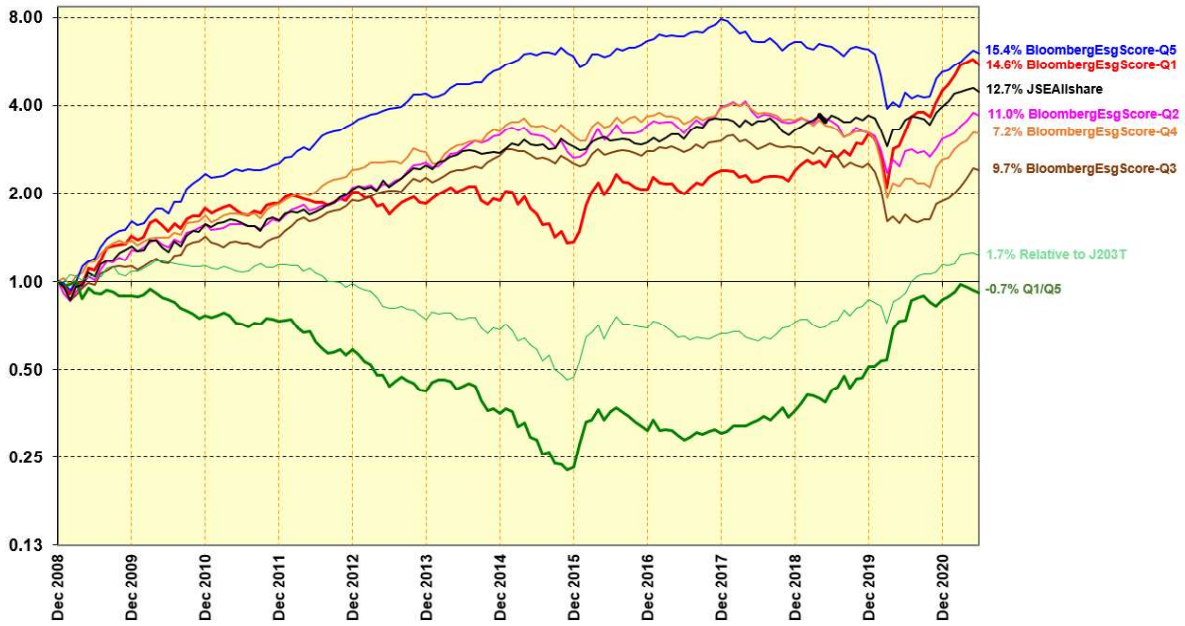
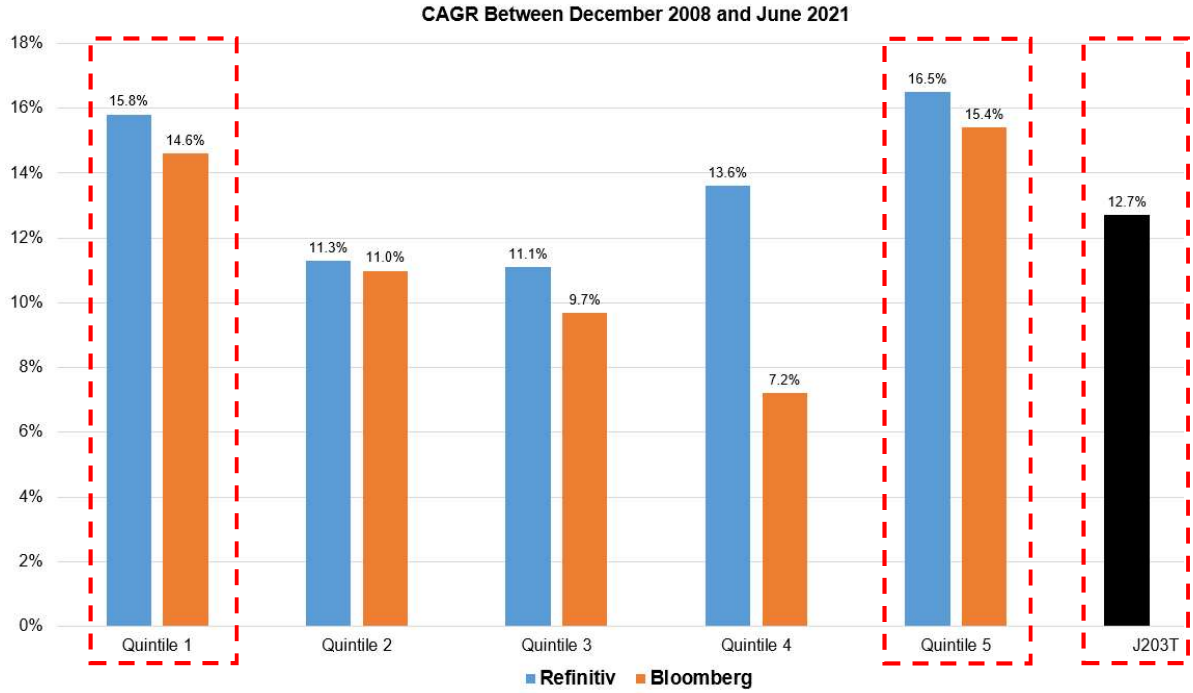


Figure 11 represents the schematic CAGR performance of portfolios made from Refinitiv's and Bloomberg's ESG rating data between December 2008 and June 2021.

Figure 11: Graphical comparison of CAGR performance at the end of June 2021



5.2 Results for Research Question 3

Research question 3: Do ESG rating scores from different rating agencies give the same financial returns in the JSE?

5.2.1 Financial Performance Graphical Time Series

Figure 12 below summarises the main comparative parameters for answering Research question 3. The extreme cases were selected for the ease of comparison and interpretation of the graphical representation. The selected parameters are as follows:

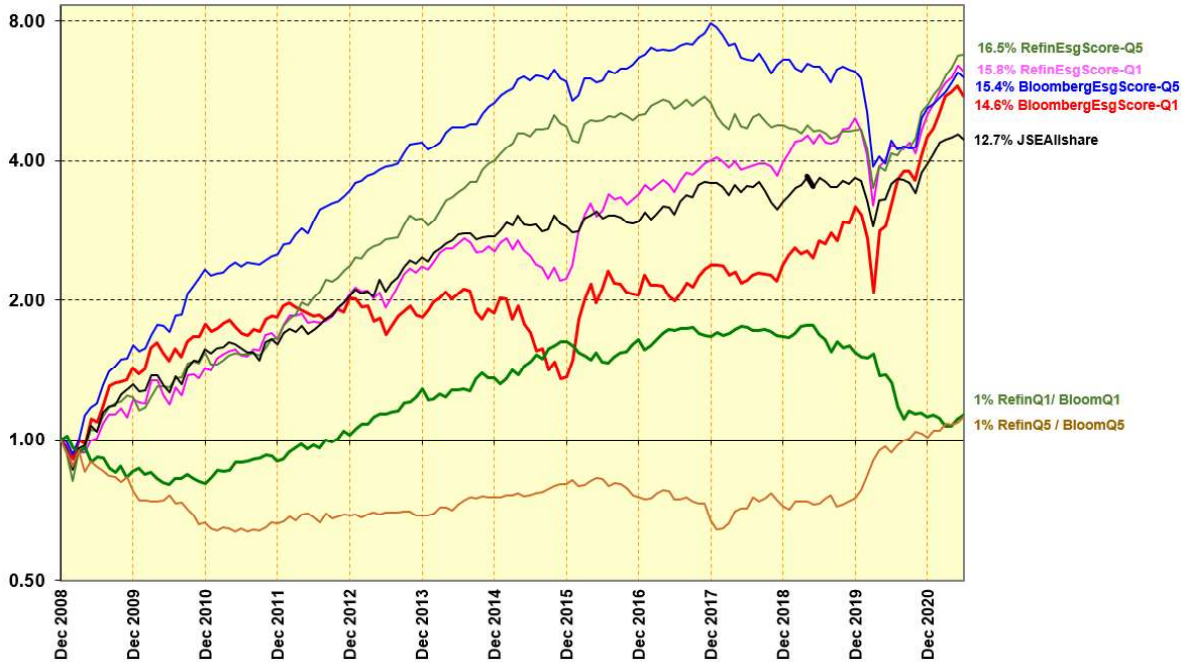
- High ESG rating portfolios from Refinitiv's and Bloomberg's ESG data represented by line graph "RefinQ1/BloomQ1", and
- Low ESG rating portfolios from Refinitiv's and Bloomberg's ESG data represented by the line graph "RefinQ5/BloomQ5".

The line graph "RefinQ1/BloomQ1" (green line graph) represents the relationship between high ESG portfolios of Refinitiv and Bloomberg (**Figure 12**). The slope of the

line carries the interpretation of the relationship. The negative slope between December 2008 and December 2010 represents underperformance of Refinitiv's "Q1" compared to Bloomberg's "Q1". The positive slope between December 2010 December 2015 shows outperformance of Refinitiv's "Q1" over Bloomberg's "Q1". The relatively flat slope between December 2015 and the middle of 2019 shows neutral performance. The negative slope between June 2019 and September 2020 shows a non-neutral performance.

The line graph "RefinQ5/BloomQ5" (brown line graph) represents the relationship between low ESG portfolios of Refinitiv and Bloomberg (**Figure 12**). The slope of the line carries the interpretation of the relationship. The negative slope between December 2008 and December 2010 represents underperformance of Refinitiv's "Q5" compared to Bloomberg's "Q5". The relatively flat slope between December 2010 and September 2019 shows neutral performance. The positive slope between September 2019 and June 2021 shows a outperformance of Refinitiv's "Q5" compared to Bloomberg's "Q5".

Figure 12: Graphical comparison of financial performance of Refinitiv's and Bloomberg's ESG portfolios Q1's and Q5's



5.2.2 Financial Performance Statistical Test

Graphical time series presented the differences through visual interpretation. A statistical tool for differences was employed as an additional test. As discussed in section **4.8.1 d)**, the first step was the normality test of the CAGR returns data using the Shapiro-Wilk method. From **Table 8**, the normality test results for Bloomberg's showed Sig. values of 0.000 below 0.05, therefore suggesting rejection of the normality distribution hypothesis at the α=0.05 significance level. The nonparametric test approach is therefore applicable.

Table 8: Results for Refinitiv's and Bloomberg's Portfolio Returns Normality Test

	Shapiro-Wilk		
	Statistic	**df**	**Sig.**
RefinitivEsgPortfolioQ1	0.952	151	0.000
RefinitivEsgPortfolioQ2	0.940	151	0.000
RefinitivEsgPortfolioQ3	0.935	151	0.000
RefinitivEsgPortfolioQ4	0.933	151	0.000
RefinitivEsgPortfolioQ5	0.909	151	0.000
BloombergEsgPortfolioQ1	0.773	151	0.000
BloombergEsgPortfolioQ2	0.933	151	0.000
BloombergEsgPortfolioQ3	0.933	151	0.000
BloombergEsgPortfolioQ4	0.920	151	0.000
BloombergEsgPortfolioQ5	0.935	151	0.000
JSE Allshare	0.948	151	0.000

The nonparametric test for two independent groups, Mann-Whitney U, was thus employed to test for difference between two selected Refinitiv and Bloomberg's ESG portfolio returns. In addressing Research Question 1, the test for CAGR difference between Bloomberg portfolio Q1 and portfolio Q5 resulted in a Sig. value of 0.000, which is less than 0.05. Similar results were achieved for the relationship between the top ranked-portfolio Q1 and the benchmark portfolio J203T. The results implied that the difference between Bloomberg portfolio Q1 and portfolio Q5; and Q1 and J203T were statistically significant.

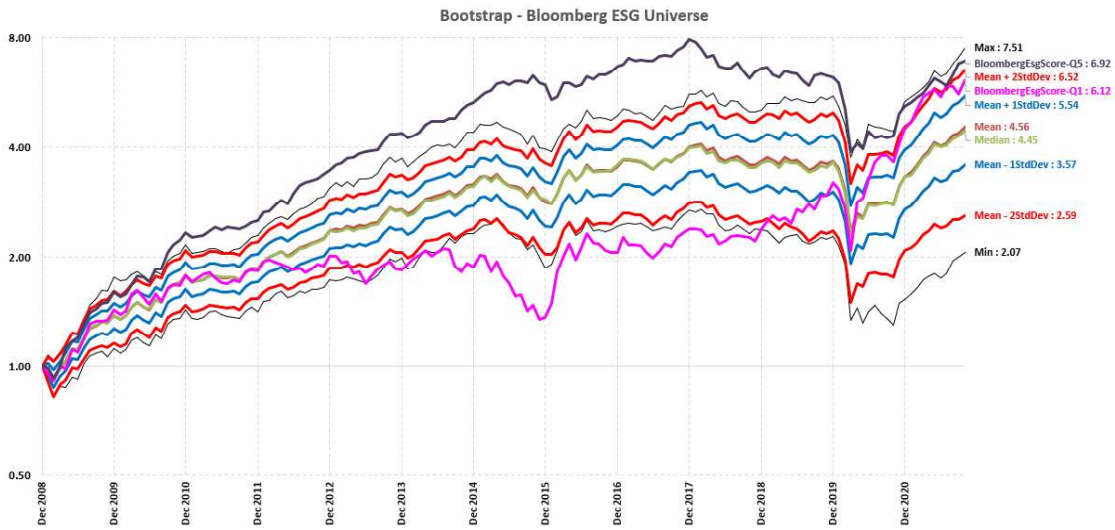
The nonparametric test for all five portfolios quintiles, Kruskal-Wallis, was thus employed to test for difference across all Bloomberg's ESG portfolio returns. Kruskal-Wallis test results showed Kruskal-Wallis = 181.26 and Sig. value or p-value of 0.000, which is less than α = 0.05. The results reject the null hypothesis, in favour of statistically significant difference in ranked medians or financial returns across the five portfolios constructed using Bloomberg data.

5.2.3 Financial Performance Bootstrap Statistical Test

The purpose of the bootstrap statistics is to show the accuracy level of the line graphs' visual representation. Since the exercise is purely illustrative, only Bloomberg's set of ESG data was utilised. The end goal is to represent the 95% confidence level schematically.

Figure 13 represents a visual illustration of the significance of the CAGR performance. Results for running random portfolios for the Bloomberg universe generated the line graphs shown below. "Max" and "Min" show the maximum and minimum random portfolios, respectively. The two line graphs create boundaries or an envelope for the Bloomberg universe. Portfolio Q1 is clearly above the envelope between September 2009 and March 2019. From statistics perspective, "Mean +2StdDev" and "Mean +2StdDev" represent the 95% confidence level. The importance of results is how portfolio Q1 and Q5 perform in relation to the 95% confidence line graphs.

Figure 13: Bootstrap Results for Bloomberg Universe



5.3 Results for Research Question 4

Research question 4: Do ESG rating scores from different rating agencies converge in the JSE?

In order to answer Research question 4, it was essential to identify JSE firms that received ESG ratings from both rating agencies at about the same time.

5.3.1 Descriptive Statistics for Firms Rated by Both Agencies

Figure 14 includes the number of firms that received ESG ratings from both firms at the same time. Observing the trend, it can be concluded that the companies evaluated different firms to some extent. The number of firms receiving a rating from both Refinitiv and Bloomberg at the same time was generally low.

Figure 14: Graphical comparison of ESG Scores Between Refinitiv and Bloomberg

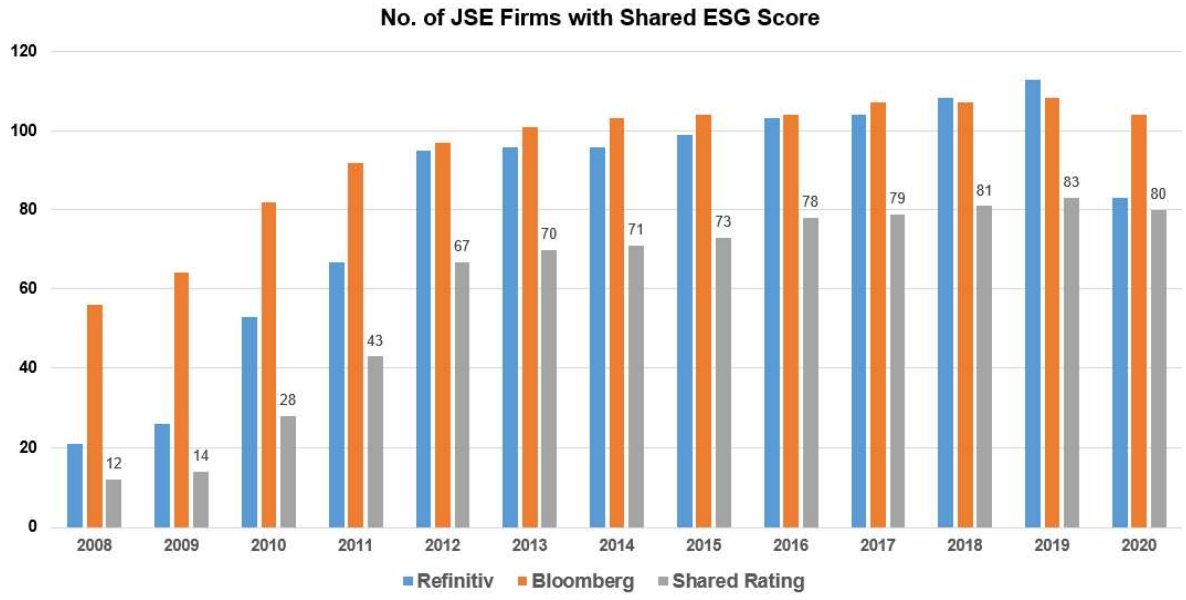


Table 9 shows that Refinitiv's maximum scores are generally higher than Bloomberg's. Similarly, the means of Refinitiv's are also higher. Refinitiv's standard deviation values are generally higher, too, suggesting spread out ESG rating scores than Bloomberg.

Table 9: Results for Descriptive Statistics for ESG Scores Between Refinitiv and Bloomberg

Year	Rating Agency	N	Min.	Max.	Mean	Std. Deviation
2008	Refntv_2008	12	20.80	70.80	44.43	16.60
	Blmbg_2008	12	15.70	51.90	37.50	10.72
2009	Refntv_2009	14	12.50	70.80	47.01	18.46
	Blmbg_2009	14	17.40	55.60	41.68	11.66
2010	Refntv_2010	28	20.80	79.20	54.14	13.80
	Blmbg_2010	28	12.90	62.30	39.91	12.02
2011	Refntv_2011	43	12.50	79.20	50.66	15.01
	Blmbg_2011	43	11.20	62.70	39.96	12.44
2012	Refntv_2012	67	12.50	79.20	48.92	17.56
	Blmbg_2012	67	5.80	61.40	34.08	14.48
2013	Refntv_2013	70	12.50	79.20	48.08	17.20
	Blmbg_2013	70	11.20	59.10	36.11	13.66
2014	Refntv_2014	71	12.50	87.50	49.45	15.42
	Blmbg_2014	71	11.20	60.60	38.15	12.85
2015	Refntv_2015	73	4.20	87.50	50.16	17.95
	Blmbg_2015	73	11.20	61.20	40.32	12.22
2016	Refntv_2016	78	12.50	87.50	51.38	16.49
	Blmbg_2016	78	11.20	62.00	40.64	12.35
2017	Refntv_2017	79	12.50	79.20	51.30	15.55
	Blmbg_2017	79	19.00	62.20	41.85	11.68
2018	Refntv_2018	81	20.80	87.50	50.96	15.95
	Blmbg_2018	81	16.67	64.88	42.72	11.94
2019	Refntv_2019	83	12.50	87.50	53.05	16.04
	Blmbg_2019	83	14.90	65.70	43.24	12.26
2020	Refntv_2020	80	12.50	79.20	53.73	16.34
	Blmbg_2020	80	14.90	65.70	43.90	11.81

5.3.2 Test for Normality for ESG Rating Data

As per the discussion in **Section 4.8.2**, the Shapiro-Wilk method was adopted for the normality test. From **Table 10**, the data for both Refinitiv and Bloomberg for 2008 to 2010 shows Sig. values greater than 0.05. The hypothesis for normally distributed data was accepted. Therefore, this part of the data could be analysed using parametric techniques. For the period from 2011 to 2021, Sig. values for the ESG data were mainly

below 0.05, and the normal distribution data hypothesis was rejected. Non-parametric techniques were employed for the period between 2011 and 2021.

Table 10: Results for ESG Data Normality Test

	Shapiro-Wilk		
	Statistic	**df**	**Sig.**
Refntv_2008	0.927	12	0.352
Blmbg_2008	0.909	12	0.208
Refntv_2009	0.915	14	0.183
Blmbg_2009	0.892	14	0.085
Refntv_2010	0.951	28	0.208
Blmbg_2010	0.975	28	0.727
Refntv_2011	0.945	43	0.041
Blmbg_2011	0.969	43	0.288
Refntv_2012	0.955	67	0.016
Blmbg_2012	0.958	67	0.024
Refntv_2013	0.956	70	0.014
Blmbg_2013	0.958	70	0.020
Refntv_2014	0.964	71	0.037
Blmbg_2014	0.958	71	0.019
Refntv_2015	0.976	73	0.182
Blmbg_2015	0.966	73	0.046
Refntv_2016	0.968	78	0.050
Blmbg_2016	0.967	78	0.038
Refntv_2017	0.964	79	0.027
Blmbg_2017	0.966	79	0.032
Refntv_2018	0.964	81	0.024
Blmbg_2018	0.967	81	0.033
Refntv_2019	0.965	83	0.022
Blmbg_2019	0.975	83	0.110
Refntv_2020	0.948	80	0.003
Blmbg_2020	0.980	80	0.230

5.3.3 Research Question 4 Correlation Test

a) Pearson Correlation

The data were found normally distributed, and the parametric correlation method, Pearson Correlation, was employed. From Table 12 (Appendix 2), there are statistically significant correlations between ESG ratings of Refinitiv and Bloomberg in the JSE for

the period of 2008 to 2010. The positive relationship ranges from the Pearson coefficient values of 0.478 to 0.845, suggesting a moderate to a strong relationship between ESG rating scores of Refinitiv and Bloomberg.

b) Spearman Correlation

The data between 2011 and 2021 deviated from the normal distribution assumption, and the non-parametric correlation method, Spearman Correlation, was employed for the analysis. With reference to Table 13 (Appendix 2), the Spearman Correlations range between 0.449 and 0.725. The values suggest a significant positive relationship between ESG rating scores of Refinitiv and Bloomberg in the JSE between 2011 and 2020/21. The strength of the relationship ranges from moderate to strong relationships.

5.4 Summary of the Results

This section presented the results for the research questions and related hypothesis as developed in Chapter 3. Research questions 1 and 2 were analysed using time series graphical analysis, **Figure 9** and **Figure 10**. Research question 3 was analysed using time series graphical analysis, **Figure 12**. Research question 4 was analysed using correlation statistical tools. The results for all the research questions are summarised in **Table 11** below.

Table 11: Results Summary for Research Questions and Hypothesis Tested

Research question	Hypothesis	Results
RQ1	H_1: High ranked ESG portfolio has higher returns than a low ranked ESG portfolio?	**Refinitiv ESG data:** - Graphical time series analysis: **Reject** the hypothesis, Q1 is **not** greater than Q5 **(Figure 9)** - Results statistically significant according to the Mann-Whitney U test **(Appendix 1)**
	Returns of Q1 > Returns of Q5, or Q1/Q5 > 1	**Bloomberg ESG data:** - Graphical time series analysis: **Reject** the hypothesis, Q1 is **not** greater than Q5 **(Figure 10)** - Results statistically significant according to the Mann-Whitney U test **(Appendix 1)**
RQ2	H_2: High ranked ESG portfolio has higher returns than ALSI portfolio	**Refinitiv ESG data:** - Graphical time series analysis: **Accept** the hypothesis, Q1 is greater than J203T **(Figure 9)** - Results statistically significant according to the Mann-Whitney U test **(Appendix 1)**
	Returns of Q1 > Returns of J203T	**Bloomberg ESG data:** - Graphical time series analysis: **Accept** the hypothesis, Q1 is greater than J203T **(Figure 10)** - Results statistically significant according to the Mann-Whitney U test **(Appendix 1)**
RQ3	H_3: Portfolio Returns (ESG data 1) ≠ Portfolio Returns (ESG data 2)	**Refinitiv vs Bloomberg ESG data portfolios:** - Graphical time series analysis: **Accept** the hypothesis, $Q1_{Refinitiv} \neq Q1_{Bloomberg}$, and $Q5_{Refinitiv} \neq Q5_{Bloomberg}$, (**Figure 12**) - Results statistically significant according to the Mann-Whitney U test **(Appendix 1)**
RQ4	H_4: ESG score 1 does not correlate with ESG score 2	**Refinitiv vs Bloomberg ESG data:** Reject hypothesis, Refinitiv & Bloomberg ESG scores moderately to strongly, the relationship is positive and statistically significant

6. Chapter 6: Discussion of Results

The study aimed at determining the financial cost of ESG investing in JSE. Four research questions were developed to guide the analysis of the study. The results of the analysis are presented in **Chapter 5**. This chapter aims to discuss the results found in the current study, discuss the results in relation to the literature and draw conclusions.

6.1 Discussion of Descriptive Statistics for ESG Rated JSE Firms

The existence of King code, CRISA code and Regulation 28 was instrumental in driving the growth of ESG investing in South Africa. **Figure 6** shows the significant uptake on ESG rating of JSE firms from 2008 through to 2016. The ratings gained traction from both prominent ESG rating agencies, Refinitiv and Bloomberg. That could be attributed to introducing the JSE listing requirement in 2010 that firms needed to declare ESG material issues in the integrated reporting (KPMG, 2012). Integrated reporting was the powerful tool coming from the release of King III in 2009 (Viviers, 2014). Rating the JSE firms was getting easier because integrated reporting mostly likely was making firms' rating information reading available in the public domain. Promulgation of Regulation 28 for Pension Fund in 2011 required fund managers to consider ESG material issues on financial decision making (Deloitte, 2014) (Viviers, 2014). South Africa has built a sound foundation for ESG investment.

Bloomberg with means ranging from 17.29 to 17.39 provided ESG ratings to more JSE firms compared to Refinitiv with means of 16.29 to 16.45, **Table 6**. The dominance of Bloomberg could be explained by its global bigger market share than Refinitiv at 33.4% and 23.1%, respectively (WallStreetPrep, 2021). Investors would probably favour the agency with a higher market share for exposure, provided cost permits. This discussion aspect falls under descriptive statistics, and no inference is made towards financial return performance or materiality dominance over Refinitiv.

Refinitiv portfolios had higher volatilities. The variance values were generally higher for the Refinitiv's portfolios than Bloomberg's portfolios, **Table 7**. From the level statically analysis, no significance of the results can be drawn but the higher variances could suggest either relatively higher returns or relatively lower returns for Refinitiv.

6.2 Discussion of Results for Research Question 1

Research question 1: Does a high ESG portfolio give better financial returns than a low ESG portfolio in the JSE?

The purpose of the research question was to determine whether investing in the top ESG rated portfolio would give better financial returns than the bottom ESG rated portfolio. The following hypothesis was developed from the literature review.

H_1: Top-ranked ESG portfolio has higher returns than bottom-ranked ESG portfolio in the JSE

H_1: Returns (CAGR) of Q1 > Returns of (CAGR) Q5, or Q1/Q5 > 1

Figure 9 presents the financial performance, CAGR, of portfolios constructed from **Refinitiv's ESG data**. This is an indication of the underperformance of portfolio Q1. The relative measure of CARG performance between the two portfolios is the ratio Q1/Q5. When Q5 is bigger than Q1, the ratio becomes smaller. Judging from the relative line graph labelled "Q1/Q5" (dark green), the CAGR of Q1 performed poorly compared to Q5 from 2008 to 2015, where a turning point to the upside can be noted in 2015. Using the Mann-Whitney U test, the outcome showed a statistically significant difference between Refinitiv's ESG portfolios Q1 and Q5 in CAGR performance (**Appendix 1**(a)).

Similarly, **Figure 10** presents the financial performance of portfolios constructed from **Bloomberg's ESG data**. The line graph for portfolio Q1 is below the line graph of Q5 throughout the period, suggesting underperformance of portfolio Q1. The relative measure of CARG performance between the two portfolios is the ratio Q1/Q5. When Q5 is bigger than Q1, the ratio becomes smaller. Judging from the relative line graph labelled "Q1/Q5" (dark green), the CAGR of Q1 performed poorly compared to Q5 from 2008 to 2015, where a turning point to the upside can be noted in 2015. Using the Mann-Whitney U test, the outcome showed a statistically significant difference between **Bloomberg's ESG** portfolios Q1 and Q5 in CAGR performance (**Appendix 1** (e)).

Contrary to the stakeholder theory premise that satisfied stakeholders result in better financial returns, top ranked ESG portfolio fails to yield better returns than the bottom ranked portfolio. At the end of the period, the bottom ranked portfolio yielded better returns than the top ranked portfolio. The outcome is supported by the findings of Naik

& Ward (2017). The results further showed that top ranked ESG portfolio did not consistently outperform the bottom ranked ESG portfolio, with evidence suggesting better performance emerging from 2015. The results corroborate the findings of Naik & Ward (2017), where low-ranked portfolios outperformed the top-ranked portfolio. The correlation between ESG rating and financial returns across five portfolios is disordered, there not meaningful. The results concur with the findings of Naik & Ward (2017), where the order of high to low performance did not correspond with financial returns. In the overall period of the study, ESG performance could not have a meaningful relationship with the financial returns, consistent with the findings of Naik & Ward (2017) and (Johnson et al., 2019).

The study results are informed by ESG data from two prominent and independent ESG rating agencies, which is the crucial difference from the past similar studies (Naik & Ward, 2017) (Johnson et al., 2019), where only data set was employed. Both sets of results for this study agree that the worst or low ESG rating yields better returns than the best or high ESG rating performance.

The research question investigated whether the top ranked ESG portfolio yielded better returns than the worst ranked portfolio. The study found that: 1) the high ESG rating portfolio underperformed financial returns of the bottom ranked or low ESG rating portfolio in the JSE between December 2008 and December 2015. However, as from December 2015 until June 2021, the high ESG rating portfolio underperformed financial returns of the low ESG rating portfolio. 2) The outperformance was not consistent throughout the study period. Importantly, the finding holds for both Refinitiv and Bloomberg ESG data sets. High ESG performing firms do not yield a better return than low ESG rating firms in the JSE.

6.3 Discussion of Results for Research Question 2

Research Question 2: Does a high ESG portfolio give better financial returns than the market or JSE All Share Index?

The second research question investigated whether top-ranked or high ESG portfolio yielded better returns than the market portfolio or the JSE All Share Index. Using literature, the following hypothesis was developed.

H_2: Top ranked ESG portfolio in the JSE has higher financial returns (CAGR) than ALSI portfolio

H_2: Returns (CAGR) of Q1 > Returns (CAGR) of J203T,

From the graphical time series of **Refinitiv ESG portfolio** on **Figure 9**, line graph Q1 represented the top ESG rated portfolio, and line graph "JSEAllshare" represented the All Share Index. The relationship between Q1 and All Share Index is represented by the "Relative to J203T" (light green) line graph on the graphical time series. Deducing from the graph, "Q1" underperformed "JSEAllshare" from 2008 until December 2015. However, "Q1" overperformed "JSEAllshare" from December 2015 until June 2021. Additionally, at the end of June 2021, the high ESG portfolio, Q1, performed better than the market portfolio measured by a CAGR of 1.9%. Using the Mann-Whitney U test, the outcome showed a statistically insignificant difference between **Refinitiv's ESG** portfolios Q1 and J203T in CAGR performance (**Appendix 1** (b)).

Figure 10 shows the performance of Bloomberg's ESG portfolios. The comparative line graph between portfolio Q1 and the benchmark J203T performance performed better from the middle of 2015. Using the Mann-Whitney U test, a confirmatory test showed a statistically insignificant difference between **Bloomberg's ESG** portfolios Q1 and J203T in CAGR performance (**Appendix 1** (e)).

Both Refinitiv's and Bloomberg's top ranked ESG portfolio Q1 performed better than the benchmark portfolio, J203T. However, the is no consistent outperformance by neither the Refinitiv ESG portfolio Q1 nor Bloomberg's portfolio Q1 over the benchmark portfolio, J203T. Interestingly ESG portfolios of the two rating agencies performed better only from 2015. It was about the same period the JSE Responsible Index Top 30 outperformed SWIX All Share (Soobramoney, 2019).

The study's both sets of results showing better returns by high ESG portfolios over JSE All Share Index are not consistent with Naik & Ward (2017), where top ranked portfolio failed to show superior returns over the All Share Index. In the earlier studies, SRII (index resembling ESG portfolios) failed to outperform conventional portfolios, including the JSE All Share Index (Gladysek & Chipeta, 2012) (Bondera, 2014).

The research question investigated if top ranked or high ESG rating portfolio delivered better returns than All Share Index. The ESG portfolio delivered emphatic outperformance over All Share Index as from the 2015. Bloomberg's ESG portfolio confirmed the results statistically significant.

6.4 Discussion of Results for Research Question 3

Research question 3: Do ESG ratings from different rating agencies yield the same financial performance for the JSE listed companies?

The third research question investigated whether top rated (or bottom rated) ESG portfolios yielded the same returns in the JSE. Using literature, the following hypothesis was developed.

H_3: Similar ESG portfolios from different ESG rating agencies do not yield the same financial returns (CAGR)

H_3: Returns of Portfolio from ESG data 1 ≠ Returns of Portfolio from ESG data 2

Each data set comprised five portfolios, but to effectively answer this question, only the top and bottom portfolio quintiles were selected (**Figure 12**).

From **Figure 12**, Refinitiv's Q1 underperformed CARG returns compared to Bloomberg's Q1 from December 2008 until the third quarter of 2011. At this point, Refinitiv's Q1 crossed above the line graph of Bloomberg's Q1 for the remainder of the period. The ratio "RefinQ1/BloomQ1" measures the gap between the two portfolios. For similar performance, the ratio ≈ 1. The line graph of the ratio shows a positive slope from December 2010 until the end of 2017 (**Figure 12**). This can be interpreted as the strength of Refinitiv Q1 or weakness of Bloomberg Q1, or the combination of the two scenarios. As of 30 June 2021, the CAGR values for Refinitiv Q1 and Bloomberg Q1 were 15.8% and 14.6%, respectively. In the end, returns are relatively comparable, and the performance is not consistent during the study period. Using the Mann-Whitney U test, a confirmatory test showed a statistically significant difference between **Refinitiv's ESG** portfolios Q1 and **Bloomberg's ESG** portfolios Q1 performance (**Appendix 1** (g)).

From **Figure 12**, Refinitiv's Q5 underperformed CARG returns compared to Bloomberg's Q5 from December 2008 until January 2020. At this point, Refinitiv's and

Bloomberg's Q5 tracked the same path. The ratio "RefinQ5/BloomQ5" measures the gap between the two portfolios. For similar performance, the ratio ≈ 1, for same growth rates the gap and the ratio stays constant. The line graph of the ratio remains relatively flat from March 2011 until December 2019 (**Figure 12**). This signals the same growth rate between the portfolios. As of 30 June 2021, the CAGR values for Refinitiv Q5 and Bloomberg Q5 were 16.5% and 15.4%, respectively. Again, in the end, returns are relatively comparable. The performance is not consistent during the period of the study. Using the Mann-Whitney U test, a confirmatory test showed a statistically significant difference between **Refinitiv's ESG** portfolios Q5 and **Bloomberg's ESG** portfolios Q5 performance (**Appendix 1** (h)).

The bulk of the literature focuses on the difference on the raw data. Literature discussion

The question was designed to quantify if financial returns from two different rating agencies were the same. ESG data from rating agencies, Refinitiv and Bloomberg, was used to answer the question. High and low ESG portfolios from both Refinitiv's and Bloomberg's ESG data did not perform the same but followed trends in a relatively comparable manner.

6.5 Discussion of Results for Research Question 4

Research question 4: Do ESG rating scores from different rating agencies for the JSE firms converge?

The fourth research question investigated the relationship between ESG rating scores from two different rating agencies. The study investigated the relationship by statistical correlation test using JSE ESG data from Refinitiv and Bloomberg.

H_4: There is no relationship between ESG rating scores rated by different rating agencies in the JSE

H_4: ESG score 1 ≠ ESG score 2

For accurate determination of the relationship between Refinitiv's and Bloomberg's ESG data, the comparison was carried out per year from 2008 until 2020. Additionally, sample firms considered were the firms that received a rating from both prominent rating

agencies. Refinitiv and Bloomberg gave different ESG scores, with the earlier' s scores generally higher throughout the period (**Table 9**).

The descriptive statistics indicated that the sample size was less than 30 for 2008 to 2010. A sample size range of 43 to 83 for the period of 2011 to 2020. Interestingly, the data for the earlier period used Pearson's correlation test. Pearson's correlations values ranged between 0.478** to 0.845** (**Appendix 2**). This result suggests a moderate to strong correlation between Refinitiv's and Bloomberg's ESG in the JSE.

The rest of the period between 2011 and 2021 was analysed using Spearman's correlation test due to the non-normality of the ESG data for both ESG rating agencies (**Table 8**). Similarly to the earlier period, the correlation coefficients ranged from 0.449** to 0.725** (**Appendix**), affirming a moderate to strong correlation between Refinitiv's and Bloomberg's ESG data in the JSE.

The literature investigating the convergence of ESG rating in the JSE was limited, so the study results are evaluated with results of the global setting. A moderate to strong correlation relationship between Refinitiv's and Bloomberg's ESG rating was found in the JSE setting. The results contradict the strong rating agency disagreement found in the global setting (Christensen et al., 2021). There was no literature found on the relationship between Refinitiv and Bloomberg. However, Bloomberg has depicted a high correlation with rating agency (Assest4) with disclosure oriented rating styles (Dorfleitner et al., 2015) (Gibson et al., 2021).

The research question examined whether ESG rating scores from different rating agencies for the JSE firms converge or correlate. ESG data from Refinitiv and Bloomberg was utilised to address the question. The hypothesis was pitched, stating that correlation does not exist between ESG data of Refinitiv and Bloomberg. The results proved otherwise. Moderate to strong correlations were found between the ESG rating scores, from Refinitiv and Bloomberg, for JSE firms. The correlation proves positive linear relationship between Refinitiv and Bloomberg ESG data (Dorfleitner et al., 2015).

7. Chapter 7: Conclusions and Recommendations

This chapter summarises the findings of the study. Academic and practical contributions are outlined in this section, along with limitations and recommendations for future research.

7.1 Principal conclusions

The study intended to determine the financial cost of ESG investing in the JSE. The study was divided into two parts. The first part focused on high ESG rating if that translated to better financial returns. The second part focused influence of ESG rating and related ESG rating agencies.

The study investigated if high ESG performance translated to better performance than low ESG performance. Grounding the approach on stakeholder theory, the expectation was that high ESG performance would translate to better returns. Exploiting ESG data from two prominent ESG data providers, Refinitiv and Bloomberg, graphical time series and supporting statistical test found that high ESG rating portfolios performed poorly compared to low ESG rating portfolios. From 2015.

Secondly, the study investigated if a high ESG rating portfolio performed better than the benchmark market portfolio, the All Share Index. Basing the analysis approach on the active portfolio management practice that the primary purpose is to outperform the market portfolio, and therefore high ESG rating was expected to outperform the All Share Index. Using ESG data from two prominent ESG data providers, Refinitiv and Bloomberg, graphical time series and supporting statistical test found that high ESG performance portfolios outperformed the All Share Index from 2015.

Thirdly, the study investigated if ESG rating data from two ESG providers translated to the same financial returns in the JSE. Basing the analysis approach on extensive literature findings (Berg et al., 2020; Escrig-Olmedo et al., 2019; Veenstra & Ellemers, 2020) that different ESG rating agencies' data disagree, the anticipation was that financial returns differed. Using ESG data from Refinitiv and Bloomberg, graphical time series and supporting statistical tests found that financial returns agreed and comparable.

Lastly, the study investigated if ESG rating data from two different ESG rating agencies correlated. Basing the analysis approach on extensive literature findings (Berg et al., 2020; Escrig-Olmedo et al., 2019; Veenstra & Ellemers, 2020) that different ESG rating agencies' data disagrees, the anticipation was that Refinitiv's and Bloomberg's data do not correlate. Applying correlation analysis tools on the ESG data from the two data providers, the results found a moderate to strong correlation between Refinitiv's and Bloomberg's ESG data in the JSE.

7.2 Theoretical contribution

The study's premise was the stakeholder theory's position that a firm's healthy relationship with stakeholders translates to financial returns. Using high ESG rating as an indicator that environmental, social, and governance stakeholders are generally satisfied. Findings from the study did not tie up with this specific line of reasoning.

7.3 Implications for ESG investors

The view of ESG investing from an active investing strategy or fund management perspective, high ESG rating has outperformed the All Share Index since 2015. However, high ESG performance does not translate to higher returns than low ESG performance in the JSE. Frankly, there is no correlation between ESG ranking and financial returns. It should be noted that there is a reasonably acceptable correlation between the ESG data of Refinitiv and Bloomberg.

7.4 Limitations and Suggestions for Future Research

The research intended to determine the financial cost of ESG investing in the JSE. Four sets of comparisons formed the core of the analysis. 1) Returns of top ESG performance against low ESG performance; 2) Returns of top ESG performance against market portfolio; 3) Returns of Refinitiv against Bloomberg; and 4) Relationship between ESG data of Refinitiv and Bloomberg.

A notable limitation is that the study intended to work on a sample size of 138 JSE firms. ESG data availability from Refinitiv and Bloomberg limited the sample size to 113 and 110, respectively. The JSE sample size became even smaller for the ESG data correlation analysis. With that noted, Refinitiv and Bloomberg remain as some of the top ESG data providers globally (Refinitiv, 2021) (WallStreetPrep, 2021).

There could be value in examining ESG performance and returns according to specific prominent indices or sectors, e.g. the Basic Materials sector, in JSE. Finally, incorporating specific JSE events may help better explain the behaviour of financial returns where results are insignificant from ESG results.

References

Ackers, B., & Eccles, N. S. (2015). Mandatory corporate social responsibility assurance practices: The case of King III in South Africa. *Accounting, Auditing & Accountability Journal*, *28*(4), 515–550. https://doi.org/10.1108/AAAJ-12-2013-1554

Adler, T., & Kritzman, M. (2008). The Cost of Socially Responsible Investing. *Journal of Portfolio Management*, *35*(1), 52–57.

Akoglu, H. (2018). User's guide to correlation coefficients. *Turkish Journal of Emergency Medicine*, *18*(3), 91–93. https://doi.org/10.1016/j.tjem.2018.08.001

Atkins, B. (2020). *Demystifying ESG: Its history & current status*. https://www.forbes.com/sites/betsyatkins/2020/06/08/demystifying-esgits-history--current-status/?sh=2e3511932cdd

Ball, R. (2021). *Examining the relationship between ESG performance and financial performance of firms listed on the JSE* [University of Cape Town]. https://open.uct.ac.za/handle/11427/33634

Bansal, S., Garg, I., & Sharma, G. D. (2019). Social entrepreneurship as a path for social change and driver of sustainable development: A systematic review and research agenda. *Sustainability (Switzerland)*, *11*(4). https://doi.org/10.3390/su11041091

Bauer, R., Koedijk, K., & Otten, R. (2002). *International evidence on ethical mutual fund and investment style* (Issue 3452). Financial Economics. www.cepr.org/pubs/dps/DP3452.asp

Berg, F., Koelbel, J., & Rigobon, R. (2020). Aggregate Confusion: The Divergence of ESG Ratings. In *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3438533

Blanchett, D. M. (2010). Exploring the cost of investing in Socially Responsible Mutual

Funds : An empirical study. *Journal of Investing*, *19*(93–103).

Bloomberg. (2014). *Look beyond*. https://doi.org/10.1177/000841740407100212

Bloomberg. (2021). *Unlock successful ESG investment with Bloomberg's data and solutions*. https://www.bloomberg.com/professional/solution/sustainable-finance/?gclid=CjwKCAjwyIKJBhBPEiwAu7zllzmCy3XB5bIzQOmPezKUD-8R75kRjy4RS-CPP7UqMec6fG1K9TUs2BoCBjcQAvD_BwE#scores/?utm_medium=Adwords&utm_campaign=ESG&utm_source=pdsrch&utm_content=esgscores&tact

Boffo, R., & Patalano, R. (2020). *ESG Investing: Practices, progress and challenges*. www.oecd.org/finance/ESG-Investing-Practices-Progress-and-Challenges.pdf

Bondera, S. (2014). *Comparative performance of Socially Responsible and Conventional Portfolios in South Africa* [University of the Witwatersrand]. http://wiredspace.wits.ac.za/jspui/bitstream/10539/15059/1/

Boos, D. D. (2003). *Introduction to the Bootstrap World Linked references are available on JSTOR for this article : 18*(2), 168–174.

Bowmans. (2021). *At a glance: ESG and investing in South Africa*. http://financialregulationjournal.co.za/2021/05/25/at-a-glance-esg-and-investing-in-south-africa/

Business Insider SA. (2020). *The biggest South African business scandals over the past decade*. https://www.businessinsider.co.za/the-top-south-african-business-scandals-the-past-decade-2020-1

Cappucci, M. (2018). The ESG Integration Paradox. *Applied Corporate Finance*, *30*(2). https://doi.org/10.1111/jacf.12296

CFA Institute. (2015). *ESG issues in environment: A guide for investment professionals*.

Christensen, D. M., Serafeim, G., & Sikochi, A. (2021). Why is corporate virtue in the eye of the beholder? The case of ESG ratings. *The Accounting Review*, *617*. https://doi.org/10.2308/tar-2019-0506

Clementino, E., & Perkins, R. (2020). *How Do Companies Respond to Environmental , Social and Governance (ESG) ratings ? Evidence from Italy*. *c*.

Cornell, B., & Angeles, L. (2020). ESG investing: conceptual issues. *The Journal of Wealth Management*, *September*. https://doi.org/10.3905/jwm.2020.1.117

Corvino, A., Doni, F., & Bianchi Martini, S. (2020). Corporate Governance , Integrated Reporting and Environmental Disclosure : Evidence from the South African Context. *Sustainability*, *12*(12), 4820.

Cronjé, M. L. (2019). *Tax avoidance as an investment style: A graphical time series approach* (Issue November). University of Pretoria.

Davids, N. (2021). *Inequality in South Africa is a 'ticking timebomb.'* UCTNews. https://www.news.uct.ac.za/article/-2021-05-21-inequality-in-south-africa-is-a-ticking-timebomb

Dawson, C. (2007). A practical Guide to Research Methods: A user-friendly manual for mastering research techniquies and projects. In *How To Content* (3rd ed.). How To Content. http://onlinelibrary.wiley.com/doi/10.1002/cbdv.200490137/abstract

Deloitte. (2014). *The relationship between CRISA and Regulation 28 of Pension Funds Act and Integrated Reporting* (pp. 1–4). https://www2.deloitte.com/content/dam/Deloitte/za/Documents/governance-risk-compliance/ZA_TheRelationshipBetweenCRISAAndRegulation28OfPensionFundsAct

04042014.pdf

Donaldson, T., & Preston, L. E. (1995). Theory the stakeholder of the concept, evidence, corporation and implications. *Academy of Management Review*, *20*(1), 65–91.

Dorfleitner, G., Halbritter, G., & Nguyen, M. (2015). Measuring the level and risk of corporate responsibility - An empirical comparison of different ESG rating approaches. *Journal of Asset Management*, *16*(7), 450–466. https://doi.org/10.1057/jam.2015.31

Drucker, D. J. (2009). *From SRI to ESG* (pp. 73–77). Financial Planning.

Du Toit, E., & Lekoloane, K. (2018). Corporate social responsibility and financial performance : Evidence from the Johannesburg Stock Exchange , South Africa. *South African Journal of Economic and Management Sciences*, *21*(1).

Duuren, E. Van, Plantinga, A., & Scholtens, B. (2016). ESG integration and the investment management process: Fundamental investing reinvented specifically relates to the impact of the company on the. *Journal of Business Ethics*, 525–533. https://doi.org/10.1007/s10551-015-2610-8

Dzingai, I., & Fakoya, M. B. (2017). Effect of corporate governance structure on the financial performance of johannesburg stock exchange (JSE)-listed mining firms. *Sustainability*, *9*(6), 1–15. https://doi.org/10.3390/su9060867

Eccles, N. S., & Viviers, S. (2011). The Origins and Meanings of Names Describing Investment Practices that Integrate a Consideration of ESG Issues in the Academic Literature. *Journal of Business Ethics*, *104*(3), 389–402. https://doi.org/10.1007/s10551-011-0917-7

Eccles, R. G., & Klimenko, S. (2019). The investor revolution: Shareholders are getting

serious about sustainability. *Harvard Business Review*, *97*(3), 106–116.

Eccles, R. G., Lee, L. E., & Stroehle, J. C. (2020). The Social Origins of ESG: An Analysis of Innovest and KLD. *Organization and Environment*, *33*(4), 575–596. https://doi.org/10.1177/1086026619888994

Escrig-olmedo, E., Fernandez-izquierdo, M. A., & Investment, S. R. (2010). *Socially responsible investing : sustainability indices , ESG rating and information provider agencies Socially responsible investing : sustainability indices , ESG rating and information provider agencies Elena Escrig-Olmedo *, María Jesús Muñoz-Torres a*. *October 2016*. https://doi.org/10.1504/IJSE.2010.035490

Escrig-Olmedo, E., Fernández-Izquierdo, M. ángeles, Ferrero-Ferrero, I., Rivera-Lirio, J. M., & Muñoz-Torres, M. J. (2019). Rating the raters: Evaluating how ESG rating agencies integrate sustainability principles. *Sustainability (Switzerland)*, *11*(3). https://doi.org/10.3390/su11030915

Fahmy, H. (2014). *Financial analysis, asset allocation and portfolio Construction: Theory & practice* (Issue October).

FrameworkESG. (2014). *Behind the Terminal: DataSlice Understanding the Bloomberg ESG Numbers*. https://frameworkesg.com/wp-content/uploads/2016/04/Bloomberg-ESG-Infographic.pdf

FrameworkESG. (2019). *Making sense of ESG ratings and rankings*.

Freeman, R. E. (2004). The Stakeholder Approach Revisited. *Zeitschrift Für Wirtschafts- Und Unternehmensethik*, *5*(3), 228–241. https://doi.org/10.5771/1439-880x-2004-3-228

Frey, B. B. (2018a). Spearman Correlation Coefficient. *The SAGE Encyclopedia of*

Educational Research, Measurement, and Evaluation, 1052–1053. https://doi.org/10.4135/9781506326139.n646

Frey, B. B. (2018b). The SAGE encyclopedia of educational research, measurement, and evaluation. In *SAGE Publications* (pp. 1349–1352). https://doi.org/https://dx.doi.org/10.4135/9781506326139

Friede, G., Busch, T., & Bassen, A. (2015). ESG and financial performance: aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance and Investment*, *5*(4), 210–233. https://doi.org/10.1080/20430795.2015.1118917

Gallant, C. (2021). *Four steps to building a profitable portfolio*. Investopeadia. https://www.investopedia.com/financial-advisor/steps-building-profitable-portfolio/

Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: A guide for non-statisticians. *International Journal of Endocrinology and Metabolism*, *10*(2), 486–489. https://doi.org/10.5812/ijem.3505

Gibson, R., Krueger, P., Riand, N., & Schmidt, P. S. (2020). ESG Rating Disagreement and Stock Returns. *Swiss Finance Institute Research Paper*, *June*, 19–67. https://doi.org/10.2139/ssrn.3433728

Gibson, R., Krueger, P., & Schmidt, P. S. (2021). ESG rating disagreement and stock returns. *Financial Analysts Journal*, *77*(4), 104–127.

Gillan, S. L., Koch, A., & Starks, L. T. (2021). Firms and social responsibility: A review of ESG and CSR research in corporate finance. *Journal of Corporate Finance*, *66*(January), 101889. https://doi.org/10.1016/j.jcorpfin.2021.101889

Gladysek, O., & Chipeta, C. (2012). The impact of Socially Responsible Investment Index constituent announcements on firm price: evidence from the JSE. *South African*

Journal of Economic and Management Sciences, *15*(4), 429–439. http://www.scielo.org.za/scielo.php?script=sci_arttext&pid=S2222-34362012000400007&lng=en&tlng=en

Gupta, R. (2017). Untapped Potential of ELSS Mutual Fund-Risk and Return Analysis. *ISSN:2249-1066*, *7*(1). https://doi.org/10.21567/adhyayan.v7i1.8106

Hauke, J., & Kossowski, T. (2011). Comparison of values of pearson's and spearman's correlation coefficients on the same sets of data. *Quaestiones Geographicae*, *30*(2), 87–93. https://doi.org/10.2478/v10117-011-0021-1

Henisz, W., Koller, T., & Nuttall, R. (2019). Five ways that ESG creates value. *McKinsey Quarterly*, *November*, 1–12. https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/five-ways-that-esg-creates-value

Huber, B. M., & Comstock, M. (2017). *ESG reports and ratings: What they are, why they matter*.

Hvidkjær, S. (2017). *ESG investing: a literature review*.

IIRC & Kirchhoff. (2020). *Closing the gap: The role of integrated reporting in communicating a company's - value creation to investors*. https://www.integratedreporting.org/wp-content/uploads/2020/12/IIRC_Kirchhoff_Investor_Reseach.pdf

Inderst, G., & Stewart, F. (2018). *Incorporating Environmental, Social and Governance (ESG) factors into fixed income investment*.

IOD SA. (2016). *King IV Report on Corporate Governance for South Africa*. https://c.ymcdn.com/sites/iodsa.siteym.%0Acom/resource/collection/684B68A7-B768-465C-8214-E3A007F15A5A/IoDSA_King_IV_Report_-_WebVersion.pdf

IOD SA. (2017). *Sustainable Development Forum: Addressing social inequality in business*. https://cdn.ymaws.com/www.iodsa.co.za/resource/collection/4B905E82-99EB-48B1-BCDA-F63F37069065/Addressing_social_inequality_in_business.pdf

IR. (2021). *Integrated Reporting*. https://integratedreporting.org/resource/international-ir-framework/

J. P. Morgan. (2016). *ESG - Environmental, Social & Governance Investing: A quantitative perspective of how ESG can enhance your portfolio* (Issue December). https://yoursri.li/media-new/download/jpm-esg-how-esg-can-enhance-your-portfolio.pdf

Johnson, R. (2020). The link between environmental , social and corporate governance disclosure and the cost of capital in South Africa. *Journal of Economic and Financial Sciences*, *13*(1), 1–12. doi.org/ 10.4102/jef.v13i1.543

Johnson, R., Mans-Kemp, N., & Erasmus, P. D. (2019). Assessing the business case for environmental, social and corporate governance practices in South Africa. *South African Journal of Economic and Management Sciences*, *22*(1), 1–13. https://doi.org/10.4102/sajems.v22i1.2727

Kapoor, N. (2014). Financial Portfolio management : Overview and Decision Making in investment Process. *International Journal of Research*, *1*(10).

Kessler, E. H. (2013). Stakeholder theory. In *Encyclopedia of management theory* (pp. 763–767). SAGE Publications, Inc.

Kim, S., & Yoon, A. (2020). Analyzing Active Managers' Commitment to ESG: Evidence from United Nations Principles for Responsible Investment. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3555984

Kotsantonis, S., Rehnberg, C., & Ward, B. (2019). The economic significance of long-term plans. *Journal of Applied Corporate Finance*, *32*(2), 21–34.

Kotsantonis, S., & Serafeim, G. (2019). Four things no one will tell you about ESG data. *Journal of Applied Corporate Finance*, *31*(2), 50–58. https://doi.org/10.1111/jacf.12346

KPMG. (2012). *Integrated Reporting in practice: The South African story in brief* (Issue June).

Lynn S. Paine, & Suraj Srinivasan. (2019). A Guide to the Big Ideas and Debates in Corporate Governance. *Harvard Business Review*, 2–19. https://hbr.org/2019/10/a-guide-to-the-big-ideas-and-debates-in-corporate-governance

Mainardes, E. W., Alves, H., & Raposo, M. (2011). Stakeholder theory: Issues to resolve. *Management Decision*, *49*(2), 226–252. https://doi.org/10.1108/00251741111109133

Malatji, S. E. (2019). *Responsible investments and sustainable value creation in selecetd Johannesburg Stock Exchange*. University of Limpopo.

Mans-Kemp, N. (2014). *Corporate governance and the financial performance of selected Johannesburg Stock Exchange Industries* (Issue December). Stellenbosch University.

Mans-Kemp, N., & van der Lugt, C. T. (2020). Linking integrated reporting quality with sustainability performance and financial performance in South Africa. *South African Journal of Economic and Management Sciences*, *23*(1), 1–11. https://doi.org/10.4102/sajems.v23i1.3572

Milenovic, Z. M. (2011). *APPLICATION OF MANN-WHITNEY U TEST IN RESEARCH OF PROFESSIONAL TRAINING OF PRIMARY SCHOOL TEACHERS*. *6*, 73–79.

Minor, D. B. (2007). Finding the [Financial] cost of socially responsible investing. *Journal of*

Investing, *16*(3), 54–70.

Mishra, P., Pandey, C. M., Singh, U., Gupta, A., Sahu, C., & Keshri, A. (2019). Descriptive statistics and normality tests for statistical data. *Annals of Cardiac Anaesthesia*, *22*(1), 67–72. https://doi.org/10.4103/aca.ACA_157_18

Mogapi, E. M. (2016). *Trade-offs in decision making by impact investors between socio-environmental return and financial return* (Issue November). University of Pretoria.

Moikwatlhai, K. B. (2019). *ESG reporting and the institutional shareholder base: A quantitative study of listed companies on the Johannesburg Stock Exchange*. University of the Witwatersrand, Johannesburg.

MSCI. (2018). *Introducing ESG investing*.

Muller, C., & Ward, M. (2013). Style-based effects on the Johannesburg Stock Exchange: A graphical time-series approach. *Investment Analysts Journal*, *77*(1), 1–16. https://doi.org/10.1080/10293523.2013.11082552

Nachar, N. (2008). *The Mann - Whitney U : A Test for Assessing Whether Two Independent Samples Come from the Same Distribution*. *4*(1), 13–20.

Naik, D., & Ward, M. (2017). *The relationship between Environmental Social and Governance (ESG) disclosure and financial performance of South African listed equities* [University of Pretoria, Gordon Institute of Business Science]. https://repository.up.ac.za/

NASA. (2020). *What's the difference between climate change and global warming?* https://climate.nasa.gov/faq/12/whats-the-difference-between-climate-change-and-global-warming/

Naude, P., Hamilton, B., Ungerer, M., Malan, D., & Klerk, M. de. (2018). Business

perspectives on the Steinhoff saga. *USB Management Review, Special Report, June 2018*, *June*, 1–36. www.usb.ac.za/managementreview%0Ahttps://www.researchgate.net/publication/337740231_BUSINESS_PERSPECTIVES_ON_THE_STEINHOFF_SAGA_SPECIAL_REPORT_JUNE_2018

Nkomani, S. (2013). *Corporate Social Responsibility and financial performance : the Johannesburg Stock Exchange top 100* (Issue February) [University of Pretoria, Gordon Institute of Business Science]. https://repository.up.ac.za/

OECD. (2021). *ESG investing and climate transition: Market aractices, issues and policy considerations*. https://www.oecd.org/finance/ESG-investing-and-climate- transition-Market-practices-issues-and-policy-considerations.pdf

Olatubosun, P. O., & Nyazenga, S. (2020). *9 . The value of Ubuntu – moral and governance case for ethical and responsible financing and investment practices in South Africa*. *May*. https://doi.org/10.4337/9781789905960.00015

Ostertagová, E., Ostertag, O., & Kováč, J. (2014). Methodology and application of the Kruskal-Wallis Test Eva Ostertagová. *Applied Mechanics and Materials*, *611*, 115–120. https://doi.org/10.4028/www.scientific.net/AMM.611.115

Peng, L. S., & Isa, M. (2020). Environmental, Social and Governance (ESG) Practices And Performance In Shariah Firms: Agency or Stakeholder Theory? *Asian Academy of Management Journal of Accounting & Finance*, *16*(1), 1–34.

PRI. (2020). *About the PRI*. https://www.unpri.org/pri/about-the-pri

Rajeswari, M. (2020). A study on construction of an investment portfolio using fundamental analysis. *International Journal of Management*, *11*(12), 415–429.

https://doi.org/10.34218/ijm.11.12.2020.038

Rathbones. (2017). *Active vs. passive investing — the great investment debate*. https://www.rathbones.com/sites/default/files/literature/pdfs/rathbones_active_vs_passive_investing_james_pettit_investment_report_full_website.pdf

Rayer, Q. (2017). Exploring ethical and sustainable investing. In *The Review of Financial Markets*. https://www.strawberryinvest.com/wp-content/uploads/2017/01/RoFMjan17-QRpps44-49.pdf

Razali, N. M., & Wah, Y. B. (2011). Power comparisons of Shapiro-Wilk, Kolmogorov-Smirnov, Lilliefors and Anderson-Darling tests. *Journal of Statistical Modeling and Analytics*, *2*(1), 13–14.

Refinitiv. (n.d.). *Refinitiv security statement technical and organisational overview Refinitiv security*. https://my.refinitiv.com/content/dam/myrefinitiv/policiesandresources/statementofservice/Refinitiv Statement of Service-Final.pdf

Refinitiv. (2021). *Environmental, Social and Governance (ESG) scores from Refinitiv* (Issue February).

Rezaee, Z., Tsui, J., Cheng, P., & Zhou, G. (2019). Chapter 2 - Sustainability principles, theories, research and education. In *Business sustainability in Asia: Compliance, performance, and integrated reporting and assurance*. ProQuest Ebook Central. https://ebookcentral-proquest-com.uplib.idm.oclc.org

Saunders, M. N. K., & Lewis, P. (2018). *Doing research in business & management: An essential guide to planning your project* (Second). Pearson.

Schindler, P. S. (2019). *Business research methods* (13th ed.). McGraw-Hill/Irwin.

Schmidt, S. (2012). Kruskal – Wallis Test. In *Encyclopedia of Research Design* (pp. 674–676). SAGE Publications, Inc. https://doi.org/https://dx.doi.org/10.4135/9781412961288

Schober, P., & Schwarte, L. A. (2018). Correlation coefficients: Appropriate use and interpretation. *Anesthesia and Analgesia*, *126*(5), 1763–1768. https://doi.org/10.1213/ANE.0000000000002864

Serafeim, G., & Yoon, A. (2021). Stock Price Reactions to ESG News: The Role of ESG Ratings and Disagreement. In *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3765217

Signori, S., San-Jose, L., Retolaza, J. L., & Rusconi, G. (2021). Stakeholder value creation: Comparing esg and value added in european companies. *Sustainability (Switzerland)*, *13*(3), 1–16. https://doi.org/10.3390/su13031392

Songi, O., & Dias, A. K. (2019). Sustainability Reporting in Africa. *Business Ethics*, *December*, 536–550. https://doi.org/10.1017/9781108658386

Soobramoney, S. (2019). *'Trending' in sustainability*. https://www.jse.co.za/sites/default/files/jse_document_manager/RW/Internal/Indices/FTSEJSE Responsible Investment index series/2018 ESG Model Enhancements/ESG model update_roadshow presentation_Sept 2018_pdf.pdf

Stats SA. (2021). *Quarterly Labour Force Survey (QLFS) – Q2:2021*. http://www.statssa.gov.za/publications/P0211/Media release QLFS Q2 2021.pdf

Stewart, D. W., & Kamins, M. A. (1993). Evaluating Secondary Sources. In *Secondary Research* (pp. 17–32). SAGE Publications, Inc. https://doi.org/https://dx-doi-org.uplib.idm.oclc.org/10.4135/9781412985802.n2

Steyn, J., & Viviers, S. (2020). The performance of morally questionable shares in South Africa (2004 – 2019). *Journal of Economic and Financial Sciences*, *13*(1), 1–12. https://doi.org/doi.org/10.4102/jef. v13i1.549

Sushko, V., & Turner, G. (2018). The implications of passive investing for securities markets. *BIS Quarterly Review*, 113–131.

SustainAbility. (2018). *Rate the raters 2018: Ratings revisited*. https://www.sustainability.com/globalassets/sustainability.com/thinking/pdfs/sa-ratetheraters_ratings-revisited_march18.pdf

Taljaard, C. C., Ward, M. J. D., & Muller, C. J. (2015). Board diversity and financial performance: A graphical time-series approach. *South African Journal of Economic and Management Sciences*, *18*(3), 425–448. https://doi.org/10.17159/2222-3436/2015/v18n3a10

Taplin, R., & Killian, N. (2021). ESG and good corporate governance in relation to the use of pension funds: Comparison between the United Kingdom and South Africa (The Report). *Interdisciplinary Journal of Economics and Business …*, *10*, 1–46. https://www.researchgate.net/profile/C-Killian/publication/354544142_ESG_and_good_corporate_governance_in_relation_to_the_use_of_pension_funds_Comparison_between_the_United_Kingdom_and_South_Africa_The_Report/links/613f151f01846e45ef450cec/ESG-and-good-co

The World Bank. (2012). *Turn down the heat: Why a 4°C warmer world must be avoided*. https://documents1.worldbank.org/curated/en/865571468149107611/pdf/NonAsciiFileName0.pdf

The World Bank. (2021). *The World Bank in South Africa*. https://www.worldbank.org/en/country/southafrica/overview#1

Thomson Reuters. (2017). *Thomson Reuters ESG Scores* (Issue March). https://www.esade.edu/itemsweb/biblioteca/bbdd/inbbdd/archivos/Thomson_Reuters_ESG_Scores.pdf

Thomson Reuters. (2021). *Thomson Reuters information security principles* (Issue January). https://www.thomsonreuters.com/content/dam/ewp-m/documents/thomsonreuters/en/pdf/white-papers/2021-thomson-reuters-information-security-principles.pdf

Tucker, J. J., & Jones, S. (2020). Governance Investing : Investor Demand , the Great Wealth Transfer , and Strategies for ESG Investing. *Journal of Financial Service Professional*, *74*(3), 56–75.

Tullberg, J. (2013). Stakeholder theory: Some revisionist suggestions. *Journal of Socio-Economics*, *42*, 127–135. https://doi.org/10.1016/j.socec.2012.11.014

UNGC. (2021). *The world's largest corporate sustainability initiative*. https://www.unglobalcompact.org/what-is-gc

Veenstra, E. M., & Ellemers, N. (2020). ESG indicators as organizational performance goals: Do rating agencies encourage a holistic approach? *Sustainability (Switzerland)*, *12*(24), 1–15. https://doi.org/10.3390/su122410228

Viljoen, L. E. (2016). *Residual momentum and investor sentiment on the Johannesburg Stock Exchange (JSE)*. *November*. https://repository.up.ac.za/bitstream/handle/2263/59799/Viljoen_Residual_2017.pdf?sequence=1

Viviers, S. (2014). 21 year of resposnsible investing in South Africa: Key investment strategies and criteria. *Journal of Economic and Financial Sciences*, *7*(3), 737–774.

Viviers, S., & Els, G. (2017). Responsible investing in South Africa: past, present and future. *African Review of Economics and Finance African*, *9*(1), 122–155.

WallStreetPrep. (2021). *Bloomberg vs. Capital IQ vs. FactSet vs. Thomson Reuters Eikon*. https://www.wallstreetprep.com/knowledge/bloomberg-vs-capital-iq-vs-factset-vs-thomson-reuters-eikon/

Wayman, R. (2021). *Compound annual growth rate: What you should know*. Investopedia. https://www.investopedia.com/investing/compound-annual-growth-rate-what-you-should-know/

WEF. (2016). *5 charts that explain the Paris climate agreement*. https://www.weforum.org/agenda/2016/11/5-charts-that-explain-the-paris-climate-agreement/

Zumente, I., & Lāce, N. (2021). Esg rating - necessity for the investor or the company? *Sustainability (Switzerland)*, *13*(16). https://doi.org/10.3390/su13168940

Appendices

Appendix 1

Results for Test for Difference for Portfolios Returns (RQ 1, 2 and 3)

a) Refinitiv ESG Portfolios: Q1 vs Q5

Mann-Whitney Test

Ranks

	Refntv_Portfolios	N	Mean Rank	Sum of Ranks
CAGR_Performance	RefntvPortfolioQ1	145	124.63	18071.00
	RefntvPortfolioQ5	145	166.37	24124.00
	Total	290		

Test Statistics[a]

	CAGR_Performance
Mann-Whitney U	7486.000
Wilcoxon W	18071.000
Z	-4.239
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: Refntv_Portfolios

b) Refinitiv ESG Portfolios: Q1 vs J203T

Mann-Whitney Test

Ranks

	Refntv_Portfolios	N	Mean Rank	Sum of Ranks
CAGR_Performance	RefntvPortfolioQ1	145	150.40	21807.50
	JSEAllshare	145	140.60	20387.50
	Total	290		

Test Statistics[a]

	CAGR_Performance
Mann-Whitney U	9802.500
Wilcoxon W	20387.500
Z	-.994
Asymp. Sig. (2-tailed)	.320

a. Grouping Variable: Refntv_Portfolios

c) Refinitiv ESG Portfolios: Q1 vs Q2 vs Q3 vs Q4 vs Q5 vs J203T

Kruskal-Wallis Test

Ranks

	Refntv_Portfolios	N	Mean Rank
CAGR_Performance	RefntvPortfolioQ1	145	399.45
	RefntvPortfolioQ2	145	352.74
	RefntvPortfolioQ3	145	433.20
	RefntvPortfolioQ4	145	530.97
	RefntvPortfolioQ5	145	522.45
	JSEAllshare	145	374.19
	Total	870	

Test Statistics[a,b]

	CAGR_Performance
Kruskal-Wallis H	65.643
df	5
Asymp. Sig.	.000

a. Kruskal Wallis Test

b. Grouping Variable: Refntv_Portfolios

d) Bloomberg ESG Portfolios: Q1 vs Q5

Mann-Whitney Test

Ranks

	Blmbg_Portfolios	N	Mean Rank	Sum of Ranks
CAGR_Performance	BlmbgPortfolioQ1	145	95.26	13813.00
	BlmbgPortfolioQ5	145	195.74	28382.00
	Total	290		

Test Statistics[a]

	CAGR_Performance
Mann-Whitney U	3228.000
Wilcoxon W	13813.000
Z	-10.202
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: Blmbg_Portfolios

e) Bloomberg ESG Portfolios: Q1 vs J203T

Mann-Whitney Test

Ranks

	Blmbg_Portfolios	N	Mean Rank	Sum of Ranks
CAGR_Performance	BlmbgPortfolioQ1	145	122.53	17766.50
	JSEAllshare	145	168.47	24428.50
	Total	290		

Test Statistics[a]

	CAGR_Performance
Mann-Whitney U	7181.500
Wilcoxon W	17766.500
Z	-4.665
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: Blmbg_Portfolios

f) Bloomberg ESG Portfolios: Q1 vs Q2 vs Q3 vs Q4 vs Q5 vs J203T

Kruskal-Wallis Test

Ranks

	Bimbg_Portfolios	N	Mean Rank
CAGR_Performance	BimbgPortfolioQ1	145	303.41
	BimbgPortfolioQ2	145	434.91
	BimbgPortfolioQ3	145	465.64
	BimbgPortfolioQ4	145	321.95
	BimbgPortfolioQ5	145	652.59
	JSEAllshare	145	434.50
	Total	870	

Test Statistics[a,b]

	CAGR_Performance
Kruskal-Wallis H	179.974
df	5
Asymp. Sig.	.000

a. Kruskal Wallis Test

b. Grouping Variable: Bimbg_Portfolios

g) Refinitiv ESG Portfolios Q1 vs Bloomberg ESG Portfolio Q1

Mann-Whitney Test

Ranks

	Refntv_Portfolios	N	Mean Rank	Sum of Ranks
CAGR_Performance	RefntvPortfolioQ1	145	167.92	24348.50
	BlmbgPortfolioQ1	145	123.08	17846.50
	Total	290		

Test Statistics[a]

	CAGR_Performance
Mann-Whitney U	7261.500
Wilcoxon W	17846.500
Z	-4.553
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: Refntv_Portfolios

h) Refinitiv ESG Portfolios Q5 vs Bloomberg ESG Portfolio Q5

Mann-Whitney Test

Ranks

	Refntv_Portfolios	N	Mean Rank	Sum of Ranks
CAGR_Performance	RefntvPortfolioQ5	145	121.15	17567.00
	BlmbgPortfolioQ5	145	169.85	24628.00
	Total	290		

Test Statistics[a]

	CAGR_Performance
Mann-Whitney U	6982.000
Wilcoxon W	17567.000
Z	-4.944
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: Refntv_Portfolios

Appendix 2

Results for Correlation Tests (RQ 4)

Table 12: Results for Pearson's Correlations (Research Question 4)

Correlations

		Refntv_2008	Refntv_2009	Refntv_2010	Refntv_2011	Refntv_2012	Refntv_2013	Refntv_2014	Refntv_2015	Refntv_2016	Refntv_2017	Refntv_2018	Refntv_2019	Refntv_2020
Blmbg_2008	Pearson Correlation	**0.734****												
	Sig. (2-tailed)	**0.007**												
	N	**12**												
Blmbg_2009	Pearson Correlation		**.845****											
	Sig. (2-tailed)		**.000**											
	N		**14**											
Blmbg_2010	Pearson Correlation			**.478***										
	Sig. (2-tailed)			**.010**										
	N			**28**										
Blmbg_2011	Pearson Correlation				.473**									
	Sig. (2-tailed)				.001									
	N				43									
Blmbg_2012	Pearson Correlation					.608**								
	Sig. (2-tailed)					.000								
	N					67								
Blmbg_2013	Pearson Correlation						.648**							
	Sig. (2-tailed)						.000							
	N						70							
Blmbg_2014	Pearson Correlation							.572**						
	Sig. (2-tailed)							.000						
	N							71						
Blmbg_2015	Pearson Correlation								.584**					
	Sig. (2-tailed)								.000					
	N								73					
Blmbg_2016	Pearson Correlation									.729**				
	Sig. (2-tailed)									.000				
	N									78				
Blmbg_2017	Pearson Correlation										.645**			
	Sig. (2-tailed)										.000			
	N										79			
Blmbg_2018	Pearson Correlation											.550**		
	Sig. (2-tailed)											.000		
	N											81		
Blmbg_2019	Pearson Correlation												.724**	
	Sig. (2-tailed)												.000	
	N												83	
Blmbg_2020	Pearson Correlation													.606**
	Sig. (2-tailed)													.000
	N													80

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 13: Results for Spearman's Coefficient Correlations (Research Question 4)

Spearman rho Correlations

		Refntv_ 2008	Refntv_ 2009	Refntv_ 2010	Refntv_ 2011	Refntv_ 2012	Refntv_ 2013	Refntv_ 2014	Refntv_ 2015	Refntv_ 2016	Refntv_ 2017	Refntv_ 2018	Refntv_ 2019	Refntv_ 2020
Blmbg_ 2008	Correlation Coefficient	.712**												
	Sig. (2-tailed)	.009												
	N	12												
Blmbg_ 2009	Correlation Coefficient		.786**											
	Sig. (2-tailed)		.001											
	N		14											
Blmbg_ 2010	Correlation Coefficient			.468*										
	Sig. (2-tailed)			.012										
	N			28										
Blmbg_ 2011	Correlation Coefficient				**.449****									
	Sig. (2-tailed)				**.003**									
	N				**43**									
Blmbg_ 2012	Correlation Coefficient					**.602****								
	Sig. (2-tailed)					**.000**								
	N					**67**								
Blmbg_ 2013	Correlation Coefficient						**.606****							
	Sig. (2-tailed)						**.000**							
	N						**70**							
Blmbg_ 2014	Correlation Coefficient							**.527****						
	Sig. (2-tailed)							**.000**						
	N							**71**						
Blmbg_ 2015	Correlation Coefficient								**.587****					
	Sig. (2-tailed)								**.000**					
	N								**73**					
Blmbg_ 2016	Correlation Coefficient									**.722****				
	Sig. (2-tailed)									**.000**				
	N									**78**				
Blmbg_ 2017	Correlation Coefficient										**.633****			
	Sig. (2-tailed)										**.000**			
	N										**79**			
Blmbg_ 2018	Correlation Coefficient											**.505****		
	Sig. (2-tailed)											**.000**		
	N											**81**		
Blmbg_ 2019	Correlation Coefficient												**.725****	
	Sig. (2-tailed)												**.000**	
	N												**83**	
Blmbg_ 2020	Pearson Correlation													**.535****
	Sig. (2-tailed)													**.000**
	N													**80**

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).