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The Impact of ESG on Stock Performance

A Case Study of Developing and Developed Countries: South Africa and Sweden.

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Abstract

Following the increasing sustainability trend and awareness, investors now look beyond only financial considerations when purchasing stocks. This paper analyzes the relationship between Environmental, Social, Governance (ESG) scores and stock performance, measured by returns. It investigates if splitting the sample period would result in a different magnitude of abnormal returns. This study further contributes to the field by comparing the impact of ESG in developed and developing countries to determine better stock performance. ESG portfolios are constructed and regressed on both CAPM and Fama-French models. The results reveal positive abnormal returns when the high and low portfolios are considered individually but negative abnormal returns when a high-minus-low strategy is applied, indicating a better stock performance with low ESG scores. When accounting for different time periods, the results show a mix of positive and negative abnormal returns, suggesting a difference in the direction and magnitude of returns in both periods. This result is consistent with the different regression models and countries. Finally, country comparison results show that developing countries' stocks perform better than developed countries.

Keywords: Sustainability · ESG · Stock performance · Returns · Fama-French factors · CAPM · · Sweden · South Africa

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1. Introduction

From the beginning of business transactions, it was repeatedly iterated that the main goals of corporate entities were profit maximization and creating stakeholder value, particularly shareholders. Several companies have taken extreme measures to ensure the achievement of these goals such that it has led to an ethical imbalance in the mode of business operations, in some instances. Depending on the kind of firm involved and what they aim to achieve, which is usually either aggressive profit generation or creating a false performance impression to the market, these extreme measures taken by firms have repercussions that affect others. For example, companies in the manufacturing industry are prone to actions that affect the environment, while the financial sector is more susceptible to corporate governance issues.

According to Becchetti (2015), discarding the multi-stakeholder view of companies results in a concept called "corporate reductionism," which confuses the "cake" (value-added creation, which contributes to the growth and economic well-being) with one of its slices (profits accruing to the shareholders alone). He further adds that rather than being a philosophical problem, reductionism is an inefficient view that reduces societal well-being and restricts human beings' and companies' contribution to their own life flourishing.

Traditional investors and companies are now pressured to have a paradigm shift in their perception of value as investors check that sustainability-related criteria are met before deciding to invest (Delevingne et al. 2020). This is further enhanced by the Principles for Responsible Investment (PRI) initiative, which encourages investors to make responsible investments rather than focus on organizations' operations (Dahlberg & Wiklund, 2018). To become better value creators, companies continuously establish policies and engage in various forms of Corporate Social Responsibility (CSR), including volunteering in the community, improving labor policies, environment conservation, etc.

These CSR activities are imperative to describing sustainability initiatives today. In the past, business leaders employed the term "sustainability' to mean a company's ability to generate profits continuously. However, following conversations about the deteriorating climate, the global economic crises caused by improper business conduct, and societal problems, the concept of sustainability has encompassed more dimensions and garnered more attention (Alsayegh, Rahman

& Homayoun, 2020). Weber (2008) states that by incorporating these initiatives into business operations, benefits such as positive effect on reputation, revenue increase from higher sales and market share, positive influence on employee motivation and retention, etc., have been realized. As a result of this global trend, there has been a remarkable increase in the detailed reporting and evaluation of sustainability performance, particularly the social, governance, and environmental aspects (Jang, 2019).

Sustainability is also known as ESG, which represents Environment, Social, and Governance pillars. Embedded in these three pillars are various measures of business operations ranging from energy savings, carbon emissions, board management, etc. With the combination of these, ESG scores are assigned to companies as a report of their sustainability performance. Investors who are conscious of these issues use ESG information when considering stock investments. Asides from stocks, more recent forms of investment such as cryptocurrencies are also affected by sustainability issues. A recent announcement by Elon Musk cited environmental concerns as the reason for not going further with his company's initial plan to accept bitcoin for vehicle purchases. This announcement severely affected the cryptocurrency as there was about a 50% decline in its price (Kolodny, 2021).

Regardless of the global shift, it is not surprising that companies in developing countries might not be as fixated on sustainability initiatives as their counterparts in developed countries. This is because the "developing" status brings the sense of an emerging market whose primary focus would be to enhance the Gross Domestic Product (GDP), hence, making them less ESG inclined. Blowfield and Frynas (2005) posit that there are low ESG investments in developing economies due to a deprived social environment.

1.1 Purpose and Research Questions

ESG literature is scarce to find when considering emerging markets/ developing countries. For this reason, this paper analyzes the relation between ESG scores and stock returns of listed companies in both developed and developing countries. This study is relevant as it contributes to the ongoing controversy and inconclusive results on the association between ESG scores and the performance of stocks in the financial market. Moreover, it goes further to compare the effect of ESG on returns of both categories of countries to determine if an inherently more ESG inclined economy

(developed) would obtain better stock returns or not. Based on the foregoing, this research aims to answer three questions:

1. Does a higher ESG score mean a higher stock return?
2. Does the effect of ESG on stock return change over time?
3. Does ESG improve the stock returns in developed more than developing countries?

The paper uses Sweden as a case study for developed countries while South Africa represents developing countries; hence the data sample and results obtained might not be fully representative of both categories of countries. Data from sample period 2010 to 2019 is analyzed using a pre-existing research approach: ESG portfolio construction method. The method involves the construction of high and low portfolios based on ESG scores, as well as a high-minus-low or difference portfolio. Portfolios are also constructed using the individual pillar scores. Fama-French models and CAPM are used for the estimation of abnormal returns (if any). The analysis reveals a negative link between ESG scores and stock returns, a declining trend in stock return for developed countries over the study period, and better performance of stocks in developing countries over the developed countries.

This paper is structured as follows: Chapter 2 provides an overview of ESG, theoretical background, the research hypothesis, and results from previous empirical research in related topics. Chapter 3 presents the data to be used and explains how the variables are measured. Chapter 4 describes the methodology to be adopted and provides further clarification of the research hypothesis. Chapter 5 presents the empirical results and discusses possible explanations for the results, while chapter 6 concludes the paper and provides recommendations for future research.

2. Theory and Literature Review

This chapter provides insight into previous literature on this topic. It speaks to the general theoretical principles, the development of ESG into what it is today, breakdown of ESG, peculiarities of developed and developing countries, and review of previous related studies.

2.1 Theoretical Background

Three theories within financial economics that pose views related to this study and support the inclusion of sustainability in investments are outlined.

2.1.1 Shared Value Theory

The concept of shared value was coined and idealized by Porter and Kramer (2006) to combat the narrow view of capitalism and contribute to the topic of managing the relationship between business and society (Michelini & Fiorentino, 2012). According to Porter and Kramer (2011), the concept of shared value means having policies and practices, which simultaneously improve the economic and social condition of the communities in which the company operates and boost a company's competitiveness. Unlike how businesses treated societal issues as a peripheral matter, the concept of shared value is based on the premise that both economic and social progress must be addressed using value principles, where value is seen as benefit relative to cost (Porter & Kramer, 2011)

Although there have been controversies around this, the co-creators further stated that shared value addresses the declining social trust in corporations and leads to improvement between business and society by aligning social benefits with corporate profits (Dembek, Singh & Bhakoo, 2016). Porter and Kramer (2011) explain that although opportunities will differ, the ability to create shared values equally applies to advanced and developing economies as well as industries. They further stated that one of the strong signs that shared value creation is possible was the blurring boundaries between profit-making and non-profits companies. This theory developed by Porter and Kramer is therefore fundamental to the argument of valuing companies' involvement in ESG in business operations.

2.1.2 Stakeholder Theory

Initially introduced by Freeman (1984), the stakeholder framework contradicts the shareholder theory by Friedman (1970). The shareholder theory states that a firm's sole responsibility is to its shareholders by increasing profits to maximize returns (Castelo, 2013). While Friedman's doctrine is purely economic, the stakeholder theory states that a firm's responsibility expands to a broader group of stakeholders, which includes the shareholders (Parmar et al., 2010). It further suggests that if the relationship between a business and those who can affect or be affected by the business is adopted as a unit of analysis, there would be a better chance to deal with problems of value creation and trade, ethics of capitalism, and managerial mindset.

There have been misconceptions as some have described the theory to be a comprehensive moral doctrine or a form of socialism. However, Parmar et al. (2010) maintained that the stakeholder theory should be seen as a valuable tool to act better in a complex world. Furthermore, by stating CSR and related activities as an important aspect of ethics, the theory posits a further purpose of the firm and how it can deliver these goals. This theory is relevant to this topic as sustainability activities practiced by firms largely consider a broader range of stakeholders.

2.1.3 Environmental Kuznets Curve

Several papers have considered the relationship between economic development and the quality of the environment (Dasgupta et al., 2002). The Environmental Kuznets Curve (EKC) was introduced by Grossman and Krueger (1991). EKC proposes that economic development would initially lead to deterioration in the environment; however, after a certain level of economic growth, there is an improvement in the relationship between society and the environment; thereby resulting in a reduction in the level of environmental degradation.

The EKC follows an inverse U-shaped pattern to depict this relationship between economic development and the environment (Andreoni & Levinson, 2001). According to Beckerman (1992), the best way for most countries to attain a decent environment is to become rich. This theory is related to this paper as it assumes that developed countries have advanced to the point where the benefit of reduced environmental degradation is being enjoyed, hence higher sustainability in these countries. However, developing countries are still in the earlier phase and are yet to enjoy the environmental benefits fully, therefore lower sustainability levels.

2.2 Development of ESG

Since the 20th century, remarkable developments have been experienced with Social Responsible Investments (SRI) (Halbritter & Dorfleitner, 2015). The responsible investing landscape became popular with SRIs, which were described with terms such as mission-related investing, impact investing, and ethical investing. According to Caplan et al. (2013), there are three main categories of responsible investing. The first being Socially Responsible Investing suggests a process of constructing portfolios that use defined ethical guidelines for negative screening, in an attempt to avoid investments in specific stocks or industries. This allows investors to select assets that are consistent with their beliefs and personal value system (Auer, 2016). The second category, Impact Investing, suggests that people invest in firms with the precise goal of affecting social or environmental changes which are mission-related. These categories were found to be too restrictive, hence the emergence of Environmental, Social and Governance (ESG) Investing, which aims to integrate ESG factors in investment analysis.

Keefe (2008) stated that responsible investment has gone from "integrating personal and societal values with investment decisions" to "integrating environmental, social and governance factors into investment decisions". He further stated that the change in language and emphasis from values to ESG integration represents a significant transformation as it marked the emergence of sustainable investing. According to him, although sustainable investing is also informed by certain values, the vital values embedded here are those which would be more durable in the long run and are achieved by internalizing certain standards; through interactions with customers, communities, and the environment. With the involvement and activism of shareholders, ESG related investing has progressed from negative to positive screening as various companies aim to achieve good ratings to be seen as best in class.

2.3 Pillars of ESG

To measure sustainability or ethical impact, three broad categories are looked at. They are referred to as the pillars of ESG- Environment, Social, and Governance pillars.

The environment pillar is also known as the planet pillar as it deals with activities that minimize the impact of business operations on the environment. It refers to the laws, regulations, and policies established regarding environmental issues. Sparked by the unfavorable climate change, this pillar

gains the most attention as it involves preserving the environment for future generations; hence, companies are constantly aiming to reduce carbon footprints, water usage, packaging waste, etc. The environment pillar encompasses other things, including pollution, protection of wildlife and endangered species, ecosystem management, etc. (Future Fitouts, 2020).

According to Ruggie and Middleton (2019), the social pillar indicates the risk of adverse impacts that businesses may have on people. This pillar is also known as the people pillar as it considers the effect of a firm's behavior regarding social issues. These issues include training and development, human rights, employment equality and gender diversity, supply chain transparency, etc. (Sisto, 2020).

Following the governance failure of various companies such as Enron, more stringent corporate governance principles have been established and implemented. The governance pillar is involved with the internal operations of firms, that is, corporate behavior. These include board diversity, transparency and anti-corruption, compensation of board executives, bribery and corruption, etc. This pillar also entails checks to ensure the alignment of management and shareholders' objectives (Beattie, 2019).

2.4 Peculiarities of Developed and Developing Countries

The distinctions between developed and developing countries are usually measured in various ways as both categories involve different characteristics. There have been ongoing debates about where to draw the line between both groups as there is no universal definition. This has led to the formation of new terms such as middle-income nations and emerging markets. According to Sandford and Sandhu (2002), every country is unique; however, they can be classified based on their economic, political and social situation as these are the dimensions of development.

Developed Countries are generally industrialized countries characterized by high income per capita, low unemployment rate, better mastering of science and technology, and good health facilities. On the other hand, based on market and economic growth, developing countries includes newly industrialized countries, emerging markets, frontier markets, and least developed countries. According to West and Desai (2002), they are characterized by low per capita income and levels of living, rising unemployment and underemployment levels, dependence on international relations, and high magnitude of poverty in extreme cases, to mention a few.

From the institutional context, developing economies have few activist consumers and limited enforcement of liability laws compared to the developed ones (Hamann, 2006). Osborn, Cutter and Ullah (2015) assert that through Official Development Assistance (ODA), international development policies, global cooperation, and other means, developed countries can and should continue to assist developing countries in their transition to sustainability.

According to Robecco (2020), Sweden tops the current country ESG rankings with a score of 8.98, and it is closely followed by its Nordic neighbors in Norway, Denmark, Iceland, and Finland. This proves that the Nordic region is one of the most sustainability inclined in the world. Robecco (2020) states that the ratings are calculated based on 40 indicators and 15 criteria, including social unrest, environment risk, aging, corruption, etc. A weight of 20% is assigned to environmental, 30% to social, and 50% to governance.

2.5 Hypothesis Development

Three null hypotheses are proposed based on the research questions and the contribution of this paper to the finance field.

Companies with high ESG scores are those which, by all pillar indications, embrace the stakeholder theory by acting better through the establishment of policies and engagement in activities that look beyond profit-making. When ESG is incorporated in returns, the market is expected to reciprocate this high level of sustainability involvement by enabling better returns for the stocks with higher scores than those with lower ESG scores. Hence, hypothesis 1 is postulated:

H_1**:** *Companies with lower ESG scores do not have higher abnormal returns than companies with higher ESG scores.*

To analyze the trend of abnormal returns and to determine if the extent of abnormal returns obtained as a result of ESG scores change over time, a second hypothesis is proposed:

H_2: *There is no significant difference in the magnitude of ESG returns realized in an earlier and a latter period.*

Since developed countries embrace the shared value concept and are generally more sustainability inclined, investors' preference for stocks with higher scores should increase. Such that the financial

market values this and rewards stocks with higher scores over those with lower stocks. For developing countries, the expected effect of deteriorating economic development would spread to financial markets, causing lower returns. Hence, a third hypothesis is tested:

H_3: *ESG does not result in better stock returns of developing countries over developed countries.*

2.6 Review of Past Research

As this topic is highly relevant, researches around this topic have been replicated to measure the impact of ESG on various stocks' returns, firms' performance, equity funds, and it has cut across different categories of stock, indices, countries, and even region. The studies have recorded conflicting and mixed results, showing a positive and significant result for some, while others are the opposite. Here, various studies which cut across the above research questions and other relevant topics are reviewed.

In a study by Halbritter and Dorfleitner (2015), they investigated the effect of ESG ratings on firm returns for U.S companies from 1990 to 2011, using portfolio construction. A 20% high-low strategy was adopted using data from ASSET4 database, KLD, and Bloomberg. Applying Carhart (1997) four-factor model on the ESG portfolio revealed no significant return difference between companies with high and low ESG ratings. The same conclusion was arrived at for the individual ESG pillars. Furthermore, splitting the sample into three (3) sub-periods revealed that there was a decline in the outperformance over the years.

Another study by Jang (2019) focused on the European market and used STOXX 600 stocks as its sample. Covering the period January 2002 to July 2018, the Carhart four-factor model result showed that ESG has a significant and negative impact on average stock returns. This indicated that corporations with lower ESG scores (less ESG friendly) have better stock performance in the market than those with higher ESG scores. However, when industry and country effect controlled pooled regressions were conducted, only Nordic firms, except Finnish firms, are positively influenced by ESG.

In their study, Ruan and Liu (2021) reviewed ESG activities and their effects on Chinese firms' performance. An analysis of China's Shanghai and Shenzhen A-share listed companies, excluding financial and insurance companies, from 2015 to 2019 was conducted. The independent variable

used was ESG ratings, while firm performance was measured using Tobin's Q. Furthermore, control variables including firm size, financial leverage, sales growth rate, audited by the big four, market value to book ratio, R&D investments, age, and largest shareholder's shareholding proportion were used. The paper applied a high-low strategy with a grouping difference test of the main variables. An Ordinary Least Square (OLS) regression analysis showed a significantly negative correlation between ESG ratings and firm performance. According to the authors, China is regarded as a developing country, and ESG activities are still in their infancy; therefore, it may bring greater cost burdens to non-state-owned and non-environmentally sensitive enterprises.

Furthermore, a study by Garcia, Mendes and Orsato (2017) analyzed the link between corporate financial performance and ESG in emerging economies by considering firms from BRICS countries (Brazil, Russia, India, China, and South Africa). Financial performance was measured using a combination of firm leverage, size, free cash flow, and asset profitability. Panel data regression was applied on a total of 365 companies from 2010 to 2012. The result suggested a negative association between ESG and financial performance as the low ESG rating firms were found to have better financial performance than the high rating firms.

Limkriangkrai, Koh and Durand (2017) investigated the relationship between ESG profiles and stock returns for the Australian market. The sample size for this paper was the top 200 companies by market capitalization listed on the Australian Securities Exchange from 2009 to 2014. Unlike many other studies, Regnan's ESG data (ValDa) which provides companies' ESG ratings from 0 to 5, was adopted. 0 being the lowest score meant that there was no element of best governance practices and vice versa. To examine if there was a difference in returns between high and low ESG scores, stocks with high and low ratings were grouped for the components E, S, and G. In addition to this, composite ESG high (low)-score portfolio, which contained the stocks with the highest (lowest) ratings in at least two of the three components, were created. Adjusting the returns for the Fama-French-Carhart (FFC) four factors, the alphas arrived at were insignificant hence indicating that no abnormal return exists for high-ESG portfolios, considering both the individual and composite portfolios.

In another study involving the Nordic countries, Dahlberg and Wiklund (2018) examined sustainability performance and Corporate Financial Performance from 2007 to 2017. Based on

some criteria set on Thomson Reuters database, a total of 108 firms in Sweden, Finland, Denmark, and Norway were chosen from the stock exchanges: Nasdaq OMX Stockholm, Nasdaq OMX Helsinki, Nasdaq OMX Copenhagen, and Oslo Børs. Instead of stock returns, Tobin's Q was used to measure financial market performance because it facilitates comparison between firms since no risk adjustment or normalization is needed. OLS regression was run with the controlling variables: beta, research & development, size, financial leverage. The study's empirical results showed a significant positive relationship between ESG ratings and financial market performance (Tobin's Q). This corroborates the notion that the Nordic region value sustainability.

Another study by Buallay et al. (2020) focused on the post-financial crisis performance of banks in both developed and developing countries. 882 banks from 80 developed and developing countries covering 11 years after the 2008 financial crisis were used, from 2009 to 2019. The dependent variables that represented banks' performance were: return on assets, return on equity, and Tobin's Q, while ESG score was the independent variable. A linear model including the independent variable as well as bank-specific and macroeconomic control variables was used. To deal with endogeneity, they applied instrumental variable – generalized method of moments (IV-GMM) dynamic fixed effects estimation approach. The results unanimously support the negative impact of ESG scores on every performance indicator as those with lower scores perform better, regardless of the type of bank, developed and/or developing countries.

Another study by Eccles, Ioannou, and Serafeim (2012) revealed annual abnormal returns of up to 4.8% for a sample period from 1993 to 2010. This study relied on ESG ratings of ASSET4 and SAM as well as on personal research and interviews. The study followed a combined approach to identify high and low sustainability firms from a sample of 180 U.S. companies. The results were arrived at using Carhart (1997) four-factor model and following a high–low strategy.

Table 1:
Summary of Previous Research

`	Author(s)	Period	Sample	Research Method	Perf. Measure	Findings
1	Halbritter and Dorfleitner (2015)	1990 - 2011	U.S market	ESG portfolios (CFF) & CSR	SR	Poitive but insignificant AR
2	Jang (2019)	2002 - 2018	European STOXX 600	Portfolio construction (FF3 & CSR)	SR	Negative and significant AR except Nordics
3	Ruan and Liu (2021)	2015 - 2019	Shanghai and Shenzhen A-share listed companies	OLS regression	FP (Tobin's Q)	Negative correlation with ESG
4	Garcia et al. (2017)	2010 - 2012	BRICS- Brazil, Russia, India, China, South Africa	Panel data regression	CFP (size, LEV, FCF, asset profitability)	Negative association between ESG and CFP
5	Limkriangkrai, Koh and Durand (2017)	2009 - 2014	Australian listed companies	Portfolio construction (CFF)	SR	No AR for high rated stocks
6	Dahlberg and Wiklund (2018)	2007 - 2017	Nordic countries	Controlled OLS regression	CFP (Tobin's Q)	Positive and significant relationship
7	Buallay et al. (2020)	2009 - 2019	80 developed and developing countries	Controlled OLS regression	FP (ROA, ROE, Tobin's Q)	Negative association between ESG and CFP
8	Eccles, Ioannou, and Serafeim (2012)	1993 - 2010	U.S. companies	ESG portfolios & interview	SR	Positive AR

This table presents an overview of previous literature investigating the link between ESG and companies' performance which are measured by stock returns and corporate financial performance. From the table, mixed results concerning the link can be seen.

*AR – Abnormal Returns
*CSR – Cross Sectional Regression
*SR- Stock Returns
*LEV – Leverage
*ROA – Return on Asset
*CFF- Carhart Four Factors
*OLS – Ordinary Least Squares
*CFP – Corporate Financial Performance
*FCF – Free Cash Flow
*ROE – Return on Equity

3. Data Presentation

This chapter discusses the data used for the study, including financial data and sustainability/ ESG scores data. It further gives a brief depiction of the variables and descriptive statistics of the variables.

3.1 Financial data- Stock Prices and Market Capitalization

Since the purpose of this paper is to evaluate ESG performance of developed and developing countries, Sweden and South Africa (SA) are selected. Sweden is a country in the Nordic region known to be one of the top sustainability inclined regions globally, making it good to model the developed country for this research. On the other hand, developing countries, especially in Africa, are generally not known to be as ESG focused as other regions. Therefore, South Africa is selected because not much research on this topic includes African countries as samples. Although it represents a less inclined region, it ranks as one of the highest in Africa and the required data for this research is relatively available for SA companies compared to some other countries.

Financial data for companies' monthly stock prices and market capitalization from 2010 – 2019 (120 months) are obtained from Datastream as it contains fundamental data for all developed markets and many emerging markets. The period 2010 to 2019 is used based on the availability of sufficient annual ESG data in both countries and to exclude the 2008 financial crisis period since the effect of the financial crises is not analyzed in this research. Since stock return is used, the excess stock return is determined by deducting the risk-free rate, which is the prevailing one-month treasury bill rate.

The companies selected are only those whose major stocks are actively traded on the primary stock exchange as of December 2019. The relevant stock exchange is limited by location to the countries being studied: Nasdaq Stockholm AB for Swedish companies and the Johannesburg Stock Exchange for South African companies. For SA, stock prices were obtained for a total of 264 companies across all sectors and industries, while stock data was obtained for 726 Swedish companies.

3.1.1 Financial Data – Pricing Factors

Asset pricing models describe the prices or expected rates of return of financial assets traded in financial markets. For the analysis and to benchmark stock performance, this paper uses three (3) asset pricing models that have consistently been used to describe stock returns. They are: Capital Asset Pricing Model (CAPM), Fama-French Three-Factor Model, and Fama-French Five-Factor Model.

Data for these models are coefficients of the risk-adjusted factors included in the models. According to Fama and French (2015, 2017), the factors are: Excess market returns (Mkt-Rf), Small minus Big (SMB), High minus Low (HML), Robust minus Weak (RMW), and Conservative minus Aggressive (CMA). From Kenneth R. French Data Library, the monthly estimates of these factors and the risk-free rates from January 2010 to December 2019 are obtained. This data library contains comprehensive data set for all the factors and they are computed to be specific to different markets. For Swedish companies, data for the European market would be used while that of the emerging markets would be used for South African companies.

3.2 Sustainability Data

Generally, sustainability data comprise details of a company's overall ESG performance and that of the individual pillars. However, various metrics are measured by different ESG databases. The focus can be on different aspects, including ESG disclosures, risk, ratings, scores, etc. Depending on the metric focused on, high-ranking companies would mean different things. For instance, a high ESG score is preferred but not a high ESG risk.

Companies' monthly ESG data for this paper is obtained from Thomson Reuters Eikon. This database contains a vast amount of ESG data. Thomson Reuters ESG score is equally weighted among its three pillars, environmental, social, and governance. The overall score is a product of the data received from different ESG categories and the debates captured in the global media. The data is gathered from subcategories such as human rights, resource use, CSR strategy, emissions, innovation, management, shareholders, workforce, community, and product responsibility. 178 relevant data points are selected to measure the overall sustainable performance (Phillips, 2013a). The data received are combined with a controversies category which captures scandals and big events from social media, and covers the overall global appearance emissions.

To avoid overfitting and to ensure that the ratings are suitable for peer-to-peer comparisons, each pillar's Key Performance Indicators (KPI) are modeled differently. The corporate governance practices are analyzed by region, the environment indicators are global-industry specific, while the social pillar contains a mix of different benchmarks depending on the KPI. For instance, issues relating to human rights are benchmarked globally, while those relating to health and safety practices are analyzed by the industry sector (Phillips, 2013b). The overall ESG score lies between 0-100, from low to high rating. For this database, a high rating is preferred as it shows that the company ranks high in sustainability.

3.3 Data Selection

After aligning the financial data based on the availability of both ESG and individual pillar scores, the total number of South African companies used for the analysis reduced from 264 to 125 while Swedish companies reduced from 726 to 155.

For both financial and sustainability data, the data set is unbalanced. Regarding financial data, the general reason is that some companies were not incorporated or listed on the respective stock exchanges as at the beginning periods covered by this research. Hence, the stock prices for these periods are not available and returns cannot be derived. This has resulted in more observations in the later years up to 2019 compared to 2010. For the ESG data, some companies' scores are not available for some months.

Based on the abovementioned, the observations vary from month to month across both countries. To ensure some form of uniformity and proper linking of ESG scores to stock returns, only companies whose return can be derived and have ESG scores are used for the empirical analysis. However, this does not control the monthly variation in observations.

Tables 2 and 3 show that the average ESG and pillar scores in both markets range from 40 to 60, which is the midpoint of the total score (100) allocated by Thompson Reuters. However, the Swedish market seems to perform better with regard to ESG. The average overall ESG and the pillar scores for environment and social are higher when compared to the South African scores, which buttresses the point relating to a generally high level of sustainability in Sweden. The governance score average is higher in South Africa by just 1.1.

Table 2:
Descriptive Statistics for Sweden Data

	ESG	*GOV*	*ENV*	*SOC*	*Stock Return*
Obs-8443					
Mean	53.56	49.98	50.29	58.25	1.1%
Median	55.48	49.75	55.27	62.20	0.8%
Std. Dev	19.74	22.57	27.84	22.37	8.9%
Minimum	2.30	1.70	0.00	1.16	-51.6%
Maximum	90.54	97.04	94.98	95.53	80.0%

This table contains the descriptive statistics of the overall ESG scores, pillar scores, and stock returns for the Swedish data. Obs - total number of observations, GOV- governance, ENV- environment, SOC- social.

With regards to stock returns, the average return is higher in the Swedish market; however, the maximum monthly return observed in the sample period is higher for the South African market at more than 100%. In the event of loss, the magnitude is also higher in the South African market at -91.7% compared to Sweden's -51.6%.

Table 3:
Descriptive Statistics for South Africa Data

	ESG	*GOV*	*ENV*	*SOC*	*Stock Return*
Obs-12672					
Mean	48.23	51.08	40.09	50.48	0.4%
Median	49.09	50.67	40.56	51.89	0.2%
Std. Dev	17.76	21.78	25.10	21.17	9.0%
Minimum	0.37	0.87	0.00	0.39	-91.7%
Maximum	88.63	98.34	96.82	96.38	108.1%

This table contains the descriptive statistics of the overall ESG scores, pillar scores, and stock returns for the South African data. Obs - total number of observations, GOV- governance, ENV- environment, SOC- social.

4. Methodology and Hypothesis

This chapter provides a proper definition of the variables, discusses the relevant equations that the study follows, describes the methodology and how it is applied with the data set. It further explains how the research hypotheses are tested.

4.1 Dependent Variable

To measure the impact of ESG scores on stock performance, we define the dependent variable as stock/portfolio returns. The stock performance of companies is usually measured by their respective monthly stock return. Since data of the stock prices are available, they are converted to returns by using:

$$R_{(i,t)} = \frac{P_{(i,t)} - P_{(i,t-1)}}{P_{(i,t-1)}} \quad (1)$$

Where, $R_{(i,t)}$ is the return of stock i at time t, $P_{(i,t)}$ is the price of stock i at time t = 1,…..T.

4.2. Independent Variables

The independent/ explanatory variable(s) depends on the model and regression equation. Three different models are used to enable the robustness of this research.

4.2.1 Capital Asset Pricing Model (CAPM)

CAPM is one of the earliest asset pricing models developed in the 1960s by Sharpe (1964), Treynor (1961), Lintner (1965), and Mossin (1966). It is referred to as a one-factor model because it uses only the excess market return to explain the relationship between the systematic risk of an asset, measured by beta, and the asset's excess return. This model was based on Markowitz's (1952) mean-variance portfolio allocation model, which involves a selection of portfolios that minimize the variance of return while maximizing expected return. He further posited that since an efficient portfolio combines risk-free and risky assets, the CAPM equation holds for any minimum variance portfolio.

The CAPM equation is given as:

$$R_i = Rf + \beta_i(Rm - Rf) \quad (2)$$

Where, R_i is the asset/portfolio return of i, Rf is the risk-free rate, β_i is the market beta of asset/portfolio i, which measures the sensitivity of the asset to the market, and $Rm - Rf$ is the excess market return over the risk-free rate.

However, since we measure excess stock/ portfolio return, the Rf is moved to the left-hand side, and the equation changes. Subsequently, the explanatory variable in this model is the excess market return and a linear regression equation is generated:

$$R_{(i,t)} - Rf_t = \alpha_i + \beta_i(Rm_t - Rf_t) + \varepsilon_{(i,t)} \quad (3)$$

The alpha/intercept (αi) measures any abnormal return not explained by the model.

4.2.2 Fama- French 3 Factor Model (FF3F)

Following unsatisfactory results in empirical studies from using CAPM, multi-factor models were birthed. One of them was the FF3F which was constructed by Fama and French (1993) as an expansion of CAPM. In addition to excess market returns, this model captures two other risk factors related to size/market capitalization and Book to Market, which explains average returns in several markets (Gaunt, 2004).

The regression equation for the FF3F is given as:

$$R_{(i,t)} - Rf_t = \alpha_i + \beta_i(Rm_t - Rf_t) + s_i SMB + h_i HML + \varepsilon_{(i,t)} \quad (4)$$

The new variables: SMB relates to size and is derived from the average returns on a portfolio of small market capitalization stocks and big market capitalization stocks, while HML is derived as the difference between the average return of a portfolio high and low book-to-market stocks.

In this model, α, β, s, h are the estimated coefficients in the regression. The intercept α (alpha) serves as a measure of abnormal return and is expected to be zero if the factors are sufficient to explain the stock returns.

4.2.3 Fama- French 5 Factor Model (FF5F)

The decision to add profitability and investment factors to the other 3 factors was followed by motivation from the dividend discount valuation model (Fama & French, 2016). These factors were also seen to have some extent of impact on asset returns in markets.

The regression equation for the FF55F is given as:

$$R_{(i,t)} - Rf_t = \alpha_i + \beta_i(Rm_t - Rf_t) + s_i SMB + h_i HML + r_i RMW + c_i CMA + \varepsilon_{(i,t)} \quad (5)$$

RMW represents profitability and is measured as the difference between the average returns of a portfolio of stocks with robust and weak profitability. CMA relates to investment and is computed as the difference between the average returns of a portfolio of stocks of low investment firms (conservative) and high investment firms (aggressive).

Similar to FF3F, the intercept/alpha measures abnormal returns (if any).

4.3 Portfolio Analysis Approach

To examine whether overall ESG scores or individual pillar scores contribute to generating abnormal stock/ portfolio returns, portfolio analysis is used in this paper. This approach is generally acceptable for related studies as various researchers who analyze either ESG scores, disclosures, or ratings in relation to stock performance have gotten results for different sample categories.

4.3.1 Portfolio Construction

This method was first used by Fama and French (1993) to construct common risk factor portfolios when trying to explain the large difference between stock returns and one-month Treasury bills. They did this by ranking the size and equity value of corporations into three value-weighted portfolios. The median of market value (size risk factor) was used to separate firms based on their size and group them into small (S) and big (B). Subsequently, firms were divided into three groups based on their book-to-market equity ratios: lowest 30% (L), medium 40% (M), and highest 30% (H). Based on this approach, six different portfolios were constructed in their research. SMB, small minus big, imitates the size-related risk factor in returns, which measures the difference between monthly returns on three small-stock portfolios and three big-stock portfolios. The High-minus-Low portfolio captures the book-to-market equity-related risk factor in stock returns and shows the difference between monthly returns in high- and low book-to-market portfolios.

4.3.2 Mimicking Portfolio

To test the hypotheses, the paper uses ESG portfolio construction and applies a high-minus-low strategy. To begin, the stocks, alongside their respective returns, are initially sorted monthly based

on the ESG and pillar scores from the lowest to the highest. Similar to other studies, a percentile-based method is used to form two groups. The first group is called the low portfolio and it comprises stocks of the lowest 20% ESG scores, while the second group, which is called the high portfolio, consists of the highest 20% ESG scores. Since ESG scores vary with time, there is continuous portfolio rebalancing, meaning that a company/stock might fall in the high portfolio in one period and be in the low portfolio in another period. This allows for a proper distinction of high vs. low and accuracy of results.

Subsequently, the equal-weighted and market capitalization-weighted stock return of each portfolio is determined. For the equal-weighted, the total return from the portfolio is divided by the number of stocks represented in the portfolio. For the market capitalization-weighted, the portfolio return is calculated by first dividing the individual stock's market value by the total market value of the group it belongs to (high/low) to assign weights to the stocks. This weight is then multiplied by the company/stock's return in the relevant period. It should be noted that market value and market capitalization are used interchangeably. The summation of returns from each group gives the returns to be used for the low and high portfolios in a particular period. This is depicted by the formula:

$$\text{Low} = \sum_{Low} \frac{Market\ Value,i}{\sum_{Low} Market\ Value,\text{i}} R_i \qquad \text{High} = \sum_{High} \frac{Market\ Value,i}{\sum_{High} Market\ Value,i} R_i \qquad (6a,b)$$

To evaluate and compare both portfolio's performance, a "difference" portfolio is constructed according to the long-short strategy. This is issued by taking a long position in stocks expected to increase in value and a short position in those expected to decrease. Therefore, a long position is held for the high portfolio and a short position for the low portfolio. In other words, high portfolio return minus low portfolio return. The difference derived is called the "difference portfolio return".

$$Difference\ Portfolio\ Return = High\ Portfolio\ return - Low\ Portfolio\ return \qquad (7)$$

This is then repeated for all months from January 2010 to December 2019, such that there is a total of 120 observations.

4.4 OLS Regression

After determining the difference in portfolio return, CAPM, Fama-French 3 factors, and Fama-French 5 factors are regressed on the constructed stock portfolio using MATLAB. Ordinary Least

Square (OLS) regression is used to estimate the parameters which indicate the relationship between the portfolio returns and the factors/independent variables.

For the regressions, the equations stated in 4.1 above are applied respectively. While the values for independent variables are the data obtained from Kenneth French Data Library, the dependent variable is modified to be the excess return of the high portfolio, low portfolio, and difference portfolio, over the prevailing risk-free rate. Therefore, the left-hand side of the regression equation becomes, $R_{\mathrm{ESG}} - R_f$, which represents the portfolio return minus the risk-free rate. The regressions estimate alpha values and factor loadings. This is done for the overall ESG portfolio and individual pillars portfolio.

To ensure that the OLS estimator provides correct inference and a Best Linear Unbiased Estimate (BLUE) of the coefficients, the OLS assumptions must be adhered to (Brooks, 2019). Diagnostics tests conducted on the data show no violation of the assumptions. *Tables A5* to *A7* of Appendix presents some diagnostics results.

4.5 Hypothesis Explanation

Below, the postulated hypotheses and testing methods for each are explained further:

H_1: *Companies with lower ESG scores do not have higher abnormal returns than companies with higher ESG scores.*

Alpha/intercept indicates the presence of abnormal returns. If a positive alpha is obtained from a high-minus-low strategy, it shows the outperformance of high ESG scored stocks over those with low scores. For this hypothesis, both countries' data would be analyzed individually. Following the methodology described above, this hypothesis initially considers the constructed high and low portfolios separately; subsequently, the difference portfolio from the high-low strategy is examined. The alphas derived from the regressions would be observed to determine the extent (if any) of abnormal returns derived from holding only a high portfolio, a low portfolio, and a combination of both by using a long-short strategy. In addition, the three pillars of ESG would be considered independently for both countries to analyze which pillar generates more abnormal returns compared to the others.

H_2: *There is no significant difference in the magnitude of ESG returns realized in an earlier and a latter period.*

For this hypothesis, both countries are also considered individually. The hypothesis tests if ESG portfolios generate better returns in one period than the other. For this, the research period is split equally into two groups of 5 years each; 2015 to 2019 represents the latter and most recent period while the earlier period consists of years from 2010 to 2014. Similar to hypothesis 1, both the equal and market capitalization-weighted average are analyzed; however, only the overall ESG constructed portfolios of both periods are considered using the difference portfolio. Due to the availability of factors data, only CAPM and FF5 regressions are conducted for South African stocks, while Swedish stock returns are also regressed on the FF3 model described in 4.2. The alphas/intercept estimated from the regression of both periods would then be compared.

H_3: *ESG does not result in better stock returns of developing countries over developed countries.*

This hypothesis provides a comparison of developed and developing countries (Sweden and South Africa). For the analysis, the alpha estimates obtained from the regressions of the overall ESG portfolio and pillars portfolio would be compared for both countries to determine which stocks perform better.

5. Empirical Results

In this chapter, the empirical results obtained from testing the hypothesis in section 4 are presented. The estimates from the CAPM and Fama-French methodologies are presented and discussed to understand how ESG ratings affect the stock performance of firms in developed and developing countries. It further provides a brief explanation of possible reasons for the results and presents the decisions on the hypothesis.

5.1 High vs. Low ESG Scores

Figures 1 and *2* show the cumulative returns for high and low portfolios as of December 2019, if 1 unit of relevant currency is invested at the beginning of January 2010. From *Figure 1*, which represents the Swedish market, we can see that the money invested in the low portfolio yields up to 500% return over the 10 years, with more growth observed in the latter years. Whereas the increment in the high portfolio is just about 100% for the same period.

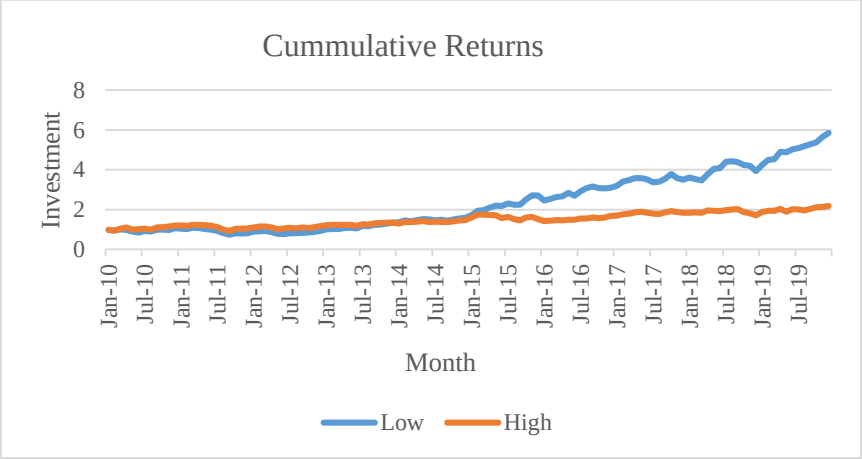

***Figure 1**: Investment in High and Low Portfolios (Sweden)*

For the South African market represented in *Figure 2*, the low portfolio shows a gradual increase with about 200% return in 2017, but it declines toward the end of the sample period. However, the high portfolio is a bit steady in growth with just about 50% over the 10-year period. Overall, it can be seen that the low portfolios perform better as the investment is worth more at the end of 2019 than if initially invested in the high portfolios. To arrive at a more accurate conclusion, Fama-French and CAPM regressions are analyzed.

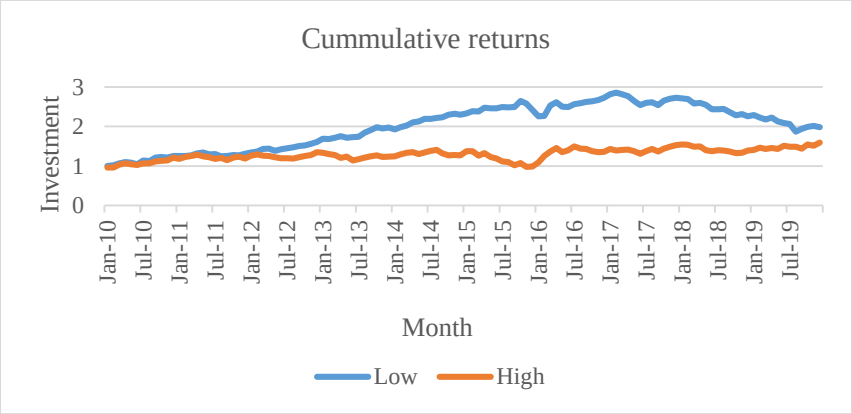

***Figure 2**: Investment in High and Low Portfolios (South Africa)*

Sweden's regression results of the high and low portfolios and the high-minus-low portfolio are presented in *Table 4*. From the table, it can be seen that all constructed high and low portfolios show positive alphas, which equates to positive returns from these portfolios, as indicated by *Figure 1*. On the contrary, the high-minus-low portfolios exhibit negative and statistically significant alphas, which indicate better alphas of the low portfolios over the high portfolio. It should be noted that this does not equate to a negative absolute return in all months from the high-minus-low portfolios. Since alpha measures abnormal returns, the result indicates that ESG based portfolios would generally yield abnormal returns in the Swedish stock market regardless of the ESG scores of the companies, as long as a high-low strategy is not applied in the construction of the portfolio. On the one hand, the positive abnormal return is not surprising as many previous pieces of literature have evidence of this; however, the negative abnormal return of the high-minus-low portfolios shows an inverse relationship between ESG scores and stock performance. Specifically considering the overall ESG portfolios, the market capitalization-weighted construction shows better outperformance of the high portfolios at 0.004 compared to the equal-weighted portfolios which give 0.001, while the low portfolios yield the same level of return.

Analyzing the individual pillars, the same trend of low portfolios exhibiting higher alphas is observed. Of all three, the environment pillar shows better outperformance of both the high and low portfolios, indicating that the Swedish market rewards environment score more than the other pillars. The governance pillar suggests no abnormal return for the high portfolios, hence resulting in a high negative abnormal return of the difference portfolio. This might be because companies with high governance scores are top companies expected to highly comply with corporate

governance regulations and policies by default. The social pillar shows the least difference between the alphas of the high and low portfolios.

Table 4: ESG Portfolios
FF5 Time Series Regression for Swedish Companies

		Alpha	Mkt-Rf	SMB	HML	RMW	CRA	R^2
ESG	High	0.001	0.723***	-0.229	-0.065	0.436	-0.124	0.555
	Low	0.011***	0.789***	0.134	-0.372	-0.481	-0.836**	0.550
	High-Low	-0.011***	-0.065	-0.356*	0.310	0.928***	0.722**	0.166
ESG*	High	0.004	0.652***	-0.233	-0.368	0.056	0.015	0.488
	Low	0.011***	0.854***	-0.026	-0.546**	-0.200	-1.006***	0.616
	High-Low	-0.008**	-0.200***	-0.199	0.180	0.267	1.031***	0.205
GOV	High	0.000	0.687***	-0.140	0.043	0.578*	-0.277	0.551
	Low	0.011***	0.669***	0.294	-0.446*	-0.534	-0.985***	0.531
	High-Low	-0.011***	0.019	-0.427**	0.492**	1.123***	0.718**	0.211
ENV	High	0.005*	0.754***	-0.177	-0.085	-0.164	-0.511*	0.626
	Low	0.012***	0.802***	0.023	-0.705**	-0.784**	-0.662*	0.577
	High-Low	-0.007***	-0.047	-0.193	0.624*	0.632**	0.162	0.105
SOC	High	0.003	0.741***	-0.159	-0.427*	0.107	-0.063	0.535
	Low	0.004	0.856***	0.205	-0.239	0.085	-0.526	0.585
	High-Low	-0.001	-0.114	-0.357*	-0.185	0.034	0.473	0.091

This table presents the Fama-French 5 factor model results for the Swedish sample companies over the study period from 2010 to 2019. The regressions are run for the high, low, and difference portfolios as well as for overall ESG and the individual pillars. "ESG" represents equally weighted portfolios while "ESG*" represents market capitalization-weighted portfolios. *** (**,*) indicates a statistical significance at 1% (5%, 10%).

The overall better outperformance of the low portfolios could probably mean that investors care about ESG such that there is more demand for stocks of highly rated companies which in turn drives up the prices of these stocks, hence reducing the extent of their returns. This is backed by Hong and Kacperczyk's (2009) study which investigated "sin stock"- companies involved in the production of gambling, alcohol, and tobacco. Based on their findings, lower holdings of these sin stocks by institutional investors resulted in higher average returns than the otherwise comparable stocks; therefore, investors get a premium by holding the sin stocks. This is seen in *Table 4* as the portfolios with lower ESG scores tend to have a premium over those with higher ESG scores.

Alternatively, this could also indicate that the market punishes companies with higher ESG or individual pillar scores such that an investor is better off with a portfolio of stocks with low ESG scores than high scores. This further suggests that if an investor diversifies his portfolio by

applying the high-low strategy based on companies' ESG scores, there would be negative abnormal returns, whereas the market might have better performance with positive excess returns. Hence, this strategy may not be the best way to diversify a portfolio.

Regarding the factor loadings, all betas follow the pattern of the alphas asides from the governance difference portfolio. For the high and low portfolios, the betas are positive, significant, and less than 1, which signifies a correlation of the portfolios with the market but with less volatility. Asides governance pillar that is positive, all betas of the high-minus-low portfolios are negative and insignificant, indicating a negative correlation of these portfolios with the Swedish stock market.

Table 5: ESG Portfolios
FF5 Time Series Regression for South African Companies

		Alpha	**Mkt-Rf**	**SMB**	**HML**	**RMW**	**CRA**	**R^2**
ESG	High	0.001	0.445***	-0.527	0.141	-0.171	0.779**	0.353
	Low	0.002	0.444***	0.079**	-0.007	0.104	0.653**	0.365
	High-Low	-0.002	0.004	-0.596**	0.141	-0.270	0.141	0.059
ESG*	High	0.006	0.438***	-0.495**	-0.096	-0.415	0.660**	0.373
	Low	0.014	0.456***	-0.387	-0.212	0.177	0.091**	0.265
	High-Low	-0.008*	-0.014	-0.097	0.109	-0.587	0.583	0.061
GOV	High	0.003	0.386***	-0.210	0.101	-0.057	0.596**	0.321
	Low	0.002	0.469***	0.105	-0.016	0.200	0.830***	0.406
	High-Low	0.000	-0.079	-0.305	0.111	-0.252	-0.220	0.024
ENV	High	-0.002	0.461***	-0.586**	0.474	0.013	0.912**	0.409
	Low	0.003	0.487***	0.088	-0.073	0.229	0.787***	0.356
	High-Low	-0.005	-0.022	-0.665**	0.540	-0.211	0.139	0.117
SOC	High	0.001	0.406***	-0.535**	0.076	-0.202	0.780**	0.359
	Low	-0.001	0.490***	0.018	-0.066	0.210	0.837***	0.392
	High-Low	0.002	-0.081	-0.543*	0.136	-0.406	-0.042	0.051

This table presents the Fama-French 5 factor model results for the South African sample companies over the study period from 2010 to 2019. The regressions are run for the high, low, and difference portfolios as well as for overall ESG and the individual pillars. "ESG" represents equally weighted portfolios while "ESG*" represents market capitalization-weighted portfolios. *** (**,*) indicates a statistical significance at 1% (5%, 10%).

The regression results of the high and low portfolios and the high-minus-low portfolio for South Africa are presented in *Table 5*. Although only one alpha is significant, there is a similarity to Sweden's results as all alphas for the overall ESG portfolios follow the same pattern. For both equal and market capitalization-weighted ESG portfolios, the alphas for the high and low portfolios are positive with higher coefficients for the low portfolios, thus indicating better

outperformance over the high portfolios. However, the individual pillars show a mixed result. For the governance pillar, the high portfolio has a slightly higher alpha, resulting in very little but positive abnormal return if the high-low strategy is applied.

Furthermore, the social pillar reveals negative alpha for the low portfolio and positive alpha for the high portfolio, resulting in a positive alpha for the high-minus-low portfolio. This suggests that South African companies with high social pillar scores perform better in terms of stock returns, and applying a high-low portfolio strategy based on this would yield a premium for the investor. Although the low portfolio outperforms the high portfolio for the environment pillar, a negative abnormal return is observed for the high portfolio, signifying that stocks with higher environment scores tend to underperform compared to those with lower scores. The difference in abnormal returns from the high and low portfolios for governance and social pillars is relatively trivial.

Overall, the results correspond to that of the Swedish market and could be an indication of more investors' consideration of ESG information in the South African stock market, hence higher stock prices and reduced returns. On the other hand, since South Africa is a developing country and the environment pillar has more negative returns compared to the other pillars, this could be a form of market response to the deteriorating phase of the Environmental Kuznets Curve. This means that the negative returns might be how the market punishes ESG inclined companies for the initial environment deteriorating phase of the curve, making the companies with higher scores have negative abnormal returns as they “contribute” more.

Table 6: ESG Portfolios:
CAPM Time Series Regression for Swedish stocks

	ESG	**ESG***	**GOV**	**ENV**	**SOC**
Alpha	-0.008***	-0.008***	-0.009***	-0.007***	-0.002
Mkt- Rf	-0.101	-0.180***	0.001	0.018	-0.143*
R^2	0.020	0.061	0.000	0.001	0.040

This table presents the CAPM regression results of Swedish stocks for the study period from 2010 to 2019. The regressions are using the difference portfolios for overall ESG and the individual pillars. *** (**,*) indicates a statistical significance at 1% (5%, 10%).

This supports the suggestion that ESG based portfolios might not be the best for diversification purposes if only financial considerations are involved for investment.

Tables 6 and *7* show the CAPM regression results of the high-minus-low portfolios for Sweden and South Africa. The tables reveal abnormal negative returns for both equal and market

capitalization-weighted ESG portfolios. This is not exclusive to the overall ESG as most individual pillars' portfolios are also seen to have negative abnormal returns.

Table 7: ESG Portfolios:
CAPM Time Series Regression for South African stocks

	ESG	ESG*	GOV	ENV	SOC
Alpha	-0.002**	-0.008	-0.001	-0.005	0.000
Mkt- Rf	0.088	0.000	0.003	0.116	0.023
R^2	0.009	0.000	0.000	0.015	0.001

This table presents the CAPM regression results of South African stocks for the study period from 2010 to 2019. The regressions are using the difference portfolios for overall ESG and the individual pillars. *** (**,*) indicates a statistical significance at 1% (5%, 10%).

In *Table 7*, the South African social pillar score does not show negative abnormal returns like the other pillars. This could indicate a different trend with this pillar in the South African market, considering that the Fama-French regression in *Table 5* revealed a positive high-minus-low return. In general, based on the data analyzed and the results obtained, we have evidence to reject the first null hypothesis that companies with lower ESG scores do not have higher abnormal returns than those with higher ESG scores.

5.2 Period Split

The full sample period is split into two equal periods to analyze the ESG portfolio return trend and determine if the magnitude of return is affected by time. *Figures A3* and *A4* in the *Appendix* give an ocular view of returns from a high-minus-low ESG portfolio. According to *Figure A3*, there is an initial gradual increase in return observed in the Swedish market till it peaked in July 2012, then a declining trend is seen till the end of the study period. This shows that if 1 Swedish Krona (SEK) was invested in either an equal or market capitalization-weighted high-minus-low portfolio at the beginning of January 2010, the investment would have increased as high as 28% but would be worth only 0.32 SEK at the end of 2019. For a more accurate analysis, the regression result is reviewed.

The regression results following the split of the sample period for the Swedish stocks are presented in *Table 8*. The table shows that the equal and market capitalization-weighted ESG portfolios give negative and significant alphas, indicating negative abnormal returns. Although little difference is observed in both alphas when considering the whole sample period, a considerable magnitude of variance is seen when the sample period is split into two equal parts. The equal-weighted portfolio

shows an alpha estimate of -0.003 for 2010 to 2014 and -0.017 for 2015 to 2019, indicating that the extent of ESG impact on stock returns is more in the recent years as this period reveals higher negative abnormal returns than the earlier years. Similarly, the market capitalization-weighted portfolio suggests the same as the alpha estimate shows more than 100% decrease from 2010 to 2014 to the latter period. This aligns with the graph shown in *Figure A3* in the *Appendix*.

Table 8: Period Split
FF5 Time Series Regression for Swedish Companies

	Alpha	Mkt-Rf	SMB	HML	RMW	CRA	R^2
2010 to 2019							
ESG	-0.011***	-0.065	-0.356*	0.310	0.928***	0.722**	0.166
ESG*	-0.008**	-0.200***	-0.199	0.180	0.267	1.031***	0.205
2010 to 2014							
ESG	-0.003	-0.101	-0.152	0.001	0.512	0.119	0.147
ESG*	-0.001	-0.267***	0.118	-0.091	-0.446	0.520	0.233
2015 to 2019							
ESG	-0.017**	0.143	-0.406	0.728*	1.298***	1.274**	0.396
ESG*	-0.012	-0.065***	-0.484	0.578	0.871	1.291	0.322

This table presents the Fama-French 5 factor model results for the Swedish stocks over the whole sample period from 2010 to 2019 and split into two equal periods from 2010 to 2014 and 2015 to 2019. The regressions are run for the equal-weighted and market capitalization-weighted ESG difference portfolios.
*** (**,*) indicates a statistical significance at 1% (5%, 10%).

From *Figure A4* in the *Appendix*, a downward trend is initially associated with ESG portfolio returns in South Africa till November 2015, then a relatively steady and continuous increase is observed till the end of the study period. Based on this, it can be assumed that an investment of 1 South African Rand (ZAR) in an ESG constructed portfolio at the beginning of the study period would have decreased to as low as 0.27 ZAR. Then would increase and be worth up to 0.75 ZAR at the end of 2019, depending on the method of portfolio construction. *Table 9* presents the regression results from the period split for the South African stocks for further analysis. Like the Swedish results, negative and significant alphas are obtained for the equal and market capitalization-weighted portfolios when the full sample period is considered. However, following the period split, a different trend is seen for the South African stocks.

The earlier period from 2010 to 2014 reveals negative alphas for both portfolios, indicating negative abnormal returns from a high-minus-low ESG portfolio. However, a mixed result is observed for the period covering 2015 to 2019 as the equal-weighted portfolio shows a positive

alpha instead. Moreover, the market capitalization-weighted portfolio for 2015 to 2019 shows an alpha estimate of -0.002, which is lower than the estimate obtained for 2010 to 2014. These results point to better performance of an ESG based portfolio for the South African market in the more recent years. Since South Africa is a developing country with characteristics described in *2.4*, the preference for ESG in investments might not as pronounced as financial considerations. The results could be because investors' interest in ESG portfolios declined in the earlier period after negative abnormal returns were gotten. Hence, to encourage investors and companies with high ESG scores and motivate those with low ESG scores to be more aware and intentional about sustainability practices, the market reverted and began to reward highly scored companies with higher returns than the previous years.

Table 9: Period Split
FF5 Time Series Regression for South African Companies

	Alpha	Mkt-Rf	SMB	HML	RMW	CRA	R^2
2010 to 2019							
ESG	-0.002	0.004	-0.596**	0.141	-0.270	0.141	0.059
ESG*	-0.008*	-0.014	-0.097	0.109	-0.587	0.583	0.061
2010 to 2014							
ESG	-0.005	-0.140	-0.215	0.804*	-0.206	-0.831*	0.124
ESG*	-0.006	-0.338**	0.217	1.233**	-0.638	-1.081**	0.201
2015 to 2019							
ESG	0.005	0.207	-0.848*	-0.794	0.029	1.972**	0.164
ESG*	-0.002	0.348*	-0.281	-1.275**	-0.223	3.259***	0.281

This table presents the Fama-French 5 factor model results for the South African stocks over the full sample period from 2010 to 2019 and split into two equal periods from 2010 to 2014 and 2015 to 2019. The regressions are run for the equal-weighted and market capitalization-weighted ESG difference portfolios.
*** (**,*) indicates a statistical significance at 1% (5%, 10%).

Also, based on Pedersen, Fitzgibbons & Pomorski (2019), it could mean that returns can go in either direction due to the existence of different types of investors in the market. According to the paper, the market consists of three types of investors: those unaware of ESG scores or simply uninterested, investors who are aware of ESG, and investors who prefer high ESG scores with active use of ESG information. Therefore, regardless of a stocks' ESG scores, returns can be higher or lower because of the combination of these classes of investors.

Table A1 of the *Appendix* shows the regression results from the sample period split of Swedish stocks using the Fama-French 3 factors model. There is a notable difference between the alpha

estimates of both periods, showing a higher degree of impact in the latter period as the negative return estimate is higher. This is corroborated by the period split CAPM regression results presented in *Table A2* of *Appendix*. However, for the South African stocks, the CAPM regression results shown in *Table A3* of the *Appendix* corresponds to the results revealed by the Fama-French regressions in *Table 9* as a mix of positive and lower estimates are seen for the latter period. Furthermore, the South African CAPM alpha estimates for the period covering 2010 to 2014 are statistically significant, unlike the FF5 alpha estimates.

Overall, for both countries, the results suggest a notable difference in the magnitude of ESG portfolio returns when the sample period is split. The results further signify that regardless of the magnitude, the direction of returns from ESG portfolios do not follow a specific trend as it could get higher or lower over time. Therefore, the second null hypothesis that there is no difference in the magnitude of ESG returns following a period split is rejected.

5.3 Developed vs. Developing Countries

Table 10 presents the estimated coefficients for the Fama-French 5 regression of the sample countries to compare developed and developing countries. This comparison only considers the regression results of the overall ESG, using both the equal and market capitalization-weighted constructed portfolios and applying a high-low portfolio strategy. From the table, the negative estimates of alphas are reiterated, showing negative abnormal returns when the whole sample period is considered. For both the equal and market capitalization-weighted portfolios, significant alpha estimates at 1%, 5%, and10% are seen, pointing towards a strong but negative relationship between ESG portfolios and stock returns in both countries.

Furthermore, when considering the equal-weighted portfolios, the alpha estimate for Sweden is more negative and significant than that of South Africa, suggesting a better performance of South African stocks.

However, the market capitalization-weighted portfolios show the exact estimates for both countries, with Sweden's estimate being statistically significant at both 5% and 10%, whereas South Africa's alpha is only significant at 10%. This points to the evidence that ESG constructed portfolios perform better in the South African market than the Swedish market.

Table 10: Country Comparison
FF5 Regression comparison of Sweden and South Africa

	Country	Alpha	Mkt-Rf	SMB	HML	RMW	CRA	R^2
ESG	South Africa	-0.002	0.004	-0.596**	0.141	-0.270	0.141	0.059
	Sweden	-0.011***	-0.065	-0.356*	0.310	0.928***	0.722**	0.166
ESG*	South Africa	-0.008*	-0.014	-0.097	0.109	-0.587	0.583	0.061
	Sweden	-0.008**	-0.200***	-0.199	0.180	0.267	1.031***	0.205

This table presents the Fama-French 5 factor model results for the South African and Swedish stocks over the full sample period from 2010 to 2019. The regressions are run for the equal-weighted and market capitalization-weighted ESG difference portfolios. *** (**,*) indicates a statistical significance at 1% (5%, 10%).

This is further supported by the results from the CAPM regression in *Table A4* of the *Appendix*. The table shows similar alpha estimates as seen in *Table 10*; however, Sweden's alpha for the equal-weighted ESG portfolio is not as bad as the FF5.

Also, briefly analyzing the individual pillars' high-minus-low portfolio results in *Tables 4* and *5*, the South African stocks' governance, social, and environment pillars are seen to have better and even positive estimates of alphas. This indicates higher and better returns of these pillars in South Africa when compared to Sweden.

The results obtained from both countries could be due to the different extent and stage of development. The combination of different investor types and investors' preference for highly rated ESG stocks in both markets could also differ. Since Sweden is more developed and rated a highly sustainable country, investors might demand stocks with higher ESG scores in their portfolios, affecting stock prices and returns. Whereas South Africa is an emerging economy with increasing investors' interest in highly scored stocks, but a financial incentive for such investment is highly preferred, as seen by the time split results.

Based on the results, the third null hypothesis is rejected as the developing countries are seen to have better returns than the developed countries.

6. Conclusion

Applying different regression models, this research investigates the relationship between companies' sustainability initiatives and their stock returns based on ESG scores. Several previous researches have found either positive abnormal returns or a mix of direction in estimates from high-low portfolio strategy while using developed countries as samples (Kempf & Osthoff, 2007; Statman & Glushkov, 2009). However, this research provides a different result as all overall ESG high-minus-low portfolios constructed show negative abnormal returns in Sweden and South Africa. While the individual pillars' high-minus-low portfolios in Sweden show negative abnormal returns, South African stocks show a mixed direction of alpha estimates/abnormal returns.

Furthermore, although the period split result reveals negative abnormal returns for all periods for the Swedish stocks, the higher magnitude in the latter period corresponds with Halbritter and Dorfleitner's (2015) paper which showed a declining trend of outperformance over the study period. On the contrary, the South African stocks showed better and positive abnormal returns in the latter period.

Additionally, the results reveal that the method applied for the ESG portfolio construction determines the level of returns obtained. For the equal-weighted portfolios, higher negative alphas are seen in Sweden than in South Africa, thus evidencing that Swedish investors would be affected more if negative abnormal returns are observed in both countries. This suggests a better performance of the stocks in developing countries. However, the market capitalization-weighted portfolios show the same extent of negative abnormal return in both countries, making it difficult to determine where there is better stock performance. To confirm if the results remain valid when the direction of the returns change, that is, in a case where the alphas exhibit positive estimates, further research would have to be conducted.

The recent wave of ESG awareness is not envisaged to decline anytime soon as the climate is continually changing, and individuals are continuously being mindful of things ranging from as little as food to investments, hence constantly updating their preferences. Although some companies are disadvantaged by the nature of their business, they would continue to align with activities that drive positive market and investors' perception, which would make them comparable sustainability-wise with companies in other industries. Hence, despite the results obtained,

investing in ESG inclined stocks would be beneficial in the long term (Dorfleitner, Utz & Wimmer, 2014) and in times of crisis (Lins, Servaes & Tamayo, 2017). This applies for both developed and developing countries.

The results obtained are limited by data source, samples used, and methods used. Based on some limitations of this study, it can be complemented by future research to use an alternative source of ESG scores as rating agencies employ different metrics for the construction of the data. Furthermore, the regression models can be extended to include momentum as an independent variable as this measures the velocity of price change in stocks. Asides from portfolio construction, other methodologies can be applied to see whether different results would be obtained. Additionally, the sample size can be increased by including more countries from different regions to represent developed and developing countries, a more extended research period can be investigated, and the 20% cutoff can be increased or decreased. Further research can also be done by analyzing based on different ESG scores providers and comparing to check if similar results are obtained (Halbritter and Dorfleitner, 2015).

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Appendix

- **Figures**

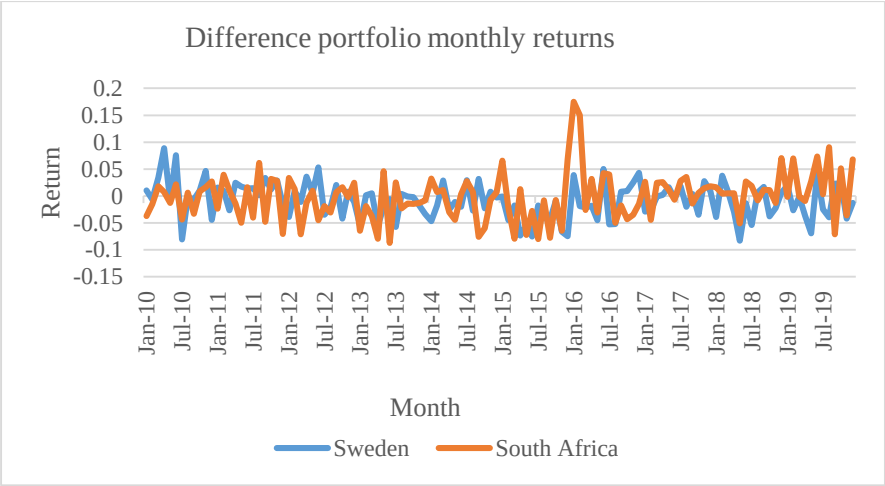

***Figure A1**:* High minus Low Portfolio Return (ESG)

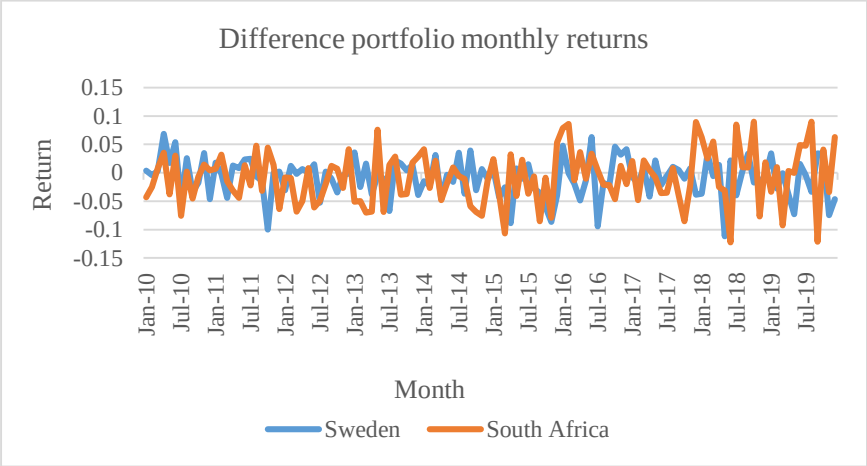

Figure A2: High-Low Portfolio Monthly Returns (ESG*)

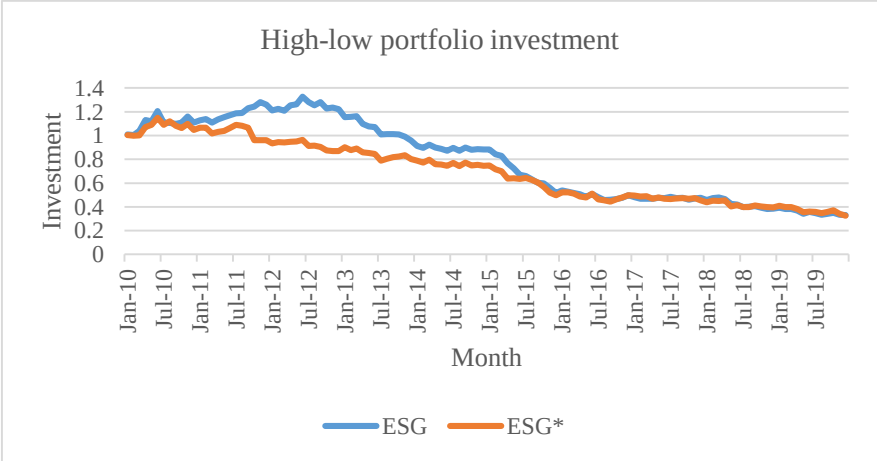

***Figure A3**:* High-Low Portfolio investment (Sweden)

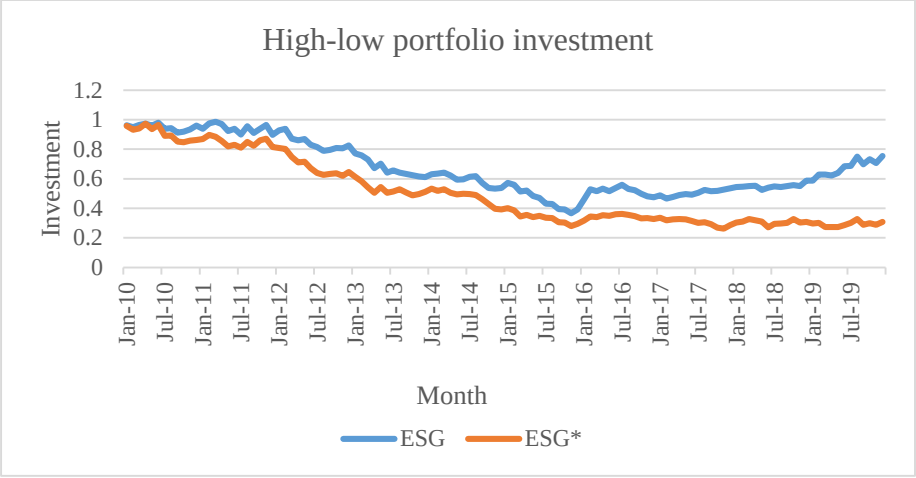

***Figure A4**:* High-Low Portfolio investment (South Africa)

- **Tables**

	Alpha	Mkt-Rf	SMB	HML	R^2
2010 to 2019					
ESG	-0.007**	-0.130*	-0.485***	0.031	0.077
ESG*	-0.006**	-0.282***	-0.290	0.387**	0.133
2010 to 2014					
ESG	-0.001	-0.122	-0.166	-0.226	0.125
ESG*	-0.002	-0.275***	0.176	0.295	0.187
2015 to 2019					
ESG	-0.014***	0.022	-0.879***	0.399*	0.230
ESG*	-0.009**	-0.190	-0.889***	0.518**	0.231

Table A1: Sweden Period Split Fama-French 3 Regression

	Alpha	Mkt-Rf	R^2
2010 to 2019			
ESG	-0.008***	-0.101	0.020
ESG*	-0.008***	-0.180***	0.061
2010 to 2014			
ESG	0.000	-0.176**	0.097
ESG*	-0.003	-0.202***	0.139
2015 to 2019			
ESG	-0.017***	0.067	0.005
ESG*	-0.013***	-0.133	0.017

Table A2: Sweden period split CAPM Regression

	Alpha	Mkt-Rf	R^2
2010 to 2019			
ESG	-0.002**	0.088	0.009
ESG*	-0.009	0.000	0.000
2010 to 2014			
ESG	-0.010**	0.103	0.024
ESG*	-0.015***	0.004	0.000
2015 to 2019			
ESG	0.006	0.062	0.003
ESG*	-0.003	-0.007	0.000

Table A3: South Africa Period Split CAPM Regression

	Country	Alpha	Mkt-Rf	R^2
ESG	South Africa	-0.002**	0.088	0.009
	Sweden	-0.008***	-0.101	0.020
ESG*	South Africa	-0.008	0.000	0.000
	Sweden	-0.008***	-0.180***	0.061

Table A4: Developed vs Developing countries CAPM Regression

	ESG-Rf	Mkt-Rf	SMB	HML	RMW	CMA
ESG-Rf	1					
Mkt-Rf	-0.143	1				
SMB	-0.214	-0.120	1			
HML	-0.045	0.474	-0.041	1		
RMW	0.191	-0.414	-0.051	-0.628	1	
CMA	0.178	0.029	-0.096	0.568	-0.462	1

Table A5: Sweden data Correlation Matrix

	ESG-Rf	Mkt-Rf	SMB	HML	RMW	CMA
ESG-Rf	1					
Mkt-Rf	0.095	1				
SMB	-0.209	-0.324	1			
HML	0.148	0.368	-0.203	1		
RMW	-0.114	-0.310	0.041	-0.576	1	
CMA	0.055	-0.360	0.054	0.355	-0.157	1

Table A6: South Africa data Correlation Matrix

	Test stat	Critical Value	P-value
Sweden	3.902	11.071	0.5
South Africa	8.048	11.071	0.15

Table A7: Homoscedasticity test