SUSTAINABLE INVESTMENTS AND THE MATERIALITY OF ESG FACTORS

A thesis

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Abstract

This research aims to investigate the sustainable investing (SI) and materiality of environmental, social and governance (ESG) factors in the Nordic market (Denmark, Sweden, Norway and Finland). The study is based on a quantitative research method analysing the returns of portfolios and financial performance of 60 companies for the period of 2009-2019.

The study is divided into five main parts. Firstly, the relevance and importance of sustainable investments and ESG factors are outlined together with raised research questions and incorporated design to conduct the study. It is followed by the academic literature analysis, describing the current main results and findings in the sustainability field. Furthermore, research methodology part justifies the research approach, outlines hypotheses and reviews the chosen data sample. Lastly, models results and conclusion are provided.

This study exhibits that ESG and material factor inclusion into the process of investment provide possible outperformance of market, excess return and does not lead to sacrificing the return over the moral values. However, no significant relationship between disclosure on sustainability issues and financial performance of the company was found.

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Keywords: ESG; sustainable investments; materiality; ESG disclosure.

Table of Contents

List of tables

1. Introduction

1.1 Background of research

The concept of sustainable investments (SI) and ESG refers to E – Environmental, S – Social and G – Governance factors. These factors have different risks and possibilities to make an impact on the performance and long-term results of the company, together with the direct effect on the financial returns. ESG term started to become widely used after the UN Global Compact initiative "Who Cares Wins" which aimed for financial markets to integrate and incorporate the ESG issues more, trying to achieve increased trust in financial markets and fostering sustainable development (Who Cares Wins, 2005). Other UN initiative which highly contributed to the usage of ESG term was the creation of Principles of Responsible Investment (PRI) which aims investors to incorporate the sustainability issues into their investments decision and processes (UN PRI).

As ESG factors could directly affect the performance of stocks, investors need to be able to analyse and identify which factors are the most material for the company and the industry it functions. Materiality, which is the primary reflection of ESG investing, refers to factors which can create long-term financial value for the company, and it differs for each sector and industry. At the same time, companies need to be able to identify the material factors so that they could mitigate the possible risks and externalities while focusing more on the long-term strategy than on the short-term performance factors. The most crucial challenge for the companies and investors stays to identify the key factors which are the most material for each company and its sector and what ESG related information should be disclosed and reported by the companies.

ESG investing has several terms referring to such investments: sustainable, responsible, impact or socially responsible investments (SRI) (State Street Global Advisors, 2019). These terms have emerged together with the growing number of global ESG initiatives for companies

and investors to consider the mentioned factors. It is essential to stress and be aware of the distinctions in between those terms, as it reveals the differences in application and the purposes of the investment process. The main dissimilarities in between the responsible and sustainable investments are that responsible investments take ESG factors for mitigation of risk and financial returns only. Sustainable investments take into account not only the ESG factors and financial returns but as well to encourage positive ESG opportunities and to enhance the value creation. The impact investments have a purpose of making a positive social and environmental impact together with the financial returns. While, finally, SRI is mainly based on ethical or moral values, with negative or positive screening (excluding or picking the companies on based criteria) implication (The Bridges Fund Management, 2015). In this research, the sustainable investments will be taken into consideration, to see what impact ESG factors might make to the financial performance of companies, creating the value for both investors and firms.

As mentioned before, sustainable investing brings financial value to both: companies and investors. Companies would create value by evaluating and distinguishing the most material factors for their business and the sector, by mitigating possible risks and contributing to society. What is more, companies are encouraged to report on such metrics, providing information to the investors and community (Eccles, Ioannou, Serafeim, 2014). At the same time, for the investors, ESG factors considerations might bring higher returns, reduce possible investment and portfolio risks. Furthermore, they can make an impact where and how the investee company would use their money at the same time encouraging companies to consider ESG factors in its strategy.

The main aim of this research is to analyse ESG factors inclusion by the companies and the possible financial value creation. As sustainable investing was more linked to mitigating the risks only related to ESG factors, now it refers to the contribution of global challenges and directing investments towards solving these issues.

Previously mentioned ESG initiatives are facing back to the 2005 – 2006 (Who Cares Wins, 2005; UN PRI). The latest initiative was seen at the end of January 2020 in the annual World Economic Forum (WEF) meeting in Davos. The main co-joined global risks indicated by WEF are environmental, social, governance (ESG) and geopolitical risks (WEF, 2020). In addition to that, one of the points in Davos manifesto (2020) says that:

> A company is more than an economic unit generating wealth. It fulfils human and societal aspirations as part of the broader social system. Performance must be measured not only on the return to shareholders but also on how it achieves its environmental, social and good governance objectives.

It means that financial performance is only one of the targets for the company (WEF, 2020). However, the company, as part of the social system, must commit to ESG factors, and those should be taken into consideration and reporting of companies as well.

1.2 Research questions and objectives

The purpose of this research is to uncover if companies with higher total ESG and individual E, S and G ratings provide better returns for investors. To evaluate, if sustainable investments could provide extra returns to investors and do not lead to sacrificing the possible profit. Besides, to analyse how disclosure of sustainability makes an impact on the financial performance of the companies.

The goal is to see whether the ESG factors are material (having a financial impact and creating value in the long-term) for the companies and investors. Two approaches would be used to analyse that: firstly, creating portfolios based on the total ESG score and individual material E, S, and G factors scores. Secondly, to see if reporting and disclosure on sustainability issues has a positive impact on the financial performance of the company.

By analysing the ESG score of the companies, its stocks return and the disclosure score on the sustainability issues, the author will try to see what impact inclusion of ESG factors

might have to the financial returns and financial performance of the company, both to investors and the companies respectively. Four research questions of this study are provided below:

Research question 1: Do investors sacrifice their returns by investing in sustainable Nordic companies?

Research question 2: Do investors sacrifice their returns by considering material ESG factors when investing?

To answer the first two questions of research, six portfolios will be created in total, based on ESG total rating and E, S and G individual rating for each company. Portfolios performance will be evaluated using three models: single-factor CAPM model and multi-factor models The Fama and French Three-factor model and Carhard Four-factor model.

Research question 3: Does ESG disclosure has a positive effect on companies financial performance?

Research question 4: Does E, S, G disclosure has a positive effect on companies financial performance?

To analyse the third and fourth research questions, ESG disclosure score for each company will be analysed together with financial performance variable Return on Equity (ROE). The panel data is tested by using the random effect model.

1.3 Research Design

As the research design is affected by the chosen framework, process and approaches incorporated to conduct the study, it is essential to outline the necessary steps to take and key

elements to consider, before starting to work on the research (Creswell, 2014). So the analysis approach, strategy, main choices together with techniques, procedures and data were outlined.

Firstly, the research topic is identified, followed by the literature review, which is a fundamental part of the study. The main keywords used for academic literature articles were: ESG, sustainable investments, materiality, ESG disclosure and sustainability disclosure. The most used sources for scholarly literature articles were secondary sources such as journals or books. Moreover, the quantitative research approach was defined and chosen. According to Creswell (2014), quantitative research strategy employs numeric data approaches together with statistical analysis and interpretation, which is going to be applied in this analysis.

The research is divided into two parts, according to previously stated research questions. The first section covers the first two questions, which will answer if ESG factors inclusion provide additional returns to investors. Firstly, the author wants to see if consideration of investing in sustainable companies does not lead to sacrificing financial returns. Secondly, to test, if individual E, S and G factors consideration, provides additional returns and does not to lead to forfeiting the possible profits as well.

The second part of the research covers third and fourth questions which analyse the impact and relationship between the disclosure on sustainability issues by the companies and its financial performance. Firstly, to see if overall disclosure has an effect to the performance of the company, and secondly, to analyse, if specific E, S or G factors disclosure has a stronger and more significant relationship with financial performance than other factors. Hence, two different quantitative research approaches are implemented in this study to see the final results of each research part.

The design of the first part of the study will include monthly secondary quantitative data for the period of July 2009 – March 2019 for 60 Nordic companies (see Appendix A). Below the data is outlined, which variables are incorporated in the regressions:

ESG score: The „XXX“ ESG scores will be downloaded from its database. Company ESG, E, S and G scores will be analysed to see its impact on the financial returns of artificial portfolios.

Financials returns of Nordic companies: Stock price of each company will be downloaded from finance.yahoo.com, and returns will be calculated respectively.

Fama and French Factors: Factor values are taken from Kenneth R. French data library.

Nonetheless, what needs to be stressed, since ESG data is not typically audited, and each third-party data provider uses different techniques to calculate the ESG score, consistency, transparency and standardisation are still missing in between the data providers (State Street Global Advisors, 2019). That being said, it means, that if this research would be conducted with other third-party ESG data provider, the research results might differ.

The second part of the study will incorporate yearly secondary numeric data from 2009 through 2018 and is covering 54 Nordic companies (see Appendix B). Examination of data set applies statistical analysis and interpretation for these variables:

ESG disclosure score: Bloomberg ESG, E, S and G disclosure scores will be downloaded from its terminal and used for companies reporting and disclosure on ESG issues analysis.

Return on Equity: dependant variable which is taken as financial performance measurement from Bloomberg data, based on literature review.

Four control variables: financial leverage, total sales, capital expenditure and asset turnover are included in the regression. Finally, all techniques and data set chosen for this research are justified and outlined in more detail in chapter 3. Research Methodology.

1.4 The sequence of the Thesis

In upcoming chapters, the literature overview of previously conducted studies on ESG investing and reporting will be provided, followed by the research methodology, empirical

results chapter and lastly the conclusion of the research with summarised main points of findings. The below a short overview is given of each upcoming section of the study.

Firstly, ESG and its background are reviewed together with the leading global initiatives for both companies and investors. An academic literature analysis results are outlined and discussed, along with the main variables and methods used to answer the research questions. What is more, Nordic exchanges overview is provided, which is followed by the studies on ESG and sustainable investments together with ESG disclosure and its materiality researches. Lastly, the remaining gaps in the current research field are outlined.

Secondly, the research methodology part is outlined followed by the sample, data and the econometric data considerations. Additionally, for the first part of the analysis, the techniques to analyse the portfolio performance are provided and justified together with the method of portfolio construction. For the second part of the study, an additional technique to examine the impact of ESG disclosure score on the financial performance of companies is outlined.

Finally, the empirical results chapter covers the main findings of regressions together with the connection to the analysed academic literature. Possible practical implications with enrichment to the current existing academic findings are summarised. The chapter is followed by the conclusion of this research and possible suggestions for future analysis.

2. Literature overview

In the last years, attention to the impact of investments is steadily rising. An increasing number of investors consider not only financial returns but as well as other additional factors. To name a few, to what companies money is invested in, what kind of industry and sector that company functions at and how it affects our environment, society, and living conditions overall. Moreover, a growing number of companies are reporting on sustainability issues together by showing how they are managing and mitigating them.

Sustainable investing (SI) applies environmental, social and governance (ESG) factors into the investment process. According to the International Monetary Fund (2019), the primary issues related to each ESG factors are: environmental (E) – pollution and waste, climate change, natural resources together with opportunities and policy; Social (S) – human capital, product responsibility, and relations; Governance (G) – corporate governance and corporate behaviour.

Not only the companies and investors started to consider the output of their investments and business from the perspective of sustainability. Also, the increased focus from the regulators and its objectives are noticed as well. One of the primary purposes of initiatives is to enhance the disclosure of sustainability and performance. The number of global ESG initiatives was created both for companies and investors.

As part of the initiatives for the companies, the United Nations Global Compact (UNGC) has a mission to encourage „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). What is more, The Paris agreement, part of the United Nations Framework Convention on Climate Change (UNFCCC) aims to fight climate change. Keeping the global temperature rise above pre-industrial levels well below 2 degrees Celsius and stressing the importance to improve countries' ability to address and deal with climate

change impacts. Task Force on Climate-related financial disclosures (TCFD), is working on Paris agreement two degrees Celsius goal as well. It encourages companies to report on governance, strategy, risk management, together with metrics and targets related to climate change risks (TCFD, 2019). It explicates, that companies are encouraged to revise their business models and possible impact on the society, and understand that their goal should not be only profits maximisation.

Furthermore, United Nations 2030 Sustainable Development Goals (SDG) are encouraging responsible consumption and production, affordable and clean energy, climate actions and 14 more goals, which strongly stress the importance of the private sector and its contribution to achieving the SDG goals. Along, the European Commission in 2018 has adopted a plan for sustainable finance, with the primary goals such as to show the commitment to reduce global warming. In addition to that, to be a role model for sustainability, attempting to address the funding gap to the Paris Agreement and most importantly allowing the financial systems to become part of the solution. A few objectives are reorienting the flow of private capital towards more sustainable investment, as well as continuous integration of sustainability in risk management together with the promotion of transparency (PRI, 2018).

Initiatives focused on investors such as the United Nations Principles for Responsible Investment (PRI), which is becoming a measurement of ESG performance for asset managers, established six principles and requires investors to report on the implementation of these principles. The first two principles „to incorporate ESG issues into investment analysis and decision-making process“ and „be active owners and incorporate ESG issues into ownership policies and practices“, and by signing and incorporating such principles, investors are adding value to creating a global financial system which is sustainable (PRI).

In addition to that, The International Corporate Governance Network (ICGN), established in 1995, as a group of investors focused on governance, since 2012, it has extended

to ESG factors. The main objectives of the network are to influence, connect and inform regarding the responsible investment policy matters (ICGN, 2019). It reveals, that number of initiatives works towards ESG and sustainability inclusion for both: investors and companies.

Together with the growing number of sustainable investors and regulations, there is an increasing number of ESG-Dedicated funds, assets under management (AUM), ESG data providers, green bonds or sustainability-linked bonds issuance. However, there is also a high number of opponents, who argue that ESG investments reduce investment opportunities and diversification possibilities. Besides, it cuts the returns, as investors are sacrificing financial profits to their moral values or sustainable investing together with ESG factors are linked to the greenwashing. Despite the number of opponents, there is an increasing number of studies and acceptance in general that sustainability issues could be financially material and powerfully crucial to investors, companies, and regulators.

Nordic countries (Sweden, Norway, Denmark, and Finland) are considered as leading economies in the sustainability field. The Nasdaq Stockholm was the first one to launch sustainable bonds. Furthermore, the Helsinki stock exchange is ranked as the most sustainable stock exchange in the world. At the same time, Nasdaq Copenhagen is ranked number 1 in the world regarding the timeliness of ESG disclosure, meaning that the companies which are trading on Nasdaq Copenhagen are the fastest to report on their corporate sustainability data and information (Sustainable Stock Exchange Initiative, 2018). As well, Novozymes, which is a Danish company, is considered to be the first company to report not only the financial results but on sustainable issues too in 2002 (Robert G. Eccles & Daniela Saltzman, 2011). Besides that, Oslo Børs (OSE) provides ESG training and courses together requiring them to be mandatory for the board members of the listed companies, as well as the management and board members of the companies which have applied for market listing (Sustainable Stock Exchange Initiative, 2018).

That being said, it reveals that sustainability, together with ESG factors, is a leading topic for investors, companies, and regulators. However, the question remains if sustainable investing does not cut the returns for investors and what benefits or losses the reporting on sustainable investments brings for the companies? As the Nordic countries are considered to be the leading ones in the sustainability field, to the author's best knowledge, the gap remains in the research area for the companies in these countries, both on the financial returns and the reporting on material issues for the companies in Scandinavian countries.

In addition to that, in this study author aims to analyse the investing with ESG factors consideration from investors side together with disclosure on sustainability issues and its impact from companies side. Hence, research is divided into two parts: sustainable investing and disclosure on sustainable issues.

2.1 Studies on sustainable investments and ESG reporting

In this part of the chapter, the academic literature on the sustainable investments field will be reviewed, together with the investments industry overview. The author will analyse the studies conducted on how the markets and its members are reacting to the ESG factors inclusion, the materiality of sustainable issues and reporting on both financial and non-financial performance of the company.

In the first part of the chapter, academic literature on SI and its returns will be reviewed together outlining the main results from the analysed studies. The second part of the chapter covers reporting and disclosure on ESG analyses. Each part of this chapter has a table with a summarised overview of studies outlined, with the following information presented: authors; period; measurements and main results.

2.1.1 Studies on returns of sustainable investments

In this section, the overview of studies on sustainable investments returns of both single stocks of the companies and the mutual funds will be analysed. The main results will be provided and compared, together with the primary limits and gaps left in the researches (see Table 1).

Several kinds of analyses have examined the advantage of sustainability, whose primary purpose was to test how the ESG factors and score might have an impact on the value of the company and its stocks. Furthermore, authors have tested corporate social responsibility and its effect on the financial performance of the business.

One of the very first analyses of socially responsible investments was published in 1993 by Hamilton, Jo and Statman. By analysing 32 funds in the United States market from 1982 to 1990, and using such measurements of performance as Jensen‘s alpha, authors found that the market does not price responsible investments. Meaning that investors are not going to sacrifice their returns; however, any strong financial effect could not be expected either, based on the research results.

Furthermore, Sciarelli and Landi (2019) tested the ESG score impact in Italian markets. By looking into yearly companies ESG assessments and the abnormal returns of the companies traded on the Italian Stock Exchange. The main findings of the study were: firstly, increasing attention and interest to sustainability issues and corporate social responsibility (CSR) from the management of the companies noticed, especially after the financial crisis of 2007-2009. Secondly, by looking into the yearly ESG assessments, the increasing quality of reporting and the materiality is seen as well. Furthermore, the authors noticed the growing attention to the CSR, reporting quality together with increased attention to ESG factors by investors in Italy. However, there were no statistically significant results proving that investors are getting market premium for ESG investing in Italy. The results go in line with Kurtz and DiBartolomeo (2007)

and Managi, Okimoto and Matsuda (2012), who tested the investment indices and compared the performance of ethical and conventional indices. Authors found that social screens are insignificant, and they do not find any difference in characteristics between ethical and traditional indices performance. Meaning, that sustainable investing does not lead to sacrificing the returns, but does not provide the additional returns as well.

In addition to the not significant responsible investments results, Schroder (2004), analysed 46 SRI funds for the period of 1990-2002. For the performance measurement author applied Jensen‘s alpha. The main results of the study are, firstly, risk-adjusted returns of socially responsible investments on average are the same as traditional investments. Secondly, socially screened investments do not demonstrate any significant disadvantages in terms of performance, then comparing to their conventional peers. The outlined studies summarises that there is no statistical significance for sustainable investing and ESG factors considerations, as it does not promise any market premium.

What is more, variations in subcategories of ESG reporting have a minor however significant impact on the companies' stock value for specific periods and sectors, which differs from country to country (Sahut, Pasquini-Descomps, 2015). Such findings highlight that ESG score and its impact might depend on the period and sector because some investors might pay attention to ESG scoring only under some circumstances, such as financial crisis, changes in the regulatory side or increased market sensitivity.

Moreover, Petit, Capelle-Blancard (2017) tested what impact on stock returns has ESG news, by equally considering both positive and negative headlines. By examining 100 companies from 2002 through 2010, authors found that markets react to the reports which are released by media. However, they do not respond to non-governmental and company news releases. In addition to that, negative news is more important and has a more substantial impact than positive news. By looking at the value of shares, adverse events affect around 0,1% in

about three days after the publication, while positive news does not put any significant changes. What was assessed as well, that the impact of negative news could be mitigated if positive ESG news was published before about the target company and it could depend on the overall reputation of the sector the company functions.

What is more, analysis of the returns on socially responsible companies (Statman, Glushkov, 2009) shows that investing in such companies is providing higher returns then comparing to the traditional investment, which is not focusing on sustainability issues in the investment area. Nevertheless, in some cases exclusion of "sin stocks" from companies in such industries as tobacco, gambling, alcohol or firearms could offset the returns, leading to the equal financial profits of investment then comparing sustainable indexes to the traditional ones, such as S&P 500. At the same time, it suggests that even if the investor is not earning the higher returns, exclusion of sin stocks does not lead to sacrificing the financial profits, as at the end both sustainable and traditional investments could provide equal returns. That is taken into consideration while further conducting the research, and exclusion of „sin" stocks will not be applied, to evaluate the overall ESG rating impact.

The similar research to test corporate social performance (CSP) and the returns of the stocks in the United Kingdom market was conducted (Brammer, Brooks, Pavelin, 2006). By looking into social and financial performance indicators, the authors found that there was a negative relationship between the CSP score and companies' stock returns, what is more, companies with lower ratings tend to provide higher yields and outperform the market.

By reviewing the studies conducted on single stock returns of the companies, it was found that many analyses on which factors have an impact to the performance of the stocks of specific companies in particular countries have been done. Such factors as absolute and relative industry ESG score, news based ESG overall and subcategories score were analysed together with corporate social responsibility impact. However, the scope of the countries was mainly

the United States of America, United Kingdom and Western Europe countries. It stresses the importance to increase the range of countries, markets and companies to see what impact to the financial performance of the company the ESG score and corporate social responsibility might have, as the results differ from country to country, and the significance of the results varies as well.

What is more, even though the ESG absolute and industry scores were examined, the validation and enlarging the findings are beneficial, especially concerning the different sectors and markets, ESG scorings and measures. In addition to that, authors suggest seeing if ESG strategy, together with material sustainability issues for the company, would provide excess returns and at the same to lower the idiosyncratic risk. Furthermore, no researches have mentioned a greenwashing problem or any relation to that while conducting analyses. The rest of this section focus on the studies with analyses on funds performance and ESG score.

Several types of research are conducted on ESG funds, mainly in the United States of America, Canada, the United Kingdom, and West Europe, analysing period starting from 1987 to 2011. The main goals of these studies were to see if investors, investing in such funds, are sacrificing returns and if there is a significant difference in the performance of sustainable and non-sustainable funds. By comparing the ESG funds to conventional mutual funds or benchmarks (like S&P 500 or TSE 300 index), researches aimed to analyse if there is a significant difference in returns, in which type of investment risk is higher or what conditions might influence the performance of the funds. The results are divided into three categories: high returns; low returns; no significant difference.

Higher returns on the United States ESG funds were noticed during the crisis period 2007-2009 (Areal, Cortez, Silva, 2010). Authors found that in a low volatility period, such funds were outperformed by the traditional funds; however, during the high volatility period, ESG funds are performing better and provide higher returns. Important to mention, that this

has to be taken with care, as the results are for the financial crisis period; however it shows that under certain circumstances, especially high volatility, the ESG funds could provide higher returns when comparing to the traditional mutual funds.

By constructing portfolios of mutual funds with ESG factors objectives and comparing to the portfolios of these funds, Geczy, Stambaugh, Levin (2003), have noticed the lower returns of ESG funds while comparing to the traditional mutual funds. Even though lower returns of such funds were seen, under certain circumstances, the difference is significant. It depends on what part of the mutual fund is allocated for sustainable investments; the larger part of the fund is for ESG investing, the higher the price is said for such investments. What is more, the manager's skills to pick the stocks for investments have an impact as well, together with the number of companies in the fund. The results signals that diversification is an essential factor while investing in ESG funds along with the stocks of companies chosen to the fund, as the number of possible companies for investing is decreased, it is crucial to pick up the right companies for higher returns.

Areal, Cortez, Silva, (2009) analysed the European and United States ESG global funds from August 1996 to August 2008. The main findings were that no significant performance difference was noticed in the European market while comparing to both conventional and socially responsible indexes, however underperformance of ESG funds found in USA funds. Amenc, Le Sourd (2008) examined the period of 6 years from 2002 to 2007. Authors, in particular, focused on funds investing in assets from France, Europe, and the Eurozone. While comparing the mutual funds to indices and applying the Fama-French three-factor model, authors did not find significant performance variations and most SRI funds obtain negative, but not statistically significant alpha.

In addition to that, Bauer, Derwall, Otten (2006), using the data from 8 ethical funds and 267 mutual funds in Canada. To conduct the research and analyse the data, the authors

applied the single-factor CAPM model together with multi-factor Carhart 4 factor model. By comparing their risk-adjusted returns, the authors did not find any significant differences in results. Authors concluded that ESG investing for Canadian investors did not provide additional returns. However, the investors were not sacrificing their financial profits as well.

Kreander, Gray, Power, Sinclair (2005) tested the 30 ESG funds against 30 similar non-sustainable funds over the period from January 1995 to December 2001, to compare the performances of funds in four countries (United Kingdom, Netherlands, Sweden, and Germany) in Europe. The findings of the research found no risk-adjusted-performance differences between the funds. What is more, Derwall and Koedijk (2009) tested the ESG bond performance and balanced funds over the period 1987–2003 in comparison to samples of traditional funds. Authors found that the average ESG fund investing in bonds performed very similar to its conventional counterpart by providing the same returns as the traditional funds.

These findings could suggest that sustainable investments do not cut the returns and investors are not sacrificing their financial profit. What is more, results reveal that ESG funds returns and performance does not sharply differ from the convention funds. However, some authors' stress that there is a stronger correlation between the ESG funds returns and traditional market funds than the ethical indices.

The studies which were conducted on the returns of mutual funds reveal results from low, high and no differences in returns of ESG and conventional funds. Authors had tested the returns and performance of sustainable funds that use different stock selection criteria. What is more, authors tested not only the equity funds, which receives a sizeable interest in the academic area but the fixed income against traditional funds as well. However, for further research on the impact of each investment criteria (environmental, social or governance) for the fixed income product is still awaiting. What is more, focus on material factors in academia is missing as well, and the gap of research is remaining in this field. Hene, author of this

research aimed to analyse and compare the performance and impact of ESG score and material factors score to the performance of the portfolios.

Table 1.

Overview of academic literature on returns of sustainable investments

Authors	*Period*	*Measured*	*Main results*
Sally Hamilton *Hoje Jo* *Meir Statman*	1982-1990	32 mutual socially responsible funds	The market does not price responsible investments; Any strong financial effect could not be expected; The socially conscious fund does not make substantial excess returns.
Jean-Michel Sahut *Hélène Pasquini-Descomps*	2007–2011	ESG news-based scores for 200 companies in the US, UK and Switzerland	Shareholders can not find ESG scores and ratings as a residual risk factor
Giovani Landi *Mauro Sciarelli*	2007-2015	If sustainable investors outperform the Italian Stock Exchange's market and receive an excess return	No significant and positive effect found on socially responsible investments
Shunsuke Managi *Tatsuyoshi Okimoto* *Akimi Matsuda*	2001-2008	SRI indexes and traditional equity indices in the USA, the UK and Japan	No statistical variation in mean and volatility between SRI and conventional indexes was noticed.
Michael Schroder	1990-2002	46 SRI funds 10 SRI indices	SRI investment funds do not substantially underperform their benchmarks; The majority of SRI indices are positive, albeit negligible, of Jensen's alpha.
Lloyd Kurtz *Dan diBartolomeo*	1992-2010	U.S. social investment index (KLD400 index)	Risk exposures produced by social monitoring can be controlled by careful portfolio construction, which is good only for values-based investor, but not financial performance advantage seeking investors.
Gunther Capelle-Blancard *Aure´lien Petit*	2002-2010	ESG news impact on the Stock Market	Negative events create a decrease in the market value of 0,1%; Positive announcements do not provide any additional gains.
Meir Statman *Denys Glushkov*	1992-2007	Stock returns and their ESG ratings by KLD	The best-in-class portfolio construction method let SR investors do both well and good; Shunning "sin stocks" brings a return disadvantage when comparing to conventional investors.
Stephen Brammer *Chris Brooks* *Stephen Pavelin*	Investment starts at 2002, at evaluates holding periods for 1; 2 and 3 years.	Corporate social effectiveness and return on stocks in the United Kingdom	Negative relationship between the CSP score and companies' stock returns; Companies with lower ratings tend to provide higher yields and outperform the market.
Maria Céu Cortez *Florinda Silva* *Nelson Areal*	1996-2008	The US and European global SR funds and their conventional benchmarks	SR funds are significantly exposed to growth stocks; No significant performance difference was noticed in the European market; The underperformance of SR funds found in USA funds.
Christopher C. Geczy *Robert F. Stambaugh*	1963-2001	Portfolio of SRI mutual funds	Lower returns of ESG funds while comparing to the traditional mutual funds; The more substantial part of the fund is for ESG investing, the higher the price is said for such investments;

David Levin			Diversification is an essential factor while investing in ESG.
Maria Céu Cortez *Nelson Areal* *Florinda Silva*	1993-2009	US equity SR funds	Higher returns on the United States ESG funds were noticed during the crisis period 2007-2009; In a low volatility period, SR funds were outperformed by the traditional funds.
Noël Amenc *Véronique Le Sourd*	2002-2007	Funds invested in assets from France, the Eurozone, and Europe	Most SRI funds obtain negative, but not statistically significant alpha
Rob Bauer *Roger Otten* *Jeroen Derwall*	1994-2003	Canadian ethical funds and their traditional peers	No significant performance difference was noticed; The investors are not sacrificing their financial return when investing in ethical funds.
Niklas Kreabder *Rob Gray* *David Power*	1995-2001	30 SR funds against 30 similar conventional funds	No risk-adjusted-performance differences between the funds
Jeroen Derwall *Kees Koedijk*	1987-2003	Socially responsible bond and balanced funds to conventional funds	SRI bond funds tend to perform similar to traditional funds SRI balanced fund outperforms the traditional funds by more than 1.3% per year.

Note: The author of this study compiled the table.

2.1.2. The materiality of sustainable issues and ESG reporting

The reporting of sustainability issues, according to environmental, social ar governance factors, is becoming more and more financially material. Researches are analysing how essential is the disclosure of ESG issues according to the industry the company functions at and what impact it might have on the performance of the company, its brand, shareholders, and society (see Table 2).

The Sustainability Accounting Standards Board (SASB) provides companies with different standards and factors, according to the industry and sector companies functions. It helps companies to be able to report on the main sustainability issues the most relevant for their sector, and in such way to provide the necessary information for investors to compare them to other companies in the same industry or sector (SASB). What is more, according to the United Nations Sustainable Stocks Exchange initiative (SSE), at the latest by 2030, all big size

companies should report on their environmental and social impact and explain why if they do not do so (SSE, 2015).

Quite a few articles analysed in this chapter are written by George Serafeim, who is the professor at Harvard Bussines School and co-founder of KKS Advisors. This leading consulting firm designs innovative solutions to incorporate material ESG problems into corporate strategy and investment strategies.

Firstly, Eccles, who is one of the most quoted and leading researcher in the field of sustainability, and Saltzman (2011) say that ESG reporting is "a crucial step to creating a more sustainable society". That company should report on both financial and non-financial performance, which would provide benefits such as increasing reputation, engagement with shareholders, together with providing information on sustainability issues for ESG factors concerned investors. At the same time, it helps to stay compliant with regulatory requirements and mitigating the possible risks. What is more, findings proof that companies that report on sustainability and include sustainability in their culture, outperform their competitors in the B2C sector, as well as in the long-term performance. In addition to that, such companies tend to have structured stakeholder engagement procedures and to be more long-term focused and oriented, meaning that it creates substantial competitive benefits and advantages (Eccles, Ioannou, Serafeim, 2014).

Li, Gong, Zhang, Koh (2018), found that transparency on ESG factors increases the trust of shareholders, the positive connection between the level of transparency and the value of the firm noticed as well. Furthermore, Ioannou and Serafeim (2017) say that increased transparency on sustainability and socio-environmental issues, regulatory-driven is linked to the higher valuation of the firm and the value of corporate. Additionally, disclosure regulations seem to have a positive economic effect, and it is creating value, even though it might develop costs for some companies.

Moreover, Serafeim and Rogers (2019) estimate the conditions under which sustainable issues from being non-financial turns into financially material for the companies and shareholders "arguing that materiality is not a state of being" but a "process of becoming." By stressing the importance of knowing how sustainability issues are becoming financially material authors outline how crucially important is the alignment of corporate behaviour with societal needs for materiality as well as keeping in mind the possible risks and handling those before they become financially material.

What is more, Serafeim, Amel-Zadeh (2018) assessed for what purposes mainly investors are using the ESG data. As the authors are analysing the data from senior investment professionals from all around the globe, they stress that there is a chance of bias and they keep the expectations that on average the respondents are familiar and aware of ESG and sustainability issues. By looking into results, firstly, investors are concerned about the ESG factors which are relevant to the investment returns, meaning that they put the financial reasons in the first place to ethical considerations. What is more, it suggests the materiality of sustainable issues and its importance for financial returns. In addition to that, the importance of different factors varies from sector to country, where the company functions. Secondly, the increasing attention and demand from the customers' side are making investors consider the ESG factors in their investment processes and the development of financial products. Moreover, the main obstacles of ESG data usage are lack of reliability and comparability, which are caused by different reporting frameworks and standards if any.

In addition to that, Taliento, Christian, and Nett (2019) have examined what impact sustainability indicators have on the financial ar economic performance of the company in Belgium, France, Germany, Italy and Spain. The authors have tested both absolute ESG and performance of industry sector scores. Even though the absolute ESG scores were not statistically significant and did not have a substantial impact on the performance of the

company, the specific score on the industry level is stressed as an essential factor of the competitiveness of the company. It means that it is more important to consider the average relative ESG scoring in the industry-sector, depending on the financially material sustainable issues for the sector. Such results show that companies must concentrate on the industry-related sustainability problems, as the distance from the average industry ESG score has an impact on the performance of the company. The materiality of industry and sector-related sustainable issues will be analysed in more details in the upcoming chapter.

Velte (2017) tested the relationship between the ESG score with the financial performance (Return on Assets and Tobin‘s Q) of companies, aiming to see if better ESG performance could lead to a better performance of the company. By analysing the listed companies in Germany, the author found that the ESG score has no impact on Tobin‘s Q. However, a significant positive effect on Return on Assets was found. In addition to that, analysis by Han, Kim and Yu (2016), showed that individual ESG disclosure scores could demonstrate different impact on the financial performance of the company. By taking ESG, and individual E, S and G disclosure scores, authors checked the relationship between the financial performance of the company. For this study, dependent variables were taken Return on Equity (ROE), Market book ratio and stock returns. The results of the panel data analysis show different results for each factor that environmental disclosure score has a negative impact on the financial performance of the company. In contrast, the governance score has a positive relationship. Finally, social disclosure score does not show any significant value.

Lastly, Buallay (2018), has analysed what impact individual E, S and G disclosure scores have on banks in Europe. The author tested what the relationship between ESG disclosure and operational (ROA), financial (ROE) ar market performance (Tobin‘s Q) is. By having 2350 observations for ten years, the author tested 235 banks in Europe. To analyse the data, the author applied panel data analysis approach, the random effect model. The results

showed a significant positive relationship between ESG disclosure and performance of the banks. However, each score has a different effect on different variables of performance. Firstly, Environmental disclosure showed a significant positive relationship with Tobin‘s Q and ROE. What is more, social disclosure has a negative effect on operational performance (ROA), and positive effect on the ROE and TQ. Furthermore, governance disclosure has a negative effect on ROA and ROE.

The analyses conducted on ESG and sustainability reporting, stress the importance to examine further the conditions under which companies are adopting sustainability and its culture together with how such culture is created. Moreover, the authors stress that results of reasons for implementing the ESG and its factors differ in each country and varies from sector to sector. Moreover, some companies might disclose information which is neither proper nor material for it, which means that it is hard to rate the reporting of such companies. In addition to that, some studies are based on data for one country, evaluating only the big-size companies, without including small or medium-sized firms. What is more, a need for disclosure of ESG and non-financial information from companies is steadily increasing and changing, doing the businesses to track the investors' needs, however, to pay attention to the most relevant risks of their business and the mitigation of them. Finally, the disclosure on sustainable issues has an impact on the financial, operational and market performance of the company, as well as individual E, S and G disclosure scores. Hence, author of this study aims to analyse what is the relationship between the ESG and its individual scores and financial performance of the Nordic companies in the sample of this study, based on the primary results by the reviewed studies (see Table 2).

Table 2.

Overview of academic literature on ESG disclosure and performance of companies

Authors	*Period*	*Measured*	*Main results*
Robert G. Eccles	1993-2010		

Ioannis Ioannou *George Serafeim*		Effect of corporate sustainability culture on organizational behaviour and performance	Companies that report on sustainability and include sustainability in their culture outperform their competitors in the long-term performance (both in accounting and stock market performance).
Yiwei Li *Mengfeng Gong* *Xiu-Ye Zhang* *Lenny Koh*	2004-2013	ESG disclosure effect on firm value, also with CEO power	A positive relationship between ESG reporting and firm value; Higher power of CEO enhances the impact of ESG disclosure on firm value;
Ioannis Ioannou *George Serafeim*	2005-2012	Regulations for ESG disclosure in 4 countries and its effect on the corporate value	Increased transparency on ESG issues, regulatory-driven is linked to the higher valuation of the company Regulations have a positive economic effect, and it is creating value, even though it might develop costs for some companies.
Giovanni Landi *Mauro Sciarelli*	2007-2015	Relationship between ESG assessment and companies returns	No positive and statistically significant impact on market premium
Patrick Velte	2010-2014	ESG score and financial performance of the company	A positive relationship between the ESG rating and the ROA found, but not with Tobin's Q.
Jae-Joon Han *Hyun Jeong Kim* *Jeongmin Yu*	2008-2014	ESG disclosure score and financial performance of companies	Environmental disclosure score harms financial performance; There is no significant relationship between the social aspect and financial results; A significantly positive relationship noticed between the transparency of governance and ROE
Amina Buallay	2007-2016	Relationship between ESG transparency and operational, financial and market results in the European banking area	The significant positive impact of ESG on the performance of the company; Environmental transparency has a positive impact on the market and financial performance; Social disclosure has a negative effect on operational performance only; Disclosure of governance has a positive impact only on market performance.

Note: The author of this study compiled the table.

2.1.3. Studies on sustainable investments in Nordic countries

As for now, several kinds of research been conducted in the Nordic region and sustainable investing there. However, it is still quite limited in scope, and many sustainability and ESG topics related studies are missing on Nordic countries and companies. In this chapter, the overview of studies conducted on the Nordic region (Denmark, Sweden, Norway and Finland) and its companies will be reviewed, together indicating the missing gaps in academic literature for the sustainable investments field in the mentioned Nordic countries.

Bengtsson (2008) tested the Scandinavian investors in terms of SRI principles and practices (in Denmark, Sweden and Norway; Finland being excluded). By using the qualitative and quantitative data, the author aimed to build an awareness of how institutional aspects affect the SRI values and behaviours of investors embedded in the investment process. In addition to that, investigate the differences and similarities between and within Nordic countries. What is more, examine how such differences could be explained. The primary findings of the study were that the role of government and public pension funds, strategies and principals of SI are substantial factors in all three countries. In addition to that, the endorsement of international human and labour rights conventions are the crucial factors for implementing SI in all countries. What is more, some investors also emphasise that, while their underlying motives differ, they avoid investing in companies that breach national and international law. Furthermore, countries differ in terms of their principles and criteria, like alcohol or tobacco, applying different definitions and percentage limits of turnover. So it shows that Scandinavian investors strongly consider many different factors when approaching sustainable investing. What is more, some differences are noticed as well, as different limits or restrictions for specific criteria when investing.

What is more, the other study was conducted on Nordic Management and Sustainable Business (Preuss, 2017). As the Nordic countries and companies are considered to be the leading ones in the sustainability field, as well as showing a strong focus on it, the author analysed the connection between the Nordic corporate culture and the long-term development and implementation of sustainability in businesses. The study was conducted by testing the big size companies in all four Scandinavian countries (Denmark, Sweden, Norway and Finland) and comparing it to the European companies. The differences such as flat hierarchy, human and future orientation were noticed in Nordic management style together with a strong focus on social values, which has a substantial impact on the companies score of sustainability. Such

results could suggest that management style has an impact on the companies sustainability and its overall score together with prospects to increase the sustainability of business and its operations.

While analysing the studies conducted on sustainability and sustainable investments in the Nordic region, it could be summarised, that sustainability is playing an essential role in both management and investment fields for Nordic investors and companies. It sets a background for the sustainable investing area in the Scandinavian region, as the companies from these countries (Denmark, Sweden, Norway and Finland) are to be examined in this research.

2.2. Conclusion

While examining the previously conducted studies on sustainable investments and its returns (Sahut et al., 2015; Taliento et al., 2019; Petit et al., 2017; Sciarelli et al., 2019), ESG reporting and sustainable issues materiality to the companies and its financial performance (Eccles, Saltzman, 2011; Eccles et al., 2014; Ioannou et al., 2017; Serafeim et al., 2019), it is essential to stress the importance to analyse and consider not only the ESG rating of the company and its financial returns but as well the sustainable material issues for the specific company (depending on its industry and sector). To encourage business to report not only on the financial but as well as non-financial performance, for investors to be able to compare the company to its peers. Besides comparison to its peers, it is crucial for companies to be aware of the essential risks for its business, to specify the methods for mitigations of those risks and disclose such information and data publicly.

This research intends to fill in the gap in the academic literature of sustainable investments fields regarding what impact discloser on the sustainability issues has on the financial performance of Nordic companies, having a return on equity as a measurement of financial performance. In addition to that, the author will analyse if Nordic investors are

sacrificing their return while investing in sustainable companies and consideration of total ESG rating differs from material scores incorporation into the portfolio construction. This study will combine two main groups of financial markets who can make the most impact, then considering the ESG and sustainability from the finance perspective: investors and companies.

Firstly, for investors, both total ESG score and material factors will be analysed, to test and compare, if consideration of materiality in sustainable investing might bring an extra return. Meaning that the money is invested in the companies which are working towards fostering the sustainable development and tackling the global issues and risks which essential for a specific company. Secondly, for companies, the author will examine, what is the relationship between the total score of the disclosure on sustainable issues and the financial performance of companies. It will be followed with analyses of what is the relationship between separate factors of environmental, social and governance disclosure and the financial performance of the company. These goals aim to see what value sustainable investing and consideration of ESG factors materiality would bring for investors and companies and to create a link between the created initiatives and practical implication of ESG factors.

3. Research Methodology

In this chapter, the research design will be outlined in details. An overview of what research questions and hypotheses were raised by the author, techniques to check them and what kind of data was used to do the research. This chapter is divided into two parts, firstly, portfolios, constructed based on the companies ESG score and its material factors, returns are analysed, focusing on what value it creates for the investors. Secondly, company disclosure on ESG and sustainability analysis is performed, looking into the effects of sustainability disclosure on the company level, precisely what is the relationship between ESG disclosure and the financial performance of the company. The overview in this chapter will be provided respectively.

In each part, firstly, the research questions and its hypothesis are provided. It is followed by the identification of data and variables to be used. Lastly, the techniques used to check the hypotheses and conduct the statistical tests are presented together with econometrical considerations employed.

3.1. ESG score and its materiality impact on the portfolio returns

As it was previously stated, ESG factors and sustainable investments are becoming widely discussed in academic, financial and political fields. However, the main challenge remains, as there is little consistency in the ESG field, exact definition and approaches to measure the companies are missing. Therefore it might lead to difficulties to demonstrate the added-value by ESG or create potential greenwashing cases. Hence, there are several kinds of research done already, which suggest that ESG factors consideration does not lead to decreased returns, and it might provide excess performance in the long term.

However, what is noticed from much academic research, that total ESG rating is taken as the main factor for examination. Notwithstanding the materiality (meaning, it could have long-term financial value for the company) of individual E, S or G factors could be essential to

make an impact, and it is not yet analysed widely. So, the purpose of the first part of this research is to see, if constructing portfolios based on their material ESG factors score performs better than constructing portfolios only on total ESG score.

Below, two research questions of the first part of the research are provided together with the hypotheses, which will be tested statistically. The hypotheses are raised based on Studenmund (2014) that the null hypotheses (H0A and H0B) are statements of the values that are not expected, and the alternative hypotheses (H1A and H1B) are the statement of the values that the researcher assumes.

Research question 1: Do investors sacrifice their returns by investing in sustainable Nordic companies?

H0A: Portfolios consisting of Nordic companies with higher ESG score does not provide higher return;

H1A: Portfolios consisting of Nordic companies with higher ESG score provides higher return;

Research question 2: Do investors sacrifice their returns by considering material ESG factors when investing?

H0B: Constructing portfolios according to their material ESG score factor does not provide extra return;

H1B: Constructing portfolios according to their material ESG score factor provides an excess return.

3.1.1. Techniques to analyse the portfolio performance

To be able to analyse and compare portfolio performance, the list of companies to be included in the portfolio was defined (see Appendix A). The portfolios were constructed based on the total ESG score of the company and its material factors score. To analyse the effect of ESG score on portfolio returns the regression analysis method was employed. According to

Brooks (2008) regression model is used to describe and evaluate the relationship between movements in a variable by reference to changes in other variables.

Firstly, the Capital Asset Pricing Model (CAPM) is applied, with the only market excess return factor (Le Sourd, 2012; Bauer et al., 2006). The model works as a predictor of the relationship between the systematic risk (beta) and the expected return of portfolio (Bodie, Kane, & Marcus, 2014). Jensen‘s alpha, which is the mean return on the portfolio over and above that predicted by the CAPM. It shows if the portfolio outperforms the market and if investors are compensated with the higher returns for the risk of their investments (Hamilton et al., 1993; Amenc et al., 2008; Areal et al., 2009; Bodie et al., 2014;). The regression of CAPM could be written as:

$$ERi = Rf + \beta i\,(ERm - Rf),$$ where:

- **ERi**= expected portfolio return
- **Bi**=beta of investment (systematic risk)
- **Rf**=risk-free rate
- **ERm-Rf**=excess return on the market portfolio

Secondly, the multifactor model with the inclusion of Fama-French 3 factors model was used to estimate the excess returns of portfolios and compare the results, in line with the researches conducted by Amenc, Le Sourd 2008; Areal et al., 2009; Bauer et al., 2006; Landi et al., 2019; Sahut et al., 2015; Geczy et al., 2005. The Fama-French model is one of the dominant approaches to describe and analyse security returns, referring to Fama and French (1993). By using the systematic factors such as firm size and book to market ratio (B/M) together with the market index, Fama and French proved that CAPM was not applicable to explain the return of an asset fully. Due to that, the results by the mentioned two models will be provided and compared respectively (Studenmund, 2014). The Fama-French 3 factors equation is provided and explained below (Fama Jr., E. F., 2006):

$$R(t) - RF(t) = a + b[RM(t) - RF(t)] + sSMB(t) + hHML(t) + e(t),$$ where

- **Rt**=total return of a portfolio i at time t
- **RF(t)**=risk free rate of return at time t

- **RM(t)**=total market portfolio return at time t
- **R(t)– RF(t)** =expected excess return
- **RM(t)–RF(t)**
  =excess return on the market portfolio
- **SMBt**=size premium (small minus big)
- **HMLt**=value premium (high minus low)

Where, SMB (small minus big) is the difference between the returns on small-stock and big-stock portfolios, with approximately the same weighted average book-to-market value, to incorporate the size factor. HML (high minus low) is the difference between high and low book-to-market stock portfolios of approximately the same weighted average volume, incorporating the value aspect of value and growth stocks. And the third factor is market return in excess of the risk-free rate (Fama, French, 1933; Griffin, 2002).

Finally, a fourth factor, momentum, was added to the standard controls for stock return behaviour. Carhart added it to the previously mentioned three factors: SMB, HML and Market Index, to evaluate portfolio performance. The momentum factor is denoted as WML, winners minus losers, by taking the winners and losers based on the last 1-12 months returns and is equal to the difference between high and low prior return stocks (Bodie, Kane, & Marcus, 2014; Bauer et al., 2006; Carhart, 1997). Hence, the Fama French 3 Factors equation was expanded as:

$$R(t) - RF(t) = a + b[RM(t) - RF(t)] + sSMB(t) + hHML(t) + wWML(t) + e(t)$$

In addition to the mentioned models, two more factors will be analysed and provided to evaluate the performance of each portfolio. In the first place, average excess returns values will be provided which are equal to the difference between the actual average rate of return on an asset and the real average risk-free rate (Bodie, Kane, & Marcus, 2014).

Going further, Sharpe ratio values, which are known as well as reward to volatility, will be discussed. Share-ratio is defined as the ratio of the excess return on the portfolio over the standard deviation of return, meaning that it shows return-risk tradeoff. So the higher the Sharpe ratio of the portfolio, the greater is the risk-adjusted return of the investment. The

equation of rate is equal to Sharpe Ratio = Risk Premium/ Standart Deviation of Excess Return (Schroder, 2004; Bauer et al., 2006; Amenc et al., 2008).

3.1.2. Portfolio construction

As four markets from different countries are analysed in this research (Denmark, Sweden, Norway and Finland), the sample consists of all listed companies in Nordic exchange which have ESG, E, S and G score from ESG data provider "XXX" from July 2009 to March 2019. The span of ten years is considered to be able to show the differences in the long-term financial returns of portfolios performance constructed based on their ESG score. As the main limitation of the research is ESG score data, it was essential to match the company and its ESG score in advance, to be able to conduct further research. Hence, the final number of companies to be analysed in this research is 60 (see Appendix A). Table 3, provides an overview of different sectors at which companies are functioning at, according to Sustainable Industry Classification System (SICS). SICS in total has 11 sectors and 77 industries and groups the companies according to their sustainability risks and which topics are financially material to the business (SASB).

In total, six portfolios were constructed. Three portfolios based on the ESG total score, where one portfolio consisted of twenty companies having the highest ESG score, the second portfolio had the bottom twenty ESG score companies. Finally, the last portfolio was constructed out of the left twenty companies, named as an average portfolio. As it is usually used in academic literature, portfolios could be built based on some threshold or cut-off line. However, the researcher keeps rebalancing the portfolio each month, based on the changes of ESG score of a particular company, and using the best in class method (Kempf, Osthoff, 2007; Robins, Krosinsky, 2008; Statman et al., 2008).

Based on the mentioned SICS classification, the material portfolios are constructed. By using the SASB Materiality map, according to the industries each company is linked to,

material dimensions and general issue categories were identified, which out of three (E, S or G) factor is the most essential to the company (Jebe, 2019). Notwithstanding, several companies have more than one material dimension, however, while constructing the portfolio, the researcher looked into the number of accounting metrics applied to each of the factor (Grewal, Hauptmann, Serafeim, 2020). If more than one factor was to be used (not only E, S or G), the average score was made out of 2 most essential elements to have the material rating for each company for each month.

Material scores portfolios were constructed and rebalanced in the same way, as the ESG score portfolios, by having top twenty, bottom twenty and the left twenty companies rebalanced each month, depending on the changes of the material E, S or G scores.

Table 3.

Number of companies in the research in each of the industry, according to the Sustainable Industry Classification System (SICS)

SICS sector	***Number of companies in the sector***
Consumer Goods	3
Extractives & Minerals Processing	5
Financials	14
Food & Beverage	5
Health Care	4
Infrastructure	3
Renewable Resources & Alternative Energy	4
Resource Transformation	11
Services	2
Technology & Communications	6
Transportation	3
Total number of companies	**60**

Note: The author of this study compiled the table.

3.1.3. Data collection

To construct portfolios and be able to analyse the impact of total ESG score and its factors materiality (E, S and G), ESG data, list of companies, its historical stock price and

returns were needed. In addition to that, Fama French factors were downloaded to conduct a statistical analysis. Sahut and Pasquini-Descomps (2015) has analysed the impact of ESG score on the performance of stocks and tested if there is a positive relationship between ESG score and its rating and the stock performance. However, the goal of this research is to analyse if portfolios with higher ESG total score and higher material factors score outperforms the market. Meaning that they provide higher returns than the market, and secondly if portfolios constructed on material factors score perform better than the ones built on total ESG score only.

The dependant variable, which moves are to be explained, will be portfolio excess returns, and explanatory, or independent, variable, will be Fama-French 3 factors (SMB; HML and Rm-Rf) and fourth factor added by Carhart: momentum (Studenmund, 2014, p. 5).

ESG Data which is used to construct portfolios is from „XXX“ database. ESG total and environmental, social and governance scores for 60 Nordic companies were downloaded from "XXX" database. ESG monthly data was downloaded for the period of July 2009 – March 2019.

Monthly stock prices data, to be a dependant variable, for each company were taken from www.finance.yahoo.com. As the companies are based in 4 different Scandinavian markets, the prices are provided in 4 different currencies: Norwegian krona (NOK), Danish krone (DKK), Swedish krona (SEK) and Euro (EUR). To align all prices to one currency, the exchanges rates NOK/EUR, DKK/EUR, SEK/EUR were applied, same as for Fama-French factors which will be discussed further as well. So the prices of all stocks were converted to EUR.

Monthly returns for each security were calculated by using the equation $R_t=(P_t/P_{t-1})-1$, which is also known as simple returns, as in the same ways returns are calculated for Fama French factors as well (Bodie et al., 2014). The performance of a security is equal to the sum

of the change in price between two time periods, reflecting the return which was provided in a specific period.

Fama-French European 3 factors, together with momentum factor monthly data, were taken from Kenneth French‘s data library. The library provides factor returns in USD for small minus big (SMB), high minus low (HML), Market – Risk-Free (RF) rate and winner minus losers (WML). Fama-French European factors include all 4 Scandinavian countries (Denmark, Norway, Sweden and Finland), together with Austria, Belgium, Switzerland, Germany, Spain, France, Great Britain, Greece, Ireland, Italy, Netherlands and Portugal (Kenneth French). The monthly data was downloaded between July 2009 and March 2019. SMB represents the difference in returns between the small size stocks and large size stocks, based on the market capitalisation of the company. At the same time, HML shows the difference in returns between value stocks (having a high book-to-market ratio) and growth stocks (lower book-to-market ratio) (Glück, Hübel, Scholz, 2020).

As Fama French European factors at Kennet R. French data library are provided in USD, the conversion to EUR was applied, according to Glück, Hübel and Scholz (2020) published research, which analyses researching non-USA markets using Fama French factors. The main finding of the study and benefits of converting the Fama-French elements is that for both investors and academic analysis of the data, it provides more accurate results and comparisons. What is more, missing the currency conversion could result in skewed betas and alphas together with controversial conclusions on investment techniques and performance (Glück, Hübel and Scholz, 2020).

The conversion was applied to Market, SMB, HML and WML factors. By adding the downloaded Risk-Free rate (RF) to European Market excess returns in USD, the raw return in USD of the European market was obtained, which was then converted by USD/EUR exchange rate to EUR. Finally, by deducting the RF rate in EUR (EURIBOR), the excess return of the

European market in EUR was received (Maier, Scholz, 2017). SMB, HML and WML factors from USD were converted to EUR by using the exchange rate USD/EUR and diving the factor in USD by one plus the exchange USD/EUR rate: $(1+ r^{USD/EUR})$ (Glück, Hübel, Scholz, 2020).

3.1.4. Econometric data considerations

The Ordinary Least Squares (OLS) estimation method is employed to run the previously stated regressions. However, OLS has four assumptions, which need to be met before running the regressions. What needs to be mentioned, that assumptions differs if the regression is single or multiple, which in our case is mainly multiple regressions used.

Firstly, autocorrelation is to be tested for all models. Table 4 represents the results received from LM (Breusch–Godfrey) test applied to all regressions in the first part of the research. H0 states there is no autocorrelation, and all the p-value shows that H0 is not rejected in every model, and demonstrates that there is no autocorrelation in regressions. LM test was run with one lag, which is one of the most common ways to run this test. However, it could be run for different order as well, depending on the frequency of data in the regression (Brooks, 2008).

Table 4.

LM test p-value results for ESG and Material portfolios

	ESG portfolios			Material portfolios		
	ESG top	ESG average	ESG bottom	Material Top	Material average	Material bottom
CAPM	0,53	0,89	0,21	0,34	0,95	0,43
Fama-French 3	0,69	0,86	0,17	0,45	0,77	0,46
Carharft factor	0,78	0,83	0,19	0,52	0,79	0,52

Note: *** denotes statistical significant at level of p<0,01; ** at level of p<0,05;* at level of p<0,1 level. The author of this study compiled the table.

Secondly, heteroscedasticity is to be tested for all models. For that, the Breusch-Pagan test is to be applied. H0 in the test stands that heteroscedasticity is not present in the model,

while an alternative hypothesis stays the model heteroscedastic. Table 5 gives an overview of the results received by applying the Breusch-Pagan test. Some p-values show that the heteroscedasticity is present in several models, meaning that H0 is rejected, and the alternative hypothesis is accepted. It indicates that the errors within the model do not have constant variance (Brooks, 2008).

Table 5.

Breusch-Pagan test for heteroskedasticity for ESG and Material portfolios

	ESG portfolios			Material portfolios		
	ESG top	ESG average	ESG bottom	Material Top	Material average	Material bottom
CAPM	0,06**	0,74	0,03**	0,23	0,002***	0,48
Fama-French 3	0,16	0,79	0,23	0,29	0,004***	0,81
Carharft factor	0,24	0,89	0,23	0,43	0,014**	0,84

Note: *** denotes statistical significant at level of p<0,01; ** at level of p<0,05;* at level of p<0,1 level. The author of this study compiled the table.

The heteroscedasticity is noticed in our regressions, that means that those regressions are not the Best Linear Unbiased Estimator (BLUE). As the regressions are not BLUE, it indicates that they no longer have the minimum variance among the class of unbiased estimators. However, to overcome the heteroscedasticity, the robust standard errors (HAC) are included in the model (Brooks 2008).

What is more, Variance Inflation Factors (VIF) was employed to test for multicollinearity in the regressions. The multicollinearity tests if explanatory variables are very highly correlated with each other or not (Brook, 2008). If the measurement value exceeds 5, according to the common rule of thumb, the multicollinearity in such case is present (Studenmund, 2014). However, in the models of this part of the research, multicollinearity was not present, which exhibits that the independent variables are not correlated with each other.

3.2. Company reporting analysis

Panel data which is as well known as a longitudinal data set, was used for the study of companies reporting on ESG factors. Panel data, which is a set of pooled time-series and cross-sectional data, an analysis was developed, to test if there is an effect by ESG, E, S and G disclosure to the financial performance of the companies (Studenmund, 2014). Longitudinal data contains information across both time and space, measuring the same entities over time (Brooks 2008).

Two research questions were raised for the second part of the analysis followed by hypotheses, which are going to be tested statistically. The null hypotheses (H0C and H0D) which are the statements of the values that are not expected by the researcher and the alternatives (H1C and H1D) are the statement of the assumed values (Studenmund, 2014).

Research question 3: Does ESG disclosure has a positive effect on companies financial performance?

H0C: There is no positive relationship between the financial performance of the company (ROE) and ESG disclosure;

H1C: There is a positive relationship between the financial performance of the company (ROE) and ESG disclosure;

Research question 4: Does E, S, G disclosure has a positive effect for companies financial performance?

H0D: There is no positive relationship between the financial performance of the company (ROE) and E, S, G disclosure;

H1D: There is a positive relationship between the financial performance of the company (ROE) and E, S, G disclosure.

3.2.1. Techniques to analyse the ESG disclosure impact

Before conducting the research and applying the model, data analysis was performed. First of all, as using panel data for the second part of the study, it is necessary to apply model diagnostics to find out which model is the most efficient. Usually, in financial analysis, one out of two estimator approaches might be employed for panel data: Random Effects or Fixed Effect Models.

The Fixed Effects model might be applied in cases when the impact of variables variation over time is more critical. Hence, the Random Effect model variation is assumed to be random and uncorrelated. It is said, that Random Effects might provide a better estimation than the Fixed Effects model, however, to find out which model should be applied in this case, three tests will be employed, which are outlined in more detail in the upcoming paragraph (Brooks, 2008).

3.2.2. Econometric Considerations

To find out and to statistically test, which model (Fixed-Effect or Random-Effect) must be employed, three tests were conducted and analysed. First one is to look into F-test, which looks for time-fixed effects, where H0 stands for pooled Ordinary Least Squared (OLS) model, and alternative hypothesis stands for Fixed-Effects model. F test looks if individual differences are jointly equal or different from zero, and if the panel dataset has individual effects (Adkins, 2014).

The second test to consider is the Breusch-Pagan test, which is based on Lagrange multiplier, where the null hypothesis stands for pooled OLS model, and alternative hypothesis holds for the Random-Effects model. Null-hypothesis, in this case, states that the variance is equal to zero across all entities over time and the rejection of null-hypothesis says, that individual (random) differences have variance (Hun Myoung Park, 2011).

And lastly, Hausman test is to be evaluated, where the final decision is to be taken, which model needs to be applied for the research. H0 in the Hausman test stands for consistency of the Random-Effects model, and the alternative hypothesis holds in favour of the Fixed-Effects model. This test is based on the difference or distance between the random and fixed effects estimates, where H0 says that unique errors are correlated with the regressors, and the alternative stands that they are not correlated. If the measurement of Hausman „H" is high, then the fixed-effects model should be used, as the random effects estimator is not consistent (Adkins, 2014).

When the type of model is finalized, econometric considerations are applied to the panel data set, to see and evaluate if it is applicable for the model. Hence, three additional tests are conducted in order to see if there are any autocorrelation, heteroscedasticity and multicollinearity issues.

One of the econometric considerations for the data is autocorrelation. The test aims to check if observations of the error term are correlated or not between each other, if yes, then autocorrelation is noticed in the panel data set. In order to test if there is any autocorrelation, as well known as serial correlation, in between the variables, Wooldridge test was applied. H0 in Wooldridge test stands that there is no first-order autocorrelation in panel data, whereas the alternative hypothesis says that it exists in the data set (Brooks, 2008).

What is more, it is necessary to test if there is any heteroscedasticity in the panel data set. Heteroscedasticity exists when the error term does not have a constant variance. The Wald test was applied to see if the panel data set used in this research is homoscedastic. The null hypothesis stands that the units have a common error variance, and alternative hypothesis goes against it (Studenmund, 2014).

Finally, the multicollinearity was tested by VIF (variance inflation factor) test. The VIF test is looking, if there is an exact linear relationship between the independent variables,

meaning that in such case multicollinearity would exist. If VIF value exceeds 5, according to the common rule of thumb, the multicollinearity in such case is severe (Studenmund, 2014).

To test the hypothesis H0C and H1C, raised to the third research question "*Does ESG disclosure has an effect for companies financial performance?"*, the following model was established, between the financial performance of the firm, ESG, disclosure scores and a set of control variables:

$$ROE = \alpha + \beta_1 ESGit + \beta_2 FLit + \beta_3 ATit + \beta_4 CAPEXit + \beta_5 TSit + \varepsilon$$

And to able to answer the last question of the research "*Does ESG disclosure has effect for companies operational performance",* the below regression model was constructed:

$$ROE = \alpha + \beta_1 Eit + \beta_2 Sit + \beta_3 G + \beta_4 FLit + \beta_5 ATit + \beta_6 CAPEXit + \beta_7 TSit + \varepsilon,$$

where

- **ROE** = return on equity
- **ESG** = total ESG disclosure score
- **E** = environmental disclosure score
- **S** = social disclosure score
- **G** = governance disclosure score
- **FL** = financial leverage, measured as *Average total assets / Average total common equity*
- **AT** = asset turnover
- **CAPEX** = capital expenditure
- **TS** = total sales
- α = constant
- ε = error term

3.2.3. Data collection and validation

As the ESG data is an essential part of this part of the research, firstly researcher made an analysis and checked if all 60 companies defined for this research has a total ESG, E, S and G disclosure scores available on Bloomberg. The results revealed that 6 out of 60 companies

did not have one of the ratings available in the system, meaning that they were excluded from the further research, and the final number of the companies to be analysed is 54. Along with ESG, E, S and G disclosure scores, taken as independent variables, the dependent and control variables were identified and collected. All the variables used to conduct the second part of this research are discussed in more details going further. The yearly data for each company and its variables is collected for ten years, from 2009 to 2018, as that is the most recent data available. The panel data is identified as unbalanced, as a few values are missing for control variables, so the time series minimum length is eight and the maximum is ten.

Firstly, total ESG Disclosure score, as an independent variable, was taken from Bloomberg terminal. Correspondingly, individual E, S and G disclosure scores were downloaded for the companies (Buallay, 2018; Li et al., 2017; Grewal et al., 2020; Tamini, Sebastianelli, 2017). For ESG, E, S and G disclosure scoring, Bloomberg is collecting data from such sources as Corporate Social Responsibility (CSR) reports, annual company reports, company websites or CDP data, together with running quality controls, to ensure that only comparable data is included in the scoring and it is at the highest standard (Bloomberg). The score span is from 0,1 (as the lowest score) to 100, and each company is evaluated according to its industry and sector, depending on how important it is to the specific company and its activity. Bloomberg, in total, provides ESG metrics for more than 9,000 companies in 70 different countries around the globe.

In several kinds of research return on equity and return on assets are taken as a dependent variable to analyse the financial and operational performance of the corporates respectively (Li et al., 2018; Eccles et al., 2014). Return on equity (ROE) variable showing the profitability performance of the company, which measures how much of the profit firm generates with the money invested by the shareholders. ROE ratio is measured of net income available for common shareholders divided by the total common equity (Buallay, 2018).

Meanwhile, Return on assets (ROA) is a variable showing the operational performance and how efficiently assets are used to generate earnings. It is a measure of net income divided by average total assets of the company (Buallay, 2018). As the purpose of this research is to analyse the impact of ESG, E, S and G disclosure score on the financial performance of the company and to see if it creates the added value, ROE is taken a dependent variable in the model.

That being said, financial leverage (FL), is taken as one of the control variables from Bloomberg which shows the average assets to the average equity and is calculated as *FL = Average total assets / Average total common equity*. Such a control variable is taken referring to the research done by Eccles et al., 2014; Buallay, 2018 and Taliento et al., 2019, when analysing ESG information disclosure on companies performance. In addition to that, asset turnover (AT) as a control variable is included, which shows the amount of revenue or sales, which were generated per dollar of assets. Whereas, it is an indicator of how efficiently the company is deploying its assets.

Capital expenditure (CAPEX), which shows the amount company spends to purchase the tangible assets, is taken as a control variable in the equation. The control variable is brought in line with the research done by Li et al., (2018), analysing the ESG disclosure impact on the firm value, as it is reported to have an effect on the firm valuation and performance. Along with CAPEX, total sales (TS), as a control variable was included in the equation as well, which is equal to the number of sales generated by a company after the deduction of sales returns, allowances, discounts a sales-based taxes. For banks and financials, it is equal to the sum of total interest and investment income, trading profits or loss and commissions and fees earned.

Furthermore, total assets (TA), as a control variable is included in several kinds of research as by Eccles et al., (2014) when analysing the impact of sustainability on corporate behaviour and performance. As well as by Sciarelli and Landi (2019), when analysing the

effects of ESG rating on organisational financial performance. However, it was decided not to include this proxy in the equation, as the average total assets are included in the control variable „FL“. The same is with total debt (TD), which is usually included in the models as a control variable. However, the researcher decided that FL should be enough, and TA and TD were not included in the regression due to possible collinearity issue as well.

To make sure that the data is organized correctly and in a suitable panel-data structure, so that it could be tested statistically, it was manually organized in excel file, before importing to test the defined models (Wooldridge, 2012).

4. Empirical Research Results

In this chapter, empirical research results are outlined. Each part of the chapter starts with raised research questions and stated hypotheses with the statistical analysis results, whenever the hypothesis was rejected or failed to reject. It is followed by an overview of the main results from the models and partial conclusion. Firstly, portfolios performance results are provided, which are followed by the companies disclosure on ESG and sustainable issues and their impact on the financial performance of the company.

4.1. Empirical Results of portfolios performance based on ESG score

On the first part of the research, the portfolios, which were created based on their ESG and material factors ratings, returns for the period of 2009.08-2019.03 were analysed. Two research questions were raised to test the performance of six created portfolios. Firstly, A) *do investors sacrifice their returns by investing in sustainable Nordic companies?,* and secondly *B) do investors sacrifice their returns by considering material ESG factors when investing?*. Hypotheses were raised to answer each of the research questions, respectively, as shown in Table 6, together with the final results.

The received results are outlined and discussed in more details in further paragraphs. Firstly, the main results for portfolios based on total ESG score of the company are presented. Then the results for portfolios based on material factors scores are introduced, and finally, the comparison of all six portfolios is examined.

Table 6.

Portfolio performance evaluation hypotheses testing results for RQA and RQB

Hypothesis	*Result*
H0A: *Portfolios consisting of Nordic companies with higher ESG score does not provide higher return;*	Reject
H1A: *Portfolios consisting of Nordic companies with higher ESG score provides higher return;*	Accept
H0B: *Constructing portfolios according to their material ESG score factor does not provide extra return;*	Reject

H1B: *Constructing portfolios according to their material ESG score factor provides an excess return.*	Accept

Note: The author of this study compiled the table.

4.1.1. Performance analysis

Firstly, the average excess returns and Sharpe-ratios were analysed. As it is illustrated in Table 7, out of three portfolios constructed on total ESG score, the highest average excess return was noticed for the top portfolio. Meaning that the portfolio created of companies having the highest overall ESG rating provided the highest profits on average, for the period of 2009.08-2019.03. When looking into the Sharpe-ratio values, top and bottom portfolio performed the same, showing that both of them provided the same risk-adjusted returns for the tested period.

Secondly, three portfolios constructed on material E, S and G factors were analysed. As it is shown in Table 7, the top portfolio provided the highest average excess return. Meaning that the highest risk premium was provided by portfolio, constructed out of the companies with the highest material factor rating proving that considering the individual material factors for each company does provide the additional excess return and does not lead to sacrificing the returns. What is more, Sharpe-ratio value is highest again for the portfolio constructed out of the top material score companies, while the lowest ratio is for the portfolio created out of the companies with the lowest material score. Showing that the companies with the lowest ratings on their main material factors provide the least risk-adjusted returns together with the lowest risk premiums.

Lastly, the comparison was made for all six portfolios, to see the differences in between the performance of portfolios constructed on total ESG score and the material E, S and G factors. As assumed, the highest average excess return out of all six portfolios is for portfolio constructed of most top material factors score companies, while the lowest average excess

return was for bottom material factor portfolio. Meaning that considering the material factors might lead to the highest risk premium. What is more, Sharpe-ratio is highest as well for the top material portfolio, meaning that it provides the highest risk-adjusted return as expected.

Table 7.

Portfolios performance results: Average excess returns and Sharpe ratio

	ESG score			***Material score***		
	Top portfolio	Average portfolio	Bottom portfolio	Top portfolio	Average portfolio	Bottom portfolio
Average excess returns	1,42	1,04	1,10	1,43	1,23	0,98
Sharpe-ratio	0,29	0,23	0,29	0,31	0,27	0,25

Note: The author of this study compiled the table.

4.1.2. Capital Asset Pricing Model

Furthermore, single factor Capital Asset Pricing Model known as CAPM, was used to calculate and evaluate alpha for each of the portfolios. By using a market premium factor as an independent variable, which is explained in chapter 2, the intercept (alpha) was calculated to evaluate the performance of portfolios. The CAPM results are provided in Table 8 with values of alphas and betas of market premium for each portfolio.

Firstly, all portfolios constructed from companies based on their total ESG score, have statistically significant positive alpha values, meaning that all of them outperform the market. Furthermore, the portfolio constructed out of companies with the highest total ESG score, has the highest alpha value out of three portfolios, showing that it provides the highest return comparing to the market performance. What is more, beta values are statistically significant as well, with the value less than 1. Which shows that all portfolios are less volatile than the market, with the bottom portfolio being least volatile out of the three portfolios based on total ESG score, and top portfolio having the highest beta value.

In addition to that, based on material factors constructed portfolios, as well has statistically significant positive alpha values, meaning that they outperform the market. Hence, the highest alpha value is noticed for a portfolio constructed of companies with the highest material factor score, while the lowest alpha value is for a bottom portfolio with the least scores of material factors. Besides that, beta values are statistically significant, being less than 1, showing that all three portfolios are less volatile and not that risky as the market.

Conclusively, comparing all six portfolios, a portfolio constructed of highest material factor score exhibits the highest alpha value, meaning that it outperforms the market the best when comparing to the rest of portfolios. It suggests that considering the material factors of the company might lead to additional returns. However, bottom portfolios exhibit the lowest beta values, in both cases, indicating that they are less volatile than the other portfolios and having a lower risk than the rest of the market. In addition to that, R-squared value is highest for bottom portfolios as well, indicating, that it tracks the market at a higher level than the rest of the portfolios in the research, with the top portfolios having the lowest R-squared values.

Table 8.

CAPM regression results for ESG score and material score portfolios

	ESG score			*Material score*		
Dependent variable	Top portfolio	Average portfolio	Bottom portfolio	Top portfolio	Average portfolio	Bottom portfolio
Alpha	1,12 ***	0,74 ***	0,83 ***	1,14 ***	0,93 ***	0,71 ***
Beta Market	0,87***	0,85 ***	0,75 ***	0,84 ***	0,85 ***	0,76 ***
Adjusted R^2	*0,47*	*0,53*	*0,57*	*0,46*	*0,51*	*0,61*

Note: *** denotes statistical significant at level of p<0,01; ** at level of p<0,05; * at level of p<0,1 level. The author of this study compiled the table.

4.1.3. Fama-French 3 Factors

The table 9, represents the results received from the multifactor model with added two more Fama-French factors to the previously ran single factor CAPM: small minus big (SMB),

high minus low (HML) and market factor, which are discussed in more detail in chapter 2. The results in the table reveal the portfolios returns exposure to the size and value stocks.

Firstly, alpha values are reduced when comparing to the results of CAPM in Table 8. However, all of them stays positive and statistically significant, meaning that portfolios outperform the market. What is more, beta values remain statistically significant and lower than 1, but a bit higher than in the CAPM. Despite that, it reveals that all six portfolios are less risky and not that volatile than the market portfolio.

Looking into the values of added two risk factors, SMB does not have any statistically significant values. At the same time, HML exhibits significant negative values for the average portfolio in the case of ESG total score and for bottom portfolio in the case of material factors score. Negative HML value indicates that these portfolios have greater exposure and imply a tendency to investing in growing or growth-oriented companies.

Table 9.

Fama-French 3 factors multifactor model results

	ESG score			*Material score*		
Dependent variable	Top portfolio	Average portfolio	Bottom portfolio	Top portfolio	Average portfolio	Bottom portfolio
Alpha	1,04 ***	0,66 **	0,79 ***	1,08 ***	0,87 ***	0,65 ***
Beta market	0,95 ***	0,95 ***	0,79 ***	0,91 ***	0,91 ***	0,85 ***
SMB	0,13	−0,15	−0,01	−0,07	0,06	0,01
HML	−0,43	−0,58 **	−0,26	−0,42	−0,35	−0,34 *
Adjusted R^2	*0,47*	*0,54*	*0,57*	*0,46*	*0,51*	*0,61*

Note: *** denotes statistical significant at level of p<0,01; ** at level of p<0,05; * at level of p<0,1 level. The author of this study compiled the table.

4.1.4. Carhart four-factors model

In the final part of portfolios analysis, last additional factors were added to the previously tested SMB, HML and market factor. Carhart model was tested with the inclusion of the momentum factor, which is known as winners minus losers (WML), discussed in more

detail in chapter 2. The results of the Carhart model are presented in table 10, with six portfolios returns regressed against all risk factors, and the sensitivity is provided, respectively.

In the first place, alpha values are analysed and compared to the previous models. All of them stays statistically significant, however lower than in the earlier models, but it still exhibits that portfolios outperform the market. Correspondingly, beta values stay statistically significant, however getting closer to 1, then comparing to the CAPM and Fama-French multifactor model with SMB, HML and market factors presented in Tables 8 and 9 respectively. Indicating, that portfolios, especially top and average constructed on ESG total score, are almost as risky and volatile as the market is.

Furthermore, looking into the additional factors added, the WML does not show any statistical significance in the model. Hence, R-squared value does not increase very significantly when comparing to the previous to models as well, indicating that added factors are not very relevant to be included in the model. In fact, only HML negative factors are significant for bottom portfolio constructed out of the companies with the lowest material factors score, showing that there is a tendency to investing in growing firms.

Table 10.

Carhart 4-factors multifactor model results

	ESG score			*Material score*		
Dependent variable	Top portfolio	Average portfolio	Bottom portfolio	Top portfolio	Average portfolio	Bottom portfolio
Alpha	0,95 ***	0,53 *	0,85 ***	1,01 ***	0,76 **	0,67 ***
Beta Market	0,96 ***	0,96 ***	0,78 ***	0,92 ***	0,93 ***	0,85 ***
SMB	0,15	−0,12	−0,02	−0,06	0,07	0,01
HML	−0,32	−0,42	−0,33	−0,33	−0,22	−0,38 *
WML	0,19	0,29	−0,13	0,17	0,24	−0,08
Adjusted R^2	*0,47*	*0,55*	*0,56*	*0,46*	*0,51*	*0,61*

Note: *** denotes statistical significant at level of p<0,01; ** at level of p<0,05;* at level of p<0,1 level. The author of this study compiled the table.

4.1.5. Partial conclusion

The received results demonstrate that ESG portfolios outperform the market and in addition to that, portfolios constructed on ESG material factors, provide higher returns than the ESG portfolios. This lets the author reject H0A and H0B, as portfolios consisting of Nordic companies with higher ESG score provides a higher return, hence constructing portfolios according to their material ESG score factor provides an excess return respectively.

The received results for portfolio performance analysis goes in line with Friede, Busch and Bassen (2015), who says that responsible investing and ESG factors integration is something, every investor should consider, especially thinking about the long-term performance. However, it requires to have the understanding to receive the full possible return and value of ESG factors.

Research results challenge the study of Hamilton et al., 1993, who said that no financial effect should be expected from responsible investments. As well the Brammer et al., 2006, who concluded its study that companies which are having a lower ESG and corporate social rating, tend to outperform the market. As this research demonstrates that bottom portfolios (both total ESG score and material scores) do not exceed the top portfolios (companies with highest ESG scores), resulting in lower returns. Furthermore, results show that sustainable investments are exposed to the growth and growth-oriented stocks, in line with Cortez et al., 2009, who demonstrated, that SR funds are significantly exposed to growth stocks.

Considering all the points, the author could conclude that ESG score and its individual factors could provide higher returns, and it does not make the investors sacrifice their financial returns. Moreover, the results of this part of the research suggest that consideration of material ESG factors for investors might lead to even higher returns than the total ESG rating of the company. However, it is necessary to pay attention and be aware of what is financially material for each sector and companies functioning there. Besides, keeping in mind that “materiality is

not a state of being, but the processes of becoming", as it is outlined by Serafeim and Rogers (2019), meaning that they are constantly changing and should be tracked.

4.2. Empirical Results of ESG disclosure impact on company financial performance

The second part or research aims to analyse if there is a significant positive relationship between Return on Equity and ESG disclosure. Two research questions were raised to test that. Firstly, C) *Does ESG disclosure has a positive effect on companies financial performance?,* and secondly *D) Does E, S, G disclosure has a positive effect on companies financial performance?.*

The period between 2009-2018 for 54 companies is employed for the regression models. The below Table 11 provides an overview of hypotheses raised for the research questions and the results received by testing them statistically. A detailed summary of the output is outlined in the following paragraphs.

Table 11.

ESG disclosure impact on ROE hypotheses testing results for RQC and RQD

Hypotheses	*Result*
H0C: *There is no positive relationship between the financial performance of the company (ROE) and ESG disclosure;*	Fail to reject
H1C: *There is a positive relationship between the financial performance of the company (ROE) and ESG disclosure*	-
H0D: *There is no positive relationship between the financial performance of the company (ROE) and E, S, G disclosure;*	Fail to reject
H1D: *There is a positive relationship between the financial performance of the company (ROE) and E, S, G disclosure*	-

Note: The author of this study compiled the table.

4.2.1. Models and data validation

To evaluate which panel data model must be employed for analysis, three tests were applied, which are outlined in more detail in chapter 3. Table 12 shows the results for each of

the conducted tests for both models. The left side of the table indicates the values received for complete ESG rating model analysis, while the right side shows the results for individual E, S and G disclosure scores.

F-test showed that Fixed-Effects model must be used for both models when the Breausch Pagan test resulted in the Random-Effects model. Finally, the Hausman test was applied, which showed that the Random-Effects model must be employed for both models.

Table 12.

F-test, Breusch- Pagan and Hausman test results, to choose for the OLS model for equation

ESG disclosure score					E, S, G disclosure score				
Test	H0	H1	P-value	Final model	Test	H0	H1	P-value	Final model
F-test	Pooled OLS model	FE model	0,00 Reject H0		*F-test*	Pooled OLS model	FE model	0,00 Reject H0	
Breusch-Pagan test	Pooled OLS model	RE model	0,00 Reject H0	**RE model**	Breusch-Pagan test	Pooled OLS model	RE model	0,00 Reject H0	**RE model**
Hausman test	RE model	FE model	0,838592 Fail to reject H0		*Hausman test*	RE model	FE model	0,914196 Fail to reject H0	

Note: *** denotes statistical significant at level of p<0,01; ** at level of p<0,05;* at level of p<0,1 level. The author of this study compiled the table.

Moreover, econometric considerations were applied to the panel data set, which are outlined in the third chapter. Firstly, the variance inflation factor (VIF) tests were used to see if there is any collinearity problem.

Table 13.

Variance inflation factor (VIF) test results for the model with ESG disclosure score

VIF total ESG disclosure score	
ESG disclosure	1,04
Financial leverage	1,67
Total sales	2,17
Capital Expenditure	2,18
Asset turnover	1,60

Note: The author of this study compiled the table.

As mentioned in section 3, if VIF value exceeds 5, there is severe multicollinearity in the model. However, as per the results outlined in Tables 11 and 12, no such values are found, which means that there is no multicollinearity problem in the data used for regressions.

Table 14.

Variance inflation factor (VIF) test results for the model with E, S, G disclosure scores

	VIF E, S, G disclosure score
E disclosure	1,93
S disclosure	1,92
G disclosure	1,58
Financial leverage	1,73
Total sales	2,17
Capital Expenditure	2,23
Asset turnover	1,64

Note: The author of this study compiled the table.

What is more, Wooldridge test was applied to the panel data sets to see if there is any first-order autocorrelation. Appendix C shows in the model where the total ESG disclosure rating is an independent variable, there is no first-order autocorrelation. However, the appendix D, shows that the author rejected H0, meaning that first-order autocorrelation exists in the panel data set with E, S and G disclosure scores. Hence, Random-Effect model assumes that the variance is constant and random, as well as is independent of the explanatory variables in the model. It means that the autocorrelation issue is overcome (Brooks, 2008).

Finally, the Wald test was employed to test for heteroscedasticity. The appendices E and F show that the H0, which is saying that the units have a common error variance, is to be rejected, meaning that the models are heteroscedastic. However, one of the ways to overcome the issue is to include robust standard errors in the models (Brooks, 2008).

As the data collection and model building and examination steps were explained and identified, in the upcoming paragraph, final results of both models are outlined and discussed.

4.2.2. ESG disclosure and company financial performance results

Table 15, represent output received by regression analysing the relationship between the dependant variable Return on Equity and explanatory variable total ESG disclosure score. Control variables in the equation are financial leverage (FL), total sales (TS), capital expenditure (CE) and asset turnover (AT). As per Table 15, there is no significant positive relationship between the ROE and total ESG disclosure, hence author fails to reject the H0C, which says that there is no positive relationship between the financial performance of the company (ROE) and ESG disclosure score. The only significant variable in the model is constant.

ESG disclosure score shows a negative relationship with ROE, meaning that if ESG disclosure increased by one unit, ROE would decrease by 0,1%; however, this relationship is not statistically significant. It shows that disclosure of sustainability issues could harm the financial performance of the company. However, this relationship is not significant.

Table 15.

Robust Random Effects regression model: ROE and ESG disclosure score

GLS	Coefficient	Standard Errors	Z
ESG disclosure	−0,001	0,0007	−1,53
Constant	0,18 **	0,08	2,21
Financial leverage	−0,001	0,002	−0,49
Total sales	0,00	0,00	−0,64
Capital Expenditure	0,00	0,00	−0,74
Asset turnover	0,06	0,05	1,21
Akaike criterion	-223,98		
Mean theta	0,56		
Between variance	0,01		
Within variance	0,02		
# Observations	535		

Note: *** denotes statistical significant at level of p<0,01; ** at level of p<0,05;* at level of p<0,1 level. The author of this study compiled the table.

Moreover, the E, S and G disclosure ratings were included in the regression together with the same explanatory variables as in the first regression. The aim was to examine if there is a significant positive relationship between dependant variable Return on Equity and individual E, S and G disclosure scores, and if these results differ from the first equation. Table 16 outlines the final results of the second equation.

When analysing the regression model with E, S and G disclosure scores the only significant factor is the social disclosure score. However, it shows a significant negative relationship, meaning that the author fails to reject H0 in this case as well. Negative social disclosure factors indicate that it has a negative effect on the Return on Equity, which means that if the social disclosure score increased by one unit, ROE value would decrease by 0,2%. E disclosure score shows a negative relationship as well; however, it is not significant. Finally, G disclosure score demonstrates a positive relationship; nevertheless, the link is not significant as well.

Table 16.

Robust Random Effects regression model: ROE and E, S, G disclosure scores

GLS	Coefficient	Standard Errors	Z
E disclosure	−0,0004	0,001	-0,72
S disclosure	−0,002 **	0,001	-2,21
G disclosure	0,002	0,001	1,58
Constant	0,13 *	0,07	1,77
Financial leverage	−0,001	0,003	-0,61
Total sales	0,00	0,00	-0,54
Capital Expenditure	0,00	0,00	-0,76
Asset turnover	0,06	0,05	1,18
Akaike criterion	-216,58		
Mean theta	0,56		
Between variance	0,01		
Within variance	0,03		
# Observations	530		

Note: *** denotes statistical significant at level of p<0,01; ** at level of p<0,05;* at level of p<0,1 level. The author of this study compiled the table.

When comparing the results from both regressions, we see that both H0 were failed to be rejected. Neither ESG disclosure rating nor E, S and G disclosures scores show a significant positive relationship with dependant variable Return on Equity. What is more, the Akaike criterion, which shows the fit of regression, is lower for ESG disclosure score regression. The lower the Akaire criterion is, it shows that the better specification of the equation is (Studenmund, 2014). Meaning that the better fit of regression is for the one with independent variable total ESG disclosure score.

Furthermore, between variance values are the same in both regressions, while the within variance is lower for regression with independent variable ESG disclosure. The between variance shows how much of equation is explained by the independent variables; within variance respectively demonstrates how much of regression is still left unexplained. As it is displayed on Tables 15 and 16, within variance is a bit higher for E, S and G disclosure independent variables regressions, showing that more equation is left unexplained than for the first one.

4.2.3. Partial conclusion

Regression results showed that ESG total disclosure score and E, S and G specific disclosure ratings do not have a significant positive relationship with financial performance (return on equity) of Nordic companies. Hence, the author failed to reject both H0C and H0D. The below-outlined results are provided with a connection to the studies analysed in the literature overview and research methodology chapters.

The regressions result in the second part of this research does not go in line with Velte (2017) who found a positive relationship between the sustainability disclosure and financial performance of the company, with the governance factor having the most substantial effect.

Furthermore, with Li et al., (2017) who found a significant positive relationship between ESG disclosure and the firm's value.

What is more, research results challenge the reviewed academic analysis by Buallay, (2018), who found a significant positive relationship between total ESG disclosure and financial performance of banks. Hence, the only same results in both studies are the negative impact of financial leverage on the return on equity. As the Buallay found a positive effect of environmental and social disclosure positive relationship, while in this research, it has a negative impact. Furthermore, while the author found a negative effect of governance disclosure, that is the only positive relationship in this research, even though it is not significant.

Moreover, the negative impact of environmental disclosure to ROE goes in line with Han et al., (2016), who tested the relationship between individual sustainability disclosure scores and financial performance of companies. Same as in this research, Han et a., (2016), found diversified results for each sustainability disclosure score. Even though the authors did not find social disclosure score to be significant, however, the effect was negative, which goes in line with this research. Furthermore, governance disclosure score appeared to be positive in both analyses; however, in this thesis relationship is not significant.

Lastly, the results of this part of the research, exhibits, that disclosure on sustainability issues do not have a significant positive relationship with return on equity of the company. What is more, social disclosure might even have a negative impact, which could signal for the companies, which are having low social performance, even not to disclose more information on this variable, as it might harm the return on equity. In addition to that, it could be related to the information companies are disclosing on sustainability issues. One of the essential issues in sustainability disclosing fields remains that companies are reporting mostly on the information which is not material or relevant to its industry.

5. Conclusion

This study examined the performance of portfolios constructed on ESG and individual E, S and G factors to test the possible materiality. In addition to that, the author tested if there is a positive relationship between the disclosure on ESG factors and financial performance of companies. The research results are based on 60 companies from four Scandinavian market countries (Denmark, Sweden, Norway and Finland).

Based on the growing number of initiatives by regulators (Davos Manifesto 2020; UN PRI; UNGC and others) and an increasing number of studies on ESG factors and sustainable investments which starts from 1993 (Buallay, 2018; Hamilton et al., 1993; Velte 2017 and others), has led and directed the author aim to analyse the same list of companies from two different perspectives: investors and firms. The goal was to see if sustainable investing and ESG factors consideration and disclosure has a positive effect on financial performance. Four research questions were raised with two hypotheses for each item.

First two questions regarding the performance of portfolios and the materiality of E, S and G factors showed, that sustainable investing does not lead to sacrificing the returns. In addition to that, portfolios based on material factors outperformed the ones constructed on ESG score only. Meaning, that considering the material factors of each company, investors could get an excess return and outperform the market as well. So both hypotheses stating that „portfolios consisting of Nordic companies with higher ESG score does not provide higher return" and "constructing portfolios according to their material ESG score factor does not provide extra return" were rejected after the statistical tests.

What is more, two more questions of the study aimed to see if ESG disclosure has an effect on the financial performance of the company, by analysing the return on equity as a measurement. However, the author failed to reject the hypothesis stating that „there is no positive relationship between the financial performance of the company (ROE) and ESG

disclosure" and "there is no positive relationship between the financial performance of the company (ROE) and E, S, G disclosure", as the significant positive relationship was not found after applying the random effect models for each regression. What is more, the only significant factor was social disclosure; however, it shows a negative impact on financial performance. Meaning that if the disclosure on social factors would increase, the return on equity might decrease, according to the model results.

That reveals, that even if disclosure on sustainable issues does not show the significant positive effect to the return on equity for companies consideration of ESG factors would still be applied. Investors could practise and address it into investments process, as ESG and material factors could provide excess return and would not lead to sacrificing the financial returns of investments over the moral values. So for investors, it exhibits that for such investments, they would receive the highest excess-return comparing to its risk. For companies, it could signal, that even though disclosure on sustainability issues does not have a positive impact on the financial performance, investors might consider the score of ESG, and material E, S or G factors ratings. That would aim to see how the company is succeeding in the sustainability field, especially in the areas the most sensitive and risky for each company.

However, one of the possible developments for future research would be, by using the same list of companies, construct portfolios based on other ESG rating data provider company. As one of the main challenges nowadays with ESG data and its scores is different methodologies and approaches used by independent research companies. That means that depending on the data provider, the ESG rating might differ significantly for each company. What could lead to different construction of portfolios and different portfolios performances as well. In addition to that, another way of portfolio construction could be implemented too, to see if results would differ significantly and what impact the portfolio construction method has on the performance.

What is more, one of the suggestions for future research on disclosure on ESG factors and sustainability would be to change the measurement of company performance, when analysing the ESG disclosure impact. It could be examined what is the relationship with the operational or market performance of the company, to see if the results would be different and if it has an impact for the companies from a performance perspective.

Furthermore, the essential factor might be the time period. It could be beneficial to analyse the time period before, during and after the financial crisis. However, due to data limitations, it was not possible to conduct in this research. Hence, the period of COVID-19 could be tested and analysed, to see and compare how companies with different total ESG and individual E, S and G ratings performed. The aim of such research might be to see if low-risk ESG companies have outperformed the high-risk companies. An extra point to consider, together with ESG score, the most affected sectors and its return changes. As it might show how high and low ESG companies are performing during the volatile and uncertain times.

The overall results of this research exhibit that both investors and companies should consider sustainable investing and ESG factors into their decisions and processes. Even though disclosure on sustainability issues does not have a significant positive relationship with return on equity of the company, however, ESG and material sustainability information and ratings must be essential for investors. Firstly, due to possible excess returns, secondly, lower risk. Furthermore, that is not only due to possible financial profits, but as well to foster sustainable development and tackle the global risks, which sooner or later makes an impact for both investors and companies from both: financial and societal side.

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Appendices

Appendix A.

List of 60 Nordic companies used in the first part of research to create portfolios

Company Name	ISIN
Novo Nordisk A/S	DK0060534915
Atlas Copco AB	SE0011166610
Investor AB	SE0000107419
Volvo	SE0000115446
Ericsson	SE0000108656
Telenor asa	NO0010063308
Kone Oyj	FI0009013403
DNB ASA	NO0010031479
Hennes & Mauritz AB	SE0000106270
Nordea	FI4000297767
Nokia Oyj	FI0009000681
Sampo Oyj	FI0009003305
Neste Oyj	FI0009013296
Assa Abloy AB	SE0007100581
A.P. Moller - Maersk A/S	DK0010244508
Coloplast A/S	DK0060448595
Sandvik AB	SE0000667891
SEB SA	SE0000148884
Carlsberg A/S	DK0010181759
Fortum Oyj	FI0009007132
Svenska Handelsbanken AB	SE0007100599
Telia Company AB	SE0000667925
DSV A/S	DK0060079531
Vestas Wind Systems A/S	DK0010268606
Swedbank AB	SE0000242455
UPM-Kymmene Oyj	FI0009005987
Danske Bank A/S	DK0010274414
Yara International ASA	NO0010208051
Mowi ASA	NO0003054108
Lundin Petroleum AB	SE0000825820
Tele2 AB	SE0005190238
Stora Enso Oyj	FI0009005961
TRYG A/S	DK0060636678
Alfa Laval AB	SE0000695876
ORKLA ASA	NO0003733800
Wärtsilä Oyj Abp	FI0009003727
SKF AB	SE0000108227
Elisa Oyj	FI0009007884
Electrolux AB	SE0000103814
William Demant Holding A/S	DK0060738599

Skanska AB	SE0000113250
Norsk Hydro ASA	NO0005052605
Swedish match AB	SE0000310336
Boliden AB	SE0012455673
Securitas AB	SE0000163594
Svenska Cellulosa Aktiebolaget SCA (publ)	SE0000112724
Metso Corporation	FI0009007835
Kesko Oyj	FI0009000202
Husqvarna AB	SE0001662230
Topdanmark A/S	DK0060477503
Nokian Tyres Oyj	FI0009005318
GETINGE AB	SE0000202624
Holmen	SE0011090018
YIT OYJ	FI0009800643
Jyske Bank	DK0010307958
Modern Times Group MTG AB B (SEK)	SE0000412371
Sparebank (NOK)	NO0010631567
SSAB AB (SEK)	SE0000171100
Sydbank (DKK)	DK0010311471
Storebrand	NO0003053605

Appendix B.

List of 54 Nordic companies used in the second part of research to analyse the ESG dislocusre score impact to the ROE

Company Name	ISIN
Novo Nordisk A/S	DK0060534915
Atlas Copco AB	SE0011166610
Volvo	SE0000115446
Ericsson	SE0000108656
Telenor asa	NO0010063308
Kone Oyj	FI0009013403
DNB ASA	NO0010031479
Hennes & Mauritz AB	SE0000106270
Nordea	FI4000297767
Nokia Oyj	FI0009000681
Sampo Oyj	FI0009003305
Neste Oyj	FI0009013296
Assa Abloy AB	SE0007100581
A.P. Moller - Maersk A/S	DK0010244508
Coloplast A/S	DK0060448595
Sandvik AB	SE0000667891
SEB SA	SE0000148884
Carlsberg A/S	DK0010181759
Fortum Oyj	FI0009007132
Svenska Handelsbanken AB	SE0007100599
Telia Company AB	SE0000667925
DSV A/S	DK0060079531
Vestas Wind Systems A/S	DK0010268606
Swedbank AB	SE0000242455
UPM-Kymmene Oyj	FI0009005987
Danske Bank A/S	DK0010274414
Yara International ASA	NO0010208051
Mowi ASA	NO0003054108
Lundin Petroleum AB	SE0000825820
Tele2 AB	SE0005190238
Stora Enso Oyj	FI0009005961
TRYG A/S	DK0060636678
Alfa Laval AB	SE0000695876
ORKLA ASA	NO0003733800
Wärtsilä Oyj Abp	FI0009003727
SKF AB	SE0000108227
Elisa Oyj	FI0009007884
Electrolux AB	SE0000103814
William Demant Holding A/S	DK0060738599
Skanska AB	SE0000113250

Norsk Hydro ASA	NO0005052605
Swedish match AB	SE0000310336
Boliden AB	SE0012455673
Securitas AB	SE0000163594
Svenska Cellulosa Aktiebolaget SCA (publ)	SE0000112724
Metso Corporation	FI0009007835
Kesko Oyj	FI0009000202
Husqvarna AB	SE0001662230
Topdanmark A/S	DK0060477503
Nokian Tyres Oyj	FI0009005318
GETINGE AB	SE0000202624
Holmen	SE0011090018
YIT OYJ	FI0009800643
Modern Times Group MTG AB B (SEK)	SE0000412371
SSAB AB (SEK)	SE0000171100
Sydbank (DKK)	DK0010311471
StoreBrand	NO0003053605

Appendix C.

Wooldridge test for autocorrelation in panel data set for total ESG disclosure score

```
Wooldridge test for autocorrelation in panel data -
  Null hypothesis: No first-order autocorrelation (rho = 0)
  Test statistic: t(53) = 1,99629
  with p-value = P(|t| > 1,99629) = 0,051051
```

Appendix D.

Wooldridge test for autocorrelation in panel data set for E, S and G disclosure scores

```
Wooldridge test for autocorrelation in panel data -
  Null hypothesis: No first-order autocorrelation (rho = 0)
  Test statistic: t(53) = 2,03839
  with p-value = P(|t| > 2,03839) = 0,0465145
```

Appendix E.

Wald test for hederoskedasticity for panel data set with total ESG disclosure score

```
Distribution free Wald test for heteroskedasticity -
  Null hypothesis: the units have a common error variance
  Asymptotic test statistic: Chi-square(54) = 155473
  with p-value = 0
```

Appendix F.

Wald test for hederoskedasticity for panel data set with E, S and G disclosure scores

```
Distribution free Wald test for heteroskedasticity -
  Null hypothesis: the units have a common error variance
  Asymptotic test statistic: Chi-square(54) = 4,21411e+006
  with p-value = 0
```