



Vaasan yliopisto
UNIVERSITY OF VAASA

Mikael Karlsson

PERFORMANCE OF NORDIC STOCK ASSEMBLED ESG MOMENTUM

Comparison to benchmark of MSCI Nordics ESG Universal Index

School of Accounting and Finance
Master's Thesis in Finance
Master's Degree Programme in Finance

Vaasa 2023

UNIVERSITY OF VAASA**School of Accounting and Finance**

Author: Mikael Karlsson
Title of thesis: PERFORMANCE OF NORDIC STOCK ASSEMBLED ESG MOMENTUM :
Comparison to benchmark of MSCI Nordics ESG Universal Index
Degree: Master's Degree in Finance
Major: Finance
Thesis supervisor: Nebojsa Dimic
Year of graduation: 2023 **Pages:** 76

ABSTRACT :

The purpose of this study is to evaluate the performance of a Nordic stock assembled ESG momentum strategy that incorporates environmental, social, and governance (ESG) scores in portfolio creation. Three different ESG momentum portfolios are constructed in this study to examine the return characteristics of the portfolios. The returns are analyzed with three different multi-factor portfolio measures to find the best fitting model to explain the returns. The empirical part of this study also shows comparison of the returns against the chosen benchmark MSCI Nordics ESG Universal Index. Environmental and social awareness have increased considerably during the 21st century. This increased global awareness has significantly accelerated the global economies to respond accordingly. Relatively new concepts have been invented, corporate behavior has been changing, stakeholders of companies are requiring continuous sustainability actions from companies, and legislation is changing globally to adjust for modern, more sustainable world. The rapid growth around corporate social responsibility actions have consequently started to increase the amount of socially responsible investments. This study is focusing on one of the most recent socially responsible strategy, the ESG momentum strategy. ESG momentum strategy aims to provide excess returns by buying companies with positive ESG score trend and selling short companies with negative trend. The ESG momentum strategy is modified to ESG context from traditional momentum strategy. Nordic countries are considered to be sustainability leaders in the world, so it could be assumed that the relationship between good ESG performance and financial performance would be positive and vice versa especially in the Nordic markets. However, the results of this study do show slightly negative and statistically significant alpha and therefore this study cannot fully support the positive findings of previous studies. The results suggest that ESG ratings alone are not sufficient to predict a company's future financial performance, although the top 10 decile of companies with improved ESG ratings outperformed the benchmark index.

KEYWORDS: Environmental, Social, Governance (ESG), Corporate Social Responsibility (CSR), Socially Responsible Investing (SRI), Corporate Financial Performance (CFP), Corporate Social Performance (CSP), Stock Performance, Stock Returns, Nordic Countries, Momentum Strategy, Multi-Factor Portfolio Performance Measure

VAASAN YLIOPISTO**School of Accounting and Finance**

Tekijä:	Mikael Karlsson		
Otsikko:	PERFORMANCE OF NORDIC STOCK ASSEMBLED ESG MOMENTUM : Comparison to benchmark of MSCI Nordics ESG Universal Index		
Koulutusohjelma:	Master's Degree in Finance		
Maisteriohjelma:	Finance		
Ohjaaja:	Nebojsa Dimic		
Valmistumisvuosi:	2023	Sivumäärä:	76

TIIVISTELMÄ :

Tämän tutkimuksen tarkoituksena on arvioida pohjoismaisista osakkeista koostetun ESG-momentum strategian suorituskykyä, portfolion rakentamisessa otetaan huomioon ympäristö-, yhteiskunta- ja hyvä hallintotapa (ESG). Tässä tutkimuksessa rakennetaan kolme erilaista ESG-momentum portfoliota, joiden tuotto-ominaisuuksia tutkitaan. Tuottoja analysoidaan kolmella eri monifaktori mallilla, jotta löydettäisiin parhaiten tuottoja selittävä malli. Tutkimuksen empiirissä osassa vertaillaan tuottoja myös valittuun vertailuindeksiin MSCI Nordics ESG Universal Indexiin. Ympäristötietoisuus ja sosiaalinen tietoisuus ovat lisääntyneet huomattavasti 2000-luvulla. Tämä lisääntynyt maailmanlaajuinen tietoisuus on nopeuttanut merkittävästi maailmantalouden reagoitua. Uusia käsitteitä on keksitty, yritysten käyttäytyminen on muuttunut, yritysten sidosryhmät vaativat yrityksiltä jatkuvia kestävään kehitykseen liittyviä toimia ja lainsäädäntö muuttuu maailmanlaajuisesti mukautuakseen nykyaikaiseen, kestävämpään maailmaan. Yritysten sosiaalisen vastuun nopea kasvu on alkanut lisätä sosiaalisesti vastuullisten investointien määrää. Tässä tutkimuksessa keskitytään yhteen uusimmista sosiaalisesti vastuullisista strategioista, ESG momentum -strategiaan. ESG momentum -strategialla pyritään tuottamaan ylituottoa ostamalla yrityksiä, joiden ESG-pisteet kehittyvät positiivisesti, ja myymällä lyhyeksi yrityksiä, joiden ESG-pisteiden suuntaus on negatiivinen. ESG momentum -strategia on muunnettu ESG-kontekstiin perinteisestä momentum strategiasta. Pohjoismaiden katsotaan olevan maailman johtavia kestävään kehityksen maita, joten voidaan olettaa, että hyvän ESG-tuloksen ja taloudellisen tuloksen välinen suhde olisi positiivinen ja päinvastoin erityisesti pohjoismaisilla markkinoilla. Tämän tutkimuksen tulokset osoittavat kuitenkin hieman negatiivista ja tilastollisesti merkitsevää alfaa, joten tämä tutkimus ei voi täysin tukea aiempien tutkimusten myönteisiä tuloksia. Tulokset viittaavat siihen, että ESG-luokitukset eivät yksinään riitä ennustamaan yrityksen tulevaa taloudellista suorituskykyä, vaikka 10 parasta kymmenesosaa yrityksistä, joiden ESG-luokitukset olivat parantuneet, tuottivatkin paremmin kuin vertailuindeksi.

AVAINSANAT: Ympäristövastuu, Yhteiskuntavastuu, Hyvä hallintotapa (ESG), Yrityksen yhteiskuntavastuu (CSR), Vastuullinen sijoittaminen (SRI), Yrityksen taloudellinen suorituskyky (CFP), Yrityksen yhteiskuntavastuullinen suorituskyky (CSP), Osakkeen suorituskyky, Osakkeiden tuotto, Pohjoismaat, Momentum strategia, Monifaktori -malli

TABLE OF CONTENTS

1	INTRODUCTION	10
1.1	Purpose of the Study	12
1.2	Research Question and Hypothesis	12
1.3	Structure of the Study	14
2	CORPORATE SOCIAL RESPONSIBILITY	15
2.1	Introduction to Corporate Social Responsibility	15
2.2	Environmental, Social, Governance (ESG)	16
2.3	The Development of Socially Responsible Investing	20
2.4	SRI Strategies	22
2.4.1	Negative screening	23
2.4.2	Corporate engagement and shareholder action	24
2.4.3	ESG integration	25
2.4.4	Norms-based screening	25
2.4.5	Best-in-class screening	25
2.4.6	ESG Momentum	26
3	PREVIOUS STUDIES	28
3.1	Value of CSR	28
3.2	Momentum Strategy Studies	29
3.3	ESG Momentum Studies	31
4	THEORETICAL FRAMEWORK	33
4.1	Traditional Finance Theory and it's Relation with SRI	33
4.2	Return	33
4.3	Momentum	34
4.4	Single-Factor Portfolio Measures	35
4.4.1	Capital Asset Pricing Model	35
4.4.2	Sharpe Ratio	36
4.4.3	Treynor Ratio	36

4.4.4	Jensen's Measure	37
4.5	Multi-Factor Portfolio Measures	38
4.5.1	Arbitrage Pricing Theory	38
4.5.2	Fama-French 3-factor Model	39
4.5.3	Carhart 4-factor Model	40
4.5.4	Fama-French 5-factor Model	41
5	DATA AND METHODOLOGY	43
5.1	ESG Scores and stock price data	43
5.2	Methodology	47
5.2.1	Constructing ESG Momentum Portfolios	47
5.2.2	Portfolio performance	48
5.2.3	Empirical Methods	52
6	EMPIRICAL RESULTS	53
6.1	Fama-French 3-Factor Model	53
6.2	Carhart 4-Factor Model	56
6.3	Fama-French 5-Factor Model	57
7	DISCUSSION ON THE EMPIRICAL RESULTS	60
8	CONCLUSIONS	64
	REFERENCES	67

TABLES & FIGURES

Table 1 Refinitiv ASSET4 ESG Scores and Definitions (Refinitiv, 2022).	17
Table 2 ESG Data – Descriptive Statistics	45
Table 3 Stock market data - Nordic companies with ESG score 2008-2021	46
Table 4 Nordic Markets - ESG Momentum Portfolio Returns	49
Table 5 Nordic Markets – Top 10% Long Portfolio Returns	50
Table 6 Nordic Markets – Bottom 10% Short Portfolio Returns	51
Table 7 Portfolio Descriptive Statistics	51
Table 8 Fama-French 3-Factor Model Regression Results	55
Table 9 Carhart 4-Factor Model Regression Results	57
Table 10 Fama-French 5-Factor Model Regression Results	59
Figure 1 Sustainable investing in the US (US SIF, 2021a).	19
Figure 2 ESG Factors Incorporated by Money Managers in the US (US SIF, 2021a).	20
Figure 3 2020 SRI assets by used strategy (GSIA, 2020).	23
Figure 4 Forming a ESG score (Refinitiv, 2021).	44
Figure 5 Graphical Representation of Nordic ESG Momentum Performance	52

ABBREVIATIONS

ESG	Environmental, Social, Governance
CSR	Corporate Social Responsibility
SRI	Socially Responsible Investing
GSIA	Global Sustainable Investment Alliance
AUM	Assets Under Management
CSP	Corporate Social Performance
CFP	Corporate Financial Performance
WBCSD	World Business Council for Sustainable Development
EU	The European Union
MSCI	Morgan Stanley Capital International
OLS	Ordinary Least Squares
PRI	Principles for Responsible Investment
SIF	Social Investment Forum
UN	The United Nations
US	The United States
USD	United States Dollar
EUR	Euro
SAM	Sustainability Asset Management Group
EIRIS	Ethical Investment Research Service
KLD	Kinder Lydenberg Domini & Co.

1 INTRODUCTION

During the past 20 years, Environmental, Social and Governance (ESG) investing has become an increasingly important area for investors, companies, asset managers, politicians, and even countries. Three categories of non-financial information on a corporate's environmental impact, social performance, and corporate governance practices are referred to as ESG. Multiple agreements and directives are demanding that companies disclose this information. Once reported, numerous private rating agencies can form ESG scores, among other non-financial measures, from the disclosed information (European Commission, 2023).

This shift in the investing and economic behavior paradigm stems from growing environmental and social awareness among the stakeholders of a business. Furthermore, the existing body of research has started to show reliable evidence of a linkage between environmental and social issues and a company's financial performance (UN PRI, 2018; Nagy et al., 2013; Friede et al., 2015). Similarly, the constantly increasing need for transparency and accountability in corporate governance actions is forcing companies to act accordingly (European Commission, 2023).

The popularity of themes such as corporate social responsibility (CSR), sustainable investing, socially responsible investing (SRI), and ESG Investing are undoubtedly rising. In Global Sustainable Investment Alliance's (2020) (GSIA) review, the regional data from the US, Canada, Japan, Australasia, and Europe shows that sustainable investments reached USD35.3 trillion in 2020 (15% growth in 2 years), measured in assets under management (AUM). The GSIA (2020) report also shows that from various sustainable investing strategies, ESG integration has trended significantly, surpassing negative/exclusionary screening and becoming the most popular sustainable investing strategy with USD25.2 trillion in AUM in 2020 report.

This study is more focused on ESG integration, further discussed in chapter 2.4, and more specifically on ESG momentum, a relatively new SRI strategy. ESG momentum is a

recently developed SRI approach that has been designed by utilizing the existing knowledge around traditional momentum strategy and by extending the theory from historical price analysis to more complex entities. A traditional momentum strategy is constructed by buying assets that have recently overperformed in the market and selling short the assets that have underperformed (Jegadeesh & Titman, 1993). ESG momentum aims to utilize the momentum effect by buying the companies' stocks with the most significant positive change in their ESG ratings and selling short the companies with the most significant negative change in their ESG rating. Therefore, the stock selection process in ESG momentum is not focused on the absolute value of ESG rating but on the historical change in the score. One can wonder why ESG momentum would be profitable as the stock selection is purely based on non-financial information. However, the existing strong base of literature around corporate social performance (CSP) and corporate financial performance (CFP) indicates that this relation between CSP and CFP is often positive, providing a fruitful platform to research ESG momentum further. (Friede et al., 2015.)

The scope of this study includes an investigation of ESG momentum strategies in the Nordic markets and their effectiveness in identifying companies with superior financial performance. This study introduces the reader to sustainable and ESG investing strategies and then moves on to portfolio creation. The empirical part of this study seeks to find overperformance in all ESG momentum portfolios created; however, failing to do that. All three portfolios created failed performance-wise when performing multi-factor portfolio performance analysis. Although the results show statistically significant negative alphas for all portfolios, the alphas are just slightly negative, indicating that the performance is still good. The performance breakdown is also shown graphically against the benchmark index MSCI Nordics ESG Universal, showing that the top 10 deciles long portfolio outperforms the benchmark throughout 2010-2021. Overall, the results of this study further set the stage for future ESG momentum studies, especially in the Nordic markets. In the future, the momentum strategies in the ESG context can be taken even

further by utilizing the increasing knowledge around the topic and modifying the strategy accordingly.

1.1 Purpose of the Study

The purpose of this study is to evaluate the performance of a Nordic stock assembled ESG momentum strategy that incorporates environmental, social, and governance (ESG) scores in portfolio creation. This study will examine the return characteristics of three different ESG momentum portfolios, consisting of Nordic stocks that have been selected based on the change in their ESG scores. This study aims to contribute to the existing literature by analyzing the performance of the three portfolios and finding out whether changes in ESG ratings can be used to predict future returns. Furthermore, this study modifies the ESG momentum portfolio creation to align with previous research findings and act as a realistic approach that can be implemented in real life. The stock price and ESG data are collected from four of the largest Nordic markets, Sweden, Finland, Norway, and Denmark. Even though Iceland is also a Nordic country, it is excluded from this study due to a lack of data.

1.2 Research Question and Hypothesis

The research question of this study arises from previous ESG momentum studies conducted, e.g., Nagy et al. (2013), Nagy et al. (2016), and Bergskaug (2019). Nagy et al. (2016) findings indicate that investors can create ESG strategies that outperform their benchmarks. However, Bergskaug (2019) finds that creating a similar ESG momentum strategy to Nagy et al. (2016) in BRICS and US -markets similar performance is not achieved. Friede et al. (2015) study supports the thought that ESG can add alpha, as they find a positive correlation between corporate financial performance and good ESG rating.

As previous studies have shown, there is possible outperformance involved with ESG momentum, at least when the investment universe is global, as in Nagy et al. (2016) research. This study contributes to the existing literature by studying the performance

of ESG momentum in Nordic markets. Interestingly, Nordic markets are known as pioneers in ESG as they are all top ranked in the 2021 SDG Index (Sustainable Development Report, 2021). The fact that sustainability is highly acknowledged in Nordic countries makes this research fruitful as the study answers questions related to the linkage between ESG score changes and stock performance. This leads to the research question, "Does ESG performance reflect to stock performance, enhancing momentum effect?". Conducting this study, I am also interested in how the ESG momentum portfolios perform together as long and short portfolios and how they perform individually.

The hypotheses are formed as follows:

H_0 = Performing ESG momentum strategy does not lead to excess returns.

This study tries to reject H_0 by finding positive excess returns involved with the ESG momentum strategy formed from Nordic markets. If the strategy does not lead to positive excess returns, H_0 holds. In the case of rejecting H_0 , findings will support that positive excess returns are involved, and therefore H_1 written as follows would hold:

H_1 = Performing ESG momentum strategy does lead to excess returns.

As previous literature around ESG performance and its linkage to corporate financial performance with some notable studies around ESG momentum strategy suggest, the possibility for excess returns is involved; therefore, H_1 would be accepted. However, due to the difference in nature of the thesis, data, and available research methods compared to, e.g., Nagy et al. (2016), the possibility for significantly different results is present.

As this study forms portfolios using realistic methods to practice in real investment, the possibility for negative returns is present. Many of the past studies finding significant positive returns use unrealistic methodology when considering real-life implementation.

Also, the wide range of ESG data providers and different markets (Nordics) will affect the results.

As I am interested to see whether the ESG momentum performs better by only including the companies with positive momentum, another hypothesis is formed as follows:

H_2 = Including only positive ESG momentum criteria into portfolio creation leads to excess returns.

1.3 Structure of the Study

This chapter will present the structure of this paper. First, this study introduces the topic, research questions, and hypothesis in Chapter 1. The second chapter introduces the concept of corporate social responsibility and discusses its subtopics ESG and socially responsible investing, ultimately leading to socially responsible investing strategies and, eventually, ESG momentum. The second chapter acts as a conceptual framework for this study, showcasing the necessary information regarding CSR, ESG, and SRI. The third chapter in this study provides summaries from relevant previous studies. The studies summarized in this chapter build a foundation with the conceptual and theoretical framework for the following empirical part of the study. The fourth chapter then moves on to discuss the theoretical framework. The theoretical framework chapter examines the financial theories and measures used to conduct this study. The fifth chapter, data and methodology, showcases the ESG scores and stock data used and then discusses the methodologies used in portfolio construction. In the fifth chapter, subchapter 5.2.2 presents the return characteristics of the formed portfolios and finally shows a graphical representation of the portfolio performance against the benchmark index. After the fifth chapter, this study moves on to its empirical part, showing the regression results for three different multi-factor portfolio performance measures that were used. The seventh chapter discusses the empirical results presented in the previous chapter and then moves on to the concluding remarks on the results and the study.

2 CORPORATE SOCIAL RESPONSIBILITY

This chapter will further introduce the concepts of corporate social responsibility (CSR), Environmental Social Governance (ESG), and the rapidly growing field of socially responsible investing (SRI), also called sustainable- or ethical investing. By integrating social, environmental, and ethical considerations into decision-making processes, investors can sustainably impact how businesses operate. Following subchapters will discuss and provide a basic understanding of CSR by showcasing the concepts of Corporate Social Responsibility (CSR), Environmental Social Governance (ESG), and Socially Responsible Investing (SRI). To provide a platform for the research, the previous literature, ideology of SRI, and most popular SRI strategies, including the ESG momentum strategy, which this thesis is focusing on, are presented as well.

2.1 Introduction to Corporate Social Responsibility

The concept of CSR and its precise definition amongst practitioners and businesses is multi-dimensional. Even though this thesis focuses mainly on movements in ESG ratings and their impact on stock prices, an awareness of CSR is essential. CSR plays a significant role when investors construct their SRI portfolios utilizing CSR analysis and ESG methodologies.

In his essay, "The Social Responsibility of Business is to Increase its Profits," published in the New York Times, famous economist Milton Friedman (1970) rejects the idea that companies can have responsibilities. For Friedman, only people can be responsible for doing something. Friedman also argues that behind every so-called responsible company is a businessman who uses stakeholders' money to further his own interests. Thus, responsible companies impose costs on the company itself and society as a whole. Friedman's paper argues that there is a negative relationship between corporate social responsibility and corporate financial performance.

Towards the 2000s, attitudes towards CSR began to change as corporate irresponsibility problems emerged and stakeholders started to demand actions towards better CSR increasingly. Today, good CSR policies contribute to the sustainable development of society while building a corporation's reputation and supporting its financial performance (Cruz & Boehe, 2010). Over the last two decades, CSR has become firmly established in the minds of many companies and managers. Many companies have presented integrated CSR projects, made CSR commitments, and published CSR reports. As CSR becomes more popular among companies, the topic will eventually be elevated to a core area of management alongside marketing, accounting, and finance (Kim et al., 2014; Crane et al., 2013).

A commonly accepted definition of CSR in the academic literature by the World Business Council for Sustainable Development is as follows: "Corporate social responsibility is the commitment of business to contribute to sustainable economic development, working with employees, their families, the local community, and society at large to improve their quality of life" (WBCSD, 2000, pp.10). It can be said that CSR is more concerned with social interaction within the company. While ESG, the focus of this study, is more concerned with environmental, social, and governance issues in a broader sense, CSR and ESG are linked through social issues, which are discussed in more detail in the following subsection.

2.2 Environmental, Social, Governance (ESG)

ESG is sometimes mistakenly combined with SRI when talking about sustainable investing. In previous studies, SRI is related to investors' personal interests, beliefs, and values, while ESG refers to environmental, social, and governance factors that enable companies to be evaluated by investors. According to US SIF (2021b), incorporating ESG criteria into portfolio construction and analysis is essential for successful SRI execution. ESG integration is done through a traditional risk-return analysis that combines qualitative and quantitative analysis of ESG policies, outcomes, practices, and impacts (US SIF, 2021b). ESG is a tool and indicator that enables responsible investment for investors within the

limits of their values and personal interests. ESG is based on the notion that providing ESG information benefits both investors and society (van Duuren et al., 2015).

Since ESG incorporation requires significant research and knowledge of the metrics and the company's internal policies and acts, ESG ratings are provided by professional rating agencies that evaluate a company's effort and success in implementing environmental, social, and governance concerns. Dorfleitner et al. (2015) list the following ESG rating agencies as the most notable ones: ASSET4 by Refinitiv (former Thomson Reuters), Ethical Investment Research Service (EIRIS), Kinder Lydenberg Domini & Co. (KLD) by MSCI, and Sustainability Asset Management Group (SAM). Other suppliers, such as Bloomberg Sustainability, also report ESG disclosure scores. As multiple unregulated agencies provide the ratings, it creates problems with comparability between ratings (Dorfleitner et al., 2015).

The ESG scores used in this study are provided from the Refinitiv ASSET4 database. Table 1 below explains the ASSET4 scores separately with definitions.

Table 1 Refinitiv ASSET4 ESG Scores and Definitions (Refinitiv, 2022).

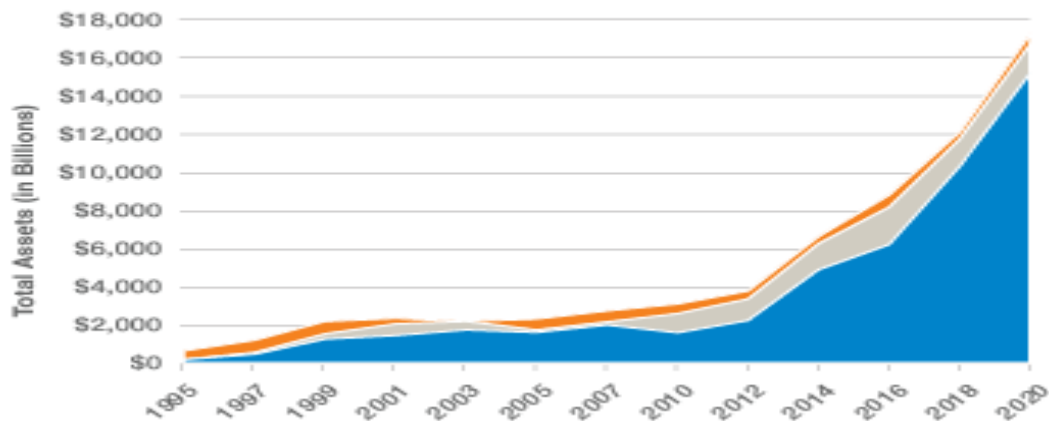
Refinitiv ASSET4 ESG Scores

Dimension/Score	Definition
Environmental / Resource use	The resource usage score represents a company's ability and success in reducing the consumption of materials, energy, or water, as well as finding more eco-efficient solutions through improved supply chain management.
Environmental / Emissions reduction	The emission reduction score assesses a company's willingness and ability to reduce environmental emissions in its manufacturing and operating operations.

Environmental / Innovation	The innovation score reflects a company's ability to lower its customers' environmental costs and burdens, hence providing new market possibilities through innovative environmental technology and processes, or eco-designed goods.
Social / Work- force	The workforce score assesses a company's ability to provide job satisfaction, a healthy and safe workplace, diversity and equal opportunity, and growth possibilities for its staff.
Social / Human rights	The human rights score assesses a company's ability to uphold essential human rights norms.
Social / Commu- nity	The community score assesses the company's commitment to being a good corporate citizen, preserving public health, and adhering to business ethics.
Social / Product responsibility	The product responsibility score represents a company's ability to provide high-quality goods and services while taking into account the customer's health and safety, integrity, and data privacy.
Governance / Management	The management score assesses a company's commitment and effectiveness in adhering to best practices in corporate governance.
Governance / Shareholders	The shareholders score assesses a company's success in terms of shareholder equality and the usage of anti-takeover equipment.
Governance / CSR strategy	The CSR strategy score indicates a company's efforts to demonstrate that it incorporates economic (financial), social, and environmental components into its day-to-day decision-making processes.

Incorporating ESG factors into portfolio creation has gained distinct popularity among financial service providers. ESG incorporation is one of the main SRI strategies, focusing on numerous non-financial aspects of a company's performance. According to van Duuren et al. (2015), a significant amount of data on the company's procedures is gathered and evaluated for each of the three ESG dimensions, enabling investors to use the results to build a diverse portfolio. However, ESG incorporation can be made in various ways. According to US SIF (2021b), some investors may actively aim to include firms with more robust ESG policies and practices in their portfolios. Others may actively strive to exclude or avoid companies with a poor ESG track record. Some may use ESG criteria to compare firms to their counterparts or to discover "best-in-class" investment possibilities based on ESG concerns. Other ethical investors include ESG concerns in the investment process as part of a broader risk-return analysis.

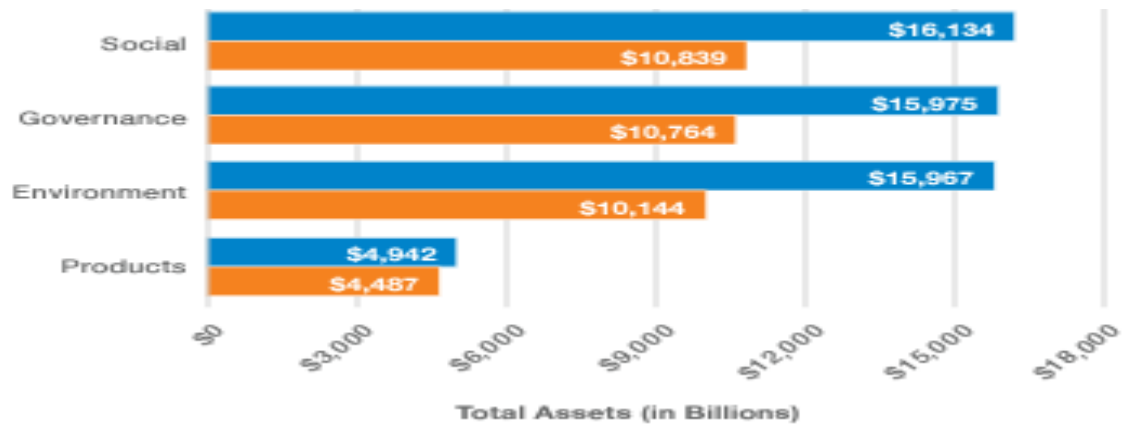
Figure 1 Sustainable investing in the US (US SIF, 2021a).



The growth in responsible investing is shown above in Figure 1. The growth in sustainable investing has been dramatic since 2010, with the fastest growth since 2012. The importance of ESG incorporation must be addressed, as it dominates the majority of invested capital. According to the GSIA Trends Report (2020), similar growth can be observed in the US and Europe, Australia, New Zealand, Canada, and Japan. Global sustainable investment in the five major economies covered in GSIA's review reached USD 35.3

trillion at the start of 2020, a 15% rise over the previous two years (2018-2020) and a 55% increase over the previous four years (2016-2020). Figure 2 below shows that the inclusion of all factors has increased between 2018 and 2020. Regarding capital allocation, managers evenly incorporate the three central E, S, and G factors across the US.

Figure 2 ESG Factors Incorporated by Money Managers in the US (US SIF, 2021a).



2.3 The Development of Socially Responsible Investing

The roots of ethical investing go back to ancient times to the teachings of Judaism, which included lessons on how to consume money ethically, and to the Christian era of the Middle Ages, when restrictions on loans were imposed based on the Old Testament (Renneboog et al., 2008). The beginning of socially responsible investing dates to the 1700s, when a Christian group called the Quakers campaigned against slavery by refusing to profit from slavery and arms (Schueth, 2003). According to Renneboog et al. (2008), the first known SRI-negative screening strategies are still extensively used today. For example, the avoidance of so-called sin stocks was first utilized in the 1920s when the Methodist Church in the UK began to avoid funding companies in the alcohol, gambling, tobacco, and arms industries that were considered 'sinful'. The Pioneer Fund, founded in 1928, began screening its investments according to religious models and was the first modern mutual fund in history to do so (Renneboog et al., 2008).

Instead of screening through religious values, modern SRI focuses on the investor's preferences and more on ethical and social debates. In the mid-20th century, anti-war and anti-racism campaigns began to shape and accelerate the growth of modern SRI into its current form, where investment channeling is seen as a highly effective means of influencing the behavior of companies or even governments (Renneboog et al., 2008). The role of SRI in today's economy has grown, and investors and the public are voting with their assets for a more sustainable future. Past wars, irresponsibility, inequality, climate change, and issues in working conditions, among other issues, have speeded up the development of SRI to a culture that nowadays is a major contributor in the global business environment. According to Renneboog et al. (2008), two other key contributors to modern SRI are the changes in consumer behavior and large-scale regulatory changes considering environmental, social, and governance activities. While SRI has grown its popularity in finance, other closely related concepts, such as corporate social responsibility and ESG incorporation, have risen rapidly as well.

The motives for socially responsible investing often fall into two categories, as Schueth (2003) listed: investors who want to feel good about their investments and who want to make positive changes and thus contribute to improving the quality of life in society. Unlike Schueth, Beal et al. (2005) classify investors' motivations into three categories; seeking better returns, seeking non-financial returns, and seeking the opportunity to contribute to society.

As SRI has been gaining popularity, the original ideology of SRI has faded. A study by Revelli (2017) points out that the ethics surrounding SRI have changed as SRI has become increasingly mainstream in the global economy. Revelli's study suggests that instead of SRI becoming even more mainstream, it should retain its original ethics, where investors make their own choices in line with their ethical goals.

Because the ideology and motivations behind SRI have been flexible and have changed over time, it cannot be limited to what Schueth (2003), Beal et al. (2005), and Revelli

(2017) highlight. However, it is necessary to understand that SRI evolves and changes over time.

2.4 SRI Strategies

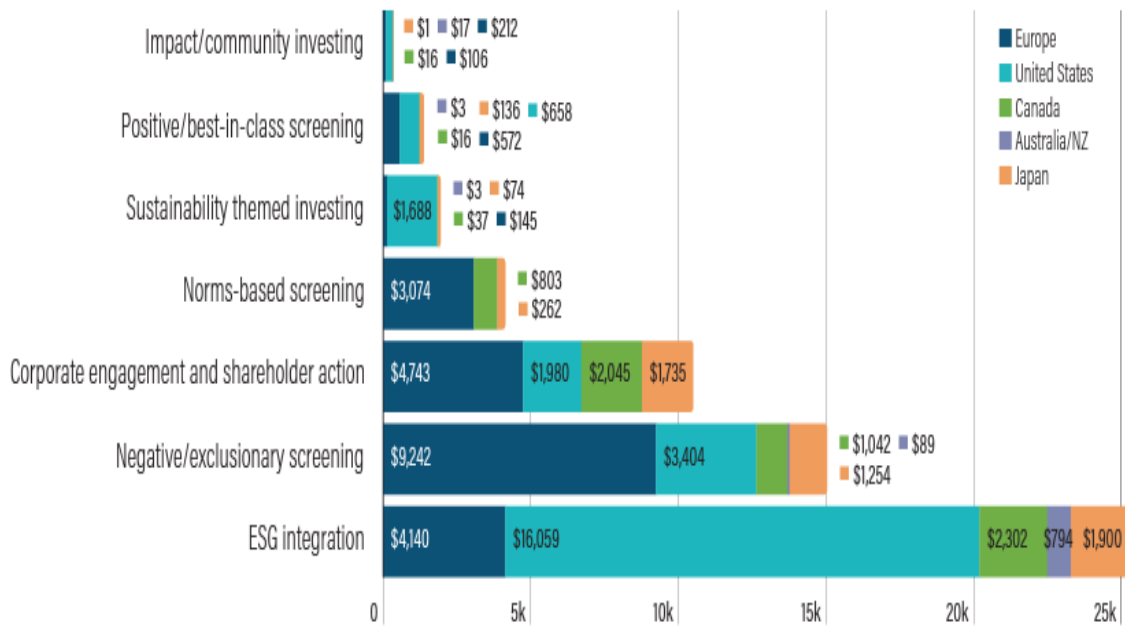
As a result of increased knowledge and awareness and the desire to promote the well-being of society, investors around the world have started to apply socially responsible investment strategies in the portfolio creation process. The most notable approaches to SRI strategies listed in Global Sustainable Investment Review by GSIA (2020) are ESG integration, corporate engagement & shareholder action, norms-based screening, negative screening, best-in-class screening, sustainability-themed investing, and impact- and community investing.

The historical origins of SRI practice are characterized by strategic homogeneity, employing just one SRI method at a time. However, as Ivanisevic Hernaus's (2019) study presents, it can be beneficial to employ many strategies concurrently. Renneboog et al. (2008) study also support the idea of multiple simultaneous strategies as they present that most US SRI mutual funds apply more than five investment screens while under one-fifth use only one social screen.

As this study focuses on performing ESG Momentum strategy in the Nordic markets, the following subsections focus on the five sustainable investment approaches that are the most widely used in Europe according to the GSIA (2020) review (see Figure 3) below.

Following an overview of the most popular SRI strategies in Europe, the study presents the ESG momentum.

Figure 3 2020 SRI assets by used strategy (GSIA, 2020).



2.4.1 Negative screening

Negative screening is the oldest known form of SRI; as introduced in chapter 2.3, negative screening is combined to the 1700s, when a Christian group called Quakers started campaigning against slavery (Schueth, 2003). More recently, negative screening, also called exclusionary screening, is still up to date and very popular among investors; in 2018, it was the most popular SRI strategy used among US SRI funds (GSIA,2020). According to GSIA's (2020) review, globally, almost 15,000 billion US dollars are invested using negative screens, making negative screening the second most popular SRI strategy globally and the most popular in Europe.

In previous literature (see. Renneboog et al., 2008), negative and positive SRI screens are referred to as first and second generations of SRI screening. Third-generation screening, also known as the "triple bottom line," is an integrated strategy in which organizations

are chosen from both negative and positive screening based on economic, environmental, and social factors. According to Renneboog et al. (2008), the fourth generation of ethical screens combines the third generation's sustainable screening methodology with shareholder engagement.

Negative screening can be defined as actions in the portfolio creation process that exclude specific industries, investments, or countries from the available investment universe based on ESG issues or investors' ethical beliefs (Ivanisevic Hernaes, 2019; Renneboog et al., 2008).

Although negative screening is still a very popular strategy, its popularity declined from 19,771 billion USD in assets invested to 15,000 billion USD between 2018 to 2020. It has been losing its popularity as ESG integration and, corporate engagement & shareholder action -strategies have gained more global attention among investors. (GSIA, 2020.)

2.4.2 Corporate engagement and shareholder action

Corporate engagement and shareholder action, also known as engagement and voting, is the 2nd most popular SRI strategy in Europe and 3rd in the global context (see. Figure 3). The ideology behind this strategy is to contribute and engage in corporate activities through active ownership and voting through shares (GSIA, 2020). Eurosif (2021) describes this strategy as a long-term process in which shareholders actively influence corporate activities to improve corporate behavior and disclosure.

The popularity of this strategy sources from the presented SRI motivation in chapter 2.2 provided by Schueth (2003) and Beal et al. (2005) where investors are simultaneously seeking to profit from doing good. By practicing this SRI strategy, investors can actively influence the company's activities and therefore contribute to positive changes in the business and improve corporate social performance (CSP) and CSR activities.

2.4.3 ESG integration

Globally the most popular SRI strategy and the 3rd most popular in Europe is ESG integration. This strategy takes advantage of the ESG risks and opportunities presented in table 1. ESG integration includes systematic and explicit incorporation of ESG issues and opportunities into financial analysis and portfolio construction (GSIA, 2020). Eurosif (2021) points out that the strategy combines traditional financial analysis with ESG considerations and focuses on the impacts of ESG issues on corporate financials (both good and negative). Earlier studies, e.g., Renneboog et al. (2008) refer to ESG integration as “triple bottom line” as it can be thought to be focusing on multiple screens that are based on E, S, and G factors simultaneously and therefore it’s focusing on people, planet & profit.

2.4.4 Norms-based screening

The norms-based method is an SRI screening strategy analyzing the investment universe for compliance with international standards and norms. Following the definition provided by Eurosif (2021), investments are screened against international standards or combinations of standards covering ESG factors. The international standards and norms covering ESG factors are defined by international sustainability and ethical bodies, such as United Nations (UN), International Labor Organization (ILO), Organization for Economic Co-operation and Development (OECD), and multiple different non-governmental organizations (NGOs) (GSIA, 2020).

2.4.5 Best-in-class screening

Best-in-class or “positive” screening, as Renneboog et al. (2008) and GSIA (2020) uses them as almost synonyms of each other. Positive screening is a more recent method to filter the investment universe. Rather than excluding the so-called “sin stocks,” positive screening concentrates on the sectors, companies, or projects that are considered as good, mirroring the ESG performance to relative peers (GSIA, 2020).

In its inner definition, best-in-class screening concentrates on ranking companies inside the market or industry by comparing them to their peer alternatives (Eurosif, 2021). This comparison allows investors to pick the best-performing alternatives for their portfolios. Positive and best-in-class screens do not exclude specific industries or countries. Renneboog et al. (2008) point out that using positive or best-in-class screens reduces the negative effect associated with the reduced investment universe often associated with negative screens, as they narrow down potential industries and countries.

2.4.6 ESG Momentum

Momentum has been a major factor in the investment world for a long time, and researchers have identified significant momentum trends since 1867 (Chabot et al., 2014). However, the momentum approach slowly began to gain popularity among practitioners in the 1980s, when Richard Driehaus, a US fund manager and founder of Driehaus Capital Management LLC, successfully implemented the momentum approach to stock selection (AAIL, 2000). As Richard Driehaus believed, the momentum strategy exploits the attractiveness of rising stock prices to investors. This is thought to cause a chain reaction, with new investors pushing share prices even higher. According to Jegadeesh and Titman (1993), the momentum strategy can achieve significant abnormal returns. Their study shows that strategies that buy the best-performing stocks in the past and sell the worst-performing stocks over different periods produced significant alpha over the 1965-1989 study period.

ESG momentum is a relatively new strategy in the SRI context. Originally momentum strategy has been based on the trend in stock price. By implementing an ESG momentum strategy, investors are interested in changes in a company's ESG ratings. As ESG has gained more attention, so has ESG momentum. More and more research has been conducted around this topic since 2013, when Nagy et al. (2013) published the first relevant ESG momentum study, founding significant alpha. UN PRI's (2018) study "Financial Performance of ESG Integration in US Investing" shows evidence that notable organizations and groups have also started showing interest in ESG momentum. PRI's study captures

ESG momentum overperformance against the benchmark indices in the US, European and Japanese markets. Additionally, they find that ESG issues can negatively affect the financial performance of an investment (UN PRI, 2018).

As briefly mentioned above, the ESG momentum is based on the change in a company's published ESG score rather than focusing on the absolute value of the score. Thus, this strategy builds on the traditional idea of momentum but combines it with ESG screening, providing socially responsible investors with an alternative method of using momentum. The ESG momentum is based on the assumption that there is a correlation between ESG scores and corporate financial performance (CFP) (Friede et al., 2015). Friede et al. (2015) conducted a study that combined results from approximately 2,200 individual studies that examined the relationship between ESG and CFP. Their study shows that ESG has a robust empirical basis and that the relationship between ESG and CFP is more often positive, thus supporting and setting the stage for ESG momentum.

3 PREVIOUS STUDIES

Corporate Social Responsibility (CSR) and Environmental Social Governance (ESG) continue to receive significant attention in the business world and among academics. Numerous studies have been carried out on CSR and ESG, and many new aspects and findings have emerged. This chapter is divided into three subchapters, presenting notable previous research focusing on the value of CSR in today's economy, introducing well-known momentum strategy studies, and research focusing on ESG Momentum strategy. The first subchapter presents previous research on the value of CSR, the second concentrates on studies around traditional momentum strategy, and the third moves into the relatively new field of ESG Momentum.

3.1 Value of CSR

The popularity of corporate social responsibility (CSR) has been rising exponentially during the past decades, even though the concept has been challenged over the years by different theories, e.g., Friedman's (1970) stakeholder theory. CSR has obtained several definitions over the years and is often used to describe ESG in the context of value creation. A study by Dahlsrud (2008) identifies multiple key dimensions of CSR that are similar to the ones linked to ESG: The stakeholder dimension, the social dimension, the economic dimension, the voluntariness dimension, and the environmental dimension.

There have been controversial opinions on CSR and its effects on corporate financial performance and competitiveness. For decades academics have founded a controversial linkage between CSR activities and financial performance. Krueger (2015) investigated short-term stock market reactions to good and negative CSR events and news, taking into account corporate CSR initiatives, and discovered that negative CSR events had a highly negative investor reaction. The reaction is justified by the idea that corporate social irresponsibility costs the firm and its shareholders (an estimated median of 76 million USD). Interestingly, Krueger also reported that investors reacted slightly negatively

to favorable news, while positive reactions were captured when corporates having a history with corporate irresponsibility increased their CSR performance. (Krueger, 2015.)

Multiple different perspectives are captured when evaluating how good CSR can improve a company's competitive advantage and increase its shareholder value. Kiernan (2001) highlights five key drivers for competitive advantage in his paper: human resource capital, cost/risk reduction, innovation capital, customer capital, and stakeholder capital. By planning strategic CSR activities, corporate management can reduce the risks of costly scandals while building brand equity and, therefore, competitive advantage (Kiernan, 2001). Also, Lins et al. (2017) and Kim et al. (2014) find that high performance in CSR builds up social capital, increasing shareholder trust, which is crucial in decreasing crash risk (Sapienza & Zingales, 2012). CSR is also attached to reducing costs, as el Ghouli et al. (2011) find that a significantly lower cost of capital is captured with firms with good CSR compared to poor alternatives. Therefore, their findings support that investment in CSR is increasing firm value.

3.2 Momentum Strategy Studies

Momentum strategy often refers to an investment strategy where the investor or asset manager buys assets or stocks that have recently outperformed the market and sells the assets or stocks that have underperformed. The evidence, e.g., Jegadeesh and Titman (1993), explain that the momentum effect is a product of behavioral biases, market frictions, risk-premium, and other economic factors affecting the price to continue following the past trend more often.

The academics mentioned above, Jegadeesh and Titman (1993), conducted the first groundbreaking momentum investing study. In their paper, "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency," the authors study the performance of momentum strategy with NYSE and NASDAQ listed stocks within the time period of 1965 to 1989, finding significant positive alphas for the momentum strategy. Adding to Jegadeesh and Titman's study, Korajczyk and Sadka's (2004) study considers

the trading costs that are expected to significantly affect the momentum strategy's returns. Korajczyk and Sadka (2004) test the robustness of momentum strategy profits to trading costs in NYSE, AMEX, and NASDAQ from 1963 to 2002. Their findings imply that momentum strategy profits decrease significantly when trading costs are considered, and the robustness of profits to trading costs weakens as the time horizon of the strategy grows. Interestingly, they also find that the momentum strategy returns are more robust to trading costs with longer holding periods, although extending the holding period can expose the returns to market crashes and weaken the momentum effect (Jegadeesh & Titman, 1993; Korajczyk & Sadka, 2004).

Adding to the previous literature supporting effectiveness of momentum strategies, Asness, Moskowitz, and Pedersen (2013) study the performance of momentum strategies in different global equity markets, including the US, Europe, and Asia. As Jegadeesh and Titman (1993) find positive returns in US stock markets, Asness et al. (2013) find that momentum strategy can produce positive returns, also in other asset classes, such as currencies, bonds, and commodities globally. In their study, the authors suggest that the drivers behind the success of momentum strategies are similar to what Jegadeesh and Titman (1993) found: behavioral biases, market frictions, and risk premiums. Additionally, a study by Georgopoulou and Wang (2017) contributed to momentum strategy studies performed in equity- and commodity markets. The authors find that time-series momentum strategies outperform traditional buy-and-hold strategies in equity and commodity markets. In addition, Georgopoulou and Wang (2017) find a negative correlation between market frictions and momentum strategy returns; the lower the economic uncertainty, the more profitable momentum strategies tend to be.

Overall, the previous literature base supports momentum strategies in various asset classes. As the recent academic evidence provides positive support for the momentum strategy where the measure for momentum is the price of an asset, this study is utilizing a relatively new approach to modify the momentum strategy. In this study, the measure for momentum is the ESG rating of a company, therefore modifying the strategy from

traditional momentum strategy to ESG momentum strategy. The following subchapter summarizes some of the most notable ESG momentum studies to introduce the concept of ESG momentum further.

3.3 ESG Momentum Studies

Thirty years ago, Jegadeesh & Titman (1993) found that a stock's six-month performance indicated its future performance. By buying the best-performing stocks and selling short the worst-performing stocks, they were able to generate abnormal returns. Their discovery led to an investment strategy that is used rather widely today, the momentum strategy. Momentum has proven its presence when tracking share price development since companies' financial performance can be assumed to continue on its current path. However, investors can take advantage of momentum in measured factors other than the stock price.

ESG momentum, a strategy where the momentum of stock price development is replaced with the momentum of the company's ESG rating, was first introduced by Nagy et al. (2013). In their paper *Optimizing Environmental, Social and Governance Factors in Portfolio Construction: Analysis of Three ESG-Tilted Strategies*, Nagy et al. (2013) evaluate the performance of three different investment strategies that lead to ESG tilt: ESG worst-in-class exclusion, simple ESG tilt, and ESG momentum. During the period of Feb 2007 to Dec 2012, all three strategies generated positive abnormal returns. Out of the three, ESG momentum significantly outperformed the other two strategies with a positive abnormal annual return of 0.35% compared to the MSCI world benchmark index. The study uses Intangible Value Assessment (IVA) ratings and GEM3L global equity model as a risk model (both provided by MSCI), and a comparison is made to the benchmark MSCI world index.

In Nagy et al. (2013) study, the ESG momentum portfolio is rebalanced every 12 months in relation to changes in ESG ratings. Their results regarding the performance of ESG momentum indicate that the market is reacting stronger to ESG rating downgrades than

upgrades. The strong reaction to downgrades is explained by the finding that ESG risks, which are more event-driven, are priced more quickly compared to long-term ESG opportunities. (Nagy et al., 2013.)

Continuing to contribute to ESG momentum literature, Nagy, with Kassam & Lee, further studies the performance of ESG tilt and momentum strategies, leaving the worst-in-class exclusions seen in Nagy et al. (2013) study out. The sample period is also extended from Dec 2012 to Mar 2015. The study attempts to uncover the relations between ESG rating and other factors by studying higher-risk strategies that allow more significant active weightings. For the most part, the study follows the methodology of the previous study in 2013, and the results are similar as well. In Nagy et al. (2016) study, the ESG momentum outperformed the MSCI world benchmark index annually by 2.2 percentage points, while in the 2013 study, relative outperformance was 0.35 percentage points. They conclude that most of the outperformance of the ESG momentum strategy is due to stock-specific returns indicating that ESG can add alpha.

4 THEORETICAL FRAMEWORK

4.1 Traditional Finance Theory and it's Relation with SRI

Since the early 1960s, traditional finance theory has assumed that every investor behaves rationally without any distractions nor influence on the investment decisions while maximizing the returns with a particular risk level given by individuals own preference (Beal & Phillips, 2005). These assumptions attribute from the influence of, e.g., Markowitz's (1952) modern portfolio theory (MPT), also known as mean-variance theory. Theory by Markowitz assumes that every investor is focused only on the expected returns and the risk of their investment portfolio. Therefore, it leaves no room for investors' personal values, making it controversial with socially responsible investing. According to Beal & Phillips (2005), if investors behave as MPT or traditional finance theory assumes, the only reason for the existence of socially responsible investing would be that it generates comparable returns with lower risk or exceptional returns with similar risk level as standard investment.

4.2 Return

It is widely known that we can calculate the return for any asset by summing the cash flows the asset has provided over time and the difference in its price between t and $t-1$. Among academics and practitioners, this type of formula is known as holding period return (HPR), as the formula includes not only the price change of the asset but also the cash flows from the holding period. One could argue that such an approach is not suitable for comparison and adjusting between different time frames. Most academic studies are calculating the returns as logarithmic returns, making the returns adjustable for different time periods and to reduce skewness in the distribution of the returns (Jensen, 1968; Kreander et al., 2005). To adjust HPR following Jensen (1968) and Kreander et al. (2005), HPR for logarithmic returns is written below:

$$(1) \quad HPR = \ln\left(\frac{P_t + D_t}{P_{t-1}}\right),$$

Where:

\ln = *Natural logarithm*

P_t = *Value of the asset at time t*

D_t = *Cash flows generated by the asset at time t*

4.3 Momentum

One of the most well-known anomalies relying on behavioral finance principles is referred to as "momentum." Several past studies have shown evidence that by utilizing this anomaly, investors can earn positive abnormal returns (Lesmond et al., 2004). The evidence is against more traditional assumptions of the efficient market hypothesis (EMH) first introduced by Eugene Fama (1970). The basic theory that EMH suggests is that today's stock prices are fully independent from the stock price yesterday, as the prices should react to all available information about the market and the company. Therefore, every stock would be priced efficiently in fully efficient markets, and no under, or overpriced stocks would appear. (Fama, 1970.)

The understanding of the markets and the existence of inefficiency in the markets has increased coming to the 21st century, and academics, among other practitioners, have found several ways to generate abnormal returns by taking advantage of the market inefficiency through, e.g., behavioral finance.

The constantly growing amount of literature and empirical evidence suggests that investors can predict price changes in different asset classes. One of the first studies to show evidence of this was a study conducted by Jegadeesh and Titman (1993), which provided results indicating that investing strategy utilizing so-called momentum provides abnormal returns in different stock markets. The term "momentum" has been used for hundreds of years in physics, where it is related to the continuity of a motion. More recently,

the term has been adopted to extent use in finance as well. In finance, momentum refers to the observed tendency for asset prices to continue to rise or fall depending on the current trend. It describes the continuation of a short-term stock price trend, where prices tend to move in the same direction for three to twelve months (Jegadeesh & Titman, 1993; Dhankar & Maheshwari, 2016.)

As the "traditional momentum strategy" is focused on movement in asset prices and ESG momentum is focused on the development in ESG ratings, it is necessary to maintain focus on ESG momentum for this study. Subchapter 3.3 above showcases examples from previous ESG momentum studies, and therefore it builds a base for the empirical part of this study as well.

4.4 Single-Factor Portfolio Measures

The following subsections present the most popular single-factor portfolio measures used in most SRI studies. The most widely known of the single-factor measures is the CAPM, on which most other measures are also based. CAPM is the only one of the following measures that is used to predict future expectations, while Sharpe-, Treynor- and Jensen ratios are calculated using historical data.

4.4.1 Capital Asset Pricing Model

The Capital asset pricing model (CAPM) is a financial model developed in the 1960s by William Sharpe, Jack Treynor, John Lintner, and Jan Mossin. CAPM was established to explain the relationship between systematic risk and expected return for different assets. CAPM relies heavily on the basic principles of Markowitz's (1952) modern portfolio theory (MPT) to examine whether the asset is reasonably priced. Because MPT is based on unrealistic assumptions regarding investor behavior and other market characteristics, the results can be biased. Even though it is unrealistic, practitioners are widely relying on CAPM, as it is a helpful model in portfolio construction when judging the projected risk and return. The formula for CAPM is written as follows:

$$(2) \quad E(R_i) = R_f + \beta_i[E(R_m) - R_f],$$

Where:

$E(R_i)$ = The expected return of asset i

R_f = The average risk – free rate of return

β_i = Beta of the asset i

$E(R_m)$ = Expected return of the market portfolio

4.4.2 Sharpe Ratio

From the performance metrics connected to the CAPM, this thesis will first address the Sharpe ratio, which is commonly used to evaluate the performance of stock portfolios. It was created by William F. Sharpe, a Nobel Prize winner, and first made public in 1966. The Sharpe ratio measures the portfolio's expected return per unit of risk. Investors can compare various investments and assess the performance of their investments using the ratio. A greater Sharpe ratio denotes that the investment's predicted returns are higher than its risk. (Sharpe, 1994.) The formula for the Sharpe ratio is written as follows:

$$(3) \quad \text{Sharpe ratio} = \frac{R_i - R_f}{\sigma(R_i - R_f)},$$

Where:

R_i = The average rate of return of asset i

R_f = The average risk – free rate of return

$\sigma(R_i - R_f)$ = The standard deviation of portfolio excess return.

4.4.3 Treynor Ratio

Another performance measure built on CAPM's philosophy is the Treynor ratio. Treynor ratio was developed during the same year (1966) when Sharpe introduced his performance measure. Similar to the Sharpe ratio, the Treynor ratio considers the return on an investment relative to its level of risk. However, unlike the Sharpe ratio, the return is

proportional to the portfolio's risk as measured by the beta coefficient. Treynor ratio is commonly used to calculate the return gained by an asset or portfolio in comparison to the risk of the market portfolio. (Treynor & Mazuy, 1966.)

$$(4) \quad \text{Treynor ratio} = \frac{R_i - R_f}{\beta_i},$$

Where:

R_i = The average rate of return of asset i

R_f = Risk – free rate of return

β_i = Beta of an asset i

4.4.4 Jensen's Measure

The last performance measure presented in this thesis is Jensen's measure, more commonly known as Jensen's alpha. Jensen's alpha is also based on the philosophy behind the CAPM, and it is widely used among practitioners and academics. It is a measure used to measure how well the asset or portfolio performs compared to the market return. In more depth, Jensen's alpha subtracts the portfolio's average return from the level of return calculated by the CAP model. If the figure is positive, the portfolio manager has managed to outperform the beta coefficient's return-risk profile by earning an "excess return," i.e., a positive alpha. (Nikkinen et al., 2002.)

$$(5) \quad \text{Jensen's } \alpha = R_i - (R_f + \beta_i(\overline{R_m} - R_f)),$$

Where:

R_i = Rate of return of asset i

$(R_f + \beta_i(\overline{R_m} - R_f)) = \text{Expected rate of return of asset } i$

4.5 Multi-Factor Portfolio Measures

By utilizing multiple factors in financial models, practitioners can increase their financial analysis's explanatory power and flexibility. As single-factor measures are often based on a market risk factor, multi-factor measures can utilize different variables or characteristics within one model to analyze asset prices. Multi-factor models are often used to explain the relationships between the individual asset or portfolio and the chosen factors. (CFA Institute, 2022.)

As the number of well-known models has increased, so has the usage of these models. Nowadays, multi-factor models are divided into three categories based on their intended use: macroeconomic models, fundamental models, and statistical models (CFA Institute, 2022). The following subchapters introduce four well-known multi-factor models widely used in studies concentrating on portfolio performance.

4.5.1 Arbitrage Pricing Theory

The first of the multi-factor portfolio measures introduced in this study is arbitrage pricing theory, also known as APT. American economist Stephen Ross developed APT in 1976. It is commonly presented as a better alternative for CAPM due to its increased explanatory power, a byproduct of multiple risk factors and variables it utilizes (Ross, 1976; Groenewold, 1997). According to Groenewold (1997), the APT multi-index model equation can be written as follows:

$$(6) \quad (APT) R_i = b_{i0} + b_{i1}F_1 + \dots + b_{ij}F_j + e_i ,$$

Where:

R_i = Rate of return of asset i

b_{ij} = Factor loading or sensitivity

e_i = Random error variable

F_j = Factor j value

$$i = 1, 2, \dots, N$$

$$j = 1, 2, \dots, j$$

As the equation shows, APT allows the user to add an infinite number of factors to the equation, and this is a strength but also a weakness of the model. As the model does not specify the number of factors added, nor does it suggest the ideal number of factors, it left space for researchers to further develop multi-factor models such as Fama-French models. (Roll & Ross, 1980; Groenewold, 1997; Dhrymes et al., 1985.)

4.5.2 Fama-French 3-factor Model

Inspired by the study results of Reinganum (1981) and Lakonishok & Shapiro (1986), who found that the relation between market beta and average market return seems to disappear during the period of 1963-1990, Fama & French (1992) identified three key risk-factors that form a multifactor asset-pricing model called “*three-factor -model*”. According to Fama & French (1996), many of the CAPM anomalies can be explained by the three-factor model, where the excess portfolio -return is dependent on its sensitivity to the factors above:

1. Excess market portfolio return.
2. The difference between the return on a portfolio of publicly listed high book-to-market value stocks and publicly listed low book-to-market value portfolio.
3. The difference between the return on a portfolio of publicly listed small company shares and a portfolio of publicly listed large company shares.

We can write the equation for the Fama-French three-factor model as follows:

$$(7) \quad R_{it} - R_{ft} = a_{it} + \beta_1(R_{Mt} - R_{ft}) + \beta_2SMB_t + \beta_3HML_t + e_{it},$$

Where:

a_{it} = Jensen's alpha for asset i at time t

R_{it} = Rate of return of asset i at time t

R_{ft} = Risk free rate of return at time t

R_{Mt} = Total market portfolio return at time t

$R_{it} - R_{ft}$ = Expected excess return over risk free rate

$R_{Mt} - R_{ft}$ = Excess return on the market portfolio

SMB_t = Difference between the return of small and large cap stock portfolios

HML_t = Difference between the return of high and low book-to-market stock portfolios

β_1, β_2 & β_3 = Factor coefficient

e_{it} = Random error variable

In their later studies, Fama & French (1993; 1996) found that the three-factor model is the most reliable when calculating returns for portfolios that are constructed according to size, book-to-market, E/P -ratio, cash flow/price -ratio, or sales growth.

4.5.3 Carhart 4-factor Model

To further develop the three-factor model established by Fama and French (1992), Mark Carhart (1997) added an additional factor called the "momentum factor" to the original model. According to Carhart (1997), the addition of momentum as a factor was able to increase the explanatory power of the model further. Previous research results, such as one from Jegadeesh and Titman (1993), provided inspiration and support for this addition, as the existence of the so-called momentum effect was proven when previous winners tend to continue rising, and previous losers tend to continue falling. (Theory on momentum is discussed in subchapter 4.3).

We can write the equation of the Carhart four-factor model by simply adding the momentum factor into the Fama-French three-factor model as follows:

$$(8) \quad R_{it} - R_{ft} = a_{it} + \beta_1(R_{Mt} - R_{ft}) + \beta_2SMB_t + \beta_3HML_t + \beta_4MOM_t + e_{it}$$

Where:

a_{it} = Jensen's alpha for asset i at time t

R_{it} = Rate of return of asset i at time t

R_{ft} = Risk free rate of return at time t

R_{Mt} = Total market portfolio return at time t

$R_{it} - R_{ft}$ = Expected excess return over risk free rate

$R_{Mt} - R_{ft}$ = Excess return on the market portfolio

SMB_t = Difference between the return of small and large cap stock portfolios

HML_t = Difference between the return of high and low book-to-market stock portfolios

MOM_t = Difference between the one-month lagged weighted average return of low performing stock portfolio and similar high performing stock portfolio

$\beta_1, \beta_2, \beta_3 \& \beta_4$ = Factor coefficient

e_{it} = Random error variable

4.5.4 Fama-French 5-factor Model

After subsequent criticism (see Black, 1993; Titman et al., 2004; Novy-Marx, 2013), Fama and French (2015) refined their model by adding two new factors: profitability (RMW) and investment (CMA) to explain asset prices and improve the explanatory power of the model, transforming the model into a five-factor model that can be written as follows:

$$(9) \quad R_{it} - R_{ft} = a_{it} + \beta_1(R_{Mt} - R_{ft}) + \beta_2SMB_t + \beta_3HML_t + \beta_4RMW_t + \beta_5CMA_t + e_{it},$$

Where:

a_{it} = Jensen's alpha for asset i at time t

R_{it} = Rate of return of asset i at time t

R_{ft} = Risk free rate of return at time t

R_{Mt} = Total market portfolio return at time t

$R_{it} - R_{ft} =$ Expected excess return over risk free rate

$R_{Mt} - R_{ft} =$ Excess return on the market portfolio

$SMB_t =$ Difference between the return of small and large cap stock portfolios

$HML_t =$ Difference between the return of high and low book-to-market stock portfolios

$RMW_t =$ Difference between the average return of strong operational profitability portfolio and weak operational profitability portfolio

$CMA_t =$ Difference between the average return of conservative investment portfolio and aggressive investment portfolio

$\beta_1, \beta_2, \beta_3, \beta_4 \& \beta_5 =$ Factor coefficient

$e_{it} =$ Random error variable

5 DATA AND METHODOLOGY

The data and the methodology used to conduct this study are showcased in this chapter. The ESG and share price data from four Nordic markets (Finland, Sweden, Denmark, and Norway) is provided by Refinitiv. More specifically, the ESG data is obtained from the Refinitiv ASSET4 ESG database and share price data from the Refinitiv DataStream database. A more detailed discussion about the databases and the data itself can be found below.

5.1 ESG Scores and stock price data

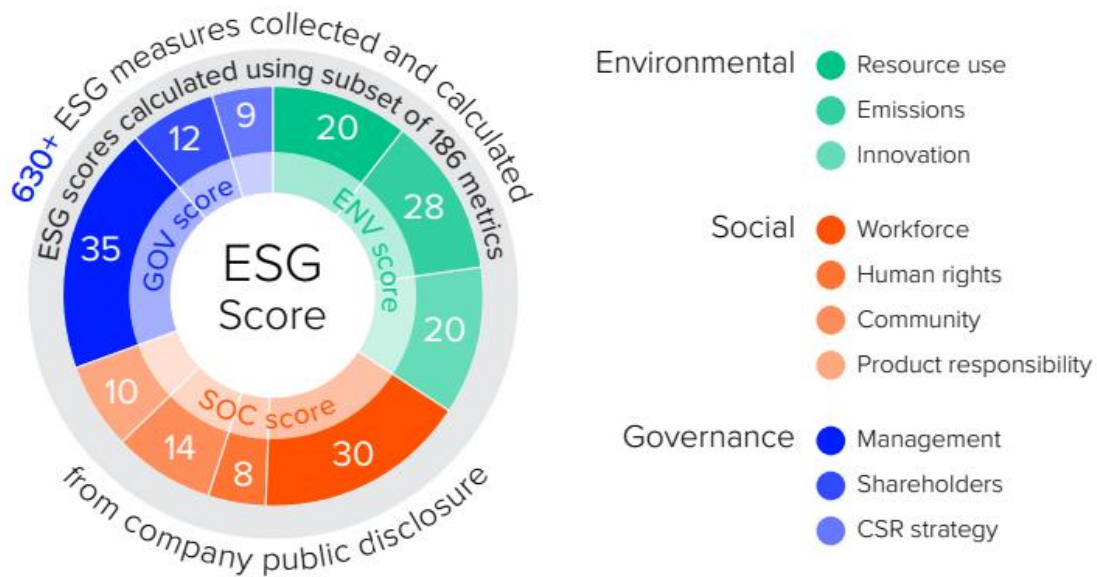
For this study, data on company specific ESG scores were pulled from the Refinitiv database. Refinitiv was chosen from many alternatives because they offer one of the most comprehensive databases for ESG data, and its database is used in similar studies (Dorfleitner et al., 2015). According to their methodology, the Refinitiv ESG database covers over 85% of the market cap globally, providing over 630 different ESG metrics (Refinitiv, 2021).

The data user needs to remember that all the ESG scores provided by different rating agencies are based on the companies' self-reported information. This has been noted to cause some issues in transparency, comparability, and quality as companies are based in different countries, operating in different industries, differing in values, etc. (Dorfleitner et al., 2015.) According to Dorfleitner et al. (2015), adding to issues that have to do with the difficulties in standardizing the ESG information reporting practices, the methodologies between the rating agencies vary, and there are some biases related to this issue as well.

To improve the efficiency of the company-level assessment and scoring, Refinitiv calculates more than 630 ESG measures at a company level, from which it collects a subset of 186 measures that are the most comparable and relevant for each industry. These

measures are then grouped into ten categories to form the "three pillar scores" (E, S, G) and the final overall ESG score, as shown in Figure 4 below. (Refinitiv, 2021.)

Figure 4 Forming a ESG score (Refinitiv, 2021).



In order to form the final ESG score, category points are combined into three pillars: - environmental, social, and governance. ESG score is the relative sum of the category weights, which vary by the industry for the environmental and social categories. For governance, the weightings remain the same for all sectors. The pillar weights are normalized into percentages ranging from 0 to 100, forming the final score. (Refinitiv, 2021.)

In addition, Refinitiv (2021) provides different ESG scores, such as ESGC score, ESG controversies score, and ESG grade. The ESGC score provides more information than the standard ESG score and is a rounded and comprehensive score. The ESGC score is based on the absolute ESG score and negative information from the global media; therefore, the ESGC scores companies in the ESG conflict category while considering the negative information. By ESG controversy scoring, Refinitiv (2021) refers to a score calculated based on 23 issues considered controversial in the ESG context. ESG controversies

scoring enables ESGC scoring, as ESGC scoring differs from conventional ESG scoring only if a company has been involved in these 23 controversial issues during the year. (Refinitiv, 2021.)

Refinitiv ESG grading system is based on the absolute ESG score and was developed to present a letter grade for companies in specific score ranges. These grades go from D- (lowest) to A+ (highest). See Refinitiv, 2021, for more detailed descriptions and score ranges. This study uses a standard (absolute) ESG score to minimize market-cap bias, affecting large companies to suffer more from negative media attention than small-cap companies (Refinitiv, 2021). Table 2 will further introduce the ESG data used to conduct this study. As shown in the table, the number of observations over the period used was 2,855, as the number of ESG scores recorded increased significantly, especially in 2019 and 2020.

Table 2 ESG Data – Descriptive Statistics

ESG Data – Descriptive Statistics of all Nordic ESG Scores 2008-2021	
Score	ESG
Mean	52,34
Median	0,37
Mode	53,87
Standard Error	69,79
Standard Deviation	19,66
Minimum	1,33
Maximum	95,74
No. of Observations	2855

To allow benchmarking against the index and compare the returns of the ESG momentum portfolios constructed, stock price data is collected for stocks with reported ESG scores on the main Nordic markets: Nasdaq Helsinki, Stockholm, Copenhagen, and Oslo Stock Exchange. As the data for the benchmark index MSCI Nordics ESG Universal is from 2010 onwards, and there is significantly less ESG data from earlier years, ESG data is collected from 2008 to 2021 and stock price data are collected from 2010-2021 in order to create the portfolios annually, beginning from the year 2010. As mentioned above,

this study concentrates on Nordic markets, generally considered sustainability leaders worldwide (Robeco, 2021). To obtain the best and most realistic results, formed portfolios can include stocks from any of the four markets, depending on the change in the reported ESG score.

Table 3 Stock market data - Nordic companies with ESG score 2008-2021

No. of Companies with ESG Score during 2010-2020					
Market	OMXS	OMXH	OMXC	OSE	NORDIC
Country	Sweden	Finland	Denmark	Norway	All
2008	47	21	23	19	110
2009	48	22	23	20	113
2010	49	23	25	21	118
2011	50	23	25	21	119
2012	51	23	25	21	120
2013	53	24	25	21	123
2014	56	24	26	22	128
2015	68	24	27	23	142
2016	72	24	28	23	147
2017	78	36	31	28	163
2018	133	34	43	60	270
2019	179	43	51	69	342
2020	280	77	66	93	516
2021	240	64	64	76	444

Table 3 above gives an overview of the data used. As mentioned, ESG and stock price data are collected from the four main Nordic market areas: Sweden, Finland, Denmark, and Norway. ESG data is collected from 2008-2021, and both ESG and share price data are cleaned by using the market volume factor in case of double observations caused by some companies having multiple share classes with the same ESG score. As we can see, the number of observations increases over the period. The total number of reported ESG scores for Nordic companies increased by 404% over the period. From the country-specific data, we can see that Sweden is by far the leader in the number of companies with ESG scores, with a growth rate of 511%, while the other three countries follow at a slightly slower rate of growth: Finland 305%, Denmark 278%, and Norway 400%.

5.2 Methodology

This methodology subsection lays the groundwork for the empirical analysis in this study, discussing the construction of the ESG momentum portfolios and the empirical methodology used to conduct the empirical analysis presented later in this study.

5.2.1 Constructing ESG Momentum Portfolios

As stated earlier, this study aims to examine the performance of ESG momentum portfolios composed of Nordic company stocks and compare it to the MSCI Nordics ESG Universal Index, which is used as a benchmark index. ESG momentum portfolios created for the study are ESG momentum long, ESG momentum short and ESG momentum combined. The portfolios are created based on the data obtained from the Refinitiv database. For each year in the tracking period, the portfolios are reconstructed based on the t-1 year change in ESG score, meaning that, e.g., the year 2010 portfolios are created by using the ESG score growth rate between the years 2008 and 2009. Each year, the three portfolios are reconstructed and re-balanced to equal weight. The number of companies in long and short portfolios is determined by the so-called "cut-off-point," which is a common way to determine winners and losers when building a momentum strategy (Bird et al., 2017). Cut-off points are found to have a negative correlation with portfolio returns. With increasing the cut-off-point, the number of companies in the portfolios increases; therefore, it increases the transaction costs, decreases the variance, and statistical significance (Bird et al., 2017; Jegadeesh & Titman, 1993). In this study, possible transaction costs from stock purchases or short positions are not taken into account; otherwise, the strategy is built in a way applicable in real life. In a study by Jegadeesh and Titman (1993), they set a fixed 20% cut-off-point to include the top 10 and bottom 10 -deciles of the companies each year in the portfolios. They found that the informational signal is somewhat optimal, and the models used provide more significant results and more information about the momentum effect.

I follow Jegadeesh & Titman's (1993) methodology in portfolio construction and apply the fixed 20% cut-off point. By following this method each year, I form three portfolios, one including the top 10, one including the bottom 10 -decile of the companies based on the annual percentage change in ESG score, and one combining these two portfolios. By ranking the companies based on the percentage change in ESG scores, long- and short portfolios are constructed, e.g., the year 2010 portfolios are created based on the percentage change in company ESG score from the year 2008 to 2009; if the company rank that year is within the threshold of top-10% or bottom-10% company will be in long or short portfolio respectively. The daily returns are calculated for each stock in the portfolios using HPR (see. equation 1.), and then annual returns are calculated for each portfolio. Following Jegadeesh and Titman (1993), every year, portfolios are equally weighted with respect to the number of companies within the portfolio. On the last day of each year, portfolios are liquidated and reconstructed accordingly on the first day of the year.

5.2.2 Portfolio performance

To get a better picture of the performance of the portfolios formed, this subsection presents the annual returns of the Momentum, Top 10% Long, and Bottom 10% Short portfolios separately, along with the annual returns of the MSCI Nordics ESG Universal Index, which was chosen as the benchmark index for this study. The tables below show the return data, the risk-free rates, and the number of companies included in the portfolio for each reference year 2010-2021.

As we can see from table 4 below, the ESG momentum portfolio, a combination of top 10% long and bottom 10% short portfolios, lost significantly to its benchmark index in terms of total 11-year cumulative return. However, we can see the effect of combining long- and short positions equally, as the annual returns are relatively lower almost every year to its alternative benchmark. The ESG momentum portfolio can be seen as a low-risk portfolio due to the neutralizing effect of market volatility caused by its long and short positions. If the ESG momentum portfolio is viewed as a low-risk portfolio, a cumulative return of 125.2% over 11 years can be considered reasonably good.

Table 4 Nordic Markets - ESG Momentum Portfolio Returns

Nordic Markets ESG Momentum Portfolio Returns				
Year	Annual Portfolio Return	Annual Benchmark Return	Risk Free Rate of Return	No. of Companies
2010	-0.66%	27.15%	0.14%	22
2011	3.42%	-18.40%	0.05%	22
2012	1.77%	20.07%	0.09%	22
2013	2.27%	24.09%	0.06%	24
2014	7.43%	-6.05%	0.03%	24
2015	-1.40%	2.26%	0.23%	24
2016	-2.12%	-3.60%	0.32%	24
2017	9.92%	24.92%	0.93%	28
2018	-9.78%	-11.55%	1.94%	28
2019	21.63%	19.48%	2.06%	32
2020	12.70%	26.21%	0.37%	54
2021	49.41%	17.25%	0.05%	66
Cumulative Return	125.20%	180.47%		

Table 5 shows the same data for the top 10% long portfolio. As we can see, the cumulative return is 325.87%, and the top 10% long portfolio significantly outperforms the benchmark index. The high returns are partly explained by the elimination of short positions, as the reference period was almost entirely a bull market, with short positions accounting for most of the significant losses.

Another observation that can be made from the data below is that the benchmark index outperformed the top 10% portfolio every year between 2010 and 2013, and significant differences in returns only started to appear after more companies were added to the top 10% portfolio, especially in 2019 and 2021. ESG has gained significant traction in the investment world, and investors have started to favor more responsible investments. Favoring more responsible investments can strengthen the so-called momentum phenomenon, which can explain the abnormal returns generated in recent years.

Table 5 Nordic Markets – Top 10% Long Portfolio Returns

Nordic Markets Top 10% Long Portfolio Returns				
Year	Annual Portfolio Return	Annual Benchmark Return	Risk Free Rate of Return	No. of Companies
2010	19.07%	27.15%	0.14%	11
2011	-21.02%	-18.40%	0.05%	11
2012	17.96%	20.07%	0.09%	11
2013	18.31%	24.09%	0.06%	12
2014	7.29%	-6.05%	0.03%	12
2015	7.71%	2.26%	0.23%	12
2016	2.48%	-3.60%	0.32%	12
2017	17.85%	24.92%	0.93%	14
2018	-13.66%	-11.55%	1.94%	14
2019	40.16%	19.48%	2.06%	16
2020	21.30%	26.21%	0.37%	27
2021	58.37%	17.25%	0.05%	33
Cumulative Return	325.87%	180.47%		

Table 6 shows the returns on the 10% short portfolio, and it can be seen that the portfolio underperforms the benchmark index by a significant margin, with a cumulative return of -75.48%. As noted earlier, the reference period is almost entirely a bull market, and betting against the trend is demonstrably unprofitable. Over the 11-year reference period, the short portfolio has outperformed the benchmark index three times on an annual basis, and all these years have been bear-market years.

From the return data provided, it can be concluded that betting against the market trend or momentum is unprofitable, and therefore short positions cut the profits of long positions, although short positions can be used as a hedge against significant market volatility. The return data shows that there is no downward momentum associated with "ESG losers". In Chapter 6, I discuss the results and the potential momentum effect in more detail.

Table 6 Nordic Markets – Bottom 10% Short Portfolio Returns

Nordic Markets Bottom 10% Short Portfolio Returns				
Year	Annual Portfolio Return	Annual Benchmark Return	Risk Free Rate of Return	No. of Companies
2010	-20.39%	27.15%	0.14%	11
2011	39.98%	-18.40%	0.05%	11
2012	-11.90%	20.07%	0.09%	11
2013	-15.85%	24.09%	0.06%	12
2014	7.65%	-6.05%	0.03%	12
2015	-15.82%	2.26%	0.23%	12
2016	-11.43%	-3.60%	0.32%	12
2017	-8.68%	24.92%	0.93%	14
2018	1.95%	-11.55%	1.94%	14
2019	-25.83%	19.48%	2.06%	16
2020	-28.93%	26.21%	0.37%	27
2021	-24.62%	17.25%	0.05%	33
Cumulative Return	-75,48%	180.47%		

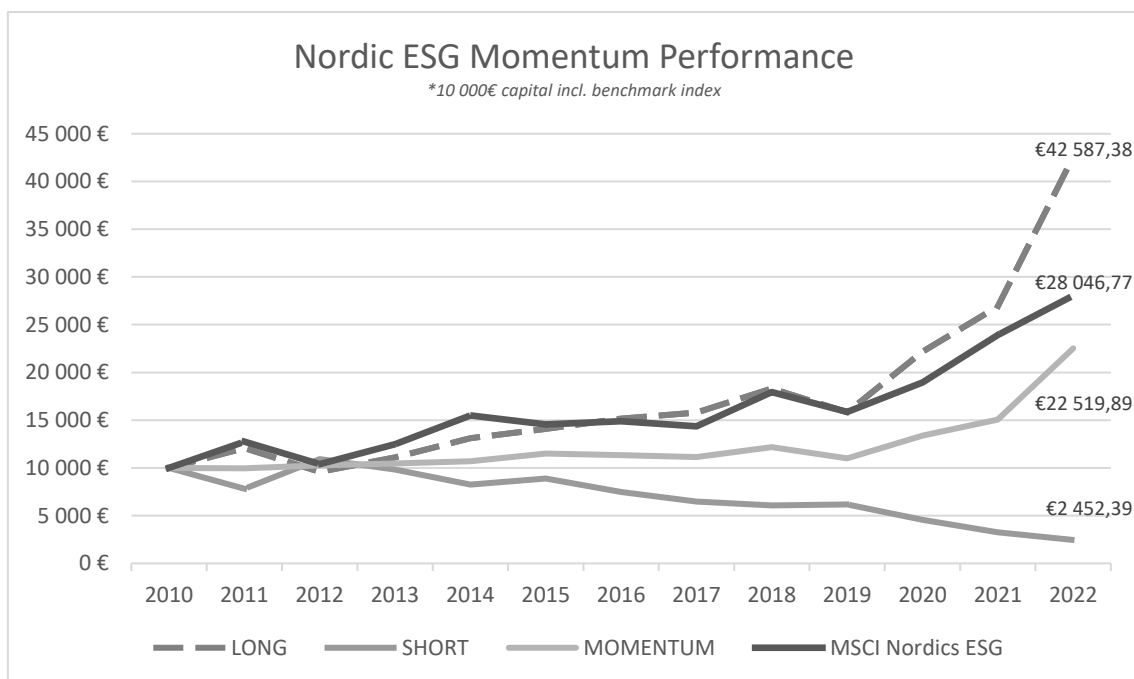
Descriptive statistics for all three portfolios are presented in Table 7. As expected, the descriptive statistics also show a similar trend in returns, with the top 10% and ESG momentum portfolios having positive mean and median returns. In comparison, the bottom 10% portfolio failed to generate positive returns. The variance of all three portfolios is relatively small, as the returns are daily, and the portfolio is widely diversified between different sectors across the Nordic countries.

Table 7 Portfolio Descriptive Statistics

Portfolio Descriptive Statistics				
Nordic Markets	Mean	Median	Standard Deviation	Variance
ESG Momentum	0.00028	0.00038	0.00617	0.00038
Top 10% Long	0.00054	0.00077	0.01191	0.00014
Bottom 10% Short	-0.00034	-0.00022	0.01507	0.00023

In figure 5 below, the Nordic ESG momentum performance is graphically represented. Figure 5 demonstrates similar results as the tables above but with 10 000€ capital invested in each of the portfolio's top-10%, bottom-10%, ESG momentum & benchmark index individually.

Figure 5 Graphical Representation of Nordic ESG Momentum Performance



5.2.3 Empirical Methods

Previous ESG investment strategy studies extensively use different methodologies to explain excess returns. The most widely used models from previous studies are presented in the subsections of this paper in chapter 4.

As in Nagy et al. (2013, 2016), many studies use only one regression model to explain returns. Some studies, for example, (Chen & Yang, 2020) use one single-factor model and one multifactor model. Since the topic is momentum, one of the most used models is Carhart's 4-factor model because it includes a momentum factor. Inspired by Fama & French (2018) to find the best model, this study utilizes three multifactor models to explain the returns: the Fama-French 3-factor model, the Carhart 4-factor model, and the Fama-French 5-factor model.

6 EMPIRICAL RESULTS

The focus of this study is to evaluate the performance of the Nordic stock assembled ESG momentum portfolio through a theoretical and empirical approach. To analyze the portfolio returns and the relationship between ESG momentum and the generated financial performance, I utilize three multi-factor regression models in explaining the returns.

The regressions are performed with the Ordinary Least Squares methodology (OLS), and the results are presented in tables 8, 9, and 10 below. All three tables include the regression results and alphas from all three portfolios formed: the Top 10% long portfolio, the bottom 10% short portfolio, and the ESG momentum portfolio.

6.1 Fama-French 3-Factor Model

The first regression utilized by this study is the Fama-French 3-Factor model, which is introduced in chapter 4.5.2. The 3-Factor model is often used in regression analysis to explain portfolio or stock returns. As initially introduced by Fama and French (1992), the model includes three independent variables: market beta (HML), size factor (SMB), and market excess return, also known as market risk -factor (Mkt-Rf), and one dependent variable, in this case, the daily portfolio return.

First, it is noteworthy that all coefficients, except the coefficient for SMB in the short portfolio, are statistically significant on the 1% significance level. For all three portfolios, the alphas are negative but close to zero. The negative alphas indicate that the portfolio has underperformed the market when none of the independent variables are accounted for. In other words, the underperformance is explained by unobserved factors outside this model.

Not surprisingly, the market risk factor has the most significant positive effect on the dependent variable in the top 10% long portfolio and the opposite effect in the short portfolio. The higher the positive coefficient is, the higher the sensitivity is to the market

movements and vice versa. When the market rises, most of the stocks often follow the trend, thus positively affecting the performance of the long portfolio. The opposite is true for the short portfolio; as the market rises, the short positions lose value, given the negative relationship with the market risk factor. For the top 10% long portfolio, the market risk coefficient is positive and statistically significant at the 1% level (0.895), indicating relatively high sensitivity to market movements. A similar but more moderate positive relation is found for the ESG momentum portfolio (0.306), which is significant at the 1% level. In contrast, the same coefficient for the bottom 10% short portfolio is negative and statistically significant at the 1% level (-0.800), indicating very low sensitivity to market movements. This is to be expected, as short positions are designed to take advantage of market declines. However, this finding shows that the "ESG losers" do not suffer when stock prices are considered.

The "SMB" coefficient represents the size factor or the portion of the portfolio's returns that can be attributed to the performance of small-cap stocks. A positive coefficient indicates that the portfolio has a higher sensitivity to small-cap stocks, while a negative coefficient indicates a lower sensitivity. For the top 10% long portfolio, the SMB coefficient is positive and statistically significant at the 1% level (0.283), indicating moderate sensitivity for the small-cap stocks. Identical factor loading is found for the ESG momentum portfolio. The SMB coefficient for the bottom 10% short portfolio is found to be negative but statistically insignificant at all three confidence levels.

The final coefficient, "HML," represents the market risk factor or the portion of the portfolio's returns that can be attributed to the performance of value stocks. A positive coefficient indicates that the portfolio has a higher sensitivity to value stocks, and a negative one indicates sensitivity towards growth stocks. For all three portfolios, the HML coefficient is negative and statistically significant at the 1% level (-0.200, -0.137, and -0.236), respectively. These loadings indicate that all the portfolios have relatively low sensitivity to value stocks and behave more similarly to growth stock portfolios. Because the HML coefficients for all three portfolios are statistically significant, it can be

interpreted that a higher proportion of growth stocks in the portfolios have underperformed relative to value stocks, contributing negatively to the overall performance of the three portfolios.

Finally, to analyze the model's fit, I analyze the "Adjusted R-squared." It represents the percentage of portfolio returns that can be explained by the independent variables in the model. A higher value indicates a better fit of the model to the data. In this context, the adjusted r-squared values are relatively high for the two individual portfolios, the top 10% long and bottom 10% short at (0.433 and 0.300), respectively, indicating a good fit. For the ESG momentum portfolio, the adjusted r-squared value is very low (0.083), indicating that the model does not fit the data. The relatively bad fit for the "combination" portfolio can be explained by the neutralizing effect of combining two opposite portfolios.

Table 8 Fama-French 3-Factor Model Regression Results

Fama-French 3-Factor Model			
	Top 10% Long Portfolio	Bottom 10% Short Portfolio	ESG Momentum Portfolio
Alpha	-0.004*** (.000)	-0.005*** (.000)	-0.005*** (.000)
Mkt-Rf	0.895*** (.000)	-0.800*** (.000)	0.306*** (.000)
SMB	0.283*** (.000)	-0.098 (.161)	0.283*** (.000)
HML	-0.200*** (.000)	-0.137*** (.009)	-0.236*** (.000)
Adj. R-squared	0.433	0.300	0.083

Significance levels are indicated followingly, * 10%, ** 5% & *** 1%.

6.2 Carhart 4-Factor Model

Additionally, the first of the two alternative multi-factor models in this study is the Carhart 4-factor model, discussed previously in chapter 4.5.3. According to Carhart (1997), the basic idea of this model is to explain the portfolio returns with the three factors introduced by Fama & French (1992) and an additional momentum factor. As previously mentioned, the momentum effect refers to past good performers' tendency to continue outperforming past losers.

As presented in table 9 below, the alphas for all three portfolios remain negative but close to zero, indicating underperformance against the benchmark. The market risk factor and SMB loadings and their interpretations remain similar to the Fama-French 3-Factor model results above.

The momentum coefficient or "MOM" represents the portion of the portfolio's returns that can be attributed to the performance of stocks with strong momentum. Again, a positive coefficient indicates higher sensitivity toward momentum stocks, while a negative indicates lower sensitivity. The loadings for the MOM coefficient in the top 10% long and ESG momentum portfolios are positive and statistically significant at a 1% level (0.144 and 0.135, respectively), indicating moderate sensitivity with momentum stocks. A somewhat similar finding is associated with the bottom 10% short portfolio, although the statistical significance is slightly lower (5% level) (0.104). These findings partly support the ESG momentum theory as the momentum coefficients are all statistically significant and positive.

Unlike the Fama-French 3-Factor model results, the HML coefficient is grown but is still negative for all three portfolios. For the top 10% long portfolio, HML is still statistically significant but at the 5% level (-0.097). The HML coefficient for the bottom 10% short portfolio is statistically insignificant (p-value of 0.300). ESG momentum portfolio also has a negative HML coefficient of (-0.141) that is statistically significant at the 1% level.

The adjusted r-squared for all three portfolios are similar but slightly larger than the above Fama-French 3-factor regression (0.437, 0.302, and 0.090, respectively), indicating a slightly better fit than the previous model. Again, the low adjusted r-squared of the ESG momentum portfolio is explained as previously in the Fama-French 3-Factor model.

Table 9 Carhart 4-Factor Model Regression Results

Carhart 4-Factor Model			
	Top 10% Long Portfolio	Bottom 10% Short Portfolio	ESG Momentum Portfolio
Alpha	-0.005*** (.000)	-0.005*** (.000)	-0.005*** (.000)
Mkt-Rf	0.895*** (.000)	-0.800*** (.000)	0.307*** (.000)
MOM	0.144*** (.000)	0.104** (.013)	0.135*** (.000)
SMB	0.268*** (.000)	-0.109 (.121)	0.270*** (.000)
HML	-0.097** (.030)	-0.063 (.300)	-0.141*** (.000)
Adj. R-squared	0.437	0.302	0.090

Significance levels are indicated followingly, * 10%, ** 5% & *** 1%.

6.3 Fama-French 5-Factor Model

Finally, the last model utilized in this study is the Fama-French 5-Factor model introduced by Fama and French (2015) in their paper "A Five-Factor Asset Pricing Model." The original model introduced by Fama and French (1992) suggests that the main drivers for the stock and portfolio returns are market risk (Mkt-Rf), size (SMB), and the value (HML) - factors. The 5-factor model adds profitability (RMW) and investment (CMA) -factors as additional drivers for the returns.

Again, as in the 3-factor model and Carhart 4-factor model, the alphas remain statistically significant at 1% level and negative but close to zero, indicating a slight

underperformance. Market risk factor coefficients are statistically significant at a 1% level for all portfolios, and the sensitivities remained similar to what they were in the results presented above. The SMB coefficients remain statistically significant at a 1% level for the top 10% long and ESG momentum portfolios; both sensitivities remain moderately positive. For the bottom 10% short portfolio, the SMB coefficient remains statistically insignificant. The HML coefficient for the top 10% long portfolio is not statistically significant (p-value at 0.119). For the bottom 10% short and ESG momentum -portfolios, the HML coefficient is negative and statistically significant at the 1% level (-0,268 and -0,219, respectively) again, indicating moderate sensitivity towards growth stocks.

The RMW coefficient represents the profitability factor or “robust minus weak”; in other words, it captures the portion of the returns dedicated to stocks with high operating profitability. The RMW factor implies that the greater the operating profitability, the more likely the asset will outperform its alternative. The RMW coefficient is statistically insignificant for all three portfolios at all significance levels.

Lastly, the “conservative minus aggressive” or CMA factor is calculated by subtracting the returns of firms that invest aggressively from the returns of firms that invest more conservatively. Therefore, the CMA coefficient captures the differences in capital investment requirements between the firms. For the top 10% long portfolio, the CMA coefficient is negative (-0.332) and statistically significant at the 1% level, indicating that most stocks in the long portfolio require many capital investments to grow the business. For the bottom 10% short and ESG momentum portfolios, CMA coefficients are statistically insignificant at all significance levels.

Table 10 Fama-French 5-Factor Model Regression Results

Fama-French 5-Factor Model			
	Top 10% Long Portfolio	Bottom 10% Short Portfolio	ESG Momentum Portfolio
Alpha	-0.005*** (.000)	-0.005*** (.000)	-0.005*** (.000)
Mkt-Rf	0.867*** (.000)	-0.784*** (.000)	0.310*** (.000)
SMB	0.261*** (.000)	-0.083 (.237)	0.286*** (.000)
HML	-0.099 (.119)	-0.268*** (.002)	-0.219*** (.000)
RMW	-0.046 (.621)	-0.157 (.202)	0.089 (.265)
CMA	-0.332*** (.000)	0.171 (.144)	0.061 (.420)
Adj. R-squared	0.435	0.301	0.083

Significance levels are indicated followingly, * 10%, ** 5% & *** 1%.

7 DISCUSSION ON THE EMPIRICAL RESULTS

The purpose of this chapter is to discuss the results of the multi-factor regression analysis and consider the relevance of the results to the research question "Does ESG performance reflect to stock performance, enhancing momentum effect?" as well as the hypotheses presented in Chapter 1.2. In addition, this chapter compares the results to other relevant studies in this field of research and makes conclusions based on the results.

This paper utilized three different multi-factor portfolio performance models to examine and explain the returns of the ESG momentum as well as the top 10% long and bottom 10% short portfolio. The reasoning for three different multi-factor models resonates from the same literature from which Fama and French (2015) received their inspiration to further add more variables to the original 3-factor model to increase the explanatory power (Black, 1993; Titman et al., 2004; and Novy-Marx, 2013). To put it more simply, adding more variables should decrease the number of errors and increase the model's explanatory power and thus increase the adjusted R-squared. However, to achieve the desired benefits from additional variables, the added variables should also fit the purpose and the data (Griffin, 2002).

Reviewing the results presented in Chapter 6, a few findings will be highlighted. It can be seen that the statistical significance is very high in all three models and the adjusted R-squareds are also at reasonable level in all of the models for the top 10% long and bottom 10% short portfolios. In the Fama-French 3-factor model, all coefficients are significant at a 1% level of significance except the SMB coefficient for the bottom 10% short portfolio. The adjusted R-squared, a measure of fit, is at a reasonably high level (.433 and .300, respectively) for the long and short portfolios, indicating that the model explains 43% and 30% of the returns in these two portfolios. The adjusted R-squared for the combination portfolio "ESG momentum" is low in all three models. The low adjusted R-squared indicates a poor fit; this makes sense since the portfolio combines two very opposite portfolios, one positively and one negatively correlating to the market

movements. Utilizing the Carhart 4-Factor model and Fama-French 5-Factor models should increase the explanatory power. The Carhart 4-factor model's momentum factor is significant for all three portfolios. Furthermore, the adjusted R-squared is the highest in this model compared to all other models. Thus, the Carhart 4-factor model best explains the variation in the dependent variable out of all the models.

Implementing the Fama-French 5-factor model reveals that of the added two factors, the only statistically significant coefficient is for the CMA top 10% long portfolio. This finding indicates that most of the returns cannot be explained by CMA or RMW factors. Therefore, it can further be deduced that this model is not the best fit for this data.

The results obtained from the three multi-factor regression models are used to further discuss the formed hypothesis below:

H_0 = Performing ESG Momentum strategy does not lead to excess returns.

H_1 = Performing ESG Momentum strategy does lead to excess returns.

H_2 = Including only positive ESG momentum criteria into portfolio creation leads to excess returns.

Reflecting on the previous studies conducted, the results of this study are partly in line with the findings made by Nagy et al. (2013;2016) and Giese et al. (2019). Some of the regression coefficients imply similar sensitivities, e.g., towards growth stocks, and positive changes in ESG scores also positively impact the portfolio performance. As the purpose of this study is to showcase the performance of Nordic stock assembled ESG momentum strategy by achieving positive excess returns, rejecting H_0 would be the optimal outcome. However, as the alphas for all three ESG momentum portfolios are negative and statistically significant at 1% level, I reject the H_1 and fail to reject H_0 . I also reject

the H_2 as the top 10% long portfolio's alphas are all negative and statistically significant, indicating slight underperformance compared against the benchmark.

Additionally, this study aims to compare the ESG momentum returns against the "MSCI Nordics ESG" - benchmark index. This comparison is done in chapter 5.2.2 and visualized in Figure 5. As can be seen from the figure, the combination portfolio ESG Momentum lost to its benchmark index. However, the top 10% long portfolio significantly outperformed its benchmark index, indicating that even though there are no excess returns to be achieved with the ESG momentum strategy in the Nordic markets, the constructed ESG momentum portfolio can still outperform many of the indexes out there.

As stated earlier, the results of this study resemble previously conducted relevant studies in this field of research. Findings by Nagy et al. (2013; 2016) show outperformance against their chosen benchmark as well as significant alphas by utilizing ESG momentum and tilt -strategies. These findings partly differ from the findings in this study, as the regression alphas were negative. However, Nagy et al. use vastly different research methods compared to this paper. Nagy et al. (2013; 2016) utilize Barra Global Equity Model (GEM3), which can be seen as a more sophisticated regression model compared to the three multi-factor models used in this study. They also use the MSCI World Index as their investment universe, which can significantly affect the results as the universe includes over 1500 companies compared to the Nordic ESG company data used in this study (110-516 companies with ESG data).

In this study, the portfolio construction was done by following Jegadeesh and Titman (1993) and Bergskaug (2019) and is supposed to mimic an investment strategy that could be implemented into real-life (considering the amount of transaction costs, etc.). This differs significantly from Nagy et al. (2013; 2016) studies, where they include the whole investment universe in their research. Reflecting on a similar study conducted by Bergskaug (2019), the results of this study are somewhat similar: both studies failed to find negative alphas and concluded to reject the alternative hypothesis. In this study,

however, the alphas are significant, unlike in Bergskaug's research. While the research methods are similar in both studies, Bergskaug uses market and ESG data from developed and developing markets, while this paper uses Nordic market data. These markets are vastly different, which can explain the divergent results.

This study's next and final chapter summarizes the study and its findings. In the following conclusions chapter, I will also discuss the possible fruitful angles for future research based on this study.

8 CONCLUSIONS

Environmental, Social, and Governance (ESG) aspects have become increasingly important over the past 20 years due to growing social, environmental, and political challenges. The reasons why ESG factors are as important as they are in today's world stem from a growing awareness of a business's environmental and social impacts. The constant concerns about climate change, among other environmental and social issues such as labor practices, human rights, diversity, and inclusion, are becoming increasingly crucial to different business stakeholders. Resonating from the above, businesses face continuously growing pressure towards sustainability, leading to more responsible business decisions and practices.

Among other factors, many regulatory- and legislation changes have accelerated the shift towards sustainability and ESG -practices. Businesses increasingly adopt ESG best practices as part of their strategy and business practices, which has had several unexpected consequences. Growing evidence of the linkage between strong ESG performance and financial performance has started to attract more institutional- and private investors. Various factors contribute to this phenomenon: strong ESG performance is found to reduce company-specific risks and costs that are indirectly linked to stock returns. Company-level ESG considerations are also found to positively affect business reputation and brand through better relations with customers, employees, and investors.

This study aims to contribute to the existing SRI literature by implementing an investment strategy that is relatively new in SRI and ESG research. The strategy that is constructed in this study is ESG Momentum which utilizes the proven momentum effect – a well-known effect where past winners tend to outperform the past losers. By implementing a similar momentum approach to ESG ratings, which are found to have a positive effect on company-level financial performance, this study presents results on whether ESG Momentum exists in Nordic markets and whether performing the ESG Momentum strategy can provide excess returns for the investors. Also, this study uses a more practical approach in portfolio construction compared to previously conducted relevant ESG

Momentum studies. To keep the trading costs realistic, this study restricts the number of companies in the portfolios and extends the holding period to 12 months (commonly holding period in other momentum studies is 3 or 6 months).

As previously mentioned, this study concentrates on Nordic markets: Finland, Sweden, Denmark, and Norway. These countries are often referred to as being the sustainability leaders in the world; therefore, it is fascinating to find out whether the leadership is shown in the results as well. The ESG rating data is pulled from the Refinitiv ASSET4 ESG database, and the share price data is obtained from the Refinitiv DataStream database. It needs to be addressed that the lack of standardization in ESG measures can affect the results of this study, as the scores can vary depending on which data provider is used. In portfolio construction, three different portfolios are constructed: ESG Momentum Long (top 10% long), ESG Momentum Short (bottom 10% short), and ESG Momentum (combination of both long- and short portfolios). After portfolio creation, the portfolio performance analysis is done by utilizing three different multi-factor portfolio performance measures: Fama-French 3-Factor Model, Carhart 4-Factor Model, and Fama-French 5-Factor Model.

The findings of this study resemble but do not align with the previous research around this topic (Nagy et al., 2013 & 2016). This study fails to find positive alphas for ESG momentum in the Nordic markets, and there can be several reasons explaining the inconsistency in the results with other similar studies. Firstly, the differences in market frictions, culture, and industry weighting vary greatly between different markets and economies. Also, the mentioned inconsistencies in ESG ratings caused by the lack of standardization between the rating agencies can distort the findings from other studies depending on what data provider they use (Dorfleitner et al., 2015). Thirdly, the empirical part of this study is done so that it can be carried out in the real world. This is done by extending the holding period and reducing the number of companies in the portfolios to achieve lower trading costs. Reduced amount of companies together with extended 12

month holding period may have significant impact on the returns, when compared to the methodology used in Nagy et al. (2013 & 2016) and Giese et al. (2019) studies.

As presented above, this study fails to find positive alphas for all three Nordic ESG momentum portfolios constructed over the 2010-2021 period. The regression outputs for all three multi-factor models show statistically significant alphas that are negative yet close to zero. However, reviewing the returns of the individual portfolios in Figure 5, one can see that the Top 10% Long portfolio outperforms its benchmark MSCI Nordics ESG Index, indicating a positive relationship with improving ESG score and stock performance. Combination of both long and short positions – ESG Momentum portfolio does show positive performance, however losing to its benchmark. Reviewing the performance of the Bottom 10% Short portfolio, the decrease in the company's ESG score is not affecting the stock performance negatively in the Nordics during the reference period, as many of the short positions tend to fail, especially during the bull market.

The results of this study contribute to the existing SRI literature by extending ESG momentum research to Nordic markets. By modifying academically proven methodology to adjust for modern investors' needs, this study provides results that can be used as a reference when executing SRI strategies, such as the momentum strategy. The results indicate that performing ESG momentum as it is done in this study is not efficient enough to provide abnormal returns in the Nordic markets during the chosen sample period. However, the evidence from previous studies combined with these results can lead to more fruitful approaches, such as utilizing the positive momentum effect with specific industries and simultaneously taking advantage of available information on factors provided in this study and previous studies. Further analysis on these factors that are considered to affect the profitability of momentum strategies, such as low market frictions and low economic uncertainty, can provide fruitful results in the future when combined with appropriate empirical methodology. Lastly, this study addresses that an investor should approach the investment strategies discussed with care, as there are still many unknown factors in this relatively new field of academic research.

REFERENCES

- Asness, C. S., Moskowitz, T. J., & Pedersen, L. H. (2013). Value and Momentum Everywhere. *The Journal of Finance*, *68*(3), 929–985.
<https://doi.org/10.1111/jofi.12021>
- American Association of Individual Investors. (2000). A look at the momentum investing: screening for stocks on a roll. Retrieved from:
<https://www.aaii.com/files/journal/pdf/a-look-at-momentum-investing-screening-for-stocks-on-a-roll.pdf>
- Barin Cruz, L., & Boehe, D. M. (2010). How do Leading Retail MNCs Leverage CSR Globally? Insights from Brazil. *Journal of Business Ethics*, *91*(S2), 243–263. <https://doi.org/10.1007/s10551-010-0617-8>
- Beal, D. J., Goyen, M., & Philips, P. (2005). Why Do We Invest Ethically? *The Journal of Investing*, *14*(3), 66–78. <https://doi.org/10.3905/joi.2005.580551>
- Bergskaug, E. (2019). Performance of the ESG Momentum Strategy.
<https://urn.fi/URN:NBN:fi-fe2019121748628>
- Bird, R., Gao, X., & Yeung, D. (2017). Time-series and cross-sectional momentum strategies under alternative implementation strategies. *Australian Journal of Management*, *42*(2), 230–251.

Carhart, M.M., (1997). On persistence in mutual fund performance. *The Journal of Finance*, 52(1), pp.57-82.

CFA Institute. (2022). Using Multi-factor Models. Retrieved 2022-10-19 from <https://www.cfainstitute.org/en/membership/professional-development/re-fresher-readings/using-multifactor-models>

Chabot, B. R., Ghysels, E., & Jagannathan, R. (2014). Momentum Trading, Return Chasing, and Predictable Crashes. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2539800>

Chen, H. Y., & Yang, S. S. (2020). Do Investors exaggerate corporate ESG information? Evidence of the ESG momentum effect in the Taiwanese market. *Pacific-Basin Finance Journal*, 63, 101407. <https://doi.org/10.1016/j.pacfin.2020.101407>

Crane, A., Matten, D., & Spence, L.J. (2013). Corporate Social Responsibility: In Global Context. *Corporate Social Responsibility: Readings. and Cases in a Global Context*. Retrieved 2022-03-02 from https://www.researchgate.net/publication/228123773_Corporate_Social_Responsibility_In_Global_Context

Dahlsrud, A. (2008). How corporate social responsibility is defined: an analysis of 37 definitions. *Corporate Social Responsibility and Environmental Management*, 15(1), 1–13. <https://doi.org/10.1002/csr.132>

Dhankar, R., & Maheshwari, S. (2016). Behavioural Finance: A New Paradigm to Explain Momentum Effect. *SSRN Electronic Journal*.

<https://doi.org/10.2139/ssrn.2785520>

Dorfleitner, G., Halbritter, G., & Nguyen, M. (2015). Measuring the level and risk of corporate responsibility – An empirical comparison of different ESG rating approaches. *Journal of Asset Management*, 16(7), 450–

466. <https://doi.org/10.1057/jam.2015.31>

el Ghouli, S., Guedhami, O., Kwok, C. C., & Mishra, D. R. (2010). Does Corporate Social Responsibility Affect the Cost of Capital? *SSRN Electronic Journal*.

<https://doi.org/10.2139/ssrn.1540299>

European Commission. (2023). Corporate Sustainability Reporting. Retrieved from: Corporate sustainability reporting (europa.eu)

Eurosif. (2021). *Responsible Investment Strategies*. Retrieved from: <https://www.eurosif.org/responsible-investment-strategies/>

Fama, E. F. (1970). Efficient Capital Markets: A Review of Theory and Empirical

Work. *The Journal of Finance*, 25(2), 383–417. <https://doi.org/10.2307/2325486>

- Fama, E. F., & French, K. R. (1992). The Cross-Section of Expected Stock Returns. *Journal of Finance*, 47(2), 427. <https://doi.org/10.2307/2329112>
- Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, 33(1), 3–56.
[https://doi.org/10.1016/0304-405x\(93\)90023-5](https://doi.org/10.1016/0304-405x(93)90023-5)
- Fama, E. F., & French, K. R. (1996). Multi-factor Explanations of Asset Pricing Anomalies. *Journal of Finance*, 51(1), 55. <https://doi.org/10.2307/2329302>
- Fama, E. F., & French, K. R. (2015). A five-factor asset pricing model. *Journal of Financial Economics*, 116(1), 1–22. <https://doi.org/10.1016/j.jfineco.2014.10.010>
- Fama, E. F., & French, K. R. (2018). Choosing factors. *Journal of Financial Economics*, 128(2), 234–252. <https://doi.org/10.1016/j.jfineco.2018.02.012>
- Friede, G., Busch, T., & Bassen, A. (2015). ESG and financial performance: aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance & Investment*, 5(4), 210–233. <https://doi.org/10.1080/20430795.2015.1118917>
- Friedman, M. (1970). The Social Responsibility of Business is to Increase its Profits. *The New York Times Magazine*, p. 122-126

Georgopoulou, A., & Wang, J. G. (2016). The Trend Is Your Friend: Time-Series Momentum Strategies across Equity and Commodity Markets*. *Review of Finance*, 21(4), 1557–1592. <https://doi.org/10.1093/rof/rfw048>

Griffin, J. M. (2002). Are the Fama and French factors global or country specific? *The Review of Financial Studies*, 15(3), 783–803.

Groenewold, N. (1997). Share Prices and Macroeconomic Factors. *Journal of Business Finance & Accounting*, 24(9 & 10), 1367–1383.
<https://doi.org/10.1111/1468-5957.t01-1-00168>

GSIA. (2020). GSIA Trends Report 2020. <http://www.gsi-alliance.org/trends-report-2020/>

Giese, G., Lee, L. E., Melas, D., Nagy, Z., & Nishikawa, L. (2019). Foundations of ESG Investing: How ESG Affects Equity Valuation, Risk, and Performance. *The Journal of Portfolio Management*, 45(5), 69–83. <https://doi.org/10.3905/jpm.2019.45.5.069>

Ivanisevic Hernaus, A. (2019). Exploring the strategic variety of socially responsible investment. *Sustainability Accounting, Management and Policy Journal*, 10(3), 545–569. <https://doi.org/10.1108/sampj-07-2018-0182>

Jegadeesh, N., & Titman, S. (1993). Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency. *The Journal of Finance*, 48(1), 65–91. <https://doi.org/10.1111/j.1540-6261.1993.tb04702.x>

Jensen, M. C. (1968). The Performance of Mutual Funds in the Period 1945–1964. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.244153>

Kim, Y., Li, H., & Li, S. (2014). Corporate social responsibility and stock price crash risk. *Journal of Banking & Finance*, 43, 1–13. <https://doi.org/10.1016/j.jbankfin.2014.02.013>

Korajczyk, R. A., & Sadka, R. (2004). Are Momentum Profits Robust to Trading Costs? *The Journal of Finance*, 59(3), 1039–1082. <https://doi.org/10.1111/j.1540-6261.2004.00656.x>

Kreander, N., Gray, R., Power, D., & Sinclair, C. (2005). Evaluating the Performance of Ethical and Non-ethical Funds: A Matched Pair Analysis. *Journal of Business Finance Accounting*, 32(7–8), 1465–1493. <https://doi.org/10.1111/j.0306-686x.2005.00636.x>

Lakonishok, J. and Shapiro, A.C., (1986). Systematic risk, total risk, and size as determinants of stock market returns. *Journal of Banking & Finance*, 10(1), pp.115-132.

- Lesmond, D. A., Schill, M. J., & Zhou, C. (2004). The illusory nature of momentum profits. *Journal of Financial Economics*, 71(2), 349–380.
[https://doi.org/10.1016/s0304-405x\(03\)00206-x](https://doi.org/10.1016/s0304-405x(03)00206-x)
- Lins, K. V., Servaes, H., & Tamayo, A. (2017). Social Capital, Trust, and Firm Performance: The Value of Corporate Social Responsibility during the Financial Crisis. *The Journal of Finance*, 72(4), 1785–1824.
<https://doi.org/10.1111/jofi.12505>
- Markowitz, H., (1952). Portfolio selection. *The Journal of Finance*, 7(1), pp.77-91.
- Nagy, Z., Cogan, D. G., & Sinnreich, D. (2013). Optimizing Environmental, Social and Governance Factors in Portfolio Construction: Analysis of Three ESG-Tilted Strategies. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2221524>
- Nagy, Z., Kassam, A., & Lee, L. E. (2016). Can ESG Add Alpha? An Analysis of ESG Tilt and Momentum Strategies. *The Journal of Investing*, 25(2), 113–124. <https://doi.org/10.3905/joi.2016.25.2.113>
- Novy-Marx, R., (2013). The other side of value: The gross profitability premium. *Journal of Financial Economics* 108, 1–28
- Nikkinen, J., Rothovius, T. & Sahlström, P. (2002). Arvopaperisijoittaminen. 218-225. WSOY.

Phoebus J. Dhrymes, Irwin Friend, Mustafa N. Gultekin, & N. Bulent Gultekin. (1985).

New Tests of the APT and Their Implications. *Journal of Finance*, 40(3), 659.

<https://doi.org/10.2307/2327788>

Refinitiv. (2022). *ESG Scores*. <https://www.refinitiv.com/en/sustainable-finance/esg-scores>

Refinitiv. (2021). *ESG Methodology*. https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

Reinganum, M.R., (1981). Empirical tests of multi-factor pricing model. *The Journal of Finance*, 36(2).

Renneboog, L., ter Horst, J., & Zhang, C. (2008). Socially responsible investments: Institutional aspects, performance, and investor behavior. *Journal of Banking & Finance*, 32(9), 1723–1742. <https://doi.org/10.1016/j.jbankfin.2007.12.039>

Revelli, C. (2017). Socially responsible investing (SRI): From mainstream to margin? *Research in International Business and Finance*, pp. 39, 711–717. <https://doi.org/10.1016/j.ribaf.2015.11.003>

Richard Roll, & Stephen A. Ross. (1980). An Empirical Investigation of the Arbitrage Pricing Theory. *Journal of Finance*, 35(5), 1073. <https://doi.org/10.2307/2327087>

Robeco. (2021). Country Sustainability Ranking. https://www.robeco.com/media/3/2/5/325dd63882d778324dd13ad2122d8ecb_202108-country-sustainability-ranking_tcm17-31263.pdf

Ross, S. A. (1976). The arbitrage theory of capital asset pricing. *Journal of Economic Theory*, 13(3), 341–360. [https://doi.org/10.1016/0022-0531\(76\)90046-6](https://doi.org/10.1016/0022-0531(76)90046-6)

Sapienza, P., & Zingales, L. (2012). A Trust Crisis. *International Review of Finance*, 12(2), 123–131. <https://doi.org/10.1111/j.1468-2443.2012.01152.x>

Schueth, S. (2003). Socially Responsible Investing in the United States. *Journal of Business Ethics*, 43(3), 189–194. <https://doi.org/10.1023/a:1022981828869>

Sharpe, W. F. (1994). The Sharpe Ratio. *The Journal of Portfolio Management*, 21(1), 49–58. <https://doi.org/10.3905/jpm.1994.409501>

Sustainable Development Report, (2021). SDG Index. <https://dashboards.sdgindex.org/rankings>

- Titman, S., Wei, K., Xie, F., (2004). Capital investments and stock returns. *Journal of Financial and Quantitative Analysis* 39, 677–700.
- Treynor, J. and Mazuy, K., (1966). Can mutual funds outguess the market? *Harvard business review*, 44(4), 131–136.
- UN PRI (2018). Financial Performance of ESG Integration in US Investing. Retrieved 2023-01-04 from <https://www.unpri.org/download?ac=4218>
- US SIF Foundation (2021a). Trends Report. Retrieved 2022-03-07 from <https://www.ussif.org/trends>
- US SIF Foundation (2021b). ESG incorporation. Retrieved 2022-03-02 from <https://www.ussif.org/esg>
- van Duuren, E., Plantinga, A., & Scholtens, B. (2015). ESG Integration and the Investment Management Process: Fundamental Investing Reinvented. *Journal of Business Ethics*, 138(3), 525–533. <https://doi.org/10.1007/s10551-015-2610-8>
- World Business Council for Sustainable Development (2000). Corporate social responsibility: making good business sense. Retrieved 2022-03-02 from 47 <http://www.ceads.org.ar/downloads/Making%20good%20business%20sense.pdf>