Vaasan yliopisto
UNIVERSITY OF VAASA

Kai Nyroos

THE EFFECTS OF INTEGRATION OF POSITIVE ESG MOMENTUM CRITERIA ON PORTFOLIO PERFORMANCE

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Author:	Kai Nyroos		
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Name of the Supervisor:	Vanja Piljak		
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ABSTRACT:

During the past few decades, environmental, social and governance (ESG) related issues have gained a lot of media time. This attention has reached investors and accelerated the continuously rising megatrend of socially responsible investing (SRI). As the industry is growing, and the investors are always trying to find new methodologies to make excess returns, the amount of SRI strategies is also rising. One of these strategies is the ESG momentum strategy, which is still a relatively new SRI strategy. Whereas the traditional SRI strategies typically focus on absolute ESG scores, ESG momentum ranks companies by focusing on the ESG growth rates.

This study contributes to the existing literature by focusing only on the positive ESG momentum criteria, leaving the worst ESG improvers out of the examination. Using financial and ESG data provided by Refinitiv, this study examines the financial performance of four different portfolios constructed by integrating the positive ESG momentum criteria. Portfolios are constructed for the sample period of 2005-2019, using S&P 500 companies. S&P 500 companies are first divided into two investment universes each year by the median market capitalization to compare whether the size of the company matters on portfolio performance. Two portfolios are constructed from both of the investment universes: Top 10%- and Top 25%-portfolios ranked by the previous year's ESG growth rate. These portfolios' financial performances are measured using CAPM, Fama-French 3-, 5-, & 6-factor models and the Carhart 4-factor model.

The findings of this study are not similar compared to previous literature. OLS regression analysis results show mostly a negative alpha for all portfolios. However, these findings are not statistically significant. All of the models show very high R-Squared and market factors statistically significant at a 1% significance level, indicating that the portfolio returns are mainly driven by market returns. Previous literature mostly shows outperformance compared to market returns for the ESG momentum strategy. The mixed findings of this study almost certainly result from the differences in data & methodology compared to existing literature. However, it shows investors that any ESG studies' findings should always be viewed critically due to vast differences in data between ESG data providers. This is even more true regarding ESG momentum studies, as the number of studies is extremely limited.

KEYWORDS: Socially Responsible Investing, ESG, ESG Momentum, S&P 500, Alpha

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TIIVISTELMÄ:

Viime vuosikymmenten aikana, ympäristövastuun, sosiaalisen vastuun ja hallintotapaan (ESG) liittyvät asiat ovat saaneet merkittävästi huomiota mediassa. Tämä huomio on tavoittanut myös sijoittajat, mikä on kiihdyttänyt entisestään vastuullisen sijoittamisen (SRI) kasvavaa megatrendiä. Alan kasvamisen ja sijoittajien jatkuvan ylituottojen etsimisen myötä, myös vastuullisten sijoitusstrategioiden kysyntä ja määrä on kasvanut. Yksi näistä strategioista on ESG momentum –strategia, mikä on vielä suhteellisen uusi vastuullinen sijoitusstrategia. Normaalisti perinteiset vastuulliset sijoitusstrategiat keskittyvät absoluuttisten ESG-pisteisiin. Tämän sijaan, ESG momentum –strategia asettaa yritykset paremmuusjärjestykseen ESG-pisteiden kasvunopeuden perusteella.

Tämä tutkimus antaa panoksensa aikaisempaan kirjallisuuteen keskittymällä ainoastaan positiiviseen ESG momentum –efektiin, jättämällä siis huonoimmat ESG-parantajat tutkimuksen ulkopuolelle. Tämä tutkimus Refinitivin käyttää ESG- ja finanssidataa. Käyttämällä kyseistä dataa, tutkimuksen tarkoituksena on tarkastella neljän portfolion performanssia, jotka on muodostettu käyttämällä ESG momentum kriteerejä. Portfolioiden performanssia tutkitaan periodilla 2005-2019, käyttämällä S&P 500-indeksin yrityksiä. Aluksi S&P 500-indeksin yrityksen jaetaan kahteen eri sijoitusuniversumiin yritysten markkina-arvon perusteella. Näin myös tutkitaan, onko yrityksen koolla merkitystä, kun ESG momentum –strategiaa käytetään. Tämän jälkeen molemmista sijoitusuniversumeista muodostetaan kaksi portfoliota: Top 10%- ja Top 25%-portfoliot viime vuoden ESG-pisteiden kasvunopeuden perusteella. Portfolioiden performanssia mitataan käyttämällä CAPM:a, Faman & Frenchin 3-, 5-, sekä 6-faktorin mallia ja Carhartin 4-faktorin mallia.

Tämän tutkimuksen tulokset eriävät aikaisempien ESG momentum –strategiaa tutkivien tulosten kanssa. OLS regressioanalyysin tulokset tuottavat pääasiassa negatiivisen alfan. Nämä tulokset eivät kuitenkaan ole tilastollisesti merkittäviä. Kaikkien mallien selitysaste (R-Squared) on erittäin korkea ja markkinafaktorit ovat tilastollisesti merkittäviä 1% merkitsevyysasteella. Tämä osoittaa, että markkinatuotot selittävät suurimmaksi osaksi portfolioiden tuotot. Aikaisemmat tutkimukset ESG momentum –strategiaan liittyen osoittavat enimmäkseen positiivista alfaa. Erot aikaisemman kirjallisuuden ja tämän tutkimuksen välillä johtuvat mitä todennäköisemmin datan ja metodologian eroavaisuuksissa. Sijoittajien tulee kuitenkin muistaa, että kaikkien ESG-tutkimusten tuloksiin tulisi suhtautua kriittisesti, koska ESG data vaihtelee huomattavasti eri datan palveluntarjoajien välillä. Tämä on sitäkin tärkeämpää ESG momentum –strategian osalla, koska aikaisempien tutkimusten määrä on erittäin rajoitettu.

AVAINSANAT: Socially Responsible Investing, ESG, ESG Momentum, S&P 500, Alpha

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Abbreviations

CAPM	Capital Asset Pricing Model
CDFI	Community Development Financial Institution
CFP	Corporate Financial Performance
CSR	Corporate Social Responsibility
EMH	Efficient Market Hypothesis
ESG	Environmental, Social and Governance
Eurosif	European Sustainable Investment Forum
GEM3	The Barra Global Equity Model
GSIA	Global Sustainable Investment Alliance
IVA	Intangible Value Assessment
MPT	Modern Portfolio Theory
MSCI	Morgan Stanley Capital International
PRI	Principles of Responsible Investing
S&P	Standard & Poor's
SRI	Socially Responsible Investing
US SIF	The Forum for Sustainable Investment

1 INTRODUCTION

In the recent decade, the world has faced some enormous challenges. These challenges are highlighted in today's society: environmental challenges caused by climate change, social injustice, economic inequality, and much more. As these challenges have gained more and more attention, it has accelerated the growth of socially responsible investing (SRI). The continuous growth of SRI is explained by the increasing number of investors and the fact that they want to invest their capital according to their values or that their investments have a meaning. Instead, this has given pressure to companies to show that they are acting according to investors' values. Thus, companies have been forced to integrate the environmental, social and governance (ESG) risk factors into their day-to-day decision-making. However, integrating these risk factors is not entirely due to outside pressure. Many companies believe that integrating these factors into the company's day-to-day decision-making leads to abnormal returns.

These abnormal returns can be obtained in several different ways. Van Duuren, Plantinga & Scholtens (2016) show that incorporating non-financial dimensions can improve performance by mitigating risk or increasing returns. Authors speculate that the mitigation of risk can be due, for example, that companies with high ESG scores might have a lower probability of a company scandal. Increasing returns instead might accrue from the high correlation between ESG factors and company-specific factors, which are associated with higher returns. Companies' high ability to plan strategically might be due to high environmental and social scores. In contrast, a high governance score can be associated with high-quality management, which is associated with higher returns. Godfrey (2005) argues that companies with high ESG scores have "insurance-like" protection due to the positive moral capital among its stakeholders under challenging times. Furthermore, the integration of ESG factors usually strengthens relationships with different stakeholders, leading to better performance. (Renneboog et al., 2008)

In contrast, some research shows that the integration of ESG factors does not lead to better company performance. According to traditional economic theory, companies should always try to maximize shareholder value (Shank et al., 2005). Based on this view, one could arguably question how the company's ethical and social efforts relate to maximizing shareholder value. Milton Friedman (1970) famously states that social efforts should be no concern of the company. Instead, companies should focus solely on profit maximization, as long as they operate within the laws and regulations. Furthermore, company management may over-invest in CSR strategies for private benefits, which leads to higher agency costs and thus decreases performance. (Barnea & Rubin, 2006)

As we can see, the integration of ESG risk factors as a concept remains controversial, and the research also shows mixed results. Friede et al. (2015) conduct a meta-study where they combine the results of over 2000 studies regarding the relationship between ESG and corporate financial performance (CFP). The study's key finding is that over 90% of the studies examined show a non-negative relationship between ESG and CFP. Furthermore, around 50% of the studies show a positive relationship, 40% show mixed results or no relationship, and only around 10% of the studies show a negative relationship between ESG and CFP. These results give a promising foundation for investigating the relationship between ESG factors and CFP and contributing to its existing literature.

1.1 Purpose of the Study, Research Questions and Hypotheses

This study aims to contribute to the existing literature of the continuously growing industry of SRI. More specifically, this study examines the relationship between ESG factors and CFP by using a relatively new SRI strategy, the ESG momentum strategy. Compared to traditional ESG related strategies, the ESG momentum strategy focuses on the ESG growth rates instead of absolute ESG scores. This way, the strategy tries to capture the companies' excess returns that are yet to be recognized by the traditional ESG screening strategies. Existing literature about the ESG momentum strategy is extremely limited, yet the results are promising. This study aims to verify the previously studied positive rela-

tionship between ESG momentum and excess returns and thus provide a viable SRI strategy to the investors. Different from previous studies, this study only focuses on the positive ESG momentum effect. This study also aims to contribute by focusing solely on the US market, as it is by far the largest market in the world and is somewhat lacking Europe in SRI. This study's motivation and purpose are next formed into research questions and hypotheses, which will guide the reader for the rest of this study.

As we discussed above, this study's primary focus is to examine the relationship between ESG factors and CFP. More specifically, this study focuses on the relationship between the positive ESG momentum effect and excess returns of the company. This can be further constructed to the first research question of this study:

RQ1: *Does the integration of positive ESG momentum criteria affect company performance?*

Furthermore, as we expect that there is no relationship between positive ESG momentum effect and excess returns, this research question can be shaped into the first null hypothesis of this study:

$H_{0,a}$ = Integration of the positive ESG momentum criteria does not lead to excess returns

However, as we are trying to find a relationship between the positive ESG momentum effect and excess returns, we can form the first alternative hypothesis of this study:

$H_{1,a}$ = Integration of the positive ESG momentum criteria leads to excess returns

The relationship between the integration of the positive ESG momentum criteria and excess returns is examined by using the ESG and financial data provided by Refinitiv over the sample period of 2005-2019. The positive ESG momentum effect is captured by con-

structing Top 10%- and Top 25%-portfolios from two different investment universes. Furthermore, the relationship and the financial performance of the constructed portfolios are examined by using the Capital Asset Pricing Model (CAPM), Fama-French 3-, 5-, & 6-factor models and Carhart 4-factor model.

This study also examines whether the company's size affects the portfolio performance when integrating the positive ESG momentum criteria. This is done by dividing the S&P 500 index into two investment universes using the median market capitalization of the index as a dividing point. From there, the portfolios examined in this study are constructed by ranking the companies by the ESG growth rate. Furthermore, the second research question of this study can be constructed as follows:

RQ2: *Does the size of the company affect portfolio performance when integrating the positive ESG momentum criteria?*

Furthermore, this research question can be shaped into the second null and alternative hypotheses of this study:

$H_{0,b}$ = Company size does not affect portfolio performance when integrating the positive ESG momentum criteria

$H_{1,b}$ = Company size affects portfolio performance when integrating the positive ESG momentum criteria

Moreover, the performance of the constructed portfolios is further examined and compared in different market conditions as well. Thus, we can construct the third research question of this study as follows:

RQ3: *When integrating positive ESG momentum criteria, does the size of the company affect portfolio performance in different market conditions?*

The portfolio performances are measured and compared in three different market conditions by dividing the whole sample period 2005-2019 to three different sample periods: pre-crisis period 2005-2006, crisis period 2007-2009 and after-crisis period 2010-2019. Hence, we can construct the following hypotheses to answer this research question:

$H_{0,c}$ = Company size does not affect portfolio performance when integrating the positive ESG momentum criteria in different market conditions

$H_{1,c}$ = Company size affects portfolio performance when integrating the positive ESG momentum criteria in the pre-crisis period 2005-2006

$H_{2,c}$ = Company size affects portfolio performance when integrating the positive ESG momentum criteria in the crisis period 2007-2009

$H_{3,c}$ = Company size affects portfolio performance when integrating the positive ESG momentum criteria in the after-crisis period 2010-2019

1.2 Structure of the Study

In order to answer the research questions of this study, the study is constructed as follows. Section 2 profoundly introduces the reader to the concept of socially responsible investing (SRI), as it is critical for the reader to understand the motivation behind it before continuing further with this study. It goes through the development of SRI during the past few decades and compares the most common SRI strategies, focusing on the ESG momentum strategy. After this, section 3 continues with the ESG momentum strategy and discusses the findings of the most relevant literature regarding it. Section 4 introduces the reader to the theoretical background behind the study and its relationship to SRI. Section 5 introduces the data and methodology used in this study and displays some descriptive statistics. In section 6, the empirical results are presented and discussed. Finally, section 7 concludes the study and presents ideas for further research.

2 SOCIALLY RESPONSIBLE INVESTING

This section introduces socially responsible investing (SRI) and the related concepts necessary to understand before moving further in the study. First, the section introduces the history of SRI and its development into its current state. Secondly, the section discusses the current state of SRI and introduces the concepts of corporate social responsibility (CSR) and Environmental, Social and Governance (ESG). The last section introduces the most common SRI strategies implemented by investors. In addition to these strategies, a more recently found ESG momentum strategy will be introduced comprehensively, as it will be the primary strategy implemented in this study.

2.1 Development of SRI

The origins of what we today call SRI date back centuries from Christian, Jewish and Islamic traditions. In the early days, this could be noticed from the teachings on how to use money ethically and from some investment and loan restrictions and the prohibition of usury. In the 1920s, the Methodists already avoided investing in “sinful” companies, such as companies operating in tobacco, alcohol, gambling and weapon industries. This form of screening of the “sin stocks” is still a widely used SRI strategy. (Renneboog et al., 2008; Schueth, 2003)

The modern roots of SRI date back to the 1960s when several movements, for example, the anti-Vietnam war, civil rights, the anti-racist and equality for women movements, gained publicity and made investors more aware of the social consequences. The first modern SRI mutual fund was founded in 1971, and it started to avoid investing in the weapon industry due to the Vietnam War (Renneboog et al., 2008). After that, SRI gained momentum towards green thinking due to environmental catastrophes such as Chernobyl and Exxon Valdez and the new information regarding global warming. Even more recently, humankind has faced a wide variety of ethical problems such as human rights issues, school shootings, the Global financial crisis and even the environmental issues have gained more attention. In addition to these issues, the rise of consumer behavior

called “ethical consumerism”, where consumers are willing to consume more expensive products if the products meet their ethical values, has shaped the SRI towards a more balanced ESG approach. (Renneboog et al., 2008; Schlueth, 2003)

2.2 SRI today

Before we move further to discuss the current state of SRI, it is appropriate to define SRI first. Although SRI is a globally spread term today, its definition varies among academicians and investors. SRI, usually known as socially conscious, ethical or sustainable investing, refers to an investing strategy that combines investors’ economic interests with one’s social, ethical and ecological interests. Frequently, investors implementing an SRI strategy are willing to sacrifice financial gains so that their investments would achieve better social, ethical and environmental benefits. (Brzeszczyński & McIntosh 2014)

Massive study by Eccles and Viviers (2011) reviews 190 studies conducted between 1975 and 2009 concerning the meanings and origins describing the names of responsible investing. They find that the most used terms are “Responsible Investing” and “Ethical Investing”. “Responsible Investing” is usually associated with positive screening, best-in-class and cause-based investing strategies, and these terms typically occur in ethical egoism studies. In contrast, the term “Ethical Investing” is associated with deontological ethics studies. In addition to these two terms, terms such as responsible investing, faith-based investing, moral investing, community investing, environmentally responsible investing and green investing occur in the academic literature. Due to the wide variety of terms associated with the genre, Eccles and Viviers think that the term “Responsible Investment” needs a formal definition. Therefore, they suggest that the term “Responsible Investment” would be defined as: (Eccles & Viviers, 2011)

“Investment practices that integrate a consideration of ESG issues with the primary purpose of delivering higher-risk-adjusted financial returns”.

In the previous literature, academicians have defined SRI with their own words, and the definition has evolved over the years. Although SRI has many definitions, the term SRI

discussed in this study considers all forms of ethical and responsible investing. Yet, the comprehensive definition of the Sustainable Investment Forum of Europe is worth mentioning: (Eurosif 2016)

"Sustainable and responsible investment ("SRI") is a long-term oriented investment approach which integrates ESG factors in the research, analysis and selection process of securities within an investment portfolio. It combines fundamental analysis and engagement with an evaluation of ESG factors to better capture long term returns for investors, and to benefit society by influencing the behavior of companies."

Definitions by Eccles & Viviers (2011) and Eurosif (2016) both highlight the ESG integration as a critical part of SRI. This assumption is illustrated in this study as well. Now that the term SRI has been defined, we can discuss the current state of SRI.

In recent decades, the SRI industry has grown more rapidly than ever, and there are no indicators that the growth of the industry would be slowing down. The growth of the industry to its current state is more extensive than ever, and it has inspired the founding of several alliances and institutions to promote and foresee the industry, such as Global Sustainable Investment Alliance (GSIA) and Principles for Responsible Investing (PRI). Both institutions are major actors in the field and advocate sustainable growth, particularly by implementing the ESG criteria.

The PRI started its journey as a leading advocate of the industry in 2006. The PRI is an independent non-profit institution that is supported by the United Nations. It openly promotes responsible investing by implementing the ESG criteria so that the investors could gain better risk-adjusted returns. It promotes that its actions have a long-term horizon to favor its signatories, financial markets, and ultimately for the whole society and environment. The long-term benefits for society and the environment are gained through a sustainable and economically efficient financial system. This mission of the

institution is fulfilled by promoting the six principles and encouraging their implementation: (PRI, 2019)

Principle 1: *We will incorporate ESG issues into investment analysis and decision-making process.*

Principle 2: *We will be active owners and incorporate ESG issues into our ownership policies and practices.*

Principle 3: *We will seek appropriate disclosure on ESG issues by the entities in which we invest.*

Principle 4: *We will promote acceptance and implementation of the Principles within the investment industry.*

Principle 5: *We will work together to enhance our effectiveness in implementing the Principles.*

Principle 6: *We will each report on to our activities and progress towards implementing the Principles.*

The PRI started its operations in 2006 with just 100 signatories. As the megatrend of SRI has grown more rapidly than ever during recent years, the number of signatories has also grown increasingly. Figure 1 below displays the growth of the PRI signatories and the assets under their management. The number of signatories has grown from the 100 founding signatories to 2372 signatories by 2019. The trend is still strong, as the number of signatories grew by 421 signatories between 2018 and 2019, which is the highest absolute growth in PRI history. By the end of 2018, the total assets under the management reached an outstanding 86.3 trillion US dollars (PRI 2019):

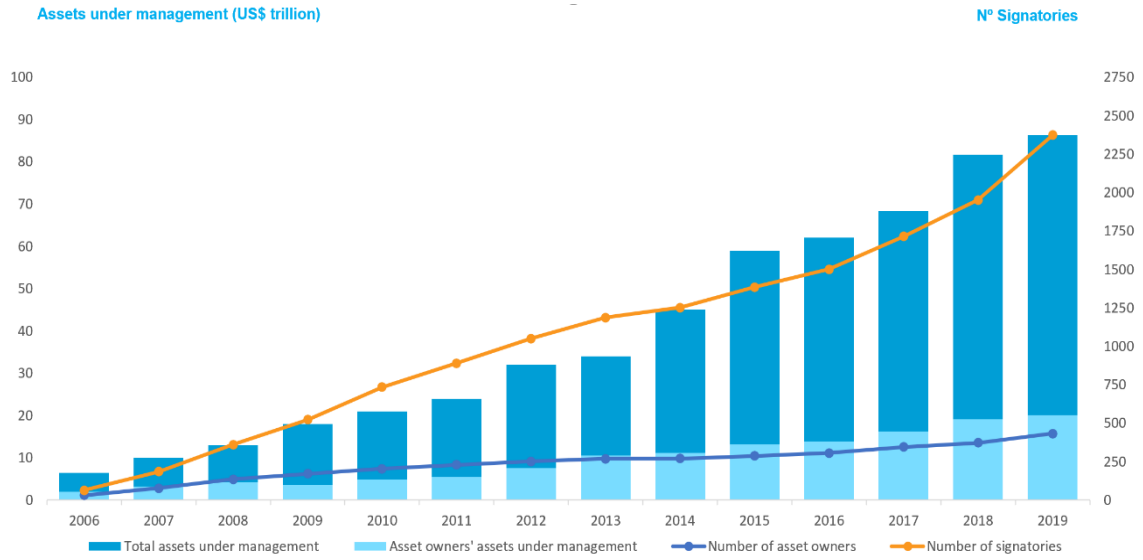


Figure 1. The growth of PRI signatories (PRI, 2019).

Another major institution mentioned, the Global Sustainable Investment Alliance (GSIA), is an alliance of its seven member institutions. GSIA promotes sustainable investment organizations by giving them more visibility and enhancing their impact at the global level. It also aims to integrate a sustainable investment approach into financial systems globally. Its most recognizable members are the European Sustainable Investment Forum (Eurosif) and The Forum for Sustainable Investment (US SIF), based in the United States. (GSIA, 2019) In its 2018 biennial trend report, US SIF reported that the number of assets invested by implementing an SRI strategy had risen 38 percent from 2016 to 12 trillion US dollars. This growth means that by the end of 2018, every fourth professionally invested dollar was invested by implementing some form of SRI in the United States. (US SIF, 2019)

Although the terms Corporate Social Responsibility (CSR) and Environmental, Social and Governance (ESG) have been mentioned earlier in the study, it is necessary to introduce them properly before moving further in the study. Introducing the terms explains the relationship between the terms and SRI and gives the reader a more comprehensive understanding of SRI.

2.2.1 CSR

Like SRI, the CSR definition has not always been clear, and some debate still exists to this date. Votaw (1972) was the first to state CSR's problems as the concept is sometimes understood differently by different people. This problem was more recently recognized by Garriga and Melé (2004). They divided the theory of CSR famously into four different approaches: instrumental theories, political theories, integrative theories and ethical theories. Instrumental theories suggest that a company's only social responsibility is profit maximization and meeting economic goals. This view was famously presented by Friedman (1970). Political theories include corporate constitutionalism and corporate citizenship. Corporate constitutionalism acknowledges that the corporate has power with social impact, and this power must be used responsibly by the corporate. The corporate citizenship approach recognizes that some modern-day corporates have become larger and more powerful than some governments, so they must act responsibly like every other citizen. By acting responsibly, the corporates consider the environment and aim for continuous improvement of the local community. Integrative theories argue that corporates are incredibly dependent on society. As society makes the existence, growth and continuity possible for the corporates, they should integrate their social values to meet the social demands. Ethical theories focus on the relationship between society and corporates and how corporates should act in a responsible way to improve society.

Nowadays, CSR has a more unified definition as the European Commission (2020) defines it as a corporates' responsibility for their impact on society. Furthermore, corporates can become socially responsible by following the law and integrating environmental, social, ethical, consumer and human rights concerns into their corporate governance and day-to-day activities. (European Commission, 2020)

Although the European Commission states different ways for corporates to become socially responsible, corporates nowadays do not generally have the luxury to choose whether to become or not to become socially responsible. Instead, the corporates need to figure out how they will do that, as the CSR activities have become the new normal.

In other words, the corporates today face the problems of balancing out between improving their CSR profiles and corporate financial performance (CFP) simultaneously. (Epstein, 2018, p. 19)

CSR can also be held as a foundation to SRI. By practicing CSR, the companies act ethically and responsibly by integrating their corporate governances to more ecological and social approaches. As companies shape their CSR profiles, it makes the examination and the comparison of the companies possible for investors implementing SRI strategies. The examination and comparison are usually done with the integration of the ESG criteria and comparing it with CFP. (Von Wallis & Klein, 2015)

2.2.2 ESG

As we have seen with SRI and CSR, sustainable investing concepts may have different meanings to different people. The concept of ESG faces the same problems. However, the approaches used by the ESG investors can be divided into three main categories. Firstly, some investors integrate the ESG criteria to improve their investment results by managing ESG related risks and seeking sustainable long-term gains. Secondly, some investors integrate the criteria so that their investments reflect their values. This can be achieved by screening out some controversial corporates or industries concerning alcohol, tobacco, military contracting, or gambling activities. Lastly, some investors want their investments to have an impact, so they invest directly into companies that are changing the world to be a better place. (MSCI, 2018)

Nowadays, there are several independent ESG score providers, such as Morgan Stanley Capital International (MSCI), Sustainalytics (owned by Morningstar) and Refinitiv (former Thomson Reuters), to name a few. The ESG score construction methodology varies between data providers. However, they all have a similar view concerning the ESG. As this study uses data from the Refinitiv ASSET4 ESG database, we will briefly discuss how Refinitiv defines and examines the ESG and its dimensions. Refinitiv ASSET4 ESG database is introduced more comprehensively in section 5.

Integrating the ESG criteria can be considered an investing strategy that captures three main dimensions of a corporate: environmental, social, and governance. These dimensions are further examined, looking into their risks and opportunities. Refinitiv further divides the three main dimensions into ten different categories. Firstly, the environmental dimension is divided into emissions-, innovations- and resource use- categories, while the social dimension is divided into community-, human rights-, product responsibility- and workforce categories. Lastly, the governance dimension consists of CSR strategy-, management-, and shareholders categories. (Refinitiv, 2020)

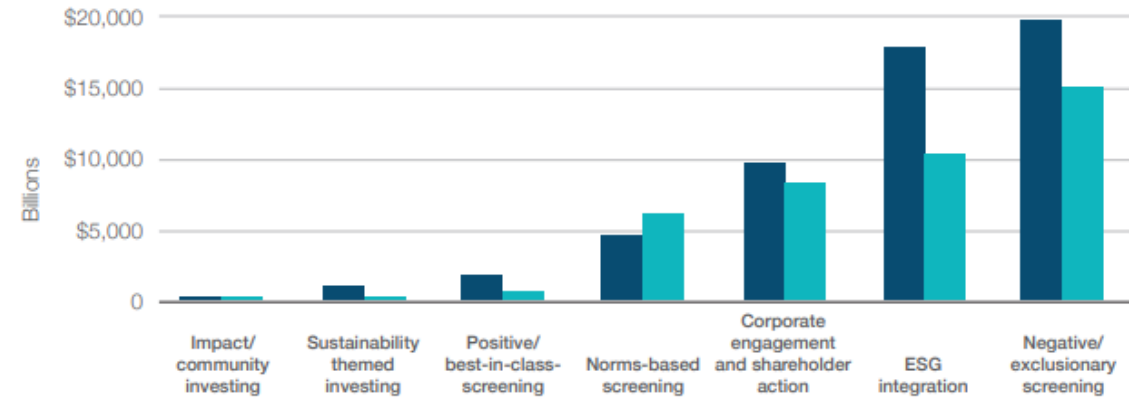
As we have now familiarized with the controversial concepts regarding sustainable investing, we can further summarize the connection between SRI, CSR and ESG: CSR has become a part of the companies' daily activities. Hence, companies continuously try to improve their CSR profiles by integrating ethical, social and environmental policies into their corporate governances. These company CSR profiles are then quantified to investors by independent rating agencies in the form of ESG scores. Furthermore, the integration of the ESG criteria is one of the most implemented SRI strategies.

In the next subsection, we will briefly discuss the most implemented SRI strategies by the investors and profoundly discuss the ESG momentum strategy.

2.3 SRI Strategies

Firstly, this subsection briefly introduces the most common SRI strategies implemented in the financial markets. Although these strategies will not be implemented in this study, it is essential to introduce these strategies. Hence, the reader can get a more comprehensive understanding of the topic. Lastly, this subsection shifts its focus to still somewhat unknown ESG momentum strategy, which will be the primary strategy of focus in this study.

Previous literature (for example, Renneboog et al., 2008; Schueth, 2003; Von Wallis & Klein, 2015) generally identifies three different SRI strategies with the dual objective of financial gains and societal gains. These strategies are screening, community investing and shareholder advocacy. Although this categorization might have been the most appropriate way in the past, it is relatively unspecified and somewhat outdated. GSIA (2019) categorizes seven different sustainable investing strategies and activities, including negative/exclusionary screening, positive screening, ESG integration, norms-based screening, corporate engagement and shareholder action, sustainability themed investing and impact/community investing. Yes, almost every strategy recognized by GSIA (2019) could be issued to one of the unspecified categories identified in previous literature. However, it should be illustrated that these categories should not be held as equal concerning their relevance and popularity:



	Impact/ community investing	Sustainability themed investing	Positive/ best-in-class-screening	Norms-based screening	Corporate engagement and shareholder action	ESG integration	Negative/ exclusionary screening
2018	$444.26	$1,017.66	$1,841.87	$4,679.44	$9,834.59	$17,543.81	$19,770.96
2016	$248.47	$276.16	$818.01	$6,195.40	$8,385.17	$10,353.20	$15,063.57
Growth 2016–18	79%	269%	125%	-24%	17%	69%	31%
CAGR	33.7%	92.0%	50.1%	-13.1%	8.3%	30.2%	14.6%

Figure 2. Global growth of sustainable investing strategies 2016-2018 (GSIA, 2019).

Figure 2 above illustrates the popularity and growth of the sustainable investing strategies where the GSIA operates between 2016 and 2018. These regions include Europe, the United States, Canada, Australia, New Zealand and Japan. As Figure 2 shows, screening-based strategies dominate other strategies concerning the assets under management. Shareholder advocacy is also implemented with 9.8 trillion US dollars in assets,

although its recent growth has not been so rapid. One must notice that one of the three main socially responsible investing strategies, impact/community investing, holds “only” 444 billion US dollars in assets, which is only a fraction compared to other SRI strategies. Although, the assets under the impact/community investing strategies have grown 79% between 2016 and 2018. ESG integration, one form of screening, has grown 69% between 2016 and 2018 and over 15.4 trillion US dollars in assets are invested under the strategy. The oldest form of SRI, negative/exclusionary screening, is also the most implemented SRI strategy today, and almost 20 trillion US dollars in assets are invested using the strategy. (GSIA, 2019)

As illustrated above, the amount of the assets under the SRI strategies vary essentially. However, this study also further discusses the three basic SRI strategies identified by the previous literature (for example, Renneboog et al., 2008; Schueth, 2003; Von Wallis & Klein, 2015) so that the reader can get a deeper understanding of the subject.

2.3.1 Screening

As we saw from Figure 2, the screening strategies are by far the most implemented SRI strategies by the investors. Traditionally, screening strategies are divided into negative screening and positive/best-in-class screening. When implementing these strategies, portfolios are constructed by excluding or including certain stocks/industries based on the CSR profiles of the companies. This leads investors to conduct a so-called double bottom line analysis, where traditional quantitative analysis is conducted to estimate the company’s potential profit, followed by a qualitative analysis of its CSR profile. Nowadays, the integration of ESG criteria is also examined separately due to its dominating popularity. Integration of ESG criteria is often a combination of these other two screening strategies. It focuses on people, planet and profit and it is thus often called triple bottom line (Schueth, 2003; Renneboog et al., 2008). However, ESG as a concept was thoroughly discussed in subsection 2.2.2, so it will not be further discussed here separately.

2.3.1.1 Negative screening

The oldest SRI strategy, negative screening, is a strategy where investors exclude certain companies from their portfolios due to industries those companies are operating in. These industries might include tobacco, alcohol, military contracting, nuclear power, adult entertainment and gambling industries. Furthermore, a company might also be excluded from the portfolio if the company is associated with some ethical issues, such as animal testing or if the company has a lousy environmental track record. (Renneboog et al., 2008; Von Wallis & Klein, 2015) However, negative screening is criticized among some academicians, such as Schwartz (2003), who argues against some ethical screens. According to Schwartz, some of the questionable industries, such as gambling, might have negative and positive effects on society. He argues that as most of the US holds gambling as free-time activity nowadays, so rather than screening these companies completely out, implementation of an ethical code would be more reasonable. (Schwartz, 2003)

2.3.1.2 Positive/Best-in-class screening

Positive screening is a more recent screening method. When implementing a positive screening strategy, investors screen out companies so that companies left have superior CSR standards compared to others. Generally, positive screens concentrate on investment sustainability, the environment, labor relations and corporate governance. Positive screens might also concentrate on companies with high renewable energy usage, low emissions or positive contributions to the community. Positive screening is often combined with the best-in-class approach, where investors rank companies inside the market sector or industry based on the companies' CSR performance. Typically, to pass the screen, companies need to pass some pre-determined threshold. In contrast to negative screening, positive screening does not prohibit investing in specific market sectors or industries. Practically, this means that negative screening potentially leads to a narrower investment universe, while positive screening does not. (Renneboog et al., 2008)

2.3.2 Shareholder Advocacy

Shareholders, that seek to influence the company's management with their actions are often referred using the shareholder advocacy strategy. These actions, what shareholders are implementing, include participation in annual meetings, voting and communicating with the management to guide them to make more socially responsible actions. This cooperation aims to improve the company's financial performance and the prosperity of all the stakeholders and the natural environment. (Schueth, 2003) However, investors with small ownership might not have realistic probabilities to influence the management's actions, but the probability increases with ownership. (De Colle & York, 2009)

2.3.3 Community Investing

Investors implementing the community investing strategy designate some pre-determined percentage of their available funds to Community Development Financial Institutions (CDFIs). CDFIs distribute these funds to low-income and at-risk communities for housing, business development, banking and crediting purposes. (De Colle & York, 2009; Schueth, 2003) However, Sparkes (2001) argues that community investing should not be seen as SRI, but as socially directed investing (SDI), since in community investing, investors are continuously willing to accept below-market returns in order to provide help for the low-income communities.

2.3.4 ESG momentum

The widely recognized momentum investing strategy started first gaining interest in the 1980s when Richard Driehaus implemented the strategy with his company Driehaus Capital Management. (AAII, 2000) Momentum is an investing strategy where investors take long positions on stocks with a positive trend in certain time periods and short positions on stocks with a negative trend in certain time periods. This strategy is based on the fact that stock prices tend to follow the same trend as earlier. (UBS, 2018)

As we have seen, an increasing number of investors are motivated to invest responsibly, which has inspired investors to develop new SRI vehicles and strategies. This has also led to the invention of the ESG momentum strategy. The strategy is relatively new, as it first appeared in financial literature by Nagy, Cognan & Sinnreich in 2013, yet the limited results are promising. Several other studies and few white papers have also been made about the strategy, and some of them are further discussed in the next section.

The ESG momentum strategy combines the widely used ESG criteria integration and the traditional momentum strategy. Instead of focusing on the absolute ESG scores of the companies, it concentrates on the changes in the ESG scores. The theory behind the approach to focus on changes is that the ESG momentum strategy could identify companies that are not yet identified by conventional ESG screening strategies. Thus, identification of potential ESG out- and underperformers may lead to financial outperformance, as the potential increase or decrease in the price might not yet be priced in by the market. It is also worth mentioning that the potential investment universe is wider with the ESG momentum strategy than with negative-, positive-, and ESG screening strategies, which might also lead to further financial outperformance. (UBS, 2018)

However, the strategy also has a few drawbacks and limitations. As the portfolio for the long positions is constructed, the best ESG score improvers are selected into the portfolio. Suppose the ESG momentum strategy is not combined with some other screens. In that case, the strategy does not consider the absolute ESG scores of the selected companies, which might lead to a lower ESG score of the portfolio because the improvers might have a low absolute ESG score. In theory, this should improve the ESG momentum strategy's financial performance compared to conventional ESG screening due to the wider investment universe; meanwhile, the strategy would not be as socially responsible. (Nagy et al., 2016) As we will see in the next section, the results of the studies conducted on the ESG momentum strategy are very promising (see, for example, Nagy et al., 2013 & 2016; Verheyden et al., 2016). However, the investor must be aware of the restricted

amount of research conducted on the strategy and thus be critical concerning the connection between the abnormal returns and the ESG momentum effect. Other key risks concerning the ESG momentum strategy include wrong scope and timing, potential sector or country biases and lack of diversification. Arguably, the investor needs a deep understanding of the company fundamentals to distinguish whether the company's ESG score actually increases or decreases or whether the increase or decrease in ESG score is due to changes in criteria or weightings. The ESG score of the company might also improve if the ESG scores of the industry's other companies decline. Also, some external event or internal driver might positively or negatively affect the ESG scores of some certain industry or region, leading to biases and undesirable portfolio diversification. Hence, active portfolio management or combining the ESG momentum strategy with some other SRI strategy is advised when implementing the ESG momentum strategy. (UBS, 2018)

In the next section, we will examine the major studies conducted on the ESG momentum strategy. As the existing literature is limited on the subject, the reader will get a comprehensive understanding of the previous findings. Although the findings have a consensus, the reader must be aware of the limited number of studies and critically view the findings.

3 PREVIOUS STUDIES

This section presents the most relevant studies concerning the ESG momentum strategy. As mentioned in the previous subsection, the ESG momentum strategy is a relatively new investing strategy, as the first study regarding it was published in 2013. This study was conducted by Nagy et al. (2013), and many of the subsequent studies have been conducted similarly. Most of these studies use the ESG data collected from MSCI ESG Research, and they use the GEM3 multi-regression model.

Nagy et al. 2013

Nagy et al. (2013) first introduce the ESG momentum strategy to financial literature. Their study uses Intangible Value Assessment (IVA) ratings from MSCI ESG Research and BARRA global equity model (GEM3) to measure performance. GEM3 multi-regression model includes factors for risk, industry, country, and style characteristics (MSCI, 2013). Their sample period is from February 2008 to December 2012, where they compare three different ESG strategies to the MSCI World Index. The strategies used were called ''ESG worst-in-class exclusion", "simple ESG tilt" (where stocks with high ESG ratings are overweighted and stocks with low ESG ratings are underweighted) and "ESG momentum" (where stocks which have improved their ESG ratings in the last 12 months are overweighted and stocks with decreased ESG ratings in the last 12 months are underweighted). ESG momentum strategy outperformed the other two strategies significantly on a risk-adjusted basis, gaining 0.35% positive abnormal return annually compared to the benchmark with an information ratio of 0.97. "ESG worst-in-class exclusion" and "simple ESG tilt" strategies also gained abnormal returns.

Nagy et al. (2013) show that the abnormal return of the ESG momentum strategy is almost entirely explained by the asset-specific characteristics instead of style, industry or country characteristics. Observing the differences in contribution between overweighted assets and underweighted assets shows that overweighted assets negatively

impact portfolio performance. Underweighted assets instead contributed consistently positively to portfolio performance. This leads to the conclusion that investors recognize and appreciate short-term ESG risks more and long-term ESG opportunities.

Nagy et al. 2016

Comparison between the ESG strategies is continued by Nagy et al. (2016). As a change to the earlier study (Nagy et al., 2013), the original sample period is extended by two years, and the "worst-in-class exclusion"-strategy is omitted from this study. This study is also conducted using the same IVA ratings and GEM3 multi-factor regression model. Compared to the 2013 study, Nagy et al. (2016) expose the portfolios to higher risk by allowing greater weightings to the stocks. This study focuses more on finding excess returns, as the 2013 study focused more on observing the different strategies.

Nagy et al. (2016) find similar results as the 2013 study, with both strategies gaining abnormal returns compared to the benchmark. Abnormal returns were higher in the sample period, as it was extended by two years. The ESG momentum strategy outperformed the tilt strategy again with a positive abnormal return of 2.2% annually, compared to a 1.1% positive abnormal annual return. Findings show that the ESG momentum strategy provides more stable returns than the tilt strategy. The returns are relatively flat before the last two years of the extended sample period. Average ESG scores are significantly higher than the benchmark portfolio for both strategies. However, the tilt strategy has a slightly higher ESG score, as the strategy concentrates solely on the absolute ESG score instead of the change in the ESG score. Firm-specific factors contributed 1.32% of the 2.2% positive abnormal return obtained by the ESG momentum strategy.

Verheyden et al. 2016

Verheyden et al. (2016) construct six different portfolios using two different investment universes, global and developed countries. Using the Carhart (1997) 4-factor model, they

compare the performances of global portfolios and portfolios constructed from developed countries. Verheyden et al. (2016) do not study separately the ESG momentum. However, they find that all the ESG portfolios outperform the benchmark portfolio, while the portfolio where the ESG momentum criteria is integrated performs the best. Another significant finding is that portfolios constructed from developed countries gained higher annualized returns while having a higher Sharpe ratio than the global portfolios.

Giese et al. 2019

Giese et al. (2019) study different ESG strategies and observe how ESG affects valuation, risk and performance. Using the same IVA ratings and the GEM3 multi-factor model as Nagy et al. (2013 & 2016), they also include the study's ESG momentum strategy. Using 2009 to 2017 as their sample period, the ESG momentum gains statistically significant positive abnormal returns compared to the benchmark. This leads to a finding that companies tend to have higher valuations than their peers if their ESG profiles have improved.

The Principles of Responsible Investment (PRI) 2018

Principles for Responsible Investment (PRI) conducted a massive study in 2018 comparing the ESG momentum strategy and the ESG tilt strategy globally, in the US, in Europe and Japan. They also use ESG data provided by MSCI ESG Research over the 10-year sample period and comparing the portfolios with matching MSCI indices. The findings show the ESG efficacy in equities investing, with the ESG momentum strategy mostly dominating the ESG tilt strategy. Both the ESG momentum and the ESG tilt strategy significantly outperform the MSCI world index in the sample period, gaining active cumulative returns of 16.8% and 11.2%, respectively, with both strategies having the same annual active risk. The ESG momentum strategy outperformed the US benchmark by 18.8%, while the ESG tilt strategy underperformed by 1.6% the benchmark in the sample period, with the ESG strategy having a slightly higher annual active risk.

Information ratios for the ESG momentum strategy portfolios were 0.72, 0.69, 0.44 and 0.65 for Global, US, Europe and Japan, respectively. Information ratios for the ESG tilt strategy portfolios were 0.43, -0.06, 1.00 and 0.16 for Global, US, Europe and Japan, respectively. According to the PRI, these results indicate that the ESG momentum strategy is the most viable in the markets where the ESG scores are not yet on an optimal level. This can be seen looking at the information ratios, as Europe has been considered the pioneer in the field of SRI, while the rest of the world is catching up. (PRI, 2018)

Bergskaug 2019

The study of Bergskaug (2019) differs from the earlier studies concerning the ESG momentum strategy as the strategy is implemented differently. Bergskaug (2019) decides to construct the portfolios in the same way as in the conventional momentum strategy. The author uses the "20% cut-off point", meaning that the top 10% ESG improvers are included in the portfolio with a long position, and the bottom 10% are included in the portfolio with a short position. This strategy vastly differs from the ESG momentum strategy used in the previous literature. For example, Nagy et al. (2013) & (2016) overweight the best ESG improvers and underweight the worst ESG improvers. The majority of the studies mentioned above concerning the ESG momentum strategy use the ESG ratings provided by MSCI ESG Research. In contrast, Bergskaug uses ESG ratings and financial data from the Refinitiv database. Bergskaug constructs six different portfolios from two investment universes, the US and the BRICS countries. The financial performance of the portfolios is observed with the CAPM, Carhart 4-factor model and Fama-French 3-factor and 5-factor models.

Bergskaug (2019) does not find statistically significant results from the ESG momentum portfolios nor the top 10% long portfolios. These results are not aligned with the aforementioned ESG momentum strategy studies, and it is most likely due to the different methodology of the study. However, the results indicate that the bottom 10% short portfolios gain positive excess returns in both the US and the BRICS countries, 2.6% and 4.4%,

respectively. These findings are statistically significant; however, the difference in excess returns between the investment universes is not. (Bergskaug 2019)

The different approach by Bergskaug is arguably better than the approaches used by other ESG momentum studies, as the results from the study can also be economically significant in addition to being statistically significant. This is because only 20% of the investment universe companies are included in the portfolios, limiting the transaction costs and improving practicality. Other aforementioned studies include the whole investment universes by overweighting and underweighting different companies based on the ESG improvement, which results from those studies most likely not economically significant. This study takes an approach similar to the approach of Bergskaug as the study tries to find not only statistically significant but also economically significant results.

4 THEORETICAL BACKGROUND

This section covers the theoretical background around the subject of this study. The reader needs to understand these theories behind the study to get a comprehensive view of the subject. First, the section presents the theoretical framework of the efficient market. Secondly, the section demonstrates generally used market efficiency measurement methods, which are later used in the study's empirical analysis. The methods are followed by the modern portfolio theory (MPT) and its relationship to SRI.

4.1 EMH

The efficient market hypothesis (EMH) was originally presented by Eugene Fama in 1970. It assumes that the prices of securities fully reflect all of the available information. This leads to a situation where no security is neither over- nor undervalued in the market. However, this assumption does not always hold, and thus there are three different forms of market efficiency: the weak form, the semi-strong form and the strong form. Definition of the weak form efficiency is satisfied when the prices reflect all of the historical information. The weak form is based on the theory of "random walk", which means that the securities prices are independent of their previous prices; thus, they follow the "random walk". Hence, investors are unable to gain abnormal returns using technical analysis. Moreover, in the semi-strong form, also all of the publicly available information to the investors, such as dividend yields and earnings announcements, is reflected in the stock prices. Hence, investors are unable to gain abnormal returns with neither technical analysis nor fundamental analysis. Lastly, the strong form is satisfied when the stock prices reflect all the public and non-public information available. This non-public information is generally referred to as insider information, and its such information that only some corporate insiders have monopolistic access to. (Bodie et al., 2018; Fama, 1970)

Fama publishes the second part regarding the efficient market hypothesis in 1991. This time, the theory is adjusted based on reviewing the theoretical and empirical research. The contribution is made by altering the forms of market efficiency. The weak form is

altered to recognize wider return predictability. The weak form of market efficiency previously recognized only the past returns' predicting power. However, it is now adjusted to include more tests of return predictability factors, such as dividend yields and interest rates. In addition to these factors, return predictability is also altered to include asset pricing models and anomalies, for example the January effect. Furthermore, Fama (1991) proposes the re-naming of the semi-strong form and the strong form of market efficiency to "event studies" and "tests for private information", respectively. (Fama, 1991)

Momentum

The EMH has been one of the most researched modern financial literature theories ever since Fama introduced it in 1970. Many theories have challenged the EMH, as it is often recorded that investors make systemically irrational decisions in the stock market, meaning that the markets are inefficient (Yen & Lee, 2008). These inefficiencies are then studied and often named if some regular pattern is found. In financial literature, these inefficiencies are called anomalies (Frankfurter & McGoun, 2001). One of these anomalies is called "momentum", which is arguably one of the best-known anomalies.

The momentum gained massive attention in finance when Jegadeesh and Titman published their groundbreaking study in 1993, and numerous studies have followed. The momentum strategy is based on the idea that stock trends tend to continue in the same trend over time. This is due to irrational investor behavior concerning the new information and reflecting it to the past performance of the stock. Based on these ideas, the momentum strategy is implemented by taking a long position on stocks that have outperformed and selling short stocks that underperformed in the past, usually in the previous 3-12 months. The momentum strategy has been shown to outperform the benchmark in different markets, time periods and asset classes by several different researchers. (Daniel & Moskowitz, 2016)

The traditional momentum strategy has several similarities to the ESG momentum strategy, which is the primary strategy in this study. However, the ESG momentum strategy focuses exclusively on the changes in the company's ESG score. It does not consider the past stock trend when constructing the portfolio, as we saw in subsection 2.3.4.

4.1.1 Market efficiency measures

Arguably the most commonly used asset pricing model used to measure the market efficiency is the Capital Asset Pricing Model (CAPM), which was developed by Sharpe (1964), Lintner (1965) and Mossin (1966). CAPM is based on the principles of the portfolio selection theory by Harry Markowitz (1952), which is further discussed in this subsection. Like the MPT, CAPM assumes that the investor is rational and risk-averse and will select only efficient mean-variance portfolios. This leads to investor selecting portfolios that maximize the return with the given variance and minimize the variance of portfolio return with the given expected return. (Markowitz, 1952; Fama & French, 2004)

Figure 3 below illustrates the CAPM portfolio opportunities. The horizontal axis displays the portfolio's risk, which is measured by the standard deviation (σ) of the return. The vertical axis displays the portfolio's expected return. The minimum variance frontier for risky assets is illustrated by the curve abc. It illustrates the relationship between the return and the risk of the portfolio. Furthermore, the mean-variance efficient frontier with a riskless asset and the minimum variance frontier for risky assets meet at the point T, in which point the investor can gain moderate return with relatively low volatility: (Fama & French, 2004)

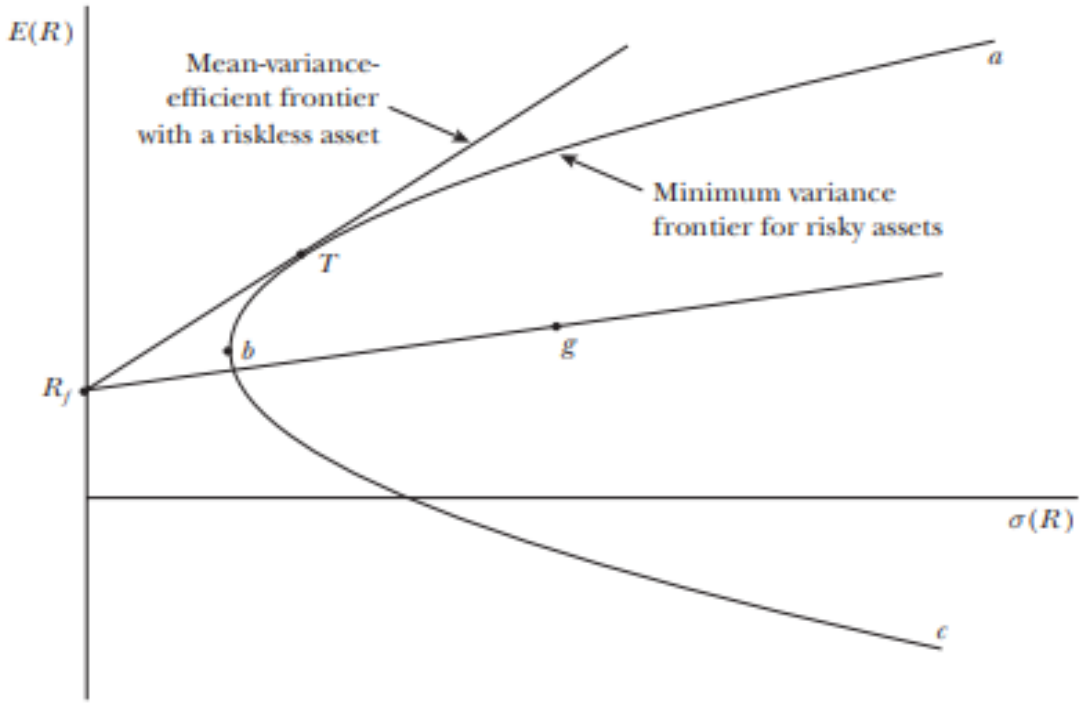


Figure 3. Investment opportunities illustrated by CAPM (Fama & French, 2004).

Furthermore, the CAPM illustrates the relationship between the expected return of an individual asset or portfolio and systematic risk: as the systematic risk increases, investors demand a higher return for the individual asset or portfolio. Thus, the expected rate of return can be derived as follows: (Fama & French, 2004)

(1) $$E(R_i) = R_f + [E(R_M) - R_f]\beta_{iM}$$

where:

$E(R_i) =$ Expected return on asset or portfolio i

$R_f =$ Risk − free rate of return

$E(R_M) =$ Expected market return

$\beta_{iM} =$ Market beta of asset or portfolio i

Also, Bodie et al. (2018) present a list of assumptions on which CAPM is based on:

1) Investors are rational and optimize the mean-variance relationship

2) Investors commonly plan for a single period
3) All the investors have homogeneous expectations
4) All the assets trade on public exchanges and are publicly held
5) Investors can borrow or lend at a risk-free rate and sell short assets
6) No transaction costs or taxes

A portfolio performance measure often related to CAPM is the Sharpe ratio. First introduced as reward-to-variability ratio by Sharpe (1966), it measures the ratio between excess return over the risk-free rate of return and the standard deviation of these excess returns. It enables the comparison between the returns of portfolios or assets by looking at the returns and considering the amount of risk these returns have generated. Thus, as the ratio increases, the reward increases relatively to risk. The ratio can be derived as follows: (Sharpe, 1966)

(2) $$Sharpe\ ratio = \frac{R_i - R_f}{\sigma_i}$$

where: $R_i = \text{Return on portfolio or asset } i$

$R_f = \text{Risk} - \text{free rate of return}$

$\sigma_i = \text{Standard deviation of the excess return}$

Even though CAPM is still widely used in finance due to its comprehensive applications, for example Reinganum (1981) and Lakonishok & Shapiro (1986) started to question the explanatory power of the CAPM on portfolio returns. Fama & French (1992, 1993) also note that the explanatory power of CAPM was sufficient in 1926-1968, but it had started to diminish over the years. Furthermore, they presented their famous 3-factor model, which had two additional risk factors: a size factor and a value factor. These additional factors were added to have a model with better explaining power on portfolio returns. The size factor captures the difference between the returns of separate diversified portfolios of small market capitalization stocks and large market capitalization stocks. The

value factor captures the difference between the returns of separate diversified portfolios of high book-to-market value stocks low book-to-market value stocks. The Fama-French 3-factor model can be presented as: (Fama & French, 1992; 1993)

(3) $$R_{it} - R_{ft} = \alpha_{it} + \beta_{1,i}(R_{Mt} - R_{ft}) + \beta_{2,i}SMB_t + \beta_{3,i}HML_t + \varepsilon_{it}$$

where:

R_{it} = Return on asset or portfolio i for time t

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

α_{it} = Alpha for asset or portfolio i for time t

$\beta_{1,2,3}$ = Factor coefficients for asset or portfolio i for time t

R_{Mt} = Return on market portfolio for time t

SMB_t = Size factor

HML_t = Value factor

ε_{it} = Error term

Inspired by the findings of Jegadeesh & Titman (1993) and the arising excitement of momentum investing, Carhart (1997) expands the Fama-French 3-factor model to increase its explanatory power by adding a momentum factor. The momentum factor captures the difference between returns of momentum versus contrarian portfolio in the past year. Furthermore, the Carhart 4-factor model can be presented as: (Carhart, 1997)

(4) $$R_{it} - R_{ft} = \alpha_{it} + \beta_{1,i}(R_{Mt} - R_{ft}) + \beta_{2,i}SMB_t + \beta_{3,i}HML_t + \beta_{4,i}UMD_t + \varepsilon_{it}$$

where:

See equation (3)

$\beta_{4,i}$ = Factor coefficient for asset or portfolio i for time t

$UMD_t = Momentum\ factor$

Fama and French (2015) also expand their own 3-factor model due to some critique (Titman, Wei & Xie, 2004; Novy-Marx, 2013) by adding two new risk factors: a profitability factor and an investment factor. The profitability factor captures the difference between the returns of separate diversified portfolios of robust profitability and weak profitability. The investment factor captures the difference between the returns of separate diversified portfolios of low investment firms and high investment firms. According to their study, up to 94% of the cross-section variance of the observed returns of the portfolios can be explained by the Fama-French 5-factor model. It can be presented as follows: (Fama & French, 2015)

(5) $$R_{it} - R_{ft} = \alpha_{it} + \beta_{1,i}(R_{Mt} - R_{ft}) + \beta_{2,i}SMB_t + \beta_{3,i}HML_t + \beta_{4,i}RMW_t + \beta_{5,i}CMA_t + \varepsilon_{it}$$

where: $See\ equation\ 3)$

$\beta_{4,5} = \text{Factor coefficients for asset or portfolio } i \text{ for time } t$

$RMW_t = \text{Profitability factor}$

$CMA_t = \text{Investment factor}$

Finally, Fama and French (2018) add a sixth, the momentum factor UMD into their 5-factor model to construct the Fama-French 6-factor model, which can explain the returns even better: (Fama & French, 2018)

(6) $$R_{it} - R_{ft} = \alpha_{it} + \beta_{1,i}(R_{Mt} - R_{ft}) + \beta_{2,i}SMB_t + \beta_{3,i}HML_t + \beta_{4,i}RMW_t + \beta_{5,i}CMA_t + \beta_{6,i}UMD_t + \varepsilon_{it}$$

where: $See\ equation\ 5)$

$\beta_6 = \text{Factor coefficient for asset or portfolio } i \text{ for time } t$

$UMD_t = \text{Momentum factor}$

4.2 MPT and its relationship to SRI

In 1952, Harry Markowitz published his famous "Portfolio Selection" paper. The paper examines the relationship between risk and returns regarding portfolio selection. Markowitz assumes that investors are rational, and thus when they are selecting securities, they base their decisions merely on risk and return. Thus, if investors choose between two securities with similar returns, they will always choose the security with lower volatility. Similarly, if investors choose between two securities with similar risks, they will always choose the security with a higher return. This leads to investors first making assumptions about the available securities' future performance based on investors' previous experiences and observations. Secondly, investors consolidate all available information on available securities to form the optimal portfolio and choose their expected return by choosing the rate of risk they are willing to tolerate. Another key conclusion from the theory is that investors are trying to minimize the unsystematic risk by building a well-diversified portfolio. This leads to a portfolio offering a similar return with less risk. (Markowitz, 1952)

MPT is the most opposing theory against SRI for several reasons. As we saw above, MPT assumes that rational investors base their investment decisions merely on risk and return expectations. These are typically based on several different fundamental factors. Suppose, however, the investors would base their investment decisions on also non-fundamental factors, such as their values and emotions. This would eventually lead to underperformance, as the investors would be less willing to alter their portfolios in an economic downturn. However, some are willing to pay for their values, making these investors irrational, according to MPT. (Bodie et al., 2018; Hickman et al., 1999)

As we discussed earlier in section 3, the screening strategies are the most implemented SRI strategies by the investors. This fact makes the investment universe of socially responsible investors smaller. Assuming that all of the MPT assumptions hold, restricting

the investment universe by screening eventually leads to a situation where absolute diversification is no longer possible. This instead leads to the downshift of the efficient frontier resulting in a sub-optimal portfolio, which means that the socially responsible investors are willing to have a lower risk-return relationship to support their own values. (Bodie et. al, 2018; Kurtz, 2005)

However, this kind of behavior can be better explained nowadays due to rising studies in behavioral finance - the field of finance that acknowledges that investors are often highly irrational. Regarding to SRI, there are three reasons why investors may prefer ethical or socially responsible investments: social change contribution, superior financial gains and/or non-wealth reasons. (Beal et al., 2005)

5 DATA AND METHODOLOGY

This section introduces the data and methodologies used in this study. First, subsection 5.1 discusses different ESG data providers and how they affect the industry. Furthermore, the reader is introduced to the ASSET4 ESG database and the data used in this study. Subsection 5.2 then discusses how the portfolios are constructed and presents some statistics about the portfolios. Finally, the empirical methods used in this study are introduced and compared to the methods used in previous studies concerning ESG momentum strategy.

5.1 Data

This subsection first introduces the different ESG providers and discusses the advantages and disadvantages of the continuously growing amount of ESG data providers. Secondly, the Refinitiv ASSET4 ESG database is further discussed as the ESG data used in this study is obtained from Refinitiv. Lastly, the data and its sources used in this study are introduced.

5.1.1 ESG databases and the variation in ESG scores between the providers

Due to the continuously rising megatrend of socially responsible investing, the amount of ESG data providers has also risen significantly. Two of the most widely used ESG data providers are Morgan Stanley Capital International (MSCI) and Sustainalytics (owned by Morningstar). Other ESG data providers include names such as Refinitiv (former Thomson Reuters), Inrate and Bloomberg. The wide availability of the ESG data is crucial for SRI, so it can grow as an investment approach, increasing the demand for academic purposes. However, the wide availability of ESG data, which comes with a continuously growing group of ESG data providers, does not come without problems. The data varies vastly between the data providers as the providers' rating and data collection methods lack transparency and standardization (SSGA, 2019). This makes the use of ESG data for

the investors especially challenging, as the ESG scores in which the investors are usually interested in may vary tremendously between the data providers.

Principles for Responsible Investment (2020) studied the environmental (E), social (S), governance (G) and overall ESG scores of the six well-known data providers and the differences between the ratings. The data used in this study includes ratings from the MSCI IVA, MSCI KLD, Refinitiv, Sustainalytics, Bloomberg and Inrate databases. The ESG ratings compared are the ESG ratings of S&P 500 companies from the years 2013-2017. As we can see from figure 5 below, the variation between the rating correlations is significant, and the correlation between the ratings is concerningly low. The highest correlation is in the overall ESG score with an average of 0.46. However, the correlation between providers varies between 0.77 and 0.12. On the other hand, the lowest correlation is found in the governance scores, averaging at 0.19 and varying between 0.41 and -0.04: (PRI, 2020)

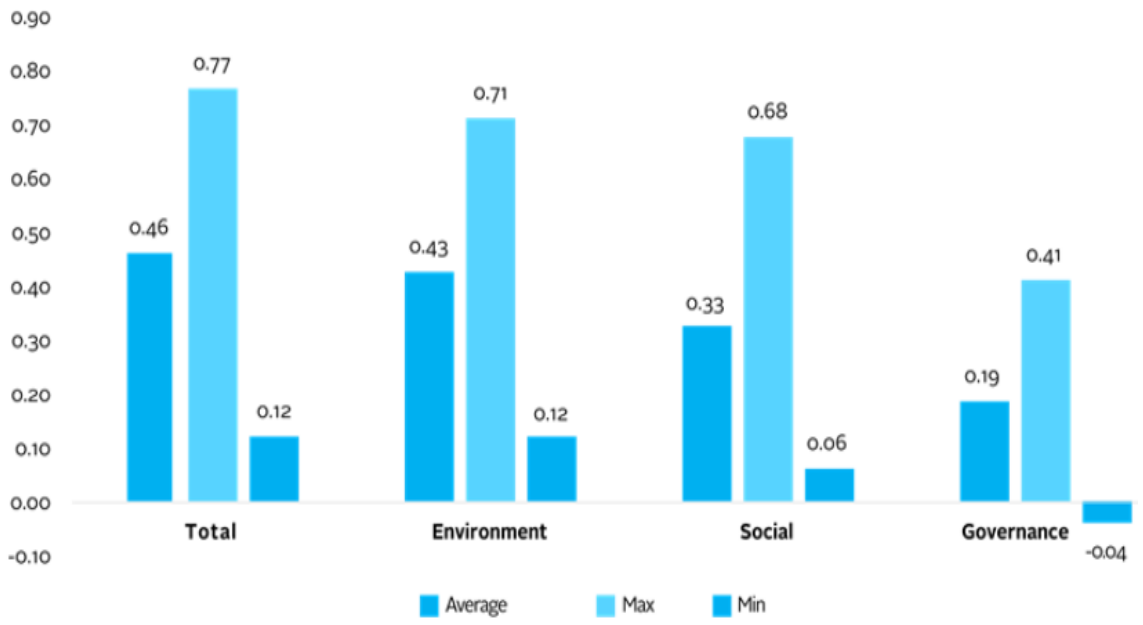


Figure 4. Correlations in the ESG data between major ESG data providers (PRI, 2020).

5.1.2 ASSET4 ESG Database

ASSET4 ESG Database is one of the largest ESG databases in the world. It provides ESG data on approximately 9000 companies in 76 different countries. The data covers over 70% of the global market capitalization, and the data was first provided back in the fiscal year 2002. As we can see from figure 6 below, nowadays the ESG data provided by Refinitiv is based on over 450 different ESG metrics. As the ESG scores provided by Refinitiv are designed to measure the ESG performance of a company relative to its peers, the final ESG score is formed from 186 comparable measures relevant to a certain industry. These metrics are then further grouped into ten different categories, which formulate the three pillar scores – environmental, social, and governance. These three pillar scores then formulate the final ESG score, which is relative to the industry. The ESG data metrics are formed using annual reports, company websites, NGO websites, stock exchange filings, CSR reports and different news sources, and they are updated on a weekly basis. (Refinitiv, 2020)

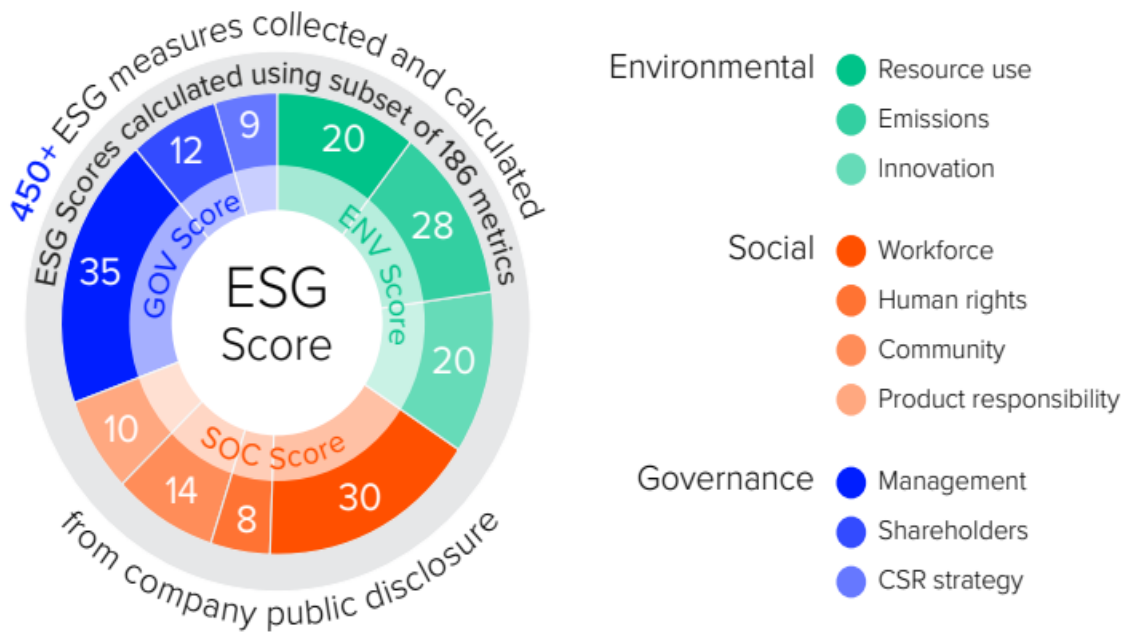


Figure 5. Refinitiv ESG Score metrics and pillars (Refinitiv, 2020).

5.1.3 Data used in this study

The ESG collected from the ASSET4 ESG Database used in this study focuses solely on the total ESG scores, thus the environmental, social and corporate governance scores are not separately examined. Although this kind of examination is typical in ESG studies, this study focuses on the ESG momentum strategy. More specifically, it focuses on how the company's size affects the performance of the strategy, as well as on the performance differences in different market conditions i.e. before the financial crisis vs. during the financial crisis vs. after the financial crisis.

As mentioned earlier, Refinitiv started collecting ESG data back in the fiscal year 2002, including S&P 500 companies, which are the main focus of this study. Hence the ESG data collected is from 2003-2018, as the ESG data of 2019 is not yet completely available.

As discussed before, the ESG momentum strategy aims to predict future returns focusing on the changes in the ESG scores instead of focusing on the pure ESG scores. Thus, the strategy needs two ESG data observations to calculate the ESG growth rate. Thus, for example, portfolio construction for the fiscal year 2005 needs ESG data from 2003 and 2004. Also, to measure the portfolio's financial performance, the stock price data is needed from the end of 2004 and 2005. As the data is needed from three consecutive years for the stock to be selected into the portfolio, it is also one of the limitations for the study, as sometimes the data is not available for three consecutive years for a particular company.

First, the whole S&P500 index for a given fiscal year is divided into half by merely using the median market capitalization of the index. Thus portfolios "Subsample 1" and "Subsample 2" are formed. "Subsample 1" consists of the companies with larger market capitalizations, and "Subsample 2" consists of the companies with smaller market capitalizations. After this, the companies in both portfolios are ranked by their ESG improvement percentage in descending order. Finally, two portfolios from each of the subsamples are formed: "Subsample 1, Top 10%", "Subsample 1, Top 25%", "Subsample 2, Top

10%" and "Subsample 2, Top 25%", which all include companies with the best positive ESG momentum rates from the given subsample. All of this is more profoundly explained in subsection 5.2.1 "Portfolio construction". However, it is briefly explained now so that the reader can understand the descriptive statistics of the data presented next.

Refinitiv's ESG scores vary between 0 and 100, 100 being the best possible score company can achieve. Table 1 below shows the descriptive statistics for the four different portfolios examined in this study and for the whole S&P500 index as a comparison. Each of the portfolios has 15 observations, the number of years included in the sample period 2005-2019. Refinitiv updates the total ESG scores yearly, so the portfolios in this study are also updated yearly. The variability in the ESG scores in the sample period is not high, as in the sample period 2005-2019 the ESG scores of S&P 500 companies have increased somewhat steadily during the whole period. Variability inside the portfolios instead was relatively high some years, as the portfolios are not constructed on an absolute ESG score basis. However, presenting these kinds of statistics is not relevant to this study.

Table 1 shows the reader several things. The means of ESG scores of the "Subsample 1"-portfolios are higher than "Subsample 2"-portfolios. These observations are in line with the findings of O'Rourke (2003), who finds that sometimes comparing the ESG scores between different sizes of companies can be problematic and biased, as the larger companies have more capital to invest in CSR activities. Also, the standard deviations are slightly higher on an absolute basis for the "Subsample 2"-portfolios compared to the "Subsample 1"-portfolios. The difference would be even higher, if a relative measure of variability, coefficient of variation would be used. When the two portfolios from the same subsample are compared against each other, we can see that the Top 25%-portfolios have higher means and higher variability than the Top 10%-portfolios. The difference in variability is simply explained by the higher amount of companies included in the portfolio. However, the difference in mean indicates that the top ESG improvers are not necessarily the best companies on an absolute ESG score basis. This is confirmed by com-

paring the ESG statistics of the whole S&P500 index to the ESG statistics of the four portfolios constructed. The mean ESG score is similar to the portfolios of "Subsample 1"-portfolios and significantly higher than "Subsample 2"-portfolios, indicating that the best ESG improvers are not necessarily the companies with the best absolute ESG scores.

ESG Scores	Sample, S&P500	Subsample 1, top 10%	Subsample 1, top 25%	Subsample 2, top 10%	Subsample 2, top 25%
Mean	48.52	47.13	51.93	38.05	40.43
Median	51.59	48.27	52.91	40.39	42.10
Minimum	30.15	31.50	32.79	23.68	24.42
Maximum	60.28	59.91	63.33	48.60	51.49
Standard deviation	9.60	7.00	7.35	7.74	8.00
Observations	15	15	15	15	15

Table 1. The descriptive statistics of the ESG scores of the S&P500 index and the portfolios over the sample period 2005-2019.

Below in figure 4, the reader can see the development of the portfolio ESG scores over the sample period 2005-2019. The development of the portfolios has been somewhat similar, and the development is relatively steady over the sample period. This is most likely due to the rising megatrend of socially responsible investing and the rising global environmental and social concerns such as climate change and racial injustices. These issues have led companies to invest more in ESG matters, which has led to a steady rise in ESG scores.

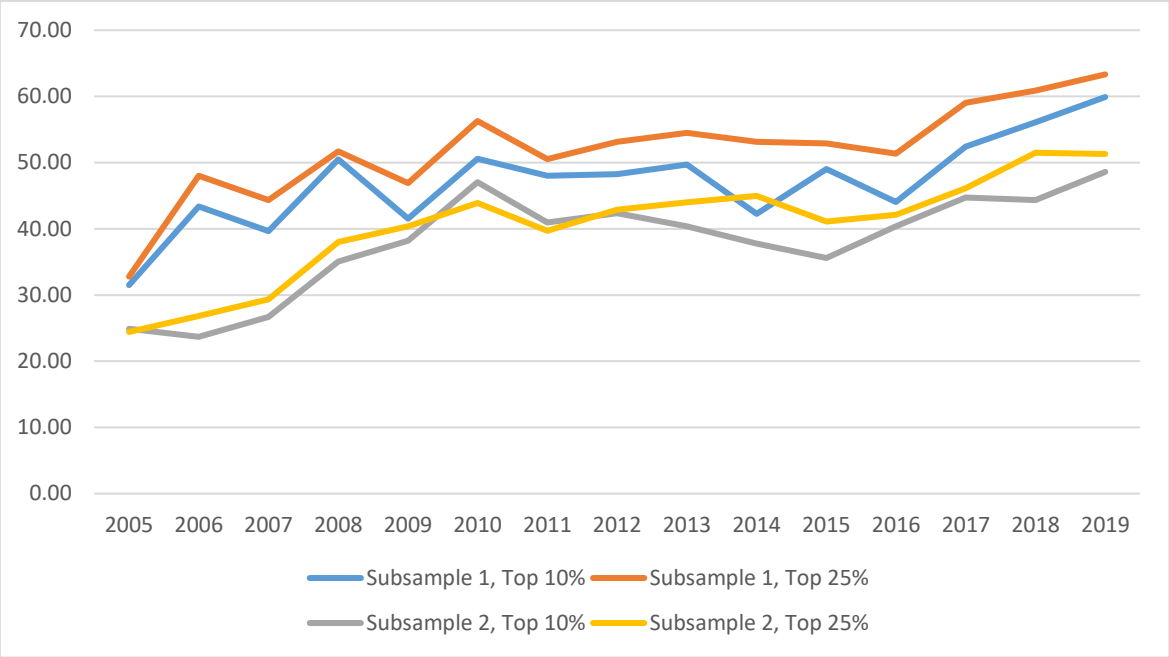


Figure 6. Visual representation of the development of the portfolio ESG scores. The portfolio ESG scores are based on the previous year's ending ESG scores.

The financial data collected for this study is also from the Refinitiv database. Financial data needed to complete the empirical analysis were the year-end share prices and the market capitalizations. Share prices were collected to measure the financial performance, and the market capitalization data was collected to divide the S&P 500 index into "Subsample 1" and "Subsample 2". However, the data for the regression analyses were collected from Kenneth R. French's (2020) database. This data included the yearly data of the market factor, the size factor, the value factor, the momentum factor, the profitability factor, and the investment factor and the risk-free rates of return. The data was collected to complete regression analyses with CAPM, Fama and French 3-factor, 5-factor & 6-factor models and the Carhart 4-factor model.

5.2 Methodology

This subsection discusses the methodology used in this study. Firstly, it will further discuss portfolio construction and present relevant portfolio statistics to the reader. Lastly, the methods used in the empirical analysis are discussed.

5.2.1 Portfolio construction

Subsection 5.1.3 briefly introduced how the portfolios examined in this study are constructed as the reader needed the information to understand the descriptive statistics presented in the subsection. However, portfolio construction is discussed more profoundly in this subsection.

The empirical analysis of this study focuses on four different portfolios, although those portfolios' performance is also examined in different time periods. As briefly discussed in subsection 5.1.3, the ESG momentum tries to generate alpha by overweighting the previous year's best ESG improvers and underweighting the worst ESG improvers. One of the study's restrictions was that in order for a company to be selected in a portfolio for a particular year, for example 2005, ESG data needed to be available for the company at the end of 2003 and 2004 to calculate the ESG growth rate. Also, the financial data needed to be available at the end of 2004 and at the end of 2005 to calculate the company's financial performance for the given fiscal year. This restricted the investment universe slightly as the data was not always available, yet it was necessary to complete the empirical analysis.

Furthermore, the whole S&P500 index was divided into two separate subsamples, "Subsample 1" and "Subsample 2". The S&P500 index was divided into half based on the size of the companies, as this study tries to examine whether the size factor matters when implementing the ESG momentum strategy. Focusing on examining whether the size factor matters is based on three scientifically proven arguments: firstly, O'Rourke (2003) argues that usually, larger companies have more resources to use in CSR activities. Secondly, Lins et al. (2017) state, that companies with higher ESG scores performed better

during the financial crisis than companies with low ESG scores. Thirdly, small-cap companies are usually more hard-hit in economic turmoil (CME Group, 2020).

Portfolio median market capitalization was used as a dividing point when constructing the two subsamples. Ideally, the examination of whether the size factors matter would have been conducted comparing “large-cap” and “small-cap” companies, but for example, the ESG data for the Russell 2000 index only available from 2017 onwards. This comparison would have narrowed the sample period significantly and made the results unreliable. Although the comparison is conducted with four portfolios of S&P500 companies, which are generally considered “large-cap” companies, the difference between the portfolio average market capitalizations is significant, as shown in table 2. The mean for the average portfolio market capitalization in the sample period for the “Subsample 1, Top 10%” is 41260.44 million US dollars and 45256.80 million US dollars for the “Subsample 1, Top 25%”. In contrast, the market capitalizations for the “Subsample 2, Top 10%” and “Subsample 2, Top 25%” are 7533.89 and 7831.34 million US dollars, thus making the difference in market capitalizations significant.

Market Capitalizations (Million USD)	Subsample 1, Top 10%	Subsample 2, Top 25%	Subsample 2, Top 10%	Subsample 2, Top 25%
Mean	41260.44	45256.80	7533.89	7831.34
Median	32062.22	38871.98	6665.16	7202.16
Minimum	19023.53	20680.49	3459.42	3510.94
Maximum	104320.34	88797.95	11039.75	12866.83
Standard Deviation	24213.73	18659.17	2412.29	2729.70
Observations	15	15	15	15

Table 2. Descriptive statistics regarding market capitalizations for the four portfolios over the sample period 2005-2019.

Figure 7 below gives a visual presentation of the four portfolios’ average market capitalization development in the sample period 2005-2019. Even though figure 7 might not indicate it, the “Subsample 2” market capitalizations have risen more percentage-wise than the “Subsample 1”-portfolios. However, as we can see, the actual dollar difference

between the portfolio average market capitalizations has risen drastically in the sample period. This is in line with the current market situation, as the larger companies are getting even larger daily, and thus the market share of the smaller companies is continuously diminishing.

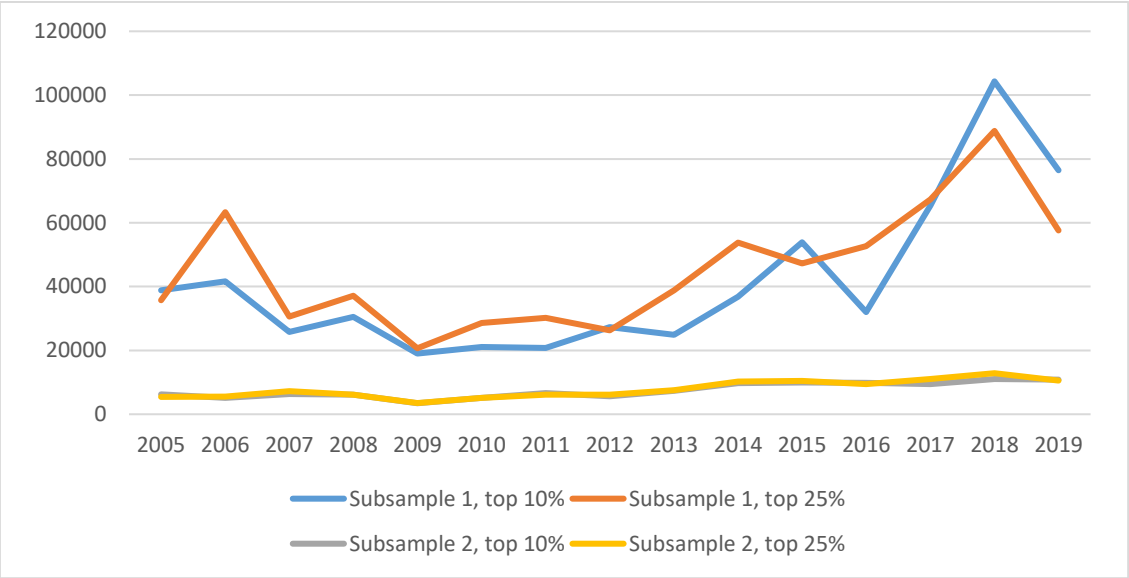


Figure 7. Visual representation of the portfolios' average market capitalization (in million USD) development over the sample period 2005-2019. The portfolio market capitalizations are based on the previous year's ending market capitalization.

After dividing the investment universe into half by market capitalization and ranking the companies with the previous year's ESG score growth rate, the four different portfolios were constructed by choosing the top 10% and top 25% ESG improvers of the subsamples. These portfolios are equally weighted. This methodology is similar to Bergskaug (2019); however, the methodology is slightly modified. Bergskaug constructed Top 10%, Bottom 10% and Long-Short -portfolios for each of his investment universes. This study focused only on the positive ESG momentum effect, as the short-portfolios' preliminary results were extremely unreliable. The reason to include Top 25%-portfolios in addition to Top 10%-portfolios is to do a robustness check for the results and thus increase the reliability of the results.

Previous main studies concerning ESG momentum strategy, such as Nagy et al. (2013 & 2016) and Verheyden et al. (2016), use different methods, as those studies include the whole investment universe in the portfolio. After that, the best ESG improvers are overweighted, and the worst ESG improvers are underweighted in the portfolio. However, these weighting methods are not further specified in the studies. The studies most probably use their own financial institutions' models, so a similar method could not be used in this study. After this, the financial performances of the portfolios are calculated, and those performances are next further discussed.

Table 3 below presents the annual returns for the "Subsample 1, Top 10%"-portfolio. The portfolio gained a cumulative return of 197.30% over the sample period 2005-2019. The table also presents the risk-free rate of returns over the sample period and the annual excess returns over the risk-free rates of return.

Subsample 1, Top 10%

Year	Portfolio return	Excess Return Over Risk-Free Rate	Risk-Free Rate of Return
2005	6.77%	3.79%	2.98%
2006	16.80%	12.00%	4.80%
2007	1.95%	-2.71%	4.66%
2008	-31.55%	-33.15%	1.60%
2009	27.35%	27.25%	0.10%
2010	18.29%	18.17%	0.12%
2011	-1.94%	-1.98%	0.04%
2012	15.53%	15.47%	0.06%
2013	21.24%	21.22%	0.02%
2014	14.17%	14.15%	0.02%
2015	-0.24%	-0.26%	0.02%
2016	0.05%	-0.15%	0.20%
2017	19.08%	18.28%	0.80%
2018	-4.71%	-6.52%	1.81%
2019	27.68%	25.54%	2.14%
Cumulative return	197.30%		

Table 3. "Subsample 1, Top 10%"-portfolio annual returns over the sample period 2005-2019.

Same portfolio performance statistics for the "Subsample 1, Top 25%"-portfolio are presented in table 4 below. "Subsample 1, Top 25%" portfolio had a cumulative return of 192.01% in the sample period. The cumulative return is very close the cumulative return of the "Subsample 1, Top 10%"-portfolio, but it slightly underperformed compared to it.

Subsample 1, Top 25%

Year	Portfolio return	Excess Return Over Risk-Free Rate	Risk-Free Rate of Return
2005	7.54%	4.56%	2.98%
2006	12.18%	7.38%	4.80%
2007	5.31%	0.65%	4.66%
2008	-38.22%	-39.82%	1.60%
2009	30.30%	30.20%	0.10%
2010	14.20%	14.08%	0.12%
2011	-0.24%	-0.28%	0.04%
2012	13.22%	13.16%	0.06%
2013	27.17%	27.15%	0.02%
2014	16.61%	16.59%	0.02%
2015	-1.68%	-1.70%	0.02%
2016	7.09%	6.89%	0.20%
2017	16.46%	15.66%	0.80%
2018	-5.71%	-7.52%	1.81%
2019	29.10%	26.96%	2.14%
Cumulative return	192.01%		

Table 4. "Subsample 1, Top 25%" portfolio annual returns over the sample period 2005-2019.

The similar portfolio performance statistics for the "Subsample 2, Top 10%"-portfolio are presented in table 5 below. Over the sample period, "Subsample 2, Top 10%"-portfolio gained a cumulative return of 302.23%. This portfolio outperformed significantly both of the "Subsample 1"-portfolios, which was expected, as companies with smaller market capitalizations have historically outperformed the companies with larger market capitalizations.

Subsample 2, Top 10%

Year	Portfolio return	Excess Return Over Risk-Free Rate	Risk-Free Rate of Return
2005	12.07%	9.09%	2.98%
2006	18.76%	13.96%	4.80%
2007	-2.31%	-6.97%	4.66%
2008	-29.11%	-30.71%	1.60%
2009	30.14%	30.04%	0.10%
2010	15.84%	15.72%	0.12%
2011	1.03%	0.99%	0.04%
2012	27.87%	27.81%	0.06%
2013	25.04%	25.02%	0.02%
2014	10.23%	10.21%	0.02%
2015	-1.37%	-1.39%	0.02%
2016	8.02%	7.82%	0.20%
2017	30.43%	29.63%	0.80%
2018	-9.90%	-11.71%	1.81%
2019	29.84%	27.70%	2.14%
Cumulative return	302.23%		

Table 5. "Subsample 2, Top 10%" portfolio annual returns over the sample period 2005-2019.

For the last portfolio, "Subsample 2, Top 25%", the financial performance is illustrated in table 6 below. It earned a cumulative return of 237.64% over the sample period and expectedly outperformed the "Subsample 1"-portfolios. As with the "Subsample 1"-portfolios, the Top 10%-portfolio outperformed the Top 25%-portfolio between the "Subsample 2"-portfolios.

Subsample 2, Top 25%

Year	Portfolio return	Excess Return Over Risk-Free Rate	Risk-Free Rate of Return
2005	16.64%	13.66%	2.98%
2006	15.16%	10.36%	4.80%
2007	2.15%	-2.51%	4.66%
2008	-35.02%	-36.62%	1.60%
2009	30.71%	30.61%	0.10%
2010	23.15%	23.03%	0.12%
2011	-1.62%	-1.66%	0.04%
2012	19.76%	19.70%	0.06%
2013	35.00%	34.98%	0.02%
2014	8.14%	8.12%	0.02%
2015	-8.89%	-8.91%	0.02%
2016	10.13%	9.93%	0.20%
2017	20.79%	19.99%	0.80%
2018	-10.21%	-12.02%	1.81%
2019	25.69%	23.55%	2.14%
Cumulative return	237.64%		

Table 6. "Subsample 2, Top 25%" portfolio annual returns over the sample period 2005-2019.

Lastly, table 7 below summarizes the portfolio performances over the sample period and presents the portfolios' descriptive statistics. As discussed earlier, "Subsample 2"-portfolios that include companies within the S&P500 index with lower market capitalizations outperformed the "Subsample 1"-portfolios with the larger market capitalization companies. However, the returns for the "Subsample 2"-portfolios were more volatile compared to "Subsample 1"-portfolios, standard deviations being 15.41%, 16.95%, 17.22% and 18.42% for the "Subsample 1, Top 10%" -, "Subsample 1, Top 25%" -, "Subsample 2, Top 10%"- and "Subsample 2, Top 25%"-portfolios, respectively. When analyzing the annual returns even further, the difference between variability can be mostly explained by

the time periods around negative return years. Companies with smaller market capitalizations in the US are generally more affected by economic turmoil than companies with larger market capitalizations in the US. However, the companies with smaller market capitalizations outperform the companies with larger market capitalizations after the economic turmoil. Thus, smaller companies tend to be associated with higher risk. (CME Group, 2020)

	Subsample 1, Top 10%	Subsample 1, Top 25%	Subsample 2, Top 10%	Subsample 2, Top 25%
Mean	0.0870	0.0889	0.1111	0.1011
Median	0.1417	0.1218	0.1207	0.1516
Minimum	-0.3155	-0.3822	-0.2911	-0.3502
Maximum	0.2768	0.3030	0.3043	0.3500
Standard deviation	0.1541	0.1695	0.1722	0.1842
Variance	0.0237	0.0287	0.0296	0.0339

Table 7. Descriptive statistics of the portfolio financial performances.

Finally, table 8 below illustrates the portfolio cumulative returns in different time periods. The sample period 2005-2019 is here further divided into three sub-periods; Pre-crisis period 2005-2006, Crisis period 2007-2009 and After-crisis period 2010-2019. Here for simplicity purposes, the Top 10%-portfolios are compared together, and the Top 25% portfolios are compared together. In every time period, the cumulative returns are higher for both the Top 10% and the Top 25%-portfolios constructed from Subsample 2. This is again in line with the previous literature that companies with smaller market capitalizations tend to outperform companies with higher market capitalizations.

Year	Subsample 1, Top 10%	Subsample 1, Top 25%	Subsample 2, Top 10%	Subsample 2, Top 25%
Pre-crisis period 2005-2006	24.71%	20.63%	33.09%	34.32%
Crisis period 2007-2009	-11.14%	-15.22%	-9.87%	-13.24%
After crisis 2010-2019	168.27%	185.52%	235.34%	189.74%

Table 8. Cumulative returns of the portfolios in the different time periods.

5.2.2 Empirical methods

In the next section, the empirical analysis of this study will be conducted. The performance of the four constructed portfolios will be measured and compared. The main focus is to investigate whether the integration of the positive ESG momentum criteria has any significant impact on the portfolio performances and whether the size of the companies affects the performance. Also, portfolio performances are investigated in different market conditions. Portfolio performance is measured using the Sharpe ratio and using CAPM, Fama-French 3-factor, 5-factor & 6-factor, and the Carhart 4-factor model in the regression analyses. These methods were discussed in subsection 4.1.1.

Overall, this study's empirical methods differ slightly from the previous studies' empirical methods regarding ESG momentum. Firstly, most of the studies use the whole particular index when constructing a portfolio by overweighting the best ESG improvers and underweighting the worst ESG improvers (see, for example, Nagy et al., 2013 & 2016). This study uses Top 10%- and Top 25% -portfolios from the investment universe, i.e., the S&P 500 index, focusing on the Top 10% -portfolios. This approach is similar to the traditional momentum strategy and the strategy used by Bergskaug (2019). This approach is used to get not only statistically significant results but also economically significant results by restricting the amount of stock selected to portfolios in a given year. Also, the lack of a

model for a different approach led to this decision. This study also focuses only on the positive ESG momentum, as the overweighting and underweighting method was unavailable, and preliminary results of shorting the worst ESG improvers were too unreliable. This is probably because over the sample period 2005-2019 market was mostly in an uptrend, and even the worst ESG improvers enjoyed a positive stock price trend. Finally, most previous studies use a different model, for example, the GEM3 multi-regression model (Nagy et al., 2013 & 2016; Giese et al., 2019), and conduct the empirical part using only a single regression model. This study uses CAPM, Fama-French 3-factor, 5-factor & 6-factor models, as well as the Carhart 4-factor model. The use of several models in this study is motivated by robustness purposes.

6 EMPIRICAL RESULTS

This section presents the empirical results of this study and discusses them comprehensively. The results over the whole sample period are first presented in tables and then discussed while addressing the research questions of this study. Moreover, the results are presented in the same order as the market efficiency performance measures are introduced in subsection 4.1.1. First, subsection 6.1 discusses the results to answer the first research question of this study: "Does integrating positive ESG momentum criteria lead to abnormal returns in the US market?". Portfolios are also compared to answer the second research question of this study: "How does the company size affect the portfolio returns when positive ESG momentum criteria is integrated?". After this, the differences in portfolio returns are also compared in different market conditions. Finally, subsection 6.2 summarizes the empirical results.

Furthermore, "Alpha" presented in the tables is an estimated coefficient, which measures the part of the excess returns which the beta coefficients of the factor models cannot explain. In this particular study, it indicates whether the integration of the positive ESG momentum criteria affects the excess returns of the portfolios. Moreover, the abbreviations R_m-R_f, SMB, HML, UMD, RMW and CMA imply the different factors of the beta coefficients used in CAPM, Fama-French 3-factor, 5-factor & 6-factor models and Carhart 4-factor model. Sharpe ratio measures the risk-adjusted return of the portfolio. R^2 (R-Squared) measures the proportion of the variance for the dependent variable, which is explained by the independent variables, i.e., the beta coefficients, in the regression models. Thus, a higher R^2 indicates a better explanatory power of the model.

6.1 Performance of the portfolios over the whole sample period 2005-2019

Table 9 below presents the CAPM regression results and Sharpe ratios for the four constructed portfolios over the whole sample period 2005-2019. All of the alphas for the portfolios are negative, except for the "Subsample 2, Top 10%"-portfolio. However, none

of these coefficients are statistically significant. This indicates that the first null hypothesis $H_{0,a}$ “Integration of the positive ESG momentum criteria does not lead to excess returns” cannot be rejected. The market factor R_m-R_f is positive and statistically significant for each of the portfolios at the 1% significance level, which indicates that the market return is the main driver for the excess returns of the portfolios. Market factors are higher for the “Subsample 2”-portfolios compared to their respective “Subsample 1”-portfolios, which indicating that the returns were more volatile for the companies with smaller market capitalizations, which is in line with the previous findings. However, the beta coefficients were under 1 for each of the portfolios except for the “Subsample 2, Top 25%”-portfolio, indicating that in general, the returns for the best ESG improvers were less volatile than the market return.

All of the portfolios have very high R-Squared, varying between 0.88-0.97, meaning that the CAPM explains extremely well the portfolio returns. Finally, the table presents the Sharpe ratios of portfolios. As we saw in subsection 5.2.1, “Subsample 2”-portfolios outperformed “Subsample 1”-portfolios over the sample period, but the returns were also more volatile, as just noticed. As the Sharpe ratios were also higher for the “Subsample 2”-portfolios over the sample period, it indicates that portfolio outperformances were relatively higher than the differences in portfolio volatilities, compared to “Subsample 1”-portfolios.

	Subsample 1, Top 10%	Subsample 1, Top 25%	Subsample 2, Top 10%	Subsample 2, Top 25%
Alpha	-0.005	-0.014	0.011	-0.0074
	(0.696)	(0.187)	(0.565)	(0.626)
R_m-R_f	0.840***	0.948***	0.923***	1.010***
	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.92	0.97	0.88	0.93
Sharpe ratio	0.47	0.44	0.56	0.47

Table 9. CAPM single-factor regression results and the Sharpe ratios. The OLS regressions results are presented over the whole sample period 2005-2019. Alpha indicates an estimated coefficient, which is the part of excess returns that cannot be explained by the beta coefficient, i.e., the R_m-R_f-factor. R^2 indicates the model's goodness-of-fit. The p-values are in the parenthesis, below the coefficient values. ***, ** and * represent 1%, 5% and 10% significance levels, respectively.

Fama-French 3-factor model regression results over the whole sample period 2005-2019 are presented in the table 10 below. The results are somewhat similar compared to the CAPM results. All of the portfolio alphas are again negative, except for "Subsample 2, Top 10%"-portfolio, yet these results are not statistically significant. The market factor is again significant for all portfolios at a 1% significance level, indicating that the market return mainly drives the portfolio excess returns. The market factor beta coefficients are under 1 for all of the portfolios, indicating that returns over the sample period have been slightly less volatile than market returns. The beta coefficients for the two additional factors, SMB and HML factors, are not significant for any of the portfolios. R-Squared values vary between 0.89-0.97, which means that the Fama-French 3-factor model explains the portfolio excess returns exceptionally well. Also, R-Squared increased for each portfolio, indicating that the Fama-French 3-factor model explains the excess returns better than the CAPM.

	Subsample 1, Top 10%	Subsample 1, Top 25%	Subsample 2, Top 10%	Subsample 2, Top 25%
Alpha	-0.008	-0.016	0.012	-0.003
	(0.598)	(0.135)	(0.572)	(0.816)
R_m-R_f	0.842***	0.960***	0.935***	0.983***
	(0.000)	(0.000)	(0.000)	(0.000)
SMB	-0.037	-0.150	-0.120	0.323
	(0.861)	(0.334)	(0.697)	(0.151)
HML	0.042	-0.042	0.115	0.050
	(0.655)	(0.655)	(0.541)	(0.703)
R^2	0.97	0.97	0.89	0.95

Table 10. Fama-French 3-factor model results. The OLS regressions results are presented over the whole sample period 2005-2019. Alpha indicates an estimated coefficient, which is the part of excess returns that cannot be explained by the beta coefficients, i.e., R_m-R_f, SMB and HML factors. R^2 indicates the model's goodness-of-fit. The p-values are in the parenthesis, below the coefficient values. ***, ** and * represent 1%, 5% and 10% significance levels, respectively.

Carhart 4-factor model regression results over the whole sample period 2005-2019 are presented in the table 11 below. Alphas for the portfolios are again negative, except for the "Subsample 2, Top 10%"-portfolio, yet the coefficients are not statistically significant. The market return seems to mainly explain the excess returns for all of the portfolios in the Carhart 4-factor model. The market factors vary between 0.842-0.983, all of them being statistically significant at a 1% significance level. The beta coefficients for any of the factors are not statistically significant. However, the beta coefficients for the SMB

and UMD factors are statistically significant at a 10% significance level for the "Subsample 1, Top 25%"-portfolio, indicating that these factors also explain the portfolio excess return to some degree. R-Squared values stay somewhat similar compared to the Fama-French 3-factor model. Value varies between 0.89-0.98, meaning that the Carhart 4-factor model explains exceptionally well the excess returns of the portfolios.

	Subsample 1, Top 10%	Subsample 1, Top 25%	Subsample 2, Top 10%	Subsample 2, Top 25%
Alpha	-0.006	-0.013	0.014	-0.004
	(0.711)	(0.181)	(0.503)	(0.806)
R_m-R_f	0.818***	0.923***	0.902***	0.994***
	(0.000)	(0.000)	(0.000)	(0.000)
SMB	-0.115	-0.255*	-0.222	0.318
	(0.629)	(0.098)	(0.509)	(0.208)
HML	-0.113	-0.054	0.108	0.087
	(0.379)	(0.485)	(0.547)	(0.505)
UMD	-0.051	-0.077*	-0.069	0.015
	(0.429)	(0.070)	(0.454)	(0.821)
R^2	0.93	0.98	0.89	0.95

Table 11. Carhart 4-factor model results. The OLS regressions results are presented over the whole sample period 2005-2019. Alpha indicates an estimated coefficient, which is the part of excess returns that cannot be explained by the beta coefficients, i.e., R_m-R_f, SMB, HML and UMD factors. R^2 indicates the model's goodness-of-fit. The p-values are in the parenthesis, below the coefficient values. ***, ** and * represent 1%, 5% and 10% significance levels, respectively.

Fama-French 5-factor model regression results over the whole sample period 2005-2019 are presented in the table 12 below. Alphas for the portfolios are again negative, except

this time for “Subsample 2, Top 25%”-portfolio. However, these coefficients are not statistically significant. The market factors are again all positive, under 1 and statistically significant at a 1% significance level. This indicates that portfolio excess returns are mainly driven by the market return and that the portfolio returns are slightly less volatile than the market return. Beta coefficients for the SMB and HML factors are not statistically significant. Also, the beta coefficients for the additional RMW and CMA factors are statistically insignificant, indicating that the profitability and investment risk factors do not explain the excess returns of the portfolios. R-Squared values are again high and vary between 0.89-0.97, indicating that also Fama-French 5-factor model can explain excess returns of the portfolios exceptionally well.

	Subsample 1, Top 10%	Subsample 1, Top 25%	Subsample 2, Top 10%	Subsample 2, Top 25%
Alpha	-0.003	-0.012	-0.000	0.002
	(0.879)	(0.450)	(0.989)	(0.918)
R_m-R_f	0.827***	0.946***	0.981***	0.961***
	(0.000)	(0.000)	(0.000)	(0.000)
SMB	-0.161	-0.152	-0.133	0.406
	(0.562)	0.454	(0.740)	(0.169)
HML	-0.191	-0.051	0.130	0.098
	(0.280)	(0.686)	(0.604)	(0.579)
RMW	-0.155	-0.082	0.255	-0.077
	(0.625)	(0.721)	(0.581)	(0.812)
CMA	0.237	0.005	0.029	-0.184
	(0.484)	(0.982)	(0.953)	(0.591)
R^2	0.94	0.97	0.89	0.95

Table 12. Fama-French 5-factor model results. The OLS regressions results are presented over the whole sample period 2005-2019. Alpha indicates an estimated coefficient, which is the part of excess returns that cannot be explained by the beta coefficients, i.e., R_m-R_f, SMB, HML, RMW and CMA factors. R^2 indicates the model's goodness-of-fit. The p-values are in the parenthesis, below the coefficient values. ***, ** and * represent 1%, 5% and 10% significance levels, respectively.

Finally, table 13 below presents the Fama-French 6-factor model regression results over the whole sample period 2005-2019. Alphas for the portfolios are this time positive, except for the "Subsample 1, Top 25%"-portfolio. However, these results are not statistically significant. Beta coefficients for the market factors are again statistically significant for all of the portfolios at a 1% significance level, implying that the excess returns are mostly driven by the market return. None of the other factor loadings are statistically significant for any of the portfolios, except for the UMD factor for the "Subsample 1, Top 25%"-portfolio at a 10% significance level. R-Squared values are again varying between 0.89-0.98, indicating that the Fama-French 6-factor model can explain the excess returns of the portfolios exceptionally well.

	Subsample 1, Top 10%	Subsample 1, Top 25%	Subsample 2, Top 10%	Subsample 2, Top 25%
Alpha	0.005	-0.003	0.005	0.001
	(0.839)	(0.854)	(0.876)	(0.979)
R_m-R_f	0.774***	0.883***	0.942***	0.972***
	(0.000)	(0.000)	(0.000)	(0.000)
SMB	-0.278	-0.294	-0.220	0.430
	(0.354)	(0.133)	(0.627)	(0.201)
HML	-0.192	-0.051	0.130	0.098
	(0.277)	(0.630)	(0.620)	(0.601)
RMW	-0.263	0.213	0.175	-0.055
	(0.430)	(0.312)	(0.729)	(0.879)
CMA	0.254	0.026	0.041	-0.187
	(0.450)	(0.899)	(0.935)	(0.607)
UMD	-0.075	-0.090*	-0.055	0.015
	(0.293)	(0.060)	(0.603)	(0.839)
R^2	0.94	0.98	0.89	0.95

Table 13. Fama-French 6-factor model results. The OLS regressions results are presented over the whole sample period 2005-2019. Alpha indicates an estimated coefficient, which is the part of excess returns that cannot be explained by the beta coefficients, i.e., R_m-R_f, SMB, HML, RMW, CMA and UMD factors. R^2 indicates the model's goodness-of-fit. The p-values are in the parenthesis, below the coefficient values. ***, ** and * represent 1%, 5% and 10% significance levels, respectively.

Differences in portfolio returns in different sample periods

Subsection 5.2.1 ended by presenting the portfolio cumulative returns in three different time periods: the pre-crisis period 2005-2006, the crisis period 2007-2009 and the after-crisis period 2010-2019. Top 10%-portfolios were compared to each other, such as Top 25%-portfolios, in every sample period. As we saw from table 8, the "Subsample 2"-portfolios outperformed their respective portfolios in each of the three sample periods. By using the paired t-test, these mean differences were further examined. Although the "Subsample 2"-portfolios outperformed their respective portfolios in each sample period, none of these mean differences are statistically significant.

6.2 Summary of the results

As we saw in the previous subsection, the regression results obtained from each of the models were somewhat similar. The market factor was statistically significant at a 1% significance level for all of the portfolios using the CAPM, as it is the only independent variable of the model. Alphas for each of the portfolios indicate a negative relationship between excess returns and integrating the positive ESG momentum criteria, "Subsample 2, Top10%"-portfolio being the example. However, the coefficients are not statistically significant. "Subsample 2"-portfolios also outperform the "Subsample 1"-portfolios on a risk-adjusted basis, as their Sharpe ratios are higher than their respective "Subsample 1"-portfolios. This indicates that even though the returns are more volatile for the "Subsample 2"-portfolios, the outperformance in returns is relatively higher, as the risk-adjusted returns are also higher.

Surprisingly, the results obtained from Fama-French 3-, 5- & 6-factor models and the Carhart 4-factor model do not considerably differ from these results. All of the models show a market factor statistically significant at a 1% significance level for all of the portfolios. Meanwhile, all of the beta coefficients for each of the other factors in the models are not statistically significant, except for a few exceptions. These results can be interpreted that the portfolio returns are mainly explained by the market return. However,

the market factor loadings drop somewhat steadily when new factors are added into the models, indicating that these additional factors explain some of the portfolio excess returns. R-Squared values are extremely high for all of the portfolios in each of the models used. There is a slight increase in the R-Squared values of the portfolios when comparing the Fama-French 3-factor model to the CAPM. However, as the R-Squared values are already so high when using the Fama-French 3-factor model, it stays somewhat the same in the Fama-French 5- & 6-factor models and the Carhart 4-factor model. This is not aligned with the previous literature, as Griffin (2002) finds that the R-Squared value should increase when adding useful factors into a model.

As the alphas are mostly negative and not statistically significant, this study fails to reject the null hypothesis $H_{0,a}$ "Integration of the positive ESG momentum criteria does not lead to excess returns". These findings are not aligned with the previous studies (see, for example, Nagy et al., 2013 & 2016). When the portfolios are examined separately over the three different sample periods (the pre-crisis period 2005-2006, the crisis period 2007-2009 and the after-crisis period 2010-2019), none of the portfolios have neither positive nor negative statistically significant alpha. This indicates that this study fails to reject the null hypothesis $H_{0,c}$ "Company size does not affect portfolio performance when integrating the positive ESG momentum criteria in different market conditions."

Secondly, this study tried to answer whether the size of the company matters to portfolio returns when integrating the positive ESG momentum criteria. As we saw, the "Subsample 2"-portfolios outperformed their respective "Subsample 1"-portfolios over the whole sample period 2005-2019 and in the three separately examined sample periods. However, when paired t-tests were conducted, none of the mean differences were significantly different from zero. Thus, the second null hypothesis of the study $H_{0,b}$ "When integrating positive ESG momentum criteria, company size does not matter to portfolio returns" cannot be rejected.

As the results of this study are not aligned with the previous studies presented in this study (see, for example, Nagy et al., 2013 & 2016; Verheyden et al., 2016; Giese et al., 2019), it is reasonable to discuss the factors which might affect to these differences. First, the investment universe and the methodology differ significantly compared to the aforementioned studies. Nagy et al. (2013 & 2016) and Giese et al. (2019) use MSCI IVA ratings and GEM3 multi-factor regression model in their studies and use the MSCI World Index as a benchmark. Verheyden et al. (2016) use two different investment universes, one consisting of large- and mid-cap stocks from 23 developed and 23 emerging countries. The second one consists of large- and mid-cap stocks from only 23 developed countries. As their regression model, they use the Carhart 4-factor model. Meanwhile, this study uses ESG and financial data obtained from the Refinitiv database and has two investment universes; the top half of the S&P 500 stocks ranked by the market capitalization, and the bottom half of the S&P 500 stocks ranked by the market capitalization. This study also uses the CAPM, Fama-French 3-, 5- & 6-factor models and Carhart 4-factor model in its empirical analysis part. Moreover, Duuren et al. (2016) find that US investors are more skeptical about the positive effect of the inclusion of ESG factors in the company performance compared to European investors. This could also explain the differences in the results.

Secondly, the method of how the portfolios are constructed in this study is somewhat unique. This study focuses only on the positive ESG momentum effect and selects 10% of the best ESG improvers into the portfolios from each of the investment universes. Also, Top 25%-portfolios are constructed from both of the investment universes for robustness reasons. The aforementioned studies use a different approach – they include the whole investment universes in their portfolios and overweight the best ESG improvers and underweight the worst ESG improvers. Closely related to this matter is also the decision of how often the portfolios are rebalanced, which also affects the performance.

As discussed before, the portfolio construction -method and the decision to rebalance portfolios yearly are somewhat similar to Bergskaug (2019). This is a more practical approach than the aforementioned studies as it does not require investors to include hundreds of stocks into their portfolios. The approach used by the aforementioned studies does not consider the significant transaction costs, which could make the findings of those studies economically insignificant. The approach used in this study considers the investor as well and thus tries to overcome this problem. However, as the results of this study indicate that integrating the positive ESG momentum criteria does not lead to statistically significant excess returns, it is impossible to consider whether these results would be economically significant. The next section concludes this study.

7 CONCLUSION

Investors are always trying to find new ways and strategies to invest and generate excess returns. In recent years, one of the megatrends has been socially responsible investing (SRI), where investors try to gain excess returns by considering environmental, social and governance (ESG) risk factors in their investment decisions. However, sometimes investors are willing to accept lower returns while integrating the ESG criteria into their investment decisions, as it allows them to invest according to their values (Renneboog et al., 2008). As the megatrend of SRI continues to grow, this study aims to contribute to its existing literature. More specifically, this study examines the ESG momentum strategy. The ESG momentum strategy tries to capture the excess returns by recognizing the best ESG improvers, which might not yet be recognized by the traditional screening strategies. ESG momentum strategy is a relatively new SRI strategy with extremely limited research, making this study even more exciting.

As most of the previous studies concerning ESG momentum strategy use basically the whole world as an investment universe and select whole indexes in their examined portfolios by overweighting the best ESG improvers and underweighting the worst ESG improvers, this study takes a somewhat different approach. This study focuses only on the S&P 500 index and divides it into two investment universes by market capitalization. From here, first, Top 10%-portfolios are constructed, and then Top 25%-portfolios are constructed for robustness reasons. The motivation for this approach is to get not only statistically significant results but also economically significant results, indicating that the possible statistically significant excess returns would also be significant after considering the transaction costs.

Furthermore, the sample period is between 2005-2019, thus consisting of 15 yearly observations. The financial and ESG data is obtained from the Refinitiv ASSET4 database. Most of the previous studies use different ESG data, excluding Bergskaug (2019), which is one of the contributions of this study. Moreover, data for the factor beta coefficients

and the yearly risk-free rates of return are collected from the Kenneth R. French database. Continuing with the methodology, which is somewhat different compared to the previous studies. This study examines whether the integration of positive ESG momentum criteria leads to significant excess returns. Performance of the portfolios is measured with the Sharpe ratio and five different market efficiency measures: the CAPM, Fama-French 3-, 5- & 6-factor models and the Carhart 4-factor model. Comparing to previous studies, Nagy et al. (2013) & (2016) and Giese et al. (2019) use MSCI IVA ratings and GEM3 multi-factor regression model and Verheyden et al. (2016) also uses worldwide investment universe and Carhart 4-factor model as a regression model.

The regression results obtained from each of the models are all somewhat similar: none of the alphas are statistically significant for either portfolio. This indicates that the integration of the positive ESG momentum criteria leads to neither outperformance nor underperformance compared to the market return. Thus, this study fails to reject the null hypothesis $H_{0,a}$ "Integration of the positive ESG momentum criteria does not lead to excess returns". Secondly, this study examined whether the company size matters when integrating the positive ESG momentum criteria. Using the paired t-test, the mean difference between similarly constructed portfolios with different market capitalizations was not significantly different from 0. Thus, the second null hypothesis $H_{0,b}$ "When integrating positive ESG momentum criteria, company size does not matter to portfolio returns" cannot be rejected either. Lastly, this study examined whether the integration of the positive ESG momentum criteria significantly affected portfolio returns in different market conditions. The portfolio returns were examined separately in three different sample periods: the pre-crisis sample period 2005-2006, the crisis period 2007-2009 and the after-crisis sample period 2010-2019. Again, none of the portfolio alphas were statistically significant, which indicates that $H_{0,c}$ "Company size does not affect portfolio performance when integrating the positive ESG momentum criteria in different market conditions" can not be rejected. It also confirms that the $H_{0,a}$ "Integration of the positive ESG momentum criteria does not lead to excess returns", cannot be rejected.

However, the results of this study should be critically reviewed as the study has its limitations. First of all, the results are solely dependable on the Refinitiv ASSET4 ESG database, as the financial and ESG data are retrieved from that single database. This is even more challenging regarding the ESG data. It is highly ambiguous, which we saw from figure 5, which showed us that the correlations between the ESG scores of the six large ESG data providers vary from low as 0.12 to only as high as 0.77. Also, there might be issues in the data processing if the original data is somehow flawed. Lastly, some of the observations needed to be omitted from the sample in a particular year if either financial or ESG data were not available for that year. Also, as the ESG data from the Russell 2000 index was not available from the Refinitiv database for a reasonable period, it limited examining whether the company size matters when integrating the positive ESG momentum criteria. Also, selections to use only the US data, use annual instead of monthly financial data, and use selected methodology are limitations of this study. However, they also act as a contribution to existing literature.

Furthermore, the results of this study are not aligned with the previous studies concerning literature. Most likely, the differences in the results originate from the aforementioned limitations of this study. However, the reader must acknowledge that the amount of ESG momentum strategy is extremely limited, even though the results are aligned. Moreover, even though the results found in these studies are statistically significant, the excess returns might be diminished if the transaction costs are considered. Furthermore, the ESG momentum tries to capture excess returns by overweighting the best ESG improvers and underweighting the worst ESG improvers in the previous years. However, the ESG data is usually available sometime in spring for the regular investor, which makes the practical implementation of the study somewhat impossible. Also, ESG data, in general, is dependent on so many things, which means that the reader should always be critical when examining the results of an ESG study.

This study contributed to the limited existing literature regarding ESG momentum using different data and methodology compared to the earlier studies. Although the alphas

are not statistically significant, and thus the results are not aligned with the previous studies, it creates exciting ideas for further research. As the results are not aligned, it indicates that the results depend on the data, methodology and the limitations of the study. Thus, replication of the main studies concerning ESG momentum could be done using similar data and different methodology or vice versa, for robustness purposes. Even the replication of this study in the near future would be interesting, as the democrat Joe Biden acting as the United States president could accelerate the growth of the SRI industry even further. In addition to that, the aforementioned limitations of this study could act as guiding principles for further research. Furthermore, examining whether the integration of the ESG momentum criteria can explain excess returns in the current COVID-19 crisis or its aftermath would be a fascinating topic of research.

Lastly, some final words considering the field of SRI in general. As we have discussed in this study, the rising megatrend of SRI has grown enormously in the past few decades, leading to a continuously growing amount of studies regarding SRI. Nevertheless, the SRI study results remain mostly mixed and controversial. For example, Auer (2016) and Kempf & Osthoff (2007) demonstrate the possibility of highly significant excess returns using different SRI strategies. In contrast, Halbritter & Dorfleitner (2015) illustrate that the integration of the ESG criteria does not yield positive excess returns, and Renneboog et al. (2008) show that the investors implementing ESG criteria are willing to accept suboptimal returns. However, all of the ESG factors are very real. We have seen this even in the recent year: the continuously growing amount of environmental disasters such as wildfires and floods due to climate change, the Black Lives Matter movement resulting from the George Floyd shooting, and the recent Wirecard scandal. Although some of the results remain mixed and controversial, many investors have outperformed the market and gained better risk-adjusted returns using SRI strategies. It is just that the industry is still relatively new, and the results are hard to interpret – but as the industry keeps growing, those who can, will definitely see returns – and simultaneously make the world a better place.

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