Master's thesis

NTNU
Norwegian University of Science and Technology
Faculty of Economics and Management
NTNU Business School

Nora Vie Holm
Marie Eskeland Øygarden

ESG and Stock Returns

Investigating the relationship between Corporate Social Responsibility and Corporate Financial Performance with evidence from European and US Markets

Master's thesis in Business Administration - Finance and Investment
Supervisor: Denis Mike Becker
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Preface

This thesis is written as a part of NTNU Business Schools master's program in Business Administration – Finance and Investment. The objective of this thesis is to investigate the relationship between Corporate Social Responsibility and Corporate Financial Performance. The topic of CSR has gained considerable attention in recent years, as investors increasingly recognize the importance of incorporating non-financial criteria into their investment decision-making processes.

We would like to express our gratitude to our supervisor Denis Mike Becker, for his guidance and assistance throughout the research and writing process. We would also like to thank the faculty members at NTNU Business School for providing us with the resources and academic environment necessary to undertake this research.

NTNU bears no responsibility for the opinions or content presented in this thesis, as it is solely the responsibility and expense of the authors.

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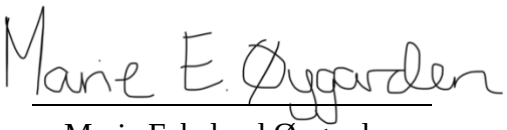
Trondheim, 25th of May 2023



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Abstract

This master thesis seeks to investigate the relationship between Corporate Social Responsibility (CSR) and Corporate Financial Performance (CFP) in Europe and the US, measured by ESG and stock returns, respectively. Our sample comprises 458 companies from Stoxx Europe 600 and 429 companies from S&P 500, over the period spanning from 2016 to 2021. The constituents were classified based on their ESG scores, and further divided into separate portfolios containing the best and worst performing companies. This resulted in a total of 16 portfolios, eight for each index. To measure the difference in returns between the portfolios, we estimated alphas from a long-short zero-cost investment strategy. This strategy involves holding a long position in companies with high ESG scores and shorting companies with low ESG scores. To conduct time series regressions, we applied the Fama & French three-factor model, the Carhart four-factor model, and the Fama & French five-factor model.

In the analyses of the US market, we found a significant negative relationship between CSR and CFP, contradicting several previous studies. The results from the European analyses were more ambiguous, with some analyses indicating a negative relationship and others giving inconclusive results. We do, however, ultimately conclude that there is a negative relationship between CSR and CFP. This implies that including companies with low ESG scores in an investment strategy should generate excess returns for an investor.

Sammendrag

Denne masteroppgaven har som mål å undersøke sammenhengen mellom selskapers samfunnsansvar (CSR) og deres finansielle prestasjoner (CFP) i Europa og USA, målt ved henholdsvis ESG og aksjeavkastning. Vårt utvalg består av 458 selskaper fra Stoxx Europe 600 og 429 selskaper fra S&P 500 fra perioden 2016 til 2021. Selskapene ble sortert basert på deres ESG score, og videre delt inn i separate porteføljer bestående av selskapene som presterte best og dårligst. Dette resulterte i totalt 16 porteføljer, åtte for hver indeks. For å måle forskjellen i avkastning mellom porteføljene, estimerte vi alfaer fra en long-short zero-cost investeringsstrategi. Denne strategien innebærer å gå long i selskaper med høy ESG score og short i selskaper med lav ESG score. For å gjennomføre tidsserieregresjoner, benyttet vi Fama & French tre-faktor modellen, Carhart fire-faktor modellen og Fama & French fem-faktor modellen.

I analysene av det amerikanske markedet fant vi en signifikant negativ sammenheng mellom CSR og CFP, noe som motsier flere tidligere studier. Resultatene fra Europa var mer tvetydige, hvor noen analyser indikerte en negativ sammenheng, mens andre ga uklare resultater. Vi konkluderer likevel til slutt med at det er en negativ sammenheng mellom CSR og CFP. Dette impliserer at å inkludere selskaper med lav ESG score i en investeringsstrategi bør generere meravkastning for en investor.

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Abbreviations

BMW	Best Minus Worst (High-rated ESG minus low-rated ESG)
CAPM	Capital Asset Pricing Model
CFP	Corporate Financial Performance
CMA	Conservative Minus Aggressive
CSR	Corporate Social Responsibility
DW	Durbin-Watson
EMH	Efficient Market Hypothesis
ESG	Environmental, Social, and Governance
ESGC	Environmental, Social, and Governance Combined
GLS	Generalized Least Squares
HML	High Minus Low
Mkt – Rf	Market Risk Premium
OLS	Ordinary Least Squares
r	Expected rate of return
Rf	Risk-free rate
Rm – Rf	Market Risk Premium
RMW	Robust Minus Weak
SDGs	Sustainable Development Goals
SI	Stakeholder-relation Index
SMB	Small Minus Big
SRI	Socially Responsible Investment
VIF	Variance Inflation Factor
WML	Winners Minus Losers
β	Factor coefficient

1. Introduction

In recent years, there has been growing awareness of the importance of sustainability. Initiatives such as the United Nations' Sustainable Development Goals (SDGs) have drawn attention to the urgent need for sustainable development (United Nations, 2023). The term "sustainability" was introduced as early as 1987 by the Brundtland Commission in the report "Our Common Future" (Brundtland, 1987). However, it is only in the past few years it has gained widespread attention from businesses, governments, and civil society organizations.

Although the UN's member states' governments and organizations are working towards achieving the SDGs (United Nations, 2023), companies play a crucial role in contributing to a more sustainable future. The Carbon Major reported that 100 active fossil fuel companies are linked to 71% of the world's greenhouse gas emissions since 1988 (CDP, 2017). The world's largest online retailer Amazon has been criticized by the US Labor Department for its treatment of warehouse workers, including allegations of lacking job security and unsafe working conditions (Sainato, 2023). Therefore, in order to address challenges and achieve the SDGs, companies have a responsibility to incorporate sustainable practices into their business model and operations. This is often referred to as "Corporate Social Responsibility" (CSR) and includes minimizing a company's environmental and social footprints, preserving natural resources, promoting workers' rights, and strengthening the communities in which they operate (OECD, 2023). As a company becomes more visible and successful, it also assumes a greater responsibility to establish ethical standards of conduct for its peers and competitors (Fernando, 2023).

As a result, Environmental, Social, and Governance (ESG) has become a popular tool for investment decision-making. By implementing ESG, investors do not only look at companies that generate profit but also have a positive impact on the environment, society, and corporate governance. With this rising trend, it is important to note that companies' ESG information is often self-reported and unaudited. The increased attention to sustainability may lead companies to engage in greenwashing in order to present themselves in a more favorable light. This behavior can be a barrier to integrating ESG factors into investment decisions (Yu et al., 2020).

The debate on whether investing in sustainability is as profitable as solely focusing on a company's financial metrics is very much alive. Proponents of sustainable investments argue that investing in companies with good ESG performance has the potential to create long-term value and outperform traditional investments (PwC, 2022). This perspective is supported by LGT Capital Partners' survey, in which 84% of investors believed that integrating ESG considerations in investments has either a positive or neutral impact on risk-adjusted returns (LGT Capital Partners, 2019). However, skeptics argue that sustainable investing results in poorer Corporate Financial Performance (CFP) and limited investment opportunities (Chang & Doug Witte, 2010).

Based on this, we find it interesting to investigate whether using a sustainability screening would add value to an investment strategy. This leads up to our research question:

Is there a relationship between CSR and CFP, and if so, is this relationship positive or negative?

As this thesis examines the relationship between CSR and CFP, it is essential to specify the type of relationship we refer to. We chose the ESG criteria to evaluate companies' social responsibility performance. When evaluating CFP, previous empirical research has employed several different measures, such as measures of profitability, liquidity, solidity, market, and growth (Qammar et al., 2012). In this thesis, we used risk-adjusted stock returns. This is a widely adopted measure for CFP and is commonly used by investors as a means of maximizing their return on investments.

In order to answer our research question, we created a new dataset with data collected from Refinitiv Datastream and the Kenneth R. French Library. The aim of our research was to investigate a potential relationship between companies' ESG and ESG Combined (ESGC) scores and their risk-adjusted stock returns. The ESG scores are calculated based on the companies' publicly reported data, while the ESGC scores are adjusted according to ESG controversies based on negative attention from global media sources (Refinitiv, 2022). By using both scores, we aim to gain a more nuanced understanding of companies' sustainability performance. Our analysis spanned from February 2016 to December 2021, a period that has experienced both bull and bear markets.

Previous research on the relationship between CSR and CFP in the US market is relatively abundant, but the findings are often contradictory. However, there seems to be a gap in the literature regarding the European market, as the literature is often limited to one or a few countries. To ensure a comprehensive analysis, we have opted to use the indices S&P 500 and Stoxx Europe 600, covering both the US and European markets. S&P 500 consists of the leading large-capitalization US companies, which in total covers about 80% of the available market capitalization in the US (S&P Dow Jones Indices, 2023). Stoxx Europe 600, henceforth referred to as Stoxx 600, consists of both small-, mid- and large-capitalization companies from a number of diversified European countries and covers about 90% of the available market capitalization in Europe (Qontigo, 2023). The composition of both indices is well diversified across companies and industries.

We further constructed a total of 16 portfolios. For each index, the portfolios were constructed based on the constituents' ESG and ESGC scores, with cut-off rates of 10% and 20%. We analyzed the differences between the companies with the highest scores and the companies with the lowest scores. These were characterized as "best" and "worst" portfolios, respectively. We further applied a long-short zero-cost investment strategy, where we held long positions in the best portfolios and shorted the worst portfolios. We utilized three different factor models in our time series regressions to determine the difference in returns and estimate alphas for the strategy. These models are the Fama & French three-factor model, the Carhart four-factor model, and the Fama & French five-factor model.

In the analysis of the European market, we found statistically significant negative alphas when we screened for ESG scores, regardless of the cut-off rate applied. The alphas had values of -0.5% and -0.7% for the cut-off rates of 20% and 10%, respectively. This implies that investors can generate excess returns by holding a long position in companies with low ESG scores and short companies with high ESG scores. When we screened for ESGC, the alphas were zero or close to zero, but no longer statistically significant. As for the American market, all alphas were negative and statistically significant, regardless of the cut-off rate and whether we screened for ESG or ESGC. The estimates ranged from -0.3% to -0.8%. These results imply that investors can screen for both ESG and ESGC and generate excess returns by holding a long position in companies with low scores and short companies with high scores. Even though our results offer a complex depiction of sustainable investing in the European market, the main findings indicate a negative relationship between ESG performance and risk-adjusted stock

returns for the indices Stoxx 600 and S&P 500. With this, we contribute with updated results regarding the relationship between CSR and CFP, while also expanding the research on the European market.

The rest of this thesis is structured as follows: Chapter 2 consists of a theoretical background with three different views on the relationship between CSR and CFP. In Chapter 3, we present a literature review consisting of previous research related to our topic, as well as research conjectures that guide our study. Chapter 4 describes the data collection process, including sources and methods used to obtain and select relevant data. Chapter 5 details the methodology used to analyze the data. In Chapter 6, we present the empirical results of our study. Chapter 7 constitutes a discussion of our findings in relation to theory and existing literature and offers insights into their practical implications. Finally, Chapter 8 summarizes the main findings and contributions of our study. We conclude our thesis and highlight future recommendations for research in this field.

2. Theory

Researchers have presented theoretical arguments that offer different perspectives on the relationship between CSR and CFP. In this chapter, we will shortly present three theories that serve as the foundation for our analysis. These can be used to argue for either a positive, negative, or absent relationship.

2.1 Stakeholder Theory

The first theory can be used to argue for a positive relationship between CSR and CFP. The stakeholder theory was introduced by Robert Edward Freeman in 1984. A stakeholder is a person or a group who benefits from or is harmed by, and whose rights are violated or respected by a company's actions (Freeman, 1998). There are often opposing goals or interest conflicts within a company. However, there is not necessarily a long-term contradiction between the company's profitability and taking on social responsibility. Freeman (1984) stated that for any business to be successful long-term, it has to create value for customers, suppliers, employees, communities, financiers, shareholders, and banks. The strategic argument is that companies will have a greater chance of succeeding over time if the interests of all stakeholders are considered. The moral Kantian argument arrives at the same conclusion through a different approach, contending that it is ethically problematic for companies to treat society solely as means for profit maximization for their owners (Freeman, 1998).

According to the stakeholder theory, prioritizing CSR activities should improve CFP through a sustainable business model. By considering stakeholder needs, companies can build a positive reputation and foster loyalty, engagement, and better relationships. These factors can drive sales, reduce costs, increase productivity, and create long-term financial advantages.

2.2 Shareholder theory

The second theory can be used to argue for a negative relationship between CSR and CFP. The shareholder theory has a traditional view of a company's purpose and implies that its only duty is to maximize its profits accruing to shareholders (Friedman, 1970). A shareholder is an individual, company, or institution that owns part of a public company through shares of stock, implying that a shareholder has a financial interest in a company's profitability (Banton, 2022). Friedman (1970) stated that the sole social responsibility of businesses is to utilize their

resources and conduct activities aimed at maximizing their profits, as long as they comply with the rules of fair and open competition, and do not engage in deception fraud.

According to the shareholder theory, companies that prioritize CSR activities may experience lower financial performance as they allocate resources away from profit-generating activities. Assuming that CSR is an unprofitable investment strategy, investing in CSR would violate what Freidman views as the core responsibility of the company, thus violating the shareholder theory.

2.3 Efficient-market hypothesis

The third theory is the efficient market hypothesis (EMH) which can be used to argue against the idea that there is a relationship between CSR and CFP. This theory suggests that financial markets are efficient, meaning that stock prices always reflect all publicly available information (Bodie et al., 2021; Fama, 1970). According to EMH, it is therefore impossible to consistently beat the market. The hypothesis is based on the idea that markets are made up of rational investors who act on all available information, causing asset prices to always be in equilibrium. The extent of available information in the market determines the categorization of the EMH into three forms: weak, semi-strong, and strong (Bodie et al., 2021).

As the EMH suggests that all relevant information is already incorporated into the stock prices in a strong market, this should also include information about a company's ESG performance. Therefore, any relationship between CSR and CFP is already reflected in the stock price, making it impossible for investors to generate consistent alphas by including ESG screenings in their investment decisions.

3. Literature Review

This chapter provides an overview of previous research on the relationship between CSR and CFP in the stock market in Europe and the US. In the three first sections, we describe previous research that has found a positive, negative, and absent relationship between CSR and CFP. Finally, we present our research conjectures created based on the literature review. The literature in this chapter primarily consists of studies conducted on companies from the US and Europe. We would like to emphasize that some of the studies conducted in Europe have been carried out in smaller parts of the continent, such as only one or a few countries. This may make it difficult and misleading to generalize the findings to the entire Europe.

3.1 Research indicating a positive relationship between CSR and CFP

Kempf & Osthoff (2007) studied the effect of socially responsible investing on portfolio performance in the S&P 500 and DS 400 indices from 1992 to 2004. The aim was to investigate whether investors could increase their performance by incorporating screening criteria such as diversity, environment, and human rights into their investment decisions. The authors implemented a trading strategy of buying stocks with high social responsibility ratings and selling stocks with low social responsibility ratings. The performance was measured using the Carhart four-factor model. The study found that portfolios with low social responsibility underperformed on some of the screening criteria, and that the trading strategy implemented led to abnormal returns.

Statman & Glushkov (2009) studied stocks from the indices S&P 500 and DS 400 from 1992 to 2007. The stocks were rated on the following social responsibility criteria: corporate governance, community, diversity, employee relations, environment, human rights, and products. The authors applied the CAPM model, the Fama & French three-factor model, and the Carhart four-factor model to analyze the stocks' risk-adjusted returns. The study concluded that the risk-adjusted stock returns of socially responsible companies are higher than those of conventional companies. They also found that shunning companies resulted in a disadvantage for investors and that the advantage of investing in socially responsible companies was offset by this.

Eccles et al. (2014) assessed a sample of 180 US companies from 1993 to 2009 and studied the effect of corporate sustainability on organizational processes and stock market performance.

The companies were divided into two groups based on their ESG disclosure score. The authors found that companies with high scores were more likely to attract human capital, avoid conflicts and engage in more product and process innovations to remain competitive given the environmental and social constraints. They concluded that high-sustainability companies significantly outperformed their counterparts, both in terms of stock market and accounting performance.

Bansal et al., (2018) studied the abnormal returns from socially responsible investing in companies from S&P 500, Russell 1000, and Russell 3000 from 1993 to 2013. They utilized ratings on over 100 CSR-related criteria. The authors constructed long-short portfolios and applied the Carhart four-factor model to examine possible abnormal returns. They concluded that the alphas are time-varying. Companies with high social responsibility ratings significantly outperformed those with low ratings during good economic times. Likewise, during bad economic times, the companies with high ratings underperformed those with low ratings. Despite variability over time, companies with high social responsibility ratings had mildly higher average alphas.

Ashwin Kumar et al. (2016) assessed 157 companies listed on the Dow Jones Sustainability Index to study the correlation between ESG performance and volatility of stock returns from 2014 to 2015. To bring potential statistically significant results, the study also assessed 809 random companies not listed on the DJSI. These were considered representative of the average market performance. The study found that the companies listed on the sustainable index had lower volatility and higher risk-adjusted returns than the random companies in the same industry.

Steen et al. (2020) studied the relationship between ESG ratings and the financial performance of 146 Norwegian mutual funds by using regressions with Fama & French risk factors from 2014 to 2018. Oslo Stock Exchange Fund Index was used as a benchmark. The mutual funds were divided into two portfolios, the top and bottom quintiles, based on five different ESG metrics: historical portfolio sustainability score, controversy score, environmental score, social score, and governance score. The findings in Norway showed neither a significant difference in rating level effects nor any abnormal risk-adjusted returns. To avoid geographical bias in the distribution of sustainability ratings, the authors further analyzed European funds separately and found significantly higher returns and positive alphas for the top ESG quintiles.

3.2 Research indicating a negative relationship between CSR and CFP

Renneboog et al. (2008) studied the performance of socially responsible mutual funds in Europe, Asia, and North America from 1991 to 2003. The authors used a unique dataset consisting of nearly all Socially Responsible Investment (SRI) funds from the relevant continents and applied the CAPM, the Carhart four-factor model, and the four-factor model extended with an ethics factor. Different factors were tested with the intention of explaining the variation in performance between ethical and non-ethical funds. The study found that SRI funds underperformed in France, Ireland, Sweden, and Japan. However, there were no significant differences between SRI funds and conventional funds in other countries included in the study.

Auer & Schuhmacher (2016) studied the performance of stocks from Europe, the US, and the Asia-Pacific region from 2004 to 2012. The authors constructed industry portfolios and analyzed the E, S, and G factors individually. They further used the Sharpe ratio to measure each portfolio's risk-adjusted performance. The study found that investments based on a company's ESG rating did not provide superior risk-adjusted performance. They concluded that investors tend to pay a price for investing socially responsibly in Europe. However, in the US and the Asia-Pacific region, investors focused on ESG still obtained a performance similar to the overall market.

Luo (2022) studied the effect of ESG scores on stock returns in the UK from 2003 to 2020. The author applied the Fama & French three-factor model and the Carhart four-factor model and found that companies within the low ESG quintile outperformed companies in the high ESG quintile. The results indicated that ESG was associated with stock liquidity. The ESG premium was significant for low-liquidity companies, but not for high-liquidity companies.

3.3 Research indicating an absent relationship between CSR and CFP

Kreander et al. (2005) studied the performance of ethical and non-ethical funds from 1995 to 2001 by performing a matched pair analysis. The study included 60 funds from the UK, the Netherlands, Sweden, and Germany. The sample comprised 30 ethical and 30 non-ethical funds, where funds from each group were paired based on age, size, country, and investment universe. To estimate a cross-sectional regression, the authors applied the Sharpe ratio, Treynor

ratio, and Jensen's alpha, as well as a size-adjusted two-index approach. The study found no significant difference in risk-adjusted performance between the ethical and non-ethical funds.

Galema et al. (2008) studied the risk-adjusted performance of stocks tracked by KLD Research and Analytics from 1992 to 2006. The study included all stocks covered by KLD, mainly companies from the US, which were divided into portfolios based on their SRI ratings. The authors further applied the Fama & French three-factor model and the Carhart four-factor model to examine whether the portfolios could generate excess returns. They concluded that the risk-adjusted performance of SRI stocks was not significantly different from zero.

Lee et al. (2013) studied the performance of sustainability stocks in the US from 1998 to 2007. The authors created a portfolio based on the difference in corporate social performance, comprising of high-ranked minus low-ranked stocks, and subsequently utilized the Fama & French three-factor model to assess the alpha's significance for this portfolio. The results indicated that risk-adjusted performance did not significantly differ between the high-ranked and low-ranked stocks.

Leite & Cortez (2014) studied the performance of SRI funds in eight Western European markets from 2000 to 2008. The authors performed a matched-pair analysis, where 54 SRI funds were matched with 145 conventional funds. The funds were matched based on age, domicile country, investment universe, and investment style. To evaluate fund performance, the authors used an extended Carhart four-factor model where they included an additional local factor to prevent any home biases. The study found no statistically significant differences in performance between the SRI funds and the conventional funds.

Borgers et al. (2013) assessed a stakeholder-relation index (SI) consisting of US companies from 1992 to 2009 to investigate whether stakeholder information predicted risk-adjusted returns due to errors in investors' expectations. The authors selected the top and bottom third-, fourth-, and fifth-ranked stocks into portfolios and used the Carhart four-factor model to derive risk-adjusted returns. The results indicated that the SI outperformance was noticeable until 2004, and afterward, it was close to zero or not significant.

Halbritter & Dorfleitner (2015) studied the relationship between ESG and financial performance in the US from 1992 to 2012. They constructed portfolios based on ESG

performance and applied the Carhart four-factor model and included regressions proposed by Fama & MacBethFama and MacBeth (1973). The authors concluded that there was no significant difference in returns between companies with high and low ESG ratings. However, the regressions showed a significant influence on the individual E, S, and G factors.

Velte (2017) studied a sample of the 110 largest companies listed on the Frankfurt Stock Exchange from 2010 to 2014. Correlation and regression analyses were conducted to determine the presence of a statistically significant relationship between ESG performance and financial performance. The latter included both accounting- and market-based measurements. The companies were screened for the variables firm size, firm risk, and industry. The study found that ESG performance had no impact on the market-based measurement Tobin's Q.

3.4 Specification of research conjectures

In this subchapter, we introduce our research conjectures, which have been developed based on previous empirical research. This research is summarized in Table 1.

Table 1: Summary of literature review

Authors	Time period	Geographic location	Positive relationship	Negative relationship	Absent relationship
Kreander et al.	1995 – 2001	Europe			x
Renneboog et al.	1991 – 2003	Europe		x	
		US			x
Kempf & Osthoff	1992 – 2004	US	x		
Galema et al.	1992 – 2006	US			x
Statman & Glushkov	1992 – 2007	US	x		
Lee et al.	1998 – 2007	US			x
Leite & Cortez	2000 – 2008	Europe			x
Borgers et al.	1992 – 2009	US			x
Eccles et al.	1993 – 2009	US	x		
Halbritter & Dorfleitner	1992 – 2012	US			x
Auer & Schuhmacher	2004 – 2012	US	x		
		Europe		x	
Bansal et al.	1993 – 2013	US	x		
Velte	2010 – 2014	Europe			x
Ashwin Kumar et al.	2014 – 2015	US	x		
Steen et al.	2014 – 2018	Europe	x		
Luo	2003 – 2020	Europe		x	

Research conjecture 1: *European companies with good ESG performance will not generate higher risk-adjusted returns in the stock markets than European companies with bad ESG performance.*

The empirical literature presents diverse findings regarding the relationship between CSR and CFP within the European market. A number of previous studies have found that ESG performance does not have a statistically significant impact on financial performance (Kreander et al., 2005; Leite & Cortez, 2014; Velte, 2017). Conversely, other European studies

have reported a negative relationship between CSR and CFP (Auer & Schuhmacher, 2016; Luo, 2022). Renneboog et al. (2008) provided further support for these divergent findings, as their research demonstrated both a negative relationship and the absence of a significant relationship. Considering these findings, we expect European companies with high ESG scores to either underperform or obtain similar risk-adjusted returns in comparison to those with low ESG scores.

Research conjecture 2*: US companies with good ESG performance will generate higher risk-adjusted returns in the stock market than US companies with bad ESG performance.*

Existing theory and previous empirical research draw different conclusions regarding the relationship between CSR and CFP in the US. They also employ different measures of sustainability and financial performance. This makes it difficult to predict what findings will be made in this thesis. Still, we do expect that US companies with high ESG scores will yield significantly higher risk-adjusted returns compared to US companies with low ESG scores. Previous studies of companies listed on the US stock market have found similar results in several cases (Ashwin Kumar et al., 2016; Auer & Schuhmacher, 2016; Bansal et al., 2018; Eccles et al., 2014; Kempf & Osthoff, 2007; Statman & Glushkov, 2009). However, it is worth mentioning that some studies have found no significant relationship between CSR and CFP (Borgers et al., 2013; Galema et al., 2008; Halbritter & Dorfleitner, 2015; Lee et al., 2013; Renneboog et al., 2008).

4. Data

This chapter provides a description of the process of collecting the data used in our thesis. This includes an overview of the data source Refinitiv and the process for how this data is generated. Further, we present the sample selection and cleaning process in detail, as well as the variables and risk factors used. Finally, we present our concerns regarding the dataset.

4.1 Data sources

The data used in this thesis is collected from Refinitiv Datastream and the Kenneth R. French Library. Refinitiv is a global financial database that features 120 years of data across 175 countries (Refinitiv, 2023a). Data obtained from Refinitiv includes the name of companies, monthly adjusted closing prices, as well as yearly ESG and ESGC scores. The Fama & French data source is Kenneth R. French's data library at Dartmouth (French, 2023) which has been used to retrieve monthly observations of the variables needed for all factor models. The library provides different variables for each continent, and we have used both European and American observations in our analyses.

4.2 Refinitiv ESG scores

Refinitiv ESG rating is an enhancement and replacement of ASSET4 ratings (Thomson Reuters, 2017). The ESG database is one of the most comprehensive databases existing in the industry. Refinitiv covers more than 630 different ESG metrics, on over 85% of the global market cap (Refinitiv, 2022). Although the database was launched in 2018 (Craig, 2018), it covers historic data back to the fiscal year of 2002 (Refinitiv, 2022), thus giving 20 years of rating history.

There are several other providers of ESG ratings, such as Bloomberg, Sustainalytics, and RepRisk, and their methodology varies to a great extent. We chose to use Refinitiv, partly because NTNU offers free access to this data. Further, Refinitiv calculates ESG scores based on publicly reported data, which ensures transparent measures of a company's ESG performance (Refinitiv, 2023b). Refinitiv is therefore deemed a credible source based on our assessment. Additionally, Refinitiv is the provider that evaluates the largest number of indicators (Davis Polk & Wardwell LLP, 2017). Finally, Refinitiv's ESG data can be considered representative as the level of information available to the common investor is comparable to that utilized by Refinitiv in its calculations.

4.2.1 ESG score

Refinitiv captures and calculates more than 630 company-level ESG measures, fully based on publicly reported information (Refinitiv, 2022). As illustrated in Figure 1, 186 of the most comparable and relevant measures power the overall assessment and scoring process of each company. These metrics are grouped into 10 categories that reformulate the three pillar scores environmental, social, and corporate governance, as well as the final ESG score. Each pillar score is a relative sum of the category weights. The weights differ by industry for the environmental and social categories but remain the same across all industries for the governance category. Table 2 presents an overview of the category weights. The final ESG score reflects how the company performs on, as well as their commitment and effectiveness regarding, ESG (Refinitiv, 2022).

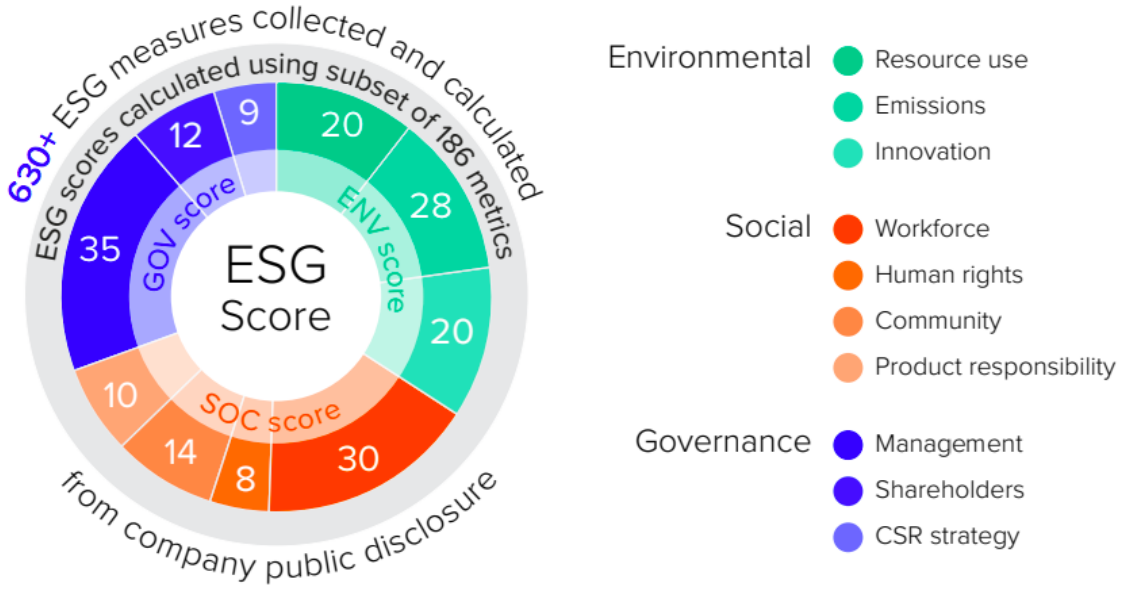

Figure 1: Refinitiv's categories reformulating the ESG pillars (Refinitiv, 2022)

Table 2: Category weights for ESG calculations

Pillar	Category	Category weights	Sum of category weights
Environmental	Resource use	15%	44%
Environmental	Emissions	15%	
Environmental	Innovation	13%	
Social	Workforce	13%	31%
Social	Human rights	5%	
Social	Community	9%	
Social	Product responsibility	4%	
Corporate Governance	Management	17%	26%
Corporate Governance	Shareholders	5%	
Corporate Governance	CSR strategy	3%	

(Refinitiv, 2022)

4.2.2 ESG score calculation methodology

By utilizing a percentile rank scoring methodology, Refinitiv is capable of generating a score between 0 and 100, along with intuitive letter grades. The methodology is based on determining the number of companies that are performing worse than the current one, the number of companies with the same value as the current one, and the number of companies with any value at all (Refinitiv, 2022). This means that the ESG calculations are derived from the performance of one company, relative to other companies. As the percentile rank score is based on rank, it is also less sensitive to outliers (Refinitiv, 2022). The ESG score is calculated as follows:

$$ESG\ score = \frac{\#\ of\ companies\ with\ a\ worse\ value + \frac{\#\ of\ companies\ with\ the\ same\ value\ included\ in\ the\ current\ one}{2}}{\#\ of\ companies\ with\ a\ value}$$

4.2.3 ESG Combined score

ESG Combined (ESGC) scores provide a more comprehensive scoring of a company's ESG performance (Refinitiv, 2022). The score is calculated by considering significant, material ESG controversies based on negative attention from global media sources. In this way, ESGC can help identify potential risks and controversies associated with a company that may not be reflected in its ESG score alone. This ultimately contributes to a more comprehensive

understanding of a company's overall sustainability practices. The ESGC score is calculated as a weighted average of the original ESG score and an ESG controversy score. The calculation of the controversy score is based on 23 ESG controversy topics, described in Appendix A. The most recent controversies are reflected in the last period, meaning that if a company is involved in a scandal during a year, its overall ESGC score will be affected. In the case of new developments related to the scandal, such as lawsuits, legislation disputes, or fines, this may also affect the company's ESGC score for the following year. Companies with no controversies will get an ESG controversy score of 100, which will be reduced according to the number and severity of controversies. The ESG controversy score account for the market capitalization bias from which large-capitalization companies suffer, as they attract more media attention than small-capitalization companies. If a company is not involved in any ESG controversies, their ESGC score will be equal to their ESG score (Refinitiv, 2022). This relation is illustrated in Figure 2.

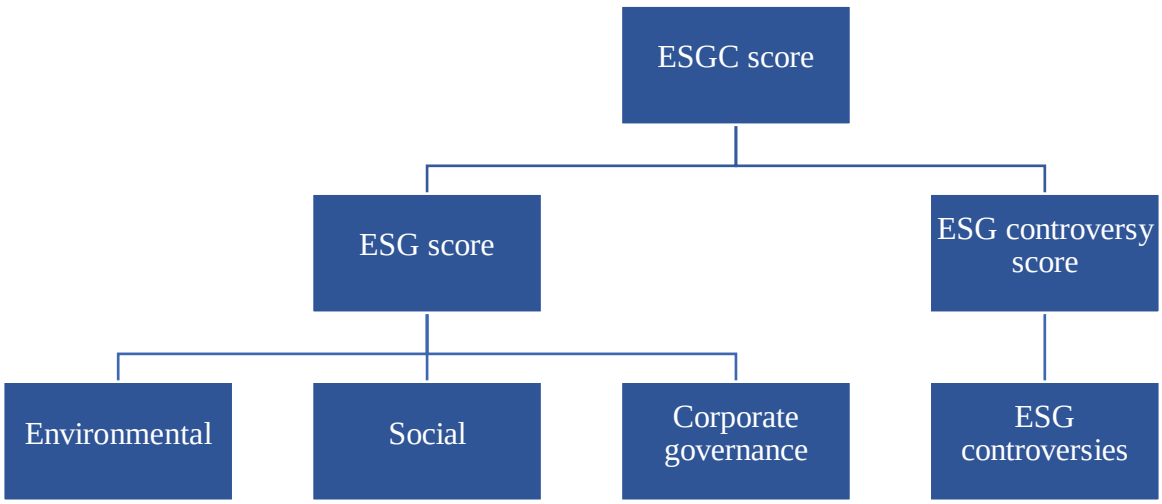

Figure 2: Illustration of the relation between ESG and ESGC

4.3 Sample selection

To answer our research question, we implemented a long-short zero-cost investment strategy based on ESG performance in the European and American markets. Our dataset included companies from the indices Stoxx 600 and S&P. Stoxx 600 consists of 600 large-, mid-, and small-capitalization companies from 17 European countries (Qontigo, 2023) and S&P 500 consists of the 500 largest companies listed in the US (S&P Dow Jones Indices, 2023). The indices cover about 90% and 80%, respectively, of the available market capitalization (Qontigo, 2023; S&P Dow Jones Indices, 2023) and are therefore considered appropriate benchmarks.

This thesis covers the period of February 2016 through December 2021. We chose this time span to include the development of the markets during both a bull and bear market. The markets had been on the rise before the COVID-19 crisis occurred in March 2020 and had still not recovered in 2021 (Kolakowski, 2022). ESG rating has received increasing attention since the financial crisis in 2008 (Galbreath, 2013) and access to ESG data was therefore not a challenge related to the selection of time period. It is worth mentioning that the American companies had a larger share of ESG scores, with only 70 missing companies compared to 131 missing companies from Europe.

4.3.1 Data cleaning

Prior to constructing portfolios and conducting analyses, it was necessary to clean the dataset. This was mainly because the indices were not constant during our selected period. Several companies had missing stock prices, either because they were not initially listed or due to mergers at a later stage. After eliminating the companies that lacked adjusted closing prices for the period, we were left with 554 European companies and 485 American companies.

Further, many of the remaining companies lacked coherent ESG scores for the whole period due to either lack of scores at the beginning of the period or in 2021. By removing these 93 European and 56 American companies, the cleaned dataset comprised a total of 458 European and 429 American companies.

4.3.2 Portfolio construction

There were several stages involved in constructing the portfolios. First, we constructed portfolios for Stoxx 600 based on the constituents' ESG and ESGC scores. For ESG, we distinguished between high and low performance by using two different cut-off rates of 10% and 20%. This resulted in the four portfolios ESG best 10%, ESG worst 10%, ESG best 20%, and ESG worst 20%. By also using the companies' ESGC scores, we generated a total of eight portfolios for Stoxx 600. After repeating the process for S&P 500, we obtained a total of 16 portfolios. Appendices B and C show a list of all portfolios. The portfolios were rebalanced annually, and the portfolio performance was evaluated at the beginning of each calendar month.

When the companies were categorized based on their ESG versus ESGC scores, the portfolios' composition of companies differed to a great extent. The decile portfolio of European companies experienced an average shift of 56% among the best companies and 28% among the worst companies. Similarly, the American companies had an average shift of 45% among the best companies and 30% among the worst companies. This is further elaborated in Appendix D.

The metric used for measuring financial performance was risk-adjusted stock returns, which is determined by investors, and not solely accounting outcomes. Investors' expectations are shaped by a range of factors, such as market conditions, competitive pressures, and societal trends. Since the EMH implies that stock market returns reflect the collective knowledge of investors who incorporate all publicly available information into their investment decisions (Bodie et al., 2021), this is considered a reliable measure of financial performance. We calculated the stock returns as an average of the adjusted closing price of all stocks in the portfolios, on the first day of each month. This means that the companies were equally weighted in the portfolios. The monthly closing prices were adjusted for dividends, stock splits, and new stock offerings (Refinitiv, 2023a). The monthly returns were calculated as follows:

$$Return_t = \frac{Price_t - Price_{t-1}}{Price_{t-1}}$$

In order to analyze the long-short strategy, we created new portfolios by subtracting the worst portfolios' equally weighted return from the best portfolios' equally weighted return. This resulted in two European portfolios with a 20% cut-off rate and two with a 10% cut-off rate, based on ESG and ESGC. The process was repeated for the American companies, resulting in a total of eight portfolios. These portfolios were called "Best minus Worst" (BMW).

Figure 3 graphically presents the development in the scores categorized both by cut-off rate and index. The 16 "best" and "worst" portfolios' descriptive statistics of returns are shown in Tables 3 and 4. In addition, Appendix E illustrates the descriptive statistics of ESG and ESGC scores of these portfolios.

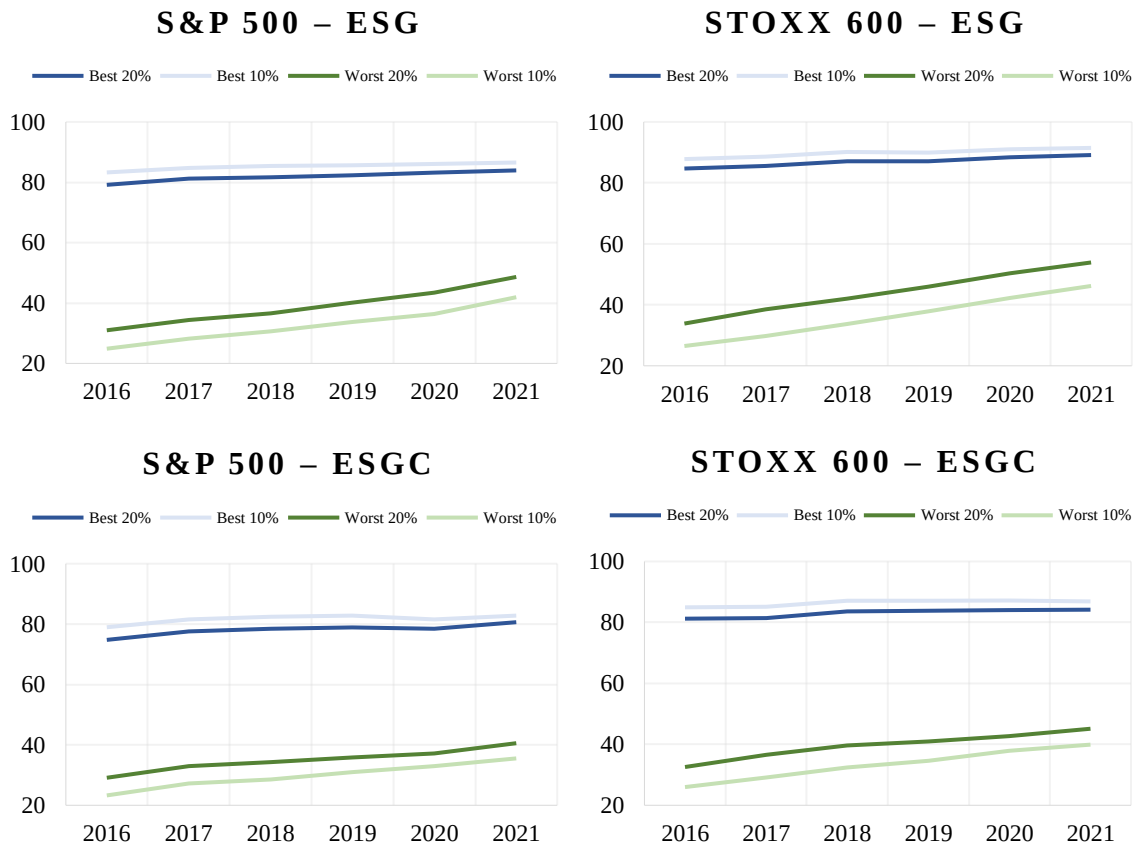

Figure 3: Development in scores for the indices

Table 3: Descriptive statistics of returns for Stoxx 600

Returns – Stoxx 600	Mean	St.dev.	Max	Min	Obs
20% best ESG-rated companies	0.72%	4.52%	18.36%	-18.60%	71
20% worst ESG-rated companies	1.15%	4.63%	13.81%	-19.56%	71
10% best ESG-rated companies	0.59%	4.78%	18.84%	19.60%	71
10% worst ESG-rated companies	1.23%	4.43%	11.85%	-16.11%	71
20% best ESGC-rated companies	0.83%	4.58%	16.56%	-19.80%	71
20% worst ESGC-rated companies	0,84%	5.00%	18.84%	-21.63%	71
10% best ESGC-rated companies	0.71%	4.65%	12.89%	-15.62%	71
10% worst ESGC-rated companies	0.90%	5.00%	18.89%	-20.20%	71

Table 4: Descriptive statistics of returns for S&P 500

Returns – S&P 500	Mean	St.dev.	Max	Min	Obs
20% best ESG-rated companies	1.22%	5.41%	16.77%	-24.95%	71
20% worst ESG-rated companies	1.78%	5.45%	18.66%	-24.70%	71
10% best ESG-rated companies	1.11%	5.41%	16.58%	-22.85%	71
10% worst ESG-rated companies	1.82%	5.18%	16.29%	-21.52%	71
20% best ESGC-rated companies	1.36%	5.23%	17.33%	-24.97%	71
20% worst ESGC-rated companies	1.57%	5.32%	15.45%	-23.70%	71
10% best ESGC-rated companies	1.19%	5.68%	17.08%	-27.33%	71
10% worst ESGC-rated companies	1.85%	5.44%	16.71%	-23.37%	71

Figure 3, as well as Appendix E, illustrate that Stoxx 600 overall had higher ESG and ESGC scores than S&P 500 during the period. This difference was most evident in the best portfolios. However, we observed a positive trend in the development of both ESG and ESGC scores, regardless of whether the portfolios consisted of European or American companies. As illustrated in Appendix E, one distinguishing factor between the best and worst portfolios was the standard deviation. Specifically, the worst portfolios had higher standard deviations and exhibited a wider range than the best portfolios.

On the other hand, the American companies yielded a higher average return compared to the European companies. This is illustrated in Tables 3 and 4 and applied to both the best and the worst portfolios sorted by both ESG and ESGC. However, the higher average returns for American companies were associated with higher volatility, demonstrated by the higher standard deviation of returns. This implies that investing in American companies carried greater risk in our sample period due to larger fluctuations in stock prices.

Figures 4 and 5 illustrate the stock returns of the 10% BMW portfolios sorted by both ESG and ESGC. The graphs for S&P 500 follow each other relatively closely, indicating that screening for either ESG or ESGC had little impact on stock returns in the portfolios. Throughout a large part of the period, the returns were negative for both graphs, suggesting that companies with lower scores had higher stock returns. However, for Stoxx 600, we observed greater differences between ESG and ESGC, particularly from 2018 onwards. For example, at the end of 2020, companies with high ESG scores had the highest returns, while companies with low ESGC scores had the highest returns.

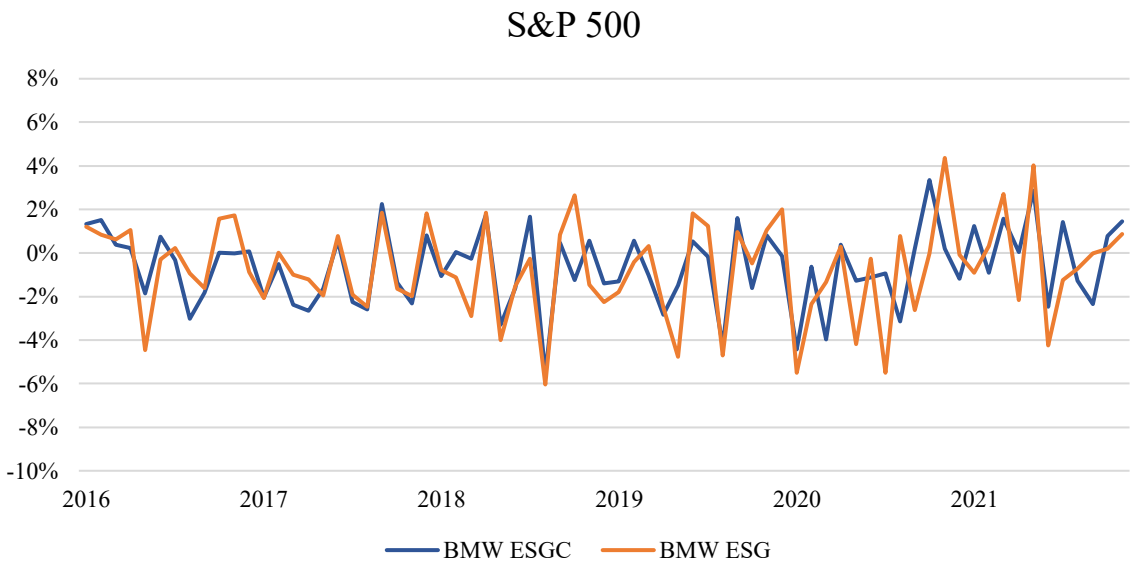

Figure 4: Monthly returns of S&P 500 decile portfolios

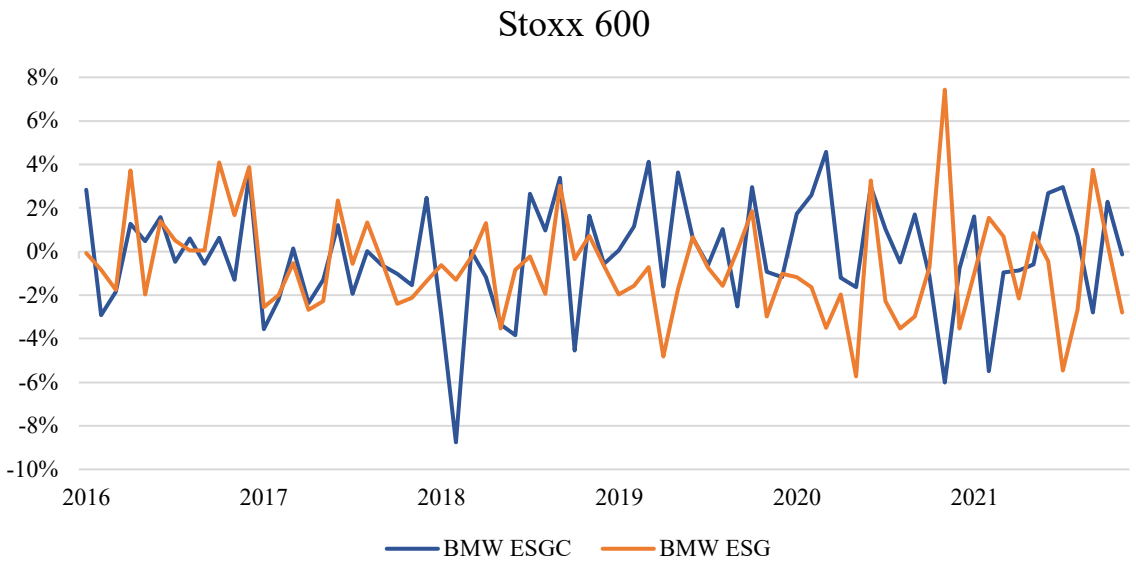

Figure 5: Monthly returns of Stoxx 600 decile portfolios

4.4 The dependent variable

The dependent variable in our analyses is called "Best minus Worst" (BMW). This variable consists of the monthly returns from a long-short zero-cost investment strategy. The strategy involves holding a long position in portfolios consisting of companies with high scores, and a short position in portfolios consisting of companies with low scores. Essentially, we go long into the best portfolio (B) and short the worst portfolio (W). We used the same approach to analyze the companies according to both their ESG and ESGC scores.

4.5 The risk factors

In this thesis we applied three factor models to describe stock returns and adjust the risk exposure in the constructed portfolios: the Fama & French three-factor model, the Carhart four-factor model, and the Fama & French five-factor model. The Kenneth R. French Library provides the risk factors needed for these models as well as a risk-free rate (French, 2023). The three-factor model consists of the market risk premium (Rm-Rf), Small minus Big (SMB), and High minus Low (HML). The four-factor model also includes a momentum factor, Winners minus Losers (WML). The five-factor model is an extension of the three-factor model and consists of the additional factors Robust minus Weak (RMW) and Conservative minus Aggressive (CMA).

4.6 Concerns regarding the dataset

As mentioned in the cleaning process, companies with missing data were excluded from the dataset. The exclusion was due to companies' lacking coherent ESG and ESGC scores or adjusted closing prices for the selected period. A significant number of these companies could have been among the best or worst performers in terms of ESG or the stock market. This could have affected the dataset and created a bias in the analyses.

In the process of creating the portfolios, the companies were equally weighted. Mid or small market capitalization companies tend to have greater risk given their volatility (Wayman, 2022). Therefore, by not value-weighting the portfolios, there could be a potential bias in the analyses.

Another potential limitation is the dataset's dependency on the Refinitiv ESG framework and methodology. Scherpenzeel & Hoff Van Scherpenzeel and Hoff (2023) mentioned three possible reasons for deviations in reported sustainability performance. These included lack of methodology standardization, possible structural bias in rating assessments, as well as different data acquisition and processing. Doyle (2018) contended that there was an inconsistency in ESG ratings because companies may not receive comparable scores across different rating agencies. As a result, the composition of the portfolios could differ depending on which agency is utilized. To attain a more robust outcome, a different approach could be employing an average score derived from multiple agencies such as Bloomberg, Sustainalytics, and RepRisk.

Transaction costs pose another possible limitation of our dataset. This thesis relied on a portfolio rebalancing strategy with a one-year frequency that in reality would result in a high level of buying and selling activities. This would inevitably lead to transaction costs. As a consequence, the potential abnormal earnings, indicated by a positive or negative alpha, could have been diminished by the expenses incurred in implementing the strategy. However, this thesis did not factor in these costs.

Finally, it should be noted that the period examined in this thesis, spanning from 2016 to 2021, was characterized first as a bull market and then the two last years as a bear market. Even though our selected period involved both, it should be noted that the bear market from 2020 to 2021 was largely influenced by the shutdown related to COVID-19 and can be said to be out

of the ordinary. Since the authorities in many countries intervened in the economy during this period, the relation between CSR and CFP may not hold for a different bear market.

5. Methodology

This chapter forms the basis for our empirical analysis. We will discuss the methodology applied, as well as the validity and reliability of the methodical approaches used to analyze the relationship between ESG and risk-adjusted stock returns.

We used time series regressions where we included multiple factors to capture differences in returns that stem from the portfolios' exposure to these factors. The factor models were also used to measure the differences in returns between the portfolios by estimating alphas for the long-short investment strategy. A positive alpha implies abnormal returns for companies with high scores, whereas a negative alpha indicates abnormal returns for companies with low scores. Thus, an alpha equal to zero means that the strategy does not generate abnormal returns.

The following sections will explain the factor models applied, the specifications of the models, as well as the tests used to ensure robust results. The dataset and portfolios were constructed in Microsoft Excel, while all regressions were performed in STATA. We used the Ordinary Least Squares (OLS) and the Generalized Least Squares (GLS) methods.

5.1 Model Specifications

Factor models operate on the assumption that assets with higher exposure to systematic risk factors are associated with greater risk and therefore demand a risk premium (Ang, 2014). The objective of the models used in this thesis is to provide an explanation of the actual returns of listed companies, by capturing the risk factors that have been proven to have a significant impact on those returns in prior empirical studies (Womack & Zhang, 2003). This made the cleaning process simpler, as we did not need to sort the data into categories based on industry or company-specific risk factors.

The use of these recognized models facilitates comprehension and comparison with prior research. Nevertheless, it is worth highlighting that interpreting the models' output from a long-short investment strategy requires a different approach. By examining differences, estimates and explanatory power may be less significant as opposed to portfolios that are solely long or short. If an estimate is deemed non-significant, it suggests no difference in exposure to the particular risk factor between the two portfolios in the long-short portfolio.

5.2 The Models

In the following subchapters, we will present the factor models used in this thesis.

5.2.1 The Fama & French three-factor model

The Fama & French three-factor model is an extension of the capital asset pricing model (CAPM) (Fama & French, 1993). CAPM assumes that a company's return only depends on systematic market risk (Sharpe, 1964). The Fama & French three-factor model includes two additional factors in order to better describe stock returns: Small minus Big (SMB) and High minus Low (HML). These factors measure the portfolio's exposure to companies' size and value. Small companies tend to outperform big companies, while companies with high book-to-market value tend to outperform companies with low book-to-market value (Fama & French, 1993). The model is estimated as follows:

$$BMW_t - Rf_t = \alpha + \beta_{Mkt}(Mkt_t - Rf_t) + \beta_{SMB}(SMB_t) + \beta_{HML}(HML_t) + \varepsilon_t$$

Where:

$BMW_t - Rf_t$	=	Excess return on best minus worst portfolio at time t
α	=	Abnormal return
β_{Mkt}	=	Exposure to market factor
$Mkt_t - Rf_t$	=	Excess return in the market at time t
β_{SMB}	=	Exposure to size factor
SMB_t	=	Size factor at time t
β_{HML}	=	Exposure to value factor
HML_t	=	Value factor at time t
ε_t	=	Error term at time t

5.2.2. The Carhart four-factor model

Carhart (1997) expanded the original three-factor model by including a momentum factor. His study revealed that this would explain more of the variation in stock returns. The momentum factor entails a one-year return momentum versus contrarian stocks. This involves holding a long position in previous stock market winners and a short position in previous stock market losers. The model is estimated as follows:

$$BMW_t - Rf_t = \alpha + \beta_{Mkt}(Mkt_t - Rf_t) + \beta_{SMB}(SMB_t) + \beta_{HML}(HML_t) + \beta_{WML}(WML_t) + \varepsilon_t$$

Where:

β_{WML}	=	Exposure to momentum factor
WML_t	=	Momentum factor at time t

5.2.3 The Fama & French five-factor model

More recent studies revealed that the three-factor model was insufficient in multiple cases. Titman et al. (2004) found that companies with increased levels of capital investment tended to have lower stock returns. Novy-Marx (2013) found that companies with higher profitability tended to generate higher stock returns. Thus, much of the variation in average returns related to these two factors seemed to be left unexplained by the three-factor model. As a response to this evidence, Fama & French (2015) extended the model with the two additional factors regarding profitability (RMW) and investments (CMA). RMW represents the difference between the returns on diversified portfolios of stocks with robust and weak profitability. CMA represents the difference between the returns on diversified portfolios of companies' stocks with low and high, or conservative and aggressive, investments (Fama & French, 2015). The model is estimated as follows:

$$BMW_t - Rf_t = \alpha + \beta_{Mkt}(Mkt_t - Rf_t) + \beta_{SMB}(SMB_t) + \beta_{HML}(HML_t) + \beta_{RMW}(RMW_t) + \beta_{CMA}(CMA_t) + \varepsilon_t$$

Where:

β_{RMW}	=	Exposure to profitability factor
RMW_t	=	Profitability factor at time t
β_{CMA}	=	Exposure to investment factor
CMA_t	=	Investment factor at time t

5.3 Model testing

The models used in this thesis are based on several classical assumptions, such as no heteroskedasticity, no perfect multicollinearity, and the absence of autocorrelation (Studenmund, 2017). Moreover, we needed stationary time series to prevent us from getting results with spurious correlations. Thus, to ensure the reliability and validity of our models, it was necessary to verify that the results met these requirements. If not, the data had to be transformed (Studenmund, 2017).

5.3.1 Test for heteroskedasticity

An important assumption of OLS is that the observations of the error term are drawn from a distribution that has a constant variance, thus $Var(\varepsilon_t) = \sigma^2$ (Studenmund, 2017). Heteroskedasticity is a violation of this assumption. Although heteroskedasticity is more prominent in cross-sectional models, it has turned out to be an important factor in time series studies of financial markets (Studenmund, 2017). To uncover problems with heteroskedasticity, we have used both the White test and the Breusch-Pagan test. As the p-values were higher than 0.10 in all tests, there were no significant indications of heteroskedasticity.

5.3.2 Test for multicollinearity

Another assumption of OLS is that no independent variable is a perfect linear function of one or more other independent variables (Studenmund, 2017). A violation of this assumption is perfect multicollinearity. Perfect multicollinearity is easily prevented, but even severe cases of imperfect multicollinearity can lead to significant problems, such as difficulties in distinguishing the effect on the dependent variable (Studenmund, 2017). To detect potential multicollinearity in our dataset, we used the variance inflation factor (VIF). All VIFs were lower than 5 for all variables in our models, which implied little to no correlation between the independent variables in our dataset.

5.3.3 Test for autocorrelation

The OLS method also assumes that different observations of the error term are uncorrelated with each other (Studenmund, 2017). A violation of this assumption can lead to autocorrelation, which occurs frequently in time series datasets, as the order of observations has meaning (Studenmund, 2017). To test for autocorrelation, we used both the Durbin-Watson test and the Breusch-Godfrey test. The Durbin-Watson test gave inconclusive results, while the Breusch-Godfrey test suggested that negative autocorrelation was present in the models with the American portfolios. The results from the Breusch-Godfrey test are presented in Appendix F. To mitigate the autocorrelation, we chose to transform these variables and use Prais-Winsten estimators (Studenmund, 2017) for the relevant regressions.

5.3.4 Test for stationarity

The basic properties of time series data, such as the mean and the variance, need to be constant over time, indicating that the time series is stationary (Studenmund, 2017). The consequence of having one or more inconstant basic properties is spurious correlations that inflate both the explanatory power and t-score. This leads to incorrect model specifications (Studenmund, 2017). To test our dataset for possible non-stationarity, we used an Augmented Dickey-Fuller test. All tests had p-values equal to zero, indicating that our time series were stationary.

6. Results

This chapter is structured into two sections which present the results of our analyses of the European and American markets, respectively. We conducted multiple regressions to test for significant differences in risk-adjusted stock returns between companies with high and low ESG and ESGC performance. The results of each model are presented in Tables 5 to 10, along with a summary description.

6.1 Analysis of the European market

Table 5: Results from the Fama & French three-factor model

Cut-off rate	**20%**				**10%**			
Score	**ESG**		**ESGC**		**ESG**		**ESGC**	
Variable	Estimate	t-value	Estimate	t-value	Estimate	t-value	Estimate	t-value
α	-0.005**	-2.04	0.000	0.01	-0.007**	-2.36	-0.002	-0.58
Mkt – Rf	-0.040	-0.72	-0.051	-1.21	-0.001	-0.02	-0.088	-1.17
SMB	0.273*	1.90	0.090	0.81	0.205	1.11	0.233	1.20
HML	0.002	0.03	-0.097	-1.54	0.010	0.09	-0.055	-0.49
N	71		71		71		71	
R^2 (%)	5.37		9.26		2.06		4.78	

Level of significance: * = p < 0.10, ** = p < 0.05, *** = p < 0.01

Table 5 shows the result from the Fama & French three-factor model on the European market with both a 20% and a 10% cut-off rate. The strategy generated a negative alpha of -0.005 and -0.007, respectively, when the portfolios were screened for companies' ESG scores. The alphas were both significant at a 5% level. The results indicate an outperformance by the worst portfolios over the best portfolios. When the portfolios were screened for ESGC, the analyses generated alphas of 0.000 and -0.002. Although the latter suggest a slight outperformance of worst portfolios, the observed alphas were not statistically significant.

The portfolios' exposure to the risk factors is also presented in Table 5. The risk factor Mkt-Rf measures the portfolios' exposure to the market risk premium. Regardless of the cut-off rate, the market risk premium had greater impact when the portfolios were screened for ESGC than ESG. In all analyses, the exposure of the risk factor was negative, indicating that companies with low scores expect higher stock returns, but also higher levels of volatility compared to companies with high scores. However, the market risk premium did not exhibit statistical significance for either ESG or ESGC.

The risk factor SMB measures the portfolio's exposure to companies' size. With a 20% cut-off rate, the risk factor was statistically significant at a 10% level with an estimate of 0.273 when screened for ESG. This suggests that the best portfolios tend to have greater exposure to small-cap companies. The SMB factor exhibited similar positive values across the remaining three portfolios, but it failed to attain statistical significance.

The risk factor HML measures the portfolio's exposure to companies' book-to-market value. HML fluctuated between positive and negative estimates depending on whether the analyzed portfolios were sorted by ESG or ESGC. When subjected to ESG screening, the risk factor exhibited values close to zero, yet positive. However, the risk factor had negative values when screened for ESGC. In addition to fluctuations, HML failed to attain statistical significance across all portfolios.

Finally, the explanatory power was relatively low, spanning from 2.06% to 9.26%. However, a noteworthy observation is that the models' capacity to explain the variation in our dependent variable was higher at a 20% cut-off rate in comparison to a 10% cut-off rate.

Table 6: Results from the Carhart four-factor model

Cut-off rate	**20%**				**10%**			
Score	**ESG**		**ESGC**		**ESG**		**ESGC**	
Variable	Estimate	t-value	Estimate	t-value	Estimate	t-value	Estimate	t-value
α	-0.005*	-1.96	0.000	0.19	-0.007**	-2.27	-0.002	-0.61
Mkt – Rf	-0.040	-0.68	-0.064	-1.39	-0.002	-0.02	-0.082	-1.01
SMB	0.273*	1.87	0.100	0.89	0.205	1.09	0.228	1.15
HML	0.001	0.01	-0.131*	-1.68	0.008	0.07	-0.038	-0.27
WML	-0.002	-0.02	-0.053	-0.75	-0.002	-0.01	0.027	0.21
N	71		71		71		71	
R^2 (%)	5.37		4.58		2.06		4.85	

Level of significance: * = p < 0.10, ** = p < 0.05, *** = p < 0.01

Table 6 shows the result from the Carhart four-factor model on the European market. These results share several similarities with those found in the three-factor model. When we screened for ESG, the strategy still generated negative alphas of -0.005 and -0.007. Our findings show that the monthly abnormal returns for portfolios consisting of companies with lower ESG performance were still higher regardless of the cut-off rate. Notably, the alpha value for the decile portfolio retained statistical significance at a 5% level, while the alpha value for the quintile portfolio exhibited significance only at a 10% level. The results indicate that portfolios screened for ESGC continued to generate alpha values near zero and there were not any statistically significant differences between them.

The market risk premium displayed values of -0.064 and -0.082 when screened for ESGC at a cut-off rate of 20% and 10%, respectively. The risk factor exhibited less influence when screened for ESG, but the negative impact was coherent in all portfolios. The findings still characterize a greater exposure of market risk for low-rated companies, but neither of the analyses retained a statistically significant market risk premium.

SMB was still statistically significant at a 10% level when screened for ESG and used a cut-off rate of 20%. The risk factor had a value of 0.273, meaning that the best portfolios had higher exposure to small-cap companies than the worst portfolios. The SMB factor exhibited similar positive values across the remaining three portfolios but failed to retain statistical significance.

HML still fluctuated between being positive and negative depending on whether the analyzed portfolios were screened for ESG or ESGC, respectively. When we used a 20% cut-off rate, the HML factor displayed a statistically significant value of -0.131 when screened for ESGC. This portfolio was the only one to attain statistical significance.

The risk factor WML measures the portfolio's exposure to previous stock market winners and losers. WML had a greater absolute coefficient when the portfolios were screened for ESGC. Expect for the ESGC-screened portfolio with a 10% cut-off rate, all portfolios exhibited a negative coefficient value. Despite fluctuations in the beta estimates, the values were relatively low and not statistically significant in any of the analyses.

Upon implementing Carhart's method to expand the model, the portfolios subjected to ESGC screening demonstrated a decline in their explanatory power, as indicated by the R^2 values. Specifically, the models could only account for 4.58% and 4.85% of the variations in the portfolios with a cut-off rate of 20% and 10%, respectively. However, when the portfolios were screened for ESG, the four-factor model exhibited an equivalent level of explanatory power to the three-factor model, with respective values of 5.37% and 2.06%.

Table 7: Results from the Fama & French five-factor model

Cut-off rate	**20%**				**10%**			
Score	**ESG**		**ESGC**		**ESG**		**ESGC**	
Variable	Estimate	t-value	Estimate	t-value	Estimate	t-value	Estimate	t-value
α	-0.005*	-1.95	0.000	-0.13	-0.007**	-2.32	-0.001	-0.44
Mkt – Rf	-0.039	-0.61	-0.069	-1.40	-0.011	-0.13	-0.038	1.30
SMB	0.320*	1.98	0.099	0.80	0.239	1.15	0.282	-1.38
HML	-0.022	-0.13	-0.017	-0.13	0.048	0.21	-0.327	-0.76
RMW	0.123	0.52	0.141	0.79	0.192	0.64	-0.238	0.93
CMA	0.136	0.49	-0.055	-0.26	0.073	0.21	0.345	-0.31
N	71		71				71	
R^2 (%)	6.08		10.29		2.62		6.85	

Level of significance: * = p < 0.10, ** = p < 0.05, *** = p < 0.01

Table 7 shows the result from the Fama & French five-factor model on the European market. The findings exhibit resemblances to both the three-factor and four-factor models. Specifically, the portfolios subjected to ESG screening demonstrated identical statistically significant coefficients for their alphas with values of -0.005 and -0.007. Moreover, the analysis still revealed no evidence of significant variations in alpha generation across portfolios screened for ESGC scores.

When screened for ESGC, the market risk premium demonstrated values of -0.069 and -0.038 when we used a cut-off rate of 20% and 10%, respectively. Although the risk factor exhibited diminished influence when screened for ESG, the negative impact remained consistent across all portfolios. The results continue to indicate a higher exposure to market risk among the worst portfolios, although neither of the analyses retained a statistically significant exposure to the market risk premium.

SMB was still statistically significant at a 10% level, but the estimate had increased to a value of 0.320 when we screened for ESG and used a cut-off rate of 20%. By expanding the model, the exposure of small-capitalization companies increased in the best portfolios relative to the worst portfolios. The SMB factor exhibited similar positive values across the remaining three portfolios but was still lacking statistical significance in these analyses.

The coefficient of the risk factor HML still fluctuated between being positive and negative but was only positive when we screened for ESG and used a 10% cut-off rate. Neither of the portfolios was able to attain statistical significance.

The additional factors RMW and CMA measures risk regarding profitability and investment. RMW's exposure was positive for all portfolios except for the one screened for ESGC with a 10% cut-off rate. This means that the best portfolio mostly comprised more companies with robust profitability than weak profitability. CMA's exposure was also positive for all portfolios except for the portfolio screened for ESGC with a 20% cut-off rate. This means that the best portfolio mostly comprised more companies with conservative investments than aggressive investments. However, neither of these risk factors retained statistical significance in our analyses.

The explanatory power had increased in all analyses from previous models. When screened for ESG, the models now explained the variation in our dependent variable by 6.08% and 2.62% when we used a cut-off rate of 20% and 10% respectively. The portfolios screened for ESGC had explanatory powers of 10.29% and 6.85%.

6.2 Analysis of the American market

Table 8: Results from the Fama & French three-factor model

Cut-off rate	**20%**				**10%**			
Score	**ESG**		**ESGC**		**ESG**		**ESGC**	
Variable	Estimate	t-value	Estimate	t-value	Estimate	t-value	Estimate	t-value
α	-0.006***	-4.17	-0.003*	-1.95	-0.008***	-3.75	-0.008***	-4.75
Mkt – Rf	0.031	0.75	0.046	1.17	0.072	1.18	0.085*	1.76
SMB	-0.250	-0.40	-0.028	-0.46	0.009	0.09	0.073	1.00
HML	0.060	1.37	0.026	0.62	0.121*	1.85	0.079	1.54
N	71		71		71		71	
R^2 (%)	4.45		2.87		9.07		14.07	
Original DW	2.420		2.326		2.416		2.471	
Transf. DW	2.070		1.951		2.126		1.997	

Level of significance: * = p < 0.10, ** = p < 0.05, *** = p < 0.01

Table 8 shows the results from the Fama & French three-factor model on the American market. When we used a cut-off rate of 20% the alphas for the portfolios screened for ESG and ESGC were -0.006 and -0.003, respectively. This indicates that the worst portfolios performed better than the best portfolios. The variables were both statistically significant at a 1% and 10% level, respectively. With a 10% cut-off rate, the alphas had the same value of -0.008 when we screened for ESG and ESGC. Both variables were statistically significant at a 1% level.

Further, Table 8 illustrates the portfolios' exposure to the market risk premium. This variable was positive in all analyses, regardless of the cut-off rate and score screening. This suggests that the best portfolios exhibited greater market risk volatility compared to the worst portfolios. However, this finding was statistically significant only in the analysis of ESGC with a 10% cut-off rate. This variable had a coefficient of 0.085 and was significant at a 10% level.

SMB was negative for both ESG and ESGC when we used a 20% cut-off rate, but positive when we used a 10% cut-off rate. This indicates that with a higher cut-off rate, the worst portfolios had higher exposure to small-capitalization companies than the best portfolios. With a lower cut-off rate, the best portfolios had higher exposure to small-capitalization companies. However, this risk factor was not statistically significant in either of the analyses.

The risk factor HML had positive beta estimates in all analyses, suggesting that the best portfolios had higher exposure to value stocks than the worst portfolios. We observed that HML was a significant variable in only one of the analyses. When we screened for ESG and used a 10% cut-off rate, the coefficient for HML had a significant value of 0.121.

The explanatory power in the analyses varied from 2.87% at the lowest to 14.07% at the highest. Generally, we observed that a cut-off rate of 10% resulted in higher levels of explanatory power, meaning that the risk factors explained 9.07% and 14.07% of the variation in our dependent variable BMW. The highest R^2 value was found when we screened for ESGC.

The Durbin-Watson statistic suggests that transforming the variables and using Prais-Winsten estimators reduced the autocorrelation in the model. In the analyses where we screened for ESG, we observed values of 2.070 and 2.126 for a cut-off rate of 20% and 10%, respectively. This may suggest that there was still weak negative autocorrelation in the models. However, the DW statistics was close to 2 in all four analyses, which is considered acceptable.

Table 9: Results from the Carhart four-factor model

Cut-off rate	**20%**				**10%**			
Score	**ESG**		**ESGC**		**ESG**		**ESGC**	
Variable	Estimate	t-value	Estimate	t-value	Estimate	t-value	Estimate	t-value
α	-0.006***	-4.14	-0.003*	-1.93	-0.008***	-3.72	-0.008***	-4.69
Mkt – Rf	0.033	0.80	0.046	1.15	0.076	1.20	0.082*	1.68
SMB	-0.023	-0.37	-0.027	-0.44	0.011	0.12	0.070	0.96
HML	0.069	1.29	0.028	0.55	0.133*	1.67	0.068	1.10
WML	0.019	0.31	0.005	0.08	0.029	0.31	-0.024	-0.34
N	71		71		71		71	
R^2 (%)	4.51		2.87		8.98		14.49	
Original DW	2.399		2.315		2.368		2.458	
Transf. DW	2.058		1.950		2.109		2.001	

Level of significance: * = p < 0.10, ** = p < 0.05, *** = p < 0.01

Table 9 shows the results from the Carhart four-factor model on the American market. With a cut-off rate of 20%, the alphas for ESG and ESGC were -0.006 and -0.003 respectively, indicating that the worst portfolios outperformed the best portfolios. Both variables were statistically significant at a 1% and 10% level, respectively. When we used a 10% cut-off rate, the alphas when we screened for both ESG and ESGC had the same value of -0.008, and both variables remained statistically significant at a 1% level. Note that both the alpha estimates and their corresponding p-values were identical to those obtained when we used the three-factor model.

The market risk premium displayed positive values regardless of cut-off rate and score screening, indicating that the best portfolios exhibited greater market risk volatility as opposed to the worst portfolios. The coefficients were slightly higher when we applied a 10% cut-off rate, but the risk factor was significant only when we screened for ESGC. This variable had a coefficient of 0.082 and a p-value lower than 10%.

Similar to the findings from the three-factor model, SMB's estimates were negative for both ESG and ESGC when we used a 20% cut-off rate, but positive when we used a 10% cut-off rate. This suggests that when we used a higher cut-off rate, the worst portfolios tended to have greater exposure to small-capitalization companies. Conversely, when we used a lower cut-off rate, the best portfolios had greater exposure to small-capitalization companies. Nevertheless, this risk factor was not statistically significant in either of the analyses.

HML displayed positive beta coefficients in all analyses, indicating that the best portfolios had greater exposure to value stocks than the worst portfolios. However, the risk factor was statistically significant in just one of the analyses. Specifically, when screened for ESG with a 10% cut-off rate, the coefficient for HML was 0.133 and significant at a 10% level.

WML had positive estimates for all analyses, except for the ESGC screened portfolio with a 10% cut-off rate. The positive estimates indicate that the best portfolios were more exposed to companies that have performed well historically than the worst portfolios. However, all beta estimates had relatively low absolute values, and none were statistically significant.

The explanatory power in the analyses varied from 2.87% at the lowest to 14.49% at the highest. The analyses with a 10% cut-off rate still yielded the highest R^2 values of 8.98% when we screened for ESG and 14.49% when we screened for ESGC. This suggests that the four-factor model did not contribute to explaining more of the variation in our dependent variable.

We observed that transforming the variables and using Prais-Winsten estimators reduced the autocorrelation. The analyses where we screened for ESG showed possible weak negative autocorrelation. Nevertheless, all the analyses exhibited a DW statistic close to 2, which is deemed acceptable.

Table 10: Results from the Fama & French five-factor model

Cut-off rate	**20%**				**10%**			
Score	**ESG**		**ESGC**		**ESG**		**ESGC**	
Variable	Estimate	t-value	Estimate	t-value	Estimate	t-value	Estimate	t-value
α	-0.006***	-4.06	-0.003*	-1.88	-0.008***	-3.54	-0.008***	-4.68
Mkt – Rf	0.067	1.41	0.056	1.22	0.111	1.54	0.085	1.49
SMB	-0.099	-1.27	-0.536	-0.71	-0.083	-0.70	0.076	0.82
HML	0.079	1.38	0.040	0.70	0.140	1.61	0.053	0.79
RMW	-0.145	-1.57	-0.037	-0.41	-0.174	-1.23	0.009	0.08
CMA	0.055	0.48	0.003	0.03	0.026	0.15	0.044	0.32
N	71		71		71		71	
R^2 (%)	8.09		3.30		10.37		14.43	
Original DW	2.308		2.277		2.280		2.428	
Transf. DW	2.065		1.945		2.095		2.012	

Level of significance: * = p < 0.10, ** = p < 0.05, *** = p < 0.01

Table 10 shows the results from the Fama & French five-factor model on the American market. With a cut-off rate of 20%, the alphas for ESG and ESGC were -0.006 and -0.003 respectively, and with a cut-off rate of 10%, the alphas for ESG and ESGC were both -0.008. These findings were identical to those in the three-factor and four-factor models and the variables reached the same level of statistical significance. All models suggest an outperformance of the worst portfolios to the best portfolios.

The market risk premium displayed positive coefficients for all analyses, implying greater market risk volatility for the best portfolios. As opposed to the two previous models, neither of the estimates remained statistically significant when we applied the five-factor model.

With a 10% cut-off rate and when screened for ESGC, SMB was positive. It exhibited negative coefficients in all other analyses. Note that the estimates had the highest absolute values when we used a 20% cut-off rate. This variable was not statistically significant in either of the previous models, and the same applied when we used the five-factor model.

HML still had positive coefficients in all analyses, implying that the best portfolios had higher exposure to value stocks. The beta values fluctuated somewhat depending on the cut-off rate and whether we screened the portfolios for ESG or ESGC. However, this variable did not obtain statistical significance in either of the analyses.

RMW had a positive beta estimate when we used a 10% cut-off rate and screened for ESGC. In all other analyses, the risk factor was negative, implying that the best portfolios comprised more companies with weak profitability. Finally, CMA had only positive beta estimates. This indicates that the best portfolios comprised more companies with conservative investments as opposed to aggressive investments. However, neither RMW nor CMA had significant estimates in any of our analyses.

We observed similar explanatory powers when we used the five-factor model as the two previous models. The lowest R^2 value observed was 3.30%, which was slightly higher than the lowest values earlier. However, the highest observed value was 14.43%, slightly lower than previously. A 10% cut-off rate still gave the highest explanatory powers of 10.37% when we screened for ESG and 14.43% when we screened for ESGC.

Similar to the three-factor and four-factor models, the Durbin-Watson statistic was close to 2 in all four analyses when we applied the five-factor model. Three of the analyses had a DW statistic above 2 in this model, indicating weak negative autocorrelation. However, as mentioned earlier, the values were close enough to 2 to be considered acceptable.

7. Discussion

In this chapter, we address our research question and conjectures by analyzing the results. The findings from our analyses are compared with theories and prior research presented in Chapters 2 and 3. The discussion is structured into three sections with the first comprising an analysis of the European market, followed by an examination of the American market. The final section offers a comprehensive and general discussion of the results obtained from the study.

7.1 European Market

According to our analysis of the European market, the worst portfolios screened for ESG demonstrated an average monthly outperformance of 0.6% to the best portfolios. When the portfolios were screened for ESGC, the average monthly outperformance of the worst portfolios was reduced to 0.1%. All three factor models provided identical alpha estimates, but the outperformance was only statistically significant when screened for ESG. This means that there were no significant differences in abnormal returns between the best and worst portfolios when we screened for ESGC. Consequently, the results of our analyses were not robust due to their limited significance and reduced impact.

Our findings align with the first research conjecture which states that European companies with good ESG performance do not generate higher risk-adjusted stock returns than those with bad ESG performance. This can be supported through Friedman's (1970) shareholder theory posing that investors are more interested in maximizing their own value rather than the sustainability practices of the company. One possible reason for this could be that companies with low ESG scores may be more focused on cost-cutting measures and short-term gains that can result in higher stock prices short term (Ball & Brown, 1968). In contrast, companies with high ESG scores may prioritize sustainability and responsible business practices, which can lead to increased expenses and reduced profits short term. Although the analyses conducted on the European market support the research conjecture, the relationship between ESG performance and risk-adjusted stock returns varied depending on which score the portfolios were screened for. These findings align with the observed stock performance illustrated in Figure 5, where the portfolios sorted by ESG and ESGC exhibited different performance patterns during the analyzed period.

The analyses conducted on portfolios screened for ESG indicated a significant negative relationship between CSR and CFP. These findings are consistent with those of Auer & Schuhmacher (2016), Luo (2022), and Renneboog et al. (2008). Luo (2022) used the same methodology and obtained similar results as our research, but only examined companies from the UK, which may not provide sufficient grounds for generalization. Our findings, based on companies from several European countries, support a more general conclusion. Auer & Schuhmacher (2016) found that investors tend to pay a prize for investing socially responsibly in Europe. This indicates that companies should explicitly communicate the potential financial benefits and balance them against other priorities, as such practices may not necessarily lead to superior financial performance in the stock market.

The ESGC analyses also support the first research conjecture but indicated that the relationship between ESGC performance and risk-adjusted returns was absent. These results can be supported through the EMH, which states that investors have access to all available information about a company. The stock market returns will therefore reflect the collective wisdom of investors. The alphas in all these analyses were approximately zero and lacked statistical significance, indicating that the ESGC performance was already reflected in the stock prices. These findings are consistent with the conclusions reached by Kreander et al. (2005), Leite & Cortez (2014), and Velte (2017). However, it should be noted that the data examined in their studies predates the data analyzed in our research and was not explicitly related to the ESGC score. As our research led to a different conclusion than the analyses conducted solely on the ESG score, the discrepancies may be due to adjustments made for outliers. We observed a noteworthy change in the average composition of companies in the portfolios sorted by ESG and ESGC. The decile portfolio had a shift of 55.5% among the best companies and 27.8% among the worst companies. These adjustments may have made it more difficult to identify any significant relationships between ESGC performance and risk-adjusted returns.

7.2 American market

The results from our analysis of the American market indicated that the worst portfolios outperformed the best portfolios by an average of 0.7% monthly. When we screened for ESGC, we still observed that the worst portfolios generated higher returns than the best portfolios, with a slightly lower average of 0.55% monthly. All three factor models provided us with the same estimates and p-values for the alpha coefficient. The analyses showed significant alphas regardless of cut-off rate, but we did however observe that a lower cut-off rate gave higher absolute alpha estimates.

Our results contradict Freeman's (1998) stakeholder theory and the second research conjecture, which states that US companies with good ESG performance will generate higher risk-adjusted returns than US companies with bad ESG performance. This could be seen as supporting Friedman's (1970) argument, which implies that the pursuit of social responsibility can lead to a suboptimal financial outcome. It may seem that American companies focusing on ESG incurred high costs that were not offset by the benefits they brought. These resources could have been used on what Freidman considered to be the core responsibility of a company; profit-generating activities. However, it is important to be aware of the long-term impact of a company neglecting ESG on its reputation and relationship with stakeholders. This could have negative consequences in the future, making it crucial to consider the potential trade-offs between short-term financial performance and long-term sustainability when making investment decisions. Moreover, since the long-term effects of certain sustainability practices may not yet be fully measurable or analyzable for our sample period, it is essential to continue gathering data and information to better understand the impact of such practices over time.

Our study has revealed a result that contradicts the conventional wisdom in the field of sustainable investing. Previous research suggest that US companies with high social responsibility tend to outperform those with low social responsibility and generate higher returns (Ashwin Kumar et al., 2016; Kempf & Osthoff, 2007; Statman & Glushkov, 2009). Our research has implications for investors who are looking to invest in socially responsible companies, as it suggests that a high ESG score may not necessarily result in better financial performance.

The fact that our alpha estimates and p-values were consistent across all three factor models suggests that our results are robust and not sensitive to the specific model chosen. The factor models had different variables and specifications included, meaning that our analysis accounted for a range of potential risk factors. This could have influenced the results. However, in our study, the consistency of results across the different models suggests that the relationship between ESG and stock returns was not overly sensitive to each risk factor. Additionally, all three factor models have a strong empirical basis in academic research (Galema et al., 2008; Luo, 2022; Statman & Glushkov, 2009; Steen et al., 2020). Therefore, the similar results across these models support the validity of our findings. In other words, our findings reflect a more general relationship between ESG and stock returns, rather than depending on any particular factor model.

We observed that although all alpha estimates were statistically significant regardless of cut-off rate, we obtained higher absolute estimates with a lower cut-off rate. This implies that when we examined fewer companies, thus extremes, the difference in abnormal returns between the best and the worst portfolios was more prominent. This tells us that our results were robust over different cut-off rates, but an investor may generate higher returns by applying a long-short strategy with a lower cut-off rate.

7.3 General discussion of the results

Despite our findings indicating either a significant negative or non-existent alpha throughout the period in the European and American analyses, there may be time-varying differences. Previous research has revealed that whether companies with high social responsibility ratings outperform or underperform companies with low social responsibility ratings depends on the general state of the economy (Bansal et al., 2018). Our analyses covered the period from February 2016 to December 2021. While the overall trend during this period was upward and characterized by a bull market, there were also periods of volatility and market corrections, including a steep decline in 2020 due to the COVID-19 pandemic. The combination of both a bullish and bearish market may have had an impact on our results. As Bansal et al. (2018) found that socially responsible companies generated higher returns during good economic times, our results could have been different or more prominent by analyzing a shorter period with only an upward or downward trend.

In the majority of our analyses, we found few or no statistically significant risk factors. Nonetheless, several of them exhibited tendencies indicating a consistent relationship throughout all models. The lack of statistical significance suggests that there were no significant differences in the exposure to these risk factors between the best and worst portfolios. However, three risk factors consistently appeared as significant in several of our analyses. These varied depending on whether we analyzed the US or Europe.

In the analyses of European companies screened for ESG, we found that the size variable had a significant positive estimate. This suggests that the impact of sustainable investment on financial performance may be more pronounced in small companies compared to larger companies. Small companies may be less responsive to sustainable investment practices due to their relative lack of resources and greater sensitivity to external factors.

The analyses of the US identified two other risk factors to be significant and positive. The market risk premium coefficient indicated that best portfolios had higher market risk volatility than the worst portfolios. This is consistent with the idea that investors demand a premium for bearing market risk and expect higher returns from stocks that are more exposed to market movements. The value factor coefficient indicated that companies with high ESG scores were more exposed to value stocks than growth stocks. This appears plausible, given that established firms typically possess greater resources to allocate towards sustainable practices compared to growth companies.

Because Refinitiv's ESG scores are based on self-reported information, it can be difficult for investors to verify the accuracy of these claims. This creates a risk of companies engaging in greenwashing by exaggerating their positive ESG performance or downplaying the negative aspects of their practices. In extreme cases, companies may even falsify or manipulate ESG data to improve their scores and attract investors. We have attempted to account for this by including both ESG and ESGC scores in our analyses. Given that our findings suggested an outperformance by the worst portfolios, it implies that greenwashing did not pose a significant threat to the reliability of our results. However, investors who are interested in sustainable investing should be aware of the risks of greenwashing and take steps to verify the accuracy of a company's ESG claims before making investment decisions.

8. Conclusion

Our first research conjecture states that European companies with high ESG performance will not generate better risk-adjusted returns in the stock market than European companies with low ESG performance. This was supported by our findings. The analyses of the portfolios screened for ESG demonstrated a negative relationship between ESG scores and stock performance. However, the results were not robust as they did not show any significant relationship when the portfolios were screened for ESGC. These findings suggest that ESGC performance may not always be a reliable predictor of corporate financial performance in terms of stock returns. Other factors may be more influential in determining returns. Therefore, investors seeking socially responsible investment opportunities in the European market may face a trade-off between realizing their social responsibility objectives and obtaining higher returns.

Our findings did not support the second research conjecture which states that US companies with high ESG performance generate higher risk-adjusted returns in the stock market than US companies with low ESG performance. Our study indicated the opposite; companies with low ESG performance generate higher risk-adjusted returns. We found significant negative alphas both when we screened for ESG and ESGC, as well as when we used cut-off rates of both 10% and 20%. This suggests that we had robust results across all analyses. Our findings lead us to conclude that there exists a negative relationship between ESG performance and risk-adjusted returns in the US. An investor who seeks to generate excess returns should include US companies with low ESG scores in their investment strategy. Likewise, our results imply that a socially responsible investor must accept a tradeoff in financial performance to adhere to their sustainability objectives.

In the introduction to this thesis, we posed the following research question: *Is there a relationship between CSR and CFP, and if so, is this relationship positive or negative?* As discussed above, our research did not provide a straightforward answer to this question. In the analyses of the US market, we found a significant negative relationship between CSR and CFP. However, the results from the European analyses were more ambiguous. Some analyses indicated a negative relationship, while others gave inconclusive results. We do, however, ultimately conclude that there is a relationship between CSR and CFP and that this relationship is negative.

Certain variables in our analyses did not reach statistical significance. Further research is required to better understand the factors driving the performance of companies screened for ESG and ESGC. Additional research may consider conducting analyses at industry level or utilizing cross-sectional methods to investigate the topic in greater depth. Examining shorter periods of either a bull or bear market could also yield a more nuanced understanding of the relationship between ESG performance and stock returns. Given the observed negative relationship between CSR and CFP in both European and American contexts, it would be interesting to examine the extent to which this pattern holds in Asia and Oceania as well.

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Appendix

A – Controversy measures

Category	Label
Community	Anti-competition controversy
Community	Business ethics controversies
Community	Intellectual property controversies
Community	Critical countries controversies
Community	Public health controversies
Community	Tax fraud controversies
Human rights	Child labor controversies
Human rights	Human rights controversies
Management	Management compensation controversies count
Product responsibility	Consumer controversies
Product responsibility	Customer health and safety controversies
Product responsibility	Privacy controversies
Product responsibility	Product access controversies
Product responsibility	Responsible marketing controversies
Product responsibility	Responsible R&D controversies
Resource use	Environmental controversies
Shareholders	Accounting controversies count
Shareholders	Insider dealings controversies
Shareholders	Shareholder rights controversies
Workforce	Diversity and opportunity controversies
Workforce	Employee health and safety controversies
Workforce	Wages and working conditions controversies
Workforce	Strikes

(Refinitiv, 2022)

B – List of companies in portfolio constructed by the index Stoxx 600 with a 10% cut-off rate

ESG 10% Stoxx					
Best 2016	**Best 2017**	**Best 2018**	**Best 2019**	**Best 2020**	**Best 2021**
ABB LTD N	ABB LTD N	ABB LTD N	ABB LTD N	ABB LTD N	ABB LTD N
ADIDAS (XET)	ADIDAS (XET)	ACCIONA	ACCIONA	ACCIONA	ADIDAS (XET)
ALLIANZ (XET)	ALLIANZ (XET)	ADIDAS (XET)	ADIDAS (XET)	ADIDAS (XET)	AIRBUS
ALSTOM	ASSICURAZIONI GENERALI	ALFA LAVAL	ALFA LAVAL	ALLIANZ (XET)	ALLIANZ (XET)
ARCELORMITTAL	ASTRAZENECA	ALLIANZ (XET)	ALLIANZ (XET)	ASSICURAZIONI GENERALI	ALSTOM
ASSICURAZIONI GENERALI	BANCO SANTANDER	ALSTOM	ASSICURAZIONI GENERALI	ASTRAZENECA	AMADEUS IT GROUP
ASTRAZENECA	BBV.ARGENTARIA	AMADEUS IT GROUP	ASTRAZENECA	BANCO SANTANDER	ASSICURAZIONI GENERALI
BANCO SANTANDER	BNP PARIBAS	ASSICURAZIONI GENERALI	BANCO SANTANDER	BASF (XET)	ASTRAZENECA
BBV.ARGENTARIA	BP	ASTRAZENECA	BASF (XET)	BAYER (XET)	BANCO SANTANDER
BMW (XET)	CASTELLUM	BANCO SANTANDER	BAYER (XET)	BNP PARIBAS	BASF (XET)
BNP PARIBAS	COCA-COLA HBC	BARCLAYS	BNP PARIBAS	BRITISH AMERICAN TOBACCO	BAYER (XET)
BP	CRH	BASF (XET)	BP	COCA-COLA HBC	BMW (XET)
COCA-COLA HBC	DANONE	BAYER (XET)	BRITISH AMERICAN TOBACCO	CRH	BNP PARIBAS
CRH	DIAGEO	BNP PARIBAS	CAIXABANK	DIAGEO	BP
DANONE	ENEL	BP	COCA-COLA HBC	ENEL	BRITISH AMERICAN TOBACCO
ENEL	EVONIK INDUSTRIES (XET)	BRITISH AMERICAN TOBACCO	DIAGEO	EVONIK INDUSTRIES (XET)	COCA-COLA HBC
EVONIK INDUSTRIES (XET)	GLAXOSMITHKLINE	COCA-COLA HBC	ENEL	GEBERIT 'R'	CRH
GLAXOSMITHKLINE	GLENCORE	DIAGEO	GEBERIT 'R'	GLAXOSMITHKLINE	ENEL
GLENCORE	IBERDROLA	ENEL	GLAXOSMITHKLINE	GLENCORE	EVONIK INDUSTRIES (XET)
IBERDROLA	INTERNATIONAL DISTRIBUTIONS	EVONIK INDUSTRIES (XET)	GLENCORE	HERA	GLAXOSMITHKLINE
INDITEX	LEGRAND	GEBERIT 'R'	LEGRAND	INTESA SANPAOLO	GLENCORE
LAND SECURITIES GROUP	MERCEDES-BENZ GROUP(XET) N	GLAXOSMITHKLINE	LONZA GROUP	LEGRAND	HERA
LEGRAND	MONDI	GLENCORE	MERCEDES-BENZ GROUP(XET) N	LEONARDO	INTESA SANPAOLO
MARKS & SPENCER GROUP	NOKIA	LEGRAND	MONDI	MERCEDES-BENZ GROUP(XET) N	MERCEDES-BENZ GROUP(XET) N
MERCEDES-BENZ GROUP(XET) N	NORSK HYDRO	MERCEDES-BENZ GROUP(XET) N	NESTLE 'N'	MONDI	ORKLA
MONDI	NOVARTIS 'R'	MONDI	NOKIA	MUENCHENER RUCK. (XET)	PUMA (XET)
NESTLE 'N'	PHILIPS ELTN.KONINKLIJKE	NESTLE 'N'	NORSK HYDRO	NESTLE 'N'	RECKITT BENCKISER GROUP
NOKIA	RELX	NOKIA	PHILIPS ELTN.KONINKLIJKE	NOKIA	RENAULT

NORSK HYDRO	RENAULT	NORSK HYDRO	REPSOL YPF	ORKLA	ROCHE HOLDING
PHILIPS ELTN.KONINKLIJKE	RIO TINTO	PHILIPS ELTN.KONINKLIJKE	ROCHE HOLDING	PHILIPS ELTN.KONINKLIJKE	SAINT GOBAIN
RELX	ROCHE HOLDING	ROCHE HOLDING	SANOFI	ROCHE HOLDING	SANOFI
RENAULT	SANOFI	SANOFI	SAP (XET)	SANOFI	SAP (XET)
ROCHE HOLDING	SAP (XET)	SAP (XET)	SHELL	SAP (XET)	SHELL
SANOFI	SHELL	SHELL	SOCIETE GENERALE	SHELL	SNAM
SAP (XET)	SOCIETE GENERALE	SNAM	STELLANTIS	SNAM	SONOVA N
SHELL	STANDARD CHARTERED	SOCIETE GENERALE	STMICROELECTRONICS (MIL)	STANDARD CHARTERED	STANDARD CHARTERED
SOCIETE GENERALE	STELLANTIS	STELLANTIS	STORA ENSO R	STELLANTIS	STELLANTIS
STELLANTIS	STMICROELECTRONICS (MIL)	STMICROELECTRONICS (MIL)	SVENSKA CELLULOSA AKTIEBOLAGET SCA B	STMICROELECTRONICS (MIL)	STMICROELECTRONICS (MIL)
STMICROELECTRONICS (MIL)	STORA ENSO R	STORA ENSO R	UBS GROUP	STORA ENSO R	STORA ENSO R
TELEFONICA	TELECOM ITALIA	SVENSKA CELLULOSA AKTIEBOLAGET SCA B	UNIBAIL RODAMCO WE STAPLED UNITS	TOTALENERGIES	STOREBRAND
TOTALENERGIES	TOTALENERGIES	TELEFONICA	UNICREDIT	UBS GROUP	UBS GROUP
UBS GROUP	UBS GROUP	UBS GROUP	UNILEVER (UK)	UNIBAIL RODAMCO WE STAPLED UNITS	UNIBAIL RODAMCO WE STAPLED UNITS
UNIBAIL RODAMCO WE STAPLED UNITS	UNIBAIL RODAMCO WE STAPLED UNITS	UNIBAIL RODAMCO WE STAPLED UNITS	UPM-KYMMENE	UNILEVER (UK)	UNILEVER (UK)
UNILEVER (UK)	UNILEVER (UK)	UNICREDIT	VOLKSWAGEN PREF. (XET)	VOLKSWAGEN PREF. (XET)	VODAFONE GROUP
VIVENDI	VIVENDI	UNILEVER (UK)	VOLVO B	VOLVO B	VOLVO B

ESG 10% Stoxx					
Worst 2016	**Worst 2017**	**Worst 2018**	**Worst 2019**	**Worst 2020**	**Worst 2021**
AALBERTS	ACKERMANS & VAN HAAREN	ACKERMANS & VAN HAAREN	ACKERMANS & VAN HAAREN	ACKERMANS & VAN HAAREN	ACKERMANS & VAN HAAREN
AIB GROUP	ALLREAL HOLDING	ALLREAL HOLDING	ALLREAL HOLDING	ALLREAL HOLDING	ALLREAL HOLDING
ALLREAL HOLDING	AMS-OSRAM AG	AMS-OSRAM AG	AMS-OSRAM AG	ASHTEAD GROUP	ASHTEAD GROUP
AMS-OSRAM AG	ASHTEAD GROUP	ASHTEAD GROUP	ASHTEAD GROUP	ASSURA	ASSURA
ASSURA	ASSURA	ASSURA	ASSURA	B&M EUROPEAN VAL.RET.	B&M EUROPEAN VAL.RET.
AUTO TRADER GROUP	BC VAUD N	AUTO TRADER GROUP	AUTO TRADER GROUP	BALOISE HOLDING	BALOISE HOLDING
BANCO BPM	BEAZLEY	B&M EUROPEAN VAL.RET.	B&M EUROPEAN VAL.RET.	BC VAUD N	BEIJER REF B
BC VAUD N	BEIJER REF B	BALOISE HOLDING	BALOISE HOLDING	BEIJER REF B	BUNZL
BEAZLEY	BELIMO N	BC VAUD N	BC VAUD N	BELIMO N	DASSAULT AVIATION
BEIJER REF B	DASSAULT AVIATION	BEAZLEY	BEIJER REF B	BUNZL	DEMANT
BOLLORE	DECHRA PHARMACEUTICALS	BEIJER REF B	BELIMO N	DCC	DIPLOMA
BUNZL	DIPLOMA	BELIMO N	BUNZL	DEMANT	DUFRY 'R'
DASSAULT AVIATION	DUFRY 'R'	BUNZL	DCC	DIPLOMA	ELIA GROUP
DIPLOMA	ELIA GROUP	CELLNEX TELECOM	DECHRA PHARMACEUTICALS	ELIA GROUP	EMS-CHEMIE 'N'

DKSH HOLDING	EMS-CHEMIE 'N'	DECHRA PHARMACEUTICALS	DEMANT	EMS-CHEMIE 'N'	FASTIGHETS BALDER B
DUFRY 'R'	FASTIGHETS BALDER B	DIPLOMA	DIPLOMA	FASTIGHETS BALDER B	FLUGHAFEN ZURICH
ELIA GROUP	FLUGHAFEN ZURICH	DUFRY 'R'	EMS-CHEMIE 'N'	FLUGHAFEN ZURICH	FLUTTER (DUB) ENTERTAINMENT
EMS-CHEMIE 'N'	FLUTTER (DUB) ENTERTAINMENT	EMS-CHEMIE 'N'	FLUGHAFEN ZURICH	FLUTTER (DUB) ENTERTAINMENT	FREENET (XET)
EUROFINS SCIEN.	FREENET (XET)	FASTIGHETS BALDER B	FLUTTER (DUB) ENTERTAINMENT	FREENET (XET)	FUCHS PETROLUB (XET) PREF.
FASTIGHETS BALDER B	GBL NEW	FLUGHAFEN ZURICH	FREENET (XET)	FUCHS PETROLUB (XET) PREF.	GRAFTON GROUP UTS.
FLUGHAFEN ZURICH	GENUS	FLUTTER (DUB) ENTERTAINMENT	FUCHS PETROLUB (XET) PREF.	GENUS	HARBOUR ENERGY
FLUTTER (DUB) ENTERTAINMENT	GRAFTON GROUP UTS.	FREENET (XET)	GENUS	GRAFTON GROUP UTS.	HAYS
FREENET (XET)	HEXAGON B	GBL NEW	GRAFTON GROUP UTS.	HAYS	HEXAGON B
FUCHS PETROLUB (XET) PREF.	IMCD GROUP	GRAFTON GROUP UTS.	HEXAGON B	HEXAGON B	HOWDEN JOINERY GP.
GBL NEW	INCHCAPE	HEXAGON B	INCHCAPE	INCHCAPE	INCHCAPE
GENUS	INDUSTRIVARDEN C	INCHCAPE	INDUSTRIVARDEN C	INDUSTRIVARDEN C	INDUSTRIVARDEN C
HEXAGON B	JD SPORTS FASHION	INDUSTRIVARDEN C	INTERMEDIATE CAPITAL GP.	INTERMEDIATE CAPITAL GP.	JD SPORTS FASHION
IMCD GROUP	LUNDBERGFORETAGEN B	INTERMEDIATE CAPITAL GP.	JD SPORTS FASHION	JD SPORTS FASHION	JYSKE BANK
INCHCAPE	OCI	JD SPORTS FASHION	KINNEVIK B	JYSKE BANK	LUNDBERGFORETAGEN B
INDUSTRIVARDEN C	PARTNERS GROUP HOLDING	LUNDBERGFORETAGEN B	LUNDBERGFORETAGEN B	LUNDBERGFORETAGEN B	MERLIN PROPERTIES REIT
JD SPORTS FASHION	PORSCHE AML.HLDG. (XET) PREF.	OCI	OCADO GROUP	MERLIN PROPERTIES REIT	OCADO GROUP
LUNDBERGFORETAGEN B	PSP SWISS PROPERTY AG	PARTNERS GROUP HOLDING	PARTNERS GROUP HOLDING	OCADO GROUP	PARTNERS GROUP HOLDING
OCI	RHEINMETALL (XET)	PORSCHE AML.HLDG. (XET) PREF.	PORSCHE AML.HLDG. (XET) PREF.	PARTNERS GROUP HOLDING	PORSCHE AML.HLDG. (XET) PREF.
PARTNERS GROUP HOLDING	RYANAIR HOLDINGS	PSP SWISS PROPERTY AG	PSP SWISS PROPERTY AG	PORSCHE AML.HLDG. (XET) PREF.	RYANAIR HOLDINGS
PORSCHE AML.HLDG. (XET) PREF.	SCOUT24 (XET)	RHEINMETALL (XET)	RYANAIR HOLDINGS	PSP SWISS PROPERTY AG	SAGE GROUP
PSP SWISS PROPERTY AG	SECTRA B	RYANAIR HOLDINGS	SECTRA B	RYANAIR HOLDINGS	SCHINDLER 'P'
SCOUT24 (XET)	SIMCORP	SECTRA B	SOFINA	SAGE GROUP	SECTRA B
SECTRA B	SOFINA	SOFINA	SOFTCAT	SECTRA B	SOFINA
SOFINA	SOFTCAT	SOFTCAT	SPIRAX-SARCO ENGR.	SOFINA	SOFTCAT
SOFTCAT	SPIRAX-SARCO ENGR.	THE SWATCH GROUP	THE SWATCH GROUP	THE SWATCH GROUP	SPIRAX-SARCO ENGR.
SWEDISH ORPHAN BIOVITRUM	THE SWATCH GROUP	TOPDANMARK	TOMRA SYSTEMS	TOPDANMARK	TOMRA SYSTEMS
THE SWATCH GROUP	TOPDANMARK	TRITAX BIG BOX REIT	TOPDANMARK	TRITAX BIG BOX REIT	TRITAX BIG BOX REIT
TRITAX BIG BOX REIT	TRITAX BIG BOX REIT	TRYG	TRITAX BIG BOX REIT	TRYG	UNITED INTERNET (XET)
UNITED INTERNET (XET)	UNITED INTERNET (XET)	UNITED INTERNET (XET)	UNITED INTERNET (XET)	UNITED INTERNET (XET)	VICTREX

VONOVIA (XET)	VICTREX	VICTREX	VICTREX	VICTREX	WIHLBORGS FASTIGHETER

ESGC 10% Stoxx					
Best 2016	**Best 2017**	**Best 2018**	**Best 2019**	**Best 2020**	**Best 2021**
ABB LTD N	ACCIONA	ABB LTD N	ABB LTD N	ABRDN	ABRDN
ACCIONA	ALFA LAVAL	ACCIONA	ACCIONA	ACCIONA	AEGON
ALLIANZ (XET)	ALLIANZ (XET)	ALFA LAVAL	ADIDAS (XET)	ATLAS COPCO A	AMADEUS IT GROUP
ALSTOM	ALSTOM	AMADEUS IT GROUP	ALFA LAVAL	BILLERUD AKTIEBOLAG	ARCELORMITTAL
ASSICURAZIONI GENERALI	AMADEUS IT GROUP	ASSICURAZIONI GENERALI	ALLIANZ (XET)	BOLIDEN ORD SHS	ATLAS COPCO A
ASTRAZENECA	ASSICURAZIONI GENERALI	ASTRAZENECA	AMADEUS IT GROUP	CHRISTIAN HANSEN HOLDING	BASF (XET)
BBV.ARGENTARIA	ASTRAZENECA	AXA	ASSICURAZIONI GENERALI	COCA-COLA HBC	BIG YELLOW GROUP
BILLERUD AKTIEBOLAG	BASF (XET)	BASF (XET)	ASTRAZENECA	CRH	BILLERUD AKTIEBOLAG
BNP PARIBAS	BP	BBV.ARGENTARIA	CAIXABANK	DEUTSCHE POST (XET)	CASTELLUM
BRITISH AMERICAN TOBACCO	CAIXABANK	BRITISH AMERICAN TOBACCO	CASTELLUM	DEUTSCHE TELEKOM (XET)	COCA-COLA HBC
CASTELLUM	CASTELLUM	CASTELLUM	COCA-COLA HBC	DSM KONINKLIJKE	CRH
COCA-COLA HBC	COCA-COLA HBC	COCA-COLA HBC	CRODA INTERNATIONAL	EIFFAGE	CRODA INTERNATIONAL
CRH	CRH	DIAGEO	DANONE	ELEKTA B	DSM KONINKLIJKE
EDP ENERGIAS DE PORTUGAL	DANONE	DSM KONINKLIJKE	DEUTSCHE POST (XET)	EVONIK INDUSTRIES (XET)	EIFFAGE
ENEL	ERICSSON B	EIFFAGE	DIAGEO	GEBERIT 'R'	ELECTROLUX B
EVONIK INDUSTRIES (XET)	EVONIK INDUSTRIES (XET)	ELEKTA B	DSM KONINKLIJKE	HERA	ELEKTA B
GEBERIT 'R'	GEBERIT 'R'	ENDESA	ELEKTA B	KINGSPAN GROUP	FABEGE
INDITEX	GLAXOSMITHKLINE	ERICSSON B	ENDESA	LONZA GROUP	FINECOBANK SPA
ING GROEP	GLENCORE	EVONIK INDUSTRIES (XET)	ERSTE GROUP BANK	MERCK KGAA (XET)	GEBERIT 'R'
KINGFISHER	IBERDROLA	GEBERIT 'R'	EVONIK INDUSTRIES (XET)	MONDI	GETLINK
KLEPIERRE REIT	KINGFISHER	GLAXOSMITHKLINE	GEBERIT 'R'	MTU AERO ENGINES (XET) HLDG.	HEIDELBERGCEMENT (XET)
LAND SECURITIES GROUP	LAND SECURITIES GROUP	IBERDROLA	IBERDROLA	MUENCHENER RUCK. (XET)	HUHTAMAKI
LEGRAND	LEGRAND	INDITEX	LEGRAND	NORSK HYDRO	LAND SECURITIES GROUP
MARKS & SPENCER GROUP	MARKS & SPENCER GROUP	LEGRAND	LONZA GROUP	ORKLA	LEGRAND
MONDI	MUENCHENER RUCK. (XET)	MERCK KGAA (XET)	MERCK KGAA (XET)	PEARSON	LONZA GROUP
NESTLE 'N'	NOKIA	MONDI	MONDI	QIAGEN (XET)	MERCK KGAA (XET)
NOKIA	NORSK HYDRO	MUENCHENER RUCK. (XET)	MUENCHENER RUCK. (XET)	RECKITT BENCKISER GROUP	MONCLER
PEARSON	PEARSON	ORKLA	NESTLE 'N'	RELX	MONDI
PUBLICIS GROUPE	PUBLICIS GROUPE	PEARSON	NEXANS	ROCHE HOLDING	OMV

RED ELECTRICA	RELX	PUBLICIS GROUPE	ORKLA	SAP (XET)	ORKLA
RELX	SGS 'N'	RELX	PUMA (XET)	SGS 'N'	PUMA (XET)
ROCHE HOLDING	SNAM	REPSOL YPF	RELX	SMURFIT KAPPA GROUP	QIAGEN (XET)
SAINT GOBAIN	SODEXO	ROCHE HOLDING	REPSOL YPF	SNAM	RELX
SAP (XET)	STMICROELECTRONICS (MIL)	SGS 'N'	ROCHE HOLDING	SONOVA N	ROCHE HOLDING
SNAM	STORA ENSO R	SNAM	SAINT GOBAIN	STMICROELECTRONICS (MIL)	SARTORIUS PREF. (XET)
SODEXO	SWEDBANK A	STMICROELECTRONICS (MIL)	SAP (XET)	STORA ENSO R	SEB
STMICROELECTRONICS (MIL)	TELECOM ITALIA	STORA ENSO R	SNAM	STOREBRAND	SGS 'N'
SVENSKA CELLULOSA AKTIEBOLAGET SCA B	TELEFONICA	SVENSKA CELLULOSA AKTIEBOLAGET SCA B	SONOVA N	SVENSKA CELLULOSA AKTIEBOLAGET SCA B	SONOVA N
TUI (LON)	UCB	TELEFONICA	STMICROELECTRONICS (MIL)	UCB	SSE
UNIBAIL RODAMCO WE STAPLED UNITS	UNIBAIL RODAMCO WE STAPLED UNITS	TUI (LON)	STORA ENSO R	UNIBAIL RODAMCO WE STAPLED UNITS	STMICROELECTRONICS (MIL)
UNILEVER (UK)	UPM-KYMMENE	UNIBAIL RODAMCO WE STAPLED UNITS	SVENSKA CELLULOSA AKTIEBOLAGET SCA B	VOLVO B	STOREBRAND
UPM-KYMMENE	VINCI	UNICREDIT	TELECOM ITALIA	VONOVIA (XET)	SVENSKA CELLULOSA AKTIEBOLAGET SCA B
VINCI	VIVENDI	UNILEVER (UK)	UNIBAIL RODAMCO WE STAPLED UNITS	WARTSILA	TERNA RETE ELETTRICA NAZ
VIVENDI	VOLVO B	UPM-KYMMENE	UPM-KYMMENE	WENDEL	UCB
WHITBREAD	WHITBREAD	VOLVO B	WENDEL	ZALANDO (XET)	UNIBAIL RODAMCO WE STAPLED UNITS

ESGC 10% Stoxx					
Worst 2016	**Worst 2017**	**Worst 2018**	**Worst 2019**	**Worst 2020**	**Worst 2021**
AALBERTS	AIRBUS	ACKERMANS & VAN HAAREN	ABN AMRO BANK	ACKERMANS & VAN HAAREN	A P MOLLER MAERSK B
AIB GROUP	ALLREAL HOLDING	ALLREAL HOLDING	ACKERMANS & VAN HAAREN	AIRBUS	ACKERMANS & VAN HAAREN
ALLREAL HOLDING	AMS-OSRAM AG	AMS-OSRAM AG	ALLREAL HOLDING	ANTOFAGASTA	ACS ACTIV.CONSTR. Y SERV.
AMS-OSRAM AG	ANHEUSER-BUSCH INBEV	ANHEUSER-BUSCH INBEV	AMS-OSRAM AG	ASSURA	ASSURA
ASSURA	ASHTEAD GROUP	ASHTEAD GROUP	ANHEUSER-BUSCH INBEV	B&M EUROPEAN VAL.RET.	B&M EUROPEAN VAL.RET.
AUTO TRADER GROUP	ASSURA	ASSURA	ASSURA	BALOISE HOLDING	BALOISE HOLDING
BANCO BPM	BC VAUD N	AUTO TRADER GROUP	BC VAUD N	BARRATT DEVELOPMENTS	BARCLAYS
BC VAUD N	BEAZLEY	BC VAUD N	BEIJER REF B	BEIJER REF B	BARRATT DEVELOPMENTS
BEAZLEY	BEIJER REF B	BEAZLEY	BMW (XET)	BOLLORE	BEIJER REF B
BEIJER REF B	BELIMO N	BEIJER REF B	BUNZL	DANSKE BANK	BT GROUP
BOLLORE	DASSAULT AVIATION	BUNZL	DANSKE BANK	DEUTSCHE BANK (XET)	CARLSBERG B
BUNZL	DECHRA PHARMACEUTICALS	CREDIT SUISSE GROUP	DEUTSCHE BANK (XET)	DEUTSCHE LUFTHANSA (XET)	CENTRICA
DIPLOMA	DIPLOMA	DANSKE BANK	DEUTSCHE LUFTHANSA (XET)	DIPLOMA	CREDIT SUISSE GROUP
DKSH HOLDING	DUFRY 'R'	DECHRA PHARMACEUTICALS	DIPLOMA	EMS-CHEMIE 'N'	DANSKE BANK

DUFRY 'R'	ELIA GROUP	DEUTSCHE BANK (XET)	DNB BANK	ENGIE	DEUTSCHE BANK (XET)
ELIA GROUP	EMS-CHEMIE 'N'	DIPLOMA	EMS-CHEMIE 'N'	ESSILORLUXOTTICA	DIPLOMA
EMS-CHEMIE 'N'	FASTIGHETS BALDER B	DUFRY 'R'	ENGIE	FLUGHAFEN ZURICH	EMS-CHEMIE 'N'
EUROFINS SCIEN.	FLUGHAFEN ZURICH	EMS-CHEMIE 'N'	FLUGHAFEN ZURICH	FREENET (XET)	ENI
FASTIGHETS BALDER B	FLUTTER (DUB) ENTERTAINMENT	FLUGHAFEN ZURICH	FLUTTER (DUB) ENTERTAINMENT	HENNES & MAURITZ B	ESSILORLUXOTTICA
FLUGHAFEN ZURICH	FREENET (XET)	FLUTTER (DUB) ENTERTAINMENT	FREENET (XET)	INCHCAPE	FASTIGHETS BALDER B
FLUTTER (DUB) ENTERTAINMENT	GBL NEW	FREENET (XET)	INCHCAPE	INDUSTRIVARDEN C	FLUGHAFEN ZURICH
FREENET (XET)	GENUS	GBL NEW	INDIVIOR	INTERMEDIATE CAPITAL GP.	FREENET (XET)
FUCHS PETROLUB (XET) PREF.	GRAFTON GROUP UTS.	GETINGE B	INDUSTRIVARDEN C	INTERNATIONAL DISTRIBUTIONS	INCHCAPE
GBL NEW	HEXAGON B	HEXAGON B	INTERMEDIATE CAPITAL GP.	JD SPORTS FASHION	INDUSTRIVARDEN C
GENUS	IMCD GROUP	INCHCAPE	INTERNATIONAL DISTRIBUTIONS	LUNDBERGFORETAGEN B	INTL.CONS.AIRL. GP.
HEXAGON B	INCHCAPE	INDUSTRIVARDEN C	JD SPORTS FASHION	LVMH	JD SPORTS FASHION
IMCD GROUP	INDUSTRIVARDEN C	INTERMEDIATE CAPITAL GP.	LUNDBERGFORETAGEN B	NATWEST GROUP	LUNDBERGFORETAGEN B
INCHCAPE	JD SPORTS FASHION	JD SPORTS FASHION	NATWEST GROUP	PLKNC.NAFTOWY ORLEN	PLKNC.NAFTOWY ORLEN
INDUSTRIVARDEN C	LUNDBERGFORETAGEN B	LUNDBERGFORETAGEN B	PLKNC.NAFTOWY ORLEN	PORSCHE AML.HLDG. (XET) PREF.	PORSCHE AML.HLDG. (XET) PREF.
JD SPORTS FASHION	OCI	OCI	PORSCHE AML.HLDG. (XET) PREF.	PRYSMIAN	REXEL
K + S (XET)	PARTNERS GROUP HOLDING	PARTNERS GROUP HOLDING	PSP SWISS PROPERTY AG	PSP SWISS PROPERTY AG	RIO TINTO
LUNDBERGFORETAGEN B	PORSCHE AML.HLDG. (XET) PREF.	PORSCHE AML.HLDG. (XET) PREF.	RYANAIR HOLDINGS	RIO TINTO	RYANAIR HOLDINGS
OCI	PSP SWISS PROPERTY AG	PSP SWISS PROPERTY AG	SAINSBURY J	RYANAIR HOLDINGS	SANDVIK
PARTNERS GROUP HOLDING	RHEINMETALL (XET)	RHEINMETALL (XET)	SECTRA B	SAGE GROUP	SECTRA B
PHOENIX GROUP HDG.	RYANAIR HOLDINGS	RYANAIR HOLDINGS	SERCO GROUP	SECTRA B	SERCO GROUP
PORSCHE AML.HLDG. (XET) PREF.	SAINSBURY J	SAINSBURY J	SOFINA	SOFINA	SOFINA
SCOUT24 (XET)	SECTRA B	SECTRA B	SOFTCAT	TAYLOR WIMPEY	TELECOM ITALIA
SECTRA B	SOFINA	SOFINA	SSE	TELENOR	THALES
SKANSKA B	SOFTCAT	SOFTCAT	SWEDBANK A	TENARIS	TOTALENERGIES
SOFINA	SPIRAX-SARCO ENGR.	THE SWATCH GROUP	THE SWATCH GROUP	THE SWATCH GROUP	TRITAX BIG BOX REIT
SOFTCAT	THE SWATCH GROUP	TOPDANMARK	THYSSENKRUPP (XET)	TOPDANMARK	UNITED INTERNET (XET)
SWEDISH ORPHAN BIOVITRUM	TRELLEBORG B	TRITAX BIG BOX REIT	TOPDANMARK	TRITAX BIG BOX REIT	VEOLIA ENVIRON
THE SWATCH GROUP	TRITAX BIG BOX REIT	UNITED INTERNET (XET)	TRITAX BIG BOX REIT	UNITED INTERNET (XET)	VICTREX
TRITAX BIG BOX REIT	UNITED INTERNET (XET)	VICTREX	UNITED INTERNET (XET)	VEOLIA ENVIRON	VINCI
UNITED INTERNET (XET)	VICTREX	VOLKSWAGEN PREF. (XET)	VICTREX	VICTREX	VOLKSWAGEN PREF. (XET)

C – List of companies in portfolio constructed by the index S&P 500 with a 10% cut-off rate

ESG 10% S&P 500					
Best 2016	**Best 2017**	**Best 2018**	**Best 2019**	**Best 2020**	**Best 2021**
3M	3M	3M	3M	3M	3M
ABBOTT LABORATORIES	ABBOTT LABORATORIES	AGILENT TECHS.	AGILENT TECHS.	ABBOTT LABORATORIES	ABBVIE
ACCENTURE CLASS A	ACCENTURE CLASS A	AIR PRDS.& CHEMS.	ALTRIA GROUP	AGILENT TECHS.	AGILENT TECHS.
ADOBE (NAS)	AGILENT TECHS.	ALTRIA GROUP	AMAZON.COM	ALTRIA GROUP	AIR PRDS.& CHEMS.
AGILENT TECHS.	ALLSTATE ORD SHS	AMAZON.COM	AUTODESK	AMAZON.COM	ALTRIA GROUP
ALTRIA GROUP	ALTRIA GROUP	APPLIED MATS.	BAXTER INTL.	ARCHER DANIELS MIDLAND	ARCHER DANIELS MIDLAND
AUTODESK	AUTODESK	BAKER HUGHES A	BEST BUY	BAKER HUGHES A	BAKER HUGHES A
BALL	BAKER HUGHES A	BAXTER INTL.	BOSTON SCIENTIFIC	CBRE GROUP CLASS A	BAXTER INTL.
BAXTER INTL.	BAXTER INTL.	BEST BUY	CAMPBELL SOUP	CHEVRON	CBRE GROUP CLASS A
BECTON DICKINSON	BECTON DICKINSON	CAMPBELL SOUP	CBRE GROUP CLASS A	CISCO SYSTEMS	CHEVRON
BEST BUY	BEST BUY	CBRE GROUP CLASS A	CISCO SYSTEMS	CITIGROUP	CISCO SYSTEMS
CAMPBELL SOUP	CAMPBELL SOUP	CHEVRON	CITIGROUP	CVS HEALTH	CITIGROUP
CARNIVAL	CBRE GROUP CLASS A	CISCO SYSTEMS	DXC TECHNOLOGY	EASTMAN CHEMICAL	CVS HEALTH
CBRE GROUP CLASS A	CHEVRON	CITIGROUP	EDISON INTL.	EDISON INTL.	EDISON INTL.
CISCO SYSTEMS	CISCO SYSTEMS	CVS HEALTH	ELEVANCE HEALTH	ELEVANCE HEALTH	ELEVANCE HEALTH
CITIGROUP	CITIGROUP	FORD MOTOR	FORD MOTOR	FREEPORT-MCMORAN	GOLDMAN SACHS GP.
CVS HEALTH	CVS HEALTH	FREEPORT-MCMORAN	FREEPORT-MCMORAN	GOLDMAN SACHS GP.	HALLIBURTON
DOMINION ENERGY	DOMINION ENERGY	GENERAL MOTORS	GENERAL MOTORS	HALLIBURTON	HASBRO
FORD MOTOR	FREEPORT-MCMORAN	HALLIBURTON	GOLDMAN SACHS GP.	HEALTHPEAK PROPERTIES	HEALTHPEAK PROPERTIES
FREEPORT-MCMORAN	GENERAL MOTORS	HOST HOTELS & RESORTS	HALLIBURTON	HILTON WORLDWIDE HDG.	HERSHEY
GENERAL ELECTRIC	HASBRO	HP	HEALTHPEAK PROPERTIES	INTEL	HONEYWELL INTL.
GENERAL MOTORS	HOME DEPOT	INTEL	HESS	INTL.FLAVORS & FRAG.	INTEL
HASBRO	INTEL	INTERNATIONAL BUS.MCHS.	HILTON WORLDWIDE HDG.	JACOBS SOLUTIONS	JACOBS SOLUTIONS
HOME DEPOT	INTL.FLAVORS & FRAG.	INTL.FLAVORS & FRAG.	HOST HOTELS & RESORTS	JOHNSON & JOHNSON	JOHNSON & JOHNSON
HOST HOTELS & RESORTS	JOHNSON & JOHNSON	INTUIT	INTEL	JP MORGAN CHASE & CO.	JP MORGAN CHASE & CO.
INTEL	JP MORGAN CHASE & CO.	JOHNSON & JOHNSON	INTL.FLAVORS & FRAG.	JUNIPER NETWORKS	KINDER MORGAN
JOHNSON & JOHNSON	LOCKHEED MARTIN	JOHNSON CONTROLS INTL.	JOHNSON & JOHNSON	KELLOGG	LINDE
JP MORGAN CHASE & CO.	LOWE'S COMPANIES	KROGER	JOHNSON CONTROLS INTL.	KINDER MORGAN	LOWE'S COMPANIES
LOCKHEED MARTIN	MERCK & COMPANY	LINDE	JP MORGAN CHASE & CO.	LINDE	MICROSOFT
LOWE'S COMPANIES	MICROSOFT	MICROSOFT	KELLOGG	MARRIOTT INTL.'A'	NEWMONT
MERCK & COMPANY	NEWMONT	NEWMONT	KIMCO REALTY	MICROSOFT	PEPSICO

MICROSOFT	PEPSICO	PEPSICO	KINDER MORGAN	NEWMONT	PHILIP MORRIS INTL.
NEWMONT	PG&E	PG&E	LINDE	PEPSICO	REALTY INCOME
PEPSICO	PHILIP MORRIS INTL.	PHILIP MORRIS INTL.	MICROSOFT	PHILIP MORRIS INTL.	REGENCY CENTERS
PG&E	PNC FINL.SVS.GP.	PNC FINL.SVS.GP.	NEWMONT	REGENCY CENTERS	REGIONS FINL.NEW
PHILIP MORRIS INTL.	PROLOGIS REIT	PROLOGIS REIT	PEPSICO	ROYAL CARIBBEAN GROUP	SCHLUMBERGER
PNC FINL.SVS.GP.	SEMPRA	ROYAL CARIBBEAN GROUP	PHILIP MORRIS INTL.	STATE STREET	STANLEY BLACK & DECKER
PROLOGIS REIT	STATE STREET	STATE STREET	ROYAL CARIBBEAN GROUP	TARGET	TARGET
STATE STREET	TARGET	TARGET	STATE STREET	TEXAS INSTRUMENTS	WALGREENS BOOTS ALLIANCE
TARGET	TEXAS INSTRUMENTS	TEXAS INSTRUMENTS	TARGET	WALGREENS BOOTS ALLIANCE	WALMART
TEXAS INSTRUMENTS	WASTE MANAGEMENT	WASTE MANAGEMENT	TEXAS INSTRUMENTS	WALMART	WASTE MANAGEMENT
WASTE MANAGEMENT	WELLS FARGO & CO	WELLS FARGO & CO	VIATRIS	WASTE MANAGEMENT	WEYERHAEUSER
WELLS FARGO & CO	WEYERHAEUSER	YUM! BRANDS	WASTE MANAGEMENT	XYLEM	XYLEM

ESG 10% S&P					
Worst 2016	**Worst 2017**	**Worst 2018**	**Worst 2019**	**Worst 2020**	**Worst 2021**
ALIGN TECHNOLOGY	ALIGN TECHNOLOGY	ALIGN TECHNOLOGY	AMEREN	AMEREN	AMEREN
ARCH CAP.GP.	ARCH CAP.GP.	ARCH CAP.GP.	ARCH CAP.GP.	ARCH CAP.GP.	ATMOS ENERGY
ARISTA NETWORKS	ATMOS ENERGY	ATMOS ENERGY	ATMOS ENERGY	ATMOS ENERGY	BATH AND BODY WORKS
ATMOS ENERGY	BOOKING HOLDINGS	BERKSHIRE HATHAWAY 'B'	BERKSHIRE HATHAWAY 'B'	BERKSHIRE HATHAWAY 'B'	BERKSHIRE HATHAWAY 'B'
BERKSHIRE HATHAWAY 'B'	BROADCOM	BROADCOM	BIO-RAD LABORATORIES 'A'	BOOKING HOLDINGS	BROWN & BROWN
BOOKING HOLDINGS	CAESARS ENTERTAINMENT	CAESARS ENTERTAINMENT	BROWN & BROWN	BROWN & BROWN	CENTERPOINT EN.
CAESARS ENTERTAINMENT	CATALENT	CARDINAL HEALTH	CAESARS ENTERTAINMENT	CENTERPOINT EN.	CH ROBINSON WWD.
CATALENT	CENTENE	CELANESE	CENTERPOINT EN.	CH ROBINSON WWD.	CHARLES SCHWAB
CHARTER COMMS.CL.A	CHARTER COMMS.CL.A	CENTENE	CHARTER COMMS.CL.A	CHARTER COMMS.CL.A	CHARTER COMMS.CL.A
COTERRA ENERGY	CONSTELLATION BRANDS 'A'	CHARTER COMMS.CL.A	CONSTELLATION BRANDS 'A'	CONSTELLATION BRANDS 'A'	CONSTELLATION BRANDS 'A'
DENTSPLY SIRONA	COPART	COPART	COPART	COPART	COPART
DEXCOM	COTERRA ENERGY	COTERRA ENERGY	COTERRA ENERGY	COTERRA ENERGY	COTERRA ENERGY
DISH NETWORK 'A'	DEXCOM	D R HORTON	D R HORTON	D R HORTON	D R HORTON
EQUIFAX	DISH NETWORK 'A'	DEXCOM	DENTSPLY SIRONA	DEXCOM	DEXCOM
EVERGY	EQUIFAX	DISH NETWORK 'A'	DEXCOM	DISH NETWORK 'A'	DISH NETWORK 'A'
FIDELITY NAT.INFO.SVS.	EVERGY	EQT	DISH NETWORK 'A'	DOLLAR GENERAL	DOLLAR GENERAL
FISERV	FISERV	EQUIFAX	EQT	FASTENAL	EQT
GENERAC HOLDINGS	GENERAC HOLDINGS	FASTENAL	EQUIFAX	FIRST REPUBLIC BANK	EQUIFAX
ILLUMINA	JACK HENRY AND	FIRST REPUBLIC BANK	FISERV	FISERV	FIRST REPUBLIC BANK
JACK HENRY AND	LENNAR 'A'	FISERV	GENERAC HOLDINGS	GENERAC HOLDINGS	GENERAC HOLDINGS

LENNAR 'A'	LIVE NATION ENTM.	GENERAC HOLDINGS	HNTGTN.INGALL S INDS.	HNTGTN.INGALL S INDS.	HNTGTN.INGALL S INDS.
LIVE NATION ENTM.	LKQ	HNTGTN.INGALL S INDS.	JACK HENRY AND	JACK HENRY AND	INCYTE
LKQ	LOEWS	JACK HENRY AND	LENNAR 'A'	LENNAR 'A'	LENNAR 'A'
LOEWS	MATCH GROUP	LENNAR 'A'	LKQ	LIVE NATION ENTM.	LIVE NATION ENTM.
MATCH GROUP	MID-AMER.APT COMMUNITIES	LIVE NATION ENTM.	MARTIN MRTA.MATS.	LKQ	LKQ
MOLINA HEALTHCARE	MOLINA HEALTHCARE	LKQ	MATCH GROUP	LOEWS	LOEWS
MONSTER BEVERAGE	MONSTER BEVERAGE	MATCH GROUP	MOLINA HEALTHCARE	MARTIN MRTA.MATS.	MARKETAXESS HOLDINGS
NETFLIX	NETFLIX	MOLINA HEALTHCARE	MONSTER BEVERAGE	MATCH GROUP	MARTIN MRTA.MATS.
NORDSON	NVR	MONSTER BEVERAGE	NETFLIX	MOLINA HEALTHCARE	MATCH GROUP
NVR	OLD DOMINION FGT.LINES	NETFLIX	NORDSON	MONSTER BEVERAGE	MONSTER BEVERAGE
O REILLY AUTOMOTIVE	PAYCHEX	NVR	NORWEGIAN CRUISE LINE HDG.	NETFLIX	NETFLIX
OLD DOMINION FGT.LINES	PAYCOM SOFTWARE	PAYCHEX	NVR	NVR	NVR
PAYCHEX	QORVO	PAYCOM SOFTWARE	OLD DOMINION FGT.LINES	O REILLY AUTOMOTIVE	O REILLY AUTOMOTIVE
PAYCOM SOFTWARE	QUANTA SERVICES	QORVO	PAYCHEX	OLD DOMINION FGT.LINES	OLD DOMINION FGT.LINES
QORVO	ROLLINS	QUANTA SERVICES	PAYCOM SOFTWARE	PAYCOM SOFTWARE	PAYCOM SOFTWARE
ROLLINS	SERVICENOW	ROLLINS	PTC	POOL	POOL
SERVICENOW	SIGNATURE BANK	SERVICENOW	ROLLINS	PTC	ROLLINS
SIGNATURE BANK	TAKE TWO INTACT.SFTW.	SIGNATURE BANK	SERVICENOW	ROLLINS	SERVICENOW
TAKE TWO INTACT.SFTW.	TARGA RESOURCES	TARGA RESOURCES	SNAP-ON	ROSS STORES	SNAP-ON
TARGA RESOURCES	TRANSDIGM GROUP	TRANSDIGM GROUP	T-MOBILE US	SNAP-ON	TAKE TWO INTACT.SFTW.
TESLA	UNIVERSAL HEALTH SVS.'B'	TYLER TECHNOLOGIES	TAKE TWO INTACT.SFTW.	TAKE TWO INTACT.SFTW.	TRANSDIGM GROUP
TRANSDIGM GROUP	WARNER BROS DISCOVERY SERIES A	UNIVERSAL HEALTH SVS.'B'	TRANSDIGM GROUP	TRANSDIGM GROUP	UNIVERSAL HEALTH SVS.'B'
VERTEX PHARMS.	ZIONS BANCORP.	ZIONS BANCORP.	UNIVERSAL HEALTH SVS.'B'	UNIVERSAL HEALTH SVS.'B'	WARNER BROS DISCOVERY SERIES A

ESGC 10% S&P 500					
Best 2016	**Best 2017**	**Best 2018**	**Best 2019**	**Best 2020**	**Best 2021**
3M	3M	ADOBE (NAS)	3M	ACCENTURE CLASS A	AGILENT TECHS.
ABBVIE	ABBOTT LABORATORIES	AGILENT TECHS.	ABBOTT LABORATORIES	AGILENT TECHS.	AIR PRDS.& CHEMS.
ACCENTURE CLASS A	ABBVIE	AIR PRDS.& CHEMS.	ACCENTURE CLASS A	AIR PRDS.& CHEMS.	AMERICAN TOWER
ADOBE (NAS)	ACCENTURE CLASS A	ALTRIA GROUP	AGILENT TECHS.	AMERICAN WATER WORKS	AMERICAN WATER WORKS
AGILENT TECHS.	ADOBE (NAS)	APPLIED MATS.	AIR PRDS.& CHEMS.	AMERIPRISE FINL.	AMGEN
ALLSTATE ORD SHS	AGILENT TECHS.	AUTODESK	APPLIED MATS.	APPLIED MATS.	APPLIED MATS.
ALTRIA GROUP	AIR PRDS.& CHEMS.	BAKER HUGHES A	ARCHER DANIELS MIDLAND	AUTODESK	BAKER HUGHES A
AMERICAN WATER WORKS	ALLSTATE ORD SHS	BAXTER INTL.	AUTODESK	AUTOMATIC DATA PROC.	BECTON DICKINSON
AUTODESK	ALTRIA GROUP	BECTON DICKINSON	AUTOMATIC DATA PROC.	BAKER HUGHES A	CBRE GROUP CLASS A
AVALONBAY COMMNS.	ARCHER DANIELS MIDLAND	BEST BUY	BAKER HUGHES A	CBRE GROUP CLASS A	COGNIZANT TECH.SLTN.'A'

BALL	AUTODESK	BIOGEN	BECTON DICKINSON	DANAHER	DANAHER
BAXTER INTL.	BAKER HUGHES A	BOSTON SCIENTIFIC	BEST BUY	EASTMAN CHEMICAL	EASTMAN CHEMICAL
BECTON DICKINSON	BALL	BRISTOL MYERS SQUIBB	BOSTON SCIENTIFIC	ELEVANCE HEALTH	ELEVANCE HEALTH
BIOGEN	BAXTER INTL.	CAMPBELL SOUP	CAMPBELL SOUP	FEDERAL REALTY INV.TST.	FREEPORT-MCMORAN
BRISTOL MYERS SQUIBB	BOSTON SCIENTIFIC	CBRE GROUP CLASS A	CBRE GROUP CLASS A	FIFTH THIRD BANCORP	HASBRO
CAMPBELL SOUP	CAMPBELL SOUP	DOMINION ENERGY	CISCO SYSTEMS	HARTFORD FINL.SVS.GP.	HEALTHPEAK PROPERTIES
CARNIVAL	CBRE GROUP CLASS A	EASTMAN CHEMICAL	DXC TECHNOLOGY	HASBRO	HESS
CBRE GROUP CLASS A	CVS HEALTH	ELEVANCE HEALTH	EASTMAN CHEMICAL	HEALTHPEAK PROPERTIES	HILTON WORLDWIDE HDG.
COCA COLA	DOMINION ENERGY	FREEPORT-MCMORAN	ELEVANCE HEALTH	HERSHEY	HOST HOTELS & RESORTS
COGNIZANT TECH.SLTN.'A'	FREEPORT-MCMORAN	HALLIBURTON	FREEPORT-MCMORAN	HILTON WORLDWIDE HDG.	JACOBS SOLUTIONS
DOMINION ENERGY	HALLIBURTON	HASBRO	HALLIBURTON	HOLOGIC	KIMCO REALTY
EATON	HASBRO	HEALTHPEAK PROPERTIES	HASBRO	HONEYWELL INTL.	KINDER MORGAN
GENERAL ELECTRIC	HESS	HESS	HEALTHPEAK PROPERTIES	HOST HOTELS & RESORTS	LOWE'S COMPANIES
HEALTHPEAK PROPERTIES	HOST HOTELS & RESORTS	HOST HOTELS & RESORTS	HESS	HUNTINGTON BCSH.	NEWMONT
HOST HOTELS & RESORTS	INTEL	HP	HILTON WORLDWIDE HDG.	JUNIPER NETWORKS	PEPSICO
HOWMET AEROSPACE	INTERNATIONAL BUS.MCHS.	HUNTINGTON BCSH.	HOST HOTELS & RESORTS	KELLOGG	PHILIP MORRIS INTL.
INTEL	INTL.FLAVORS & FRAG.	INTERNATIONAL BUS.MCHS.	HP	KIMCO REALTY	QUEST DIAGNOSTICS
INTERNATIONAL BUS.MCHS.	INTUIT	INTL.FLAVORS & FRAG.	HUNTINGTON BCSH.	KINDER MORGAN	REALTY INCOME
INTL.FLAVORS & FRAG.	KELLOGG	INTUIT	INTL.FLAVORS & FRAG.	LINDE	REGENCY CENTERS
INTUIT	LOCKHEED MARTIN	JOHNSON CONTROLS INTL.	JOHNSON CONTROLS INTL.	LOWE'S COMPANIES	REGIONS FINL.NEW
JOHNSON CONTROLS INTL.	LOWE'S COMPANIES	KELLOGG	KELLOGG	MERCK & COMPANY	ROBERT HALF
KEYSIGHT TECHNOLOGIES	NEWMONT	KIMCO REALTY	KIMCO REALTY	PERKINELMER	ROYAL CARIBBEAN GROUP
LOCKHEED MARTIN	PEPSICO	LINDE	KINDER MORGAN	REALTY INCOME	SCHLUMBERGER
LOWE'S COMPANIES	PHILIP MORRIS INTL.	LOWE'S COMPANIES	LINDE	REGENCY CENTERS	STANLEY BLACK & DECKER
MARRIOTT INTL.'A'	PNC FINL.SVS.GP.	NEWMONT	LOCKHEED MARTIN	SCHLUMBERGER	STRYKER
NEWMONT	PROLOGIS REIT	PEPSICO	NEWMONT	SHERWIN-WILLIAMS	TARGET
PHILIP MORRIS INTL.	REGENCY CENTERS	PNC FINL.SVS.GP.	REGENCY CENTERS	STATE STREET	TEXAS INSTRUMENTS
PNC FINL.SVS.GP.	SCHLUMBERGER	PROLOGIS REIT	ROYAL CARIBBEAN GROUP	TEXAS INSTRUMENTS	TRANE TECHNOLOGIES
PROLOGIS REIT	SEMPRA	ROYAL CARIBBEAN GROUP	STATE STREET	TRANE TECHNOLOGIES	WASTE MANAGEMENT
SYSCO	TEXAS INSTRUMENTS	SCHLUMBERGER	TEXAS INSTRUMENTS	UNITED RENTALS	WEST PHARM.SVS.
TEXAS INSTRUMENTS	WASTE MANAGEMENT	TEXAS INSTRUMENTS	TRACTOR SUPPLY	WEST PHARM.SVS.	WEYERHAEUSER
WASTE MANAGEMENT	WEYERHAEUSER	WASTE MANAGEMENT	WASTE MANAGEMENT	WEYERHAEUSER	WHIRLPOOL
WEYERHAEUSER	XYLEM	YUM! BRANDS	WEST PHARM.SVS.	XYLEM	XYLEM

ESGC 10% S&P 500					
Worst 2016	**Worst 2017**	**Worst 2018**	**Worst 2019**	**Worst 2020**	**Worst 2021**
ALIGN TECHNOLOGY	ALIGN TECHNOLOGY	ALIGN TECHNOLOGY	AMEREN	AMEREN	AMEREN
ARCH CAP.GP.	ARCH CAP.GP.	ARCH CAP.GP.	ARCH CAP.GP.	ARCH CAP.GP.	ATMOS ENERGY
ARISTA NETWORKS	ATMOS ENERGY	ATMOS ENERGY	ATMOS ENERGY	ATMOS ENERGY	BATH AND BODY WORKS
ATMOS ENERGY	BOOKING HOLDINGS	BERKSHIRE HATHAWAY 'B'	BERKSHIRE HATHAWAY 'B'	BERKSHIRE HATHAWAY 'B'	BERKSHIRE HATHAWAY 'B'
BERKSHIRE HATHAWAY 'B'	BROADCOM	BROADCOM	BIO-RAD LABORATORIES 'A'	BOOKING HOLDINGS	BROWN & BROWN
BOOKING HOLDINGS	CAESARS ENTERTAINMENT	CAESARS ENTERTAINMENT	BROWN & BROWN	BROWN & BROWN	CENTERPOINT EN.
CAESARS ENTERTAINMENT	CATALENT	CARDINAL HEALTH	CAESARS ENTERTAINMENT	CENTERPOINT EN.	CH ROBINSON WWD.
CATALENT	CENTENE	CELANESE	CENTERPOINT EN.	CH ROBINSON WWD.	CHARLES SCHWAB
CHARTER COMMS.CL.A	CHARTER COMMS.CL.A	CENTENE	CHARTER COMMS.CL.A	CHARTER COMMS.CL.A	CHARTER COMMS.CL.A
COTERRA ENERGY	CONSTELLATION BRANDS 'A'	CHARTER COMMS.CL.A	CONSTELLATION BRANDS 'A'	CONSTELLATION BRANDS 'A'	CONSTELLATION BRANDS 'A'
DENTSPLY SIRONA	COPART	COPART	COPART	COPART	COPART
DEXCOM	COTERRA ENERGY	COTERRA ENERGY	COTERRA ENERGY	COTERRA ENERGY	COTERRA ENERGY
DISH NETWORK 'A'	DEXCOM	D R HORTON	D R HORTON	D R HORTON	D R HORTON
EQUIFAX	DISH NETWORK 'A'	DEXCOM	DENTSPLY SIRONA	DEXCOM	DEXCOM
EVERGY	EQUIFAX	DISH NETWORK 'A'	DEXCOM	DISH NETWORK 'A'	DISH NETWORK 'A'
FIDELITY NAT.INFO.SVS.	EVERGY	EQT	DISH NETWORK 'A'	DOLLAR GENERAL	DOLLAR GENERAL
FISERV	FISERV	EQUIFAX	EQT	FASTENAL	EQT
GENERAC HOLDINGS	GENERAC HOLDINGS	FASTENAL	EQUIFAX	FIRST REPUBLIC BANK	EQUIFAX
ILLUMINA	JACK HENRY AND	FIRST REPUBLIC BANK	FISERV	FISERV	FIRST REPUBLIC BANK
JACK HENRY AND	LENNAR 'A'	FISERV	GENERAC HOLDINGS	GENERAC HOLDINGS	GENERAC HOLDINGS
LENNAR 'A'	LIVE NATION ENTM.	GENERAC HOLDINGS	HNTGTN.INGALLS INDS.	HNTGTN.INGALLS INDS.	HNTGTN.INGALLS INDS.
LIVE NATION ENTM.	LKQ	HNTGTN.INGALLS INDS.	JACK HENRY AND	JACK HENRY AND	INCYTE
LKQ	LOEWS	JACK HENRY AND	LENNAR 'A'	LENNAR 'A'	LENNAR 'A'
LOEWS	MATCH GROUP	LENNAR 'A'	LKQ	LIVE NATION ENTM.	LIVE NATION ENTM.
MATCH GROUP	MID-AMER.APT COMMUNITIES	LIVE NATION ENTM.	MARTIN MRTA.MATS.	LKQ	LKQ
MOLINA HEALTHCARE	MOLINA HEALTHCARE	LKQ	MATCH GROUP	LOEWS	LOEWS
MONSTER BEVERAGE	MONSTER BEVERAGE	MATCH GROUP	MOLINA HEALTHCARE	MARTIN MRTA.MATS.	MARKETAXESS HOLDINGS
NETFLIX	NETFLIX	MOLINA HEALTHCARE	MONSTER BEVERAGE	MATCH GROUP	MARTIN MRTA.MATS.
NORDSON	NVR	MONSTER BEVERAGE	NETFLIX	MOLINA HEALTHCARE	MATCH GROUP
NVR	OLD DOMINION FGT.LINES	NETFLIX	NORDSON	MONSTER BEVERAGE	MONSTER BEVERAGE
O REILLY AUTOMOTIVE	PAYCHEX	NVR	NORWEGIAN CRUISE LINE HDG.	NETFLIX	NETFLIX
OLD DOMINION FGT.LINES	PAYCOM SOFTWARE	PAYCHEX	NVR	NVR	NVR

PAYCHEX	QORVO	PAYCOM SOFTWARE	OLD DOMINION FGT.LINES	O REILLY AUTOMOTIVE	O REILLY AUTOMOTIVE
PAYCOM SOFTWARE	QUANTA SERVICES	QORVO	PAYCHEX	OLD DOMINION FGT.LINES	OLD DOMINION FGT.LINES
QORVO	ROLLINS	QUANTA SERVICES	PAYCOM SOFTWARE	PAYCOM SOFTWARE	PAYCOM SOFTWARE
ROLLINS	SERVICENOW	ROLLINS	PTC	POOL	POOL
SERVICENOW	SIGNATURE BANK	SERVICENOW	ROLLINS	PTC	ROLLINS
SIGNATURE BANK	TAKE TWO INTACT.SFTW.	SIGNATURE BANK	SERVICENOW	ROLLINS	SERVICENOW
TAKE TWO INTACT.SFTW.	TARGA RESOURCES	TARGA RESOURCES	SNAP-ON	ROSS STORES	SNAP-ON
TARGA RESOURCES	TRANSDIGM GROUP	TRANSDIGM GROUP	T-MOBILE US	SNAP-ON	TAKE TWO INTACT.SFTW.
TESLA	UNIVERSAL HEALTH SVS.'B'	TYLER TECHNOLOGIES	TAKE TWO INTACT.SFTW.	TAKE TWO INTACT.SFTW.	TRANSDIGM GROUP
TRANSDIGM GROUP	WARNER BROS DISCOVERY SERIES A	UNIVERSAL HEALTH SVS.'B'	TRANSDIGM GROUP	TRANSDIGM GROUP	UNIVERSAL HEALTH SVS.'B'
VERTEX PHARMS.	ZIONS BANCORP.	ZIONS BANCORP.	UNIVERSAL HEALTH SVS.'B'	UNIVERSAL HEALTH SVS.'B'	WARNER BROS DISCOVERY SERIES A

D – Differences between the ESG and ESGC portfolio compositions with a 10% cut-off rate

Stoxx 600	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**Average**
Best companies	20	24	21	22	29	34	25
Change in composition	*44%*	*53%*	*47%*	*49%*	*64%*	*76%*	*56%*
Worst companies	3	4	7	17	20	24	13
Change in composition	*7%*	*9%*	*16%*	*38%*	*44%*	*53%*	*28%*
Total companies	45	45	45	45	45	45	

S&P 500	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**Average**
Best companies	19	15	17	16	28	21	19
Change in composition	*44%*	*35%*	*40%*	*37%*	*65%*	*49%*	*45%*
Worst companies	7	6	11	16	18	20	13
Change in composition	*16%*	*14%*	*26%*	*37%*	*42%*	*47%*	*30%*
Total companies	43	43	43	43	43	43	

E – Detailed descriptive statistics of ESG and ESGC scores for each of the 16 portfolios

Best ESGC quintile portfolios, S&P 500					
	Mean	**St.dev.**	**Max**	**Min**	**Obs**
2016	74.77	5.39	88.77	68.09	85
2017	77.53	5.14	90.70	69.44	85
2018	78.44	5.07	91.94	71.61	85
2019	78.93	4.82	89.98	72.78	85
2020	78.38	4.14	89.79	73.01	85
2021	80.63	2.89	88.81	76.63	85

Worst ESGC quintile portfolios, S&P 500					
	Mean	**St.dev.**	**Max**	**Min**	**Obs**
2016	29.11	7.10	37.86	9.19	85
2017	33.01	7.16	42.84	14.21	85
2018	34.25	7.11	42.84	18.30	85
2019	35.92	6.56	44.77	19.78	85
2020	37.21	5.58	44.22	18.98	85
2021	40.56	7.56	48.75	6.38	85

Best ESGC quintile portfolios, Stoxx 600					
	Mean	**St.dev.**	**Max**	**Min**	**Obs**
2016	81.22	4.39	91.25	75.25	91
2017	81.51	4.51	93.90	76.11	91
2018	83.55	4.14	92.83	78.05	91
2019	83.76	4.02	94.15	78.31	91
2020	84.01	3.82	94.16	78.66	91
2021	84.17	3.27	93.33	79.83	91

Worst ESGC quintile portfolios, Stoxx 600					
	Mean	**St.dev.**	**Max**	**Min**	**Obs**
2016	32.55	8.64	43.00	3.91	91
2017	36.65	9.80	47.20	6.68	91
2018	39.62	9.59	50.05	8.96	91
2019	40.93	8.74	49.94	9.95	91
2020	42.79	7.59	50.01	11.44	91
2021	45.11	7.15	53.93	15.52	91

Best ESGC descile portfolios, S&P 500					
	Mean	**St.dev.**	**Max**	**Min**	**Obs**
2016	78.96	4.44	88.77	73.65	43
2017	81.61	3.54	90.70	76.97	43
2018	82.52	3.63	91.94	77.96	43
2019	82.81	3.55	89.98	78.07	43
2020	81.63	3.21	89.79	77.50	43
2021	82.81	2.41	88.81	80.18	43

Worst ESGC descile portfolios, S&P 500					
	Mean	**St.dev.**	**Max**	**Min**	**Obs**
2016	23.26	5.09	31.04	9.19	43
2017	27.19	5.19	33.57	14.21	43
2018	28.58	5.52	35.71	18.30	43
2019	30.93	5.44	37.3	19.78	43
2020	33.04	4.91	39.14	18.98	43
2021	35.52	7.62	42.48	6.38	43

Best ESGC descile portfolios, Stoxx 600					
	Mean	**St.dev.**	**Max**	**Min**	**Obs**
2016	84.94	2.98	91.25	80.73	45
2017	85.20	3.39	93.90	81.27	45
2018	87.02	2.95	92.83	82.76	45
2019	87.07	3.02	94.15	83.01	45
2020	87.18	2.80	94.16	83.53	45
2021	86.83	2.48	93.33	83.58	45

Worst ESGC descile portfolios, Stoxx 600					
	Mean	**St.dev.**	**Max**	**Min**	**Obs**
2016	25.97	7.77	34.71	3.91	45
2017	29.20	8.90	39.58	6.68	45
2018	32.46	8.92	43.15	8.96	45
2019	34.66	8.58	43.81	9.95	45
2020	37.78	8.06	45.15	11.44	45
2021	39.89	6.71	46.41	15.52	45

Best ESG quintile portfolios, S&P 500					
	Mean	**St.dev.**	**Max**	**Min**	**Obs**
2016	79.17	5.09	91.29	71.59	85
2017	81.14	4.48	91.80	74.61	85
2018	81.64	4.54	93.22	74.51	85
2019	82.43	3.94	92.97	76.53	85
2020	83.21	3.81	93.84	78.47	85
2021	83.95	3.26	92.96	80.14	85

Worst ESG quintile portfolios, S&P 500					
	Mean	**St.dev.**	**Max**	**Min**	**Obs**
2016	30.97	7.69	41.09	9.19	85
2017	34.44	7.73	44.37	14.21	85
2018	36.59	7.69	45.51	18.30	85
2019	40.02	7.99	49.32	19.78	85
2020	43.42	8.74	54.27	20.95	85
2021	48.65	9.14	59.08	6.38	85

Best ESG quintile portfolios, Stoxx 600					
	Mean	**St.dev.**	**Max**	**Min**	**Obs**
2016	84.72	3.60	92.21	79.44	91
2017	85.53	3.83	90.43	80.19	91
2018	87.01	3.62	94.83	81.95	91
2019	87.19	3.32	94.18	83.51	91
2020	88.47	3.12	95.29	84.00	91
2021	89.15	2.80	95.44	85.54	91

Worst ESG quintile portfolios, Stoxx 600					
	Mean	**St.dev.**	**Max**	**Min**	**Obs**
2016	33.85	9.54	46.08	3.91	91
2017	38.55	11.23	52.83	6.68	91
2018	42.07	10.73	54.28	8.96	91
2019	45.92	10.57	57.28	9.95	91
2020	50.30	10.71	61.85	11.44	91
2021	53.90	10.26	64.37	15.52	91

Best ESG descile portfolios, S&P 500					
	Mean	**St.dev.**	**Max**	**Min**	**Obs**
2016	83.28	3.65	91.29	78.38	43
2017	84.86	2.96	91.80	80.96	43
2018	85.42	2.95	93.22	80.28	43
2019	85.67	2.69	92.97	81.78	43
2020	86.19	3.05	93.84	81.96	43
2021	86.56	2.53	92.96	83.02	43

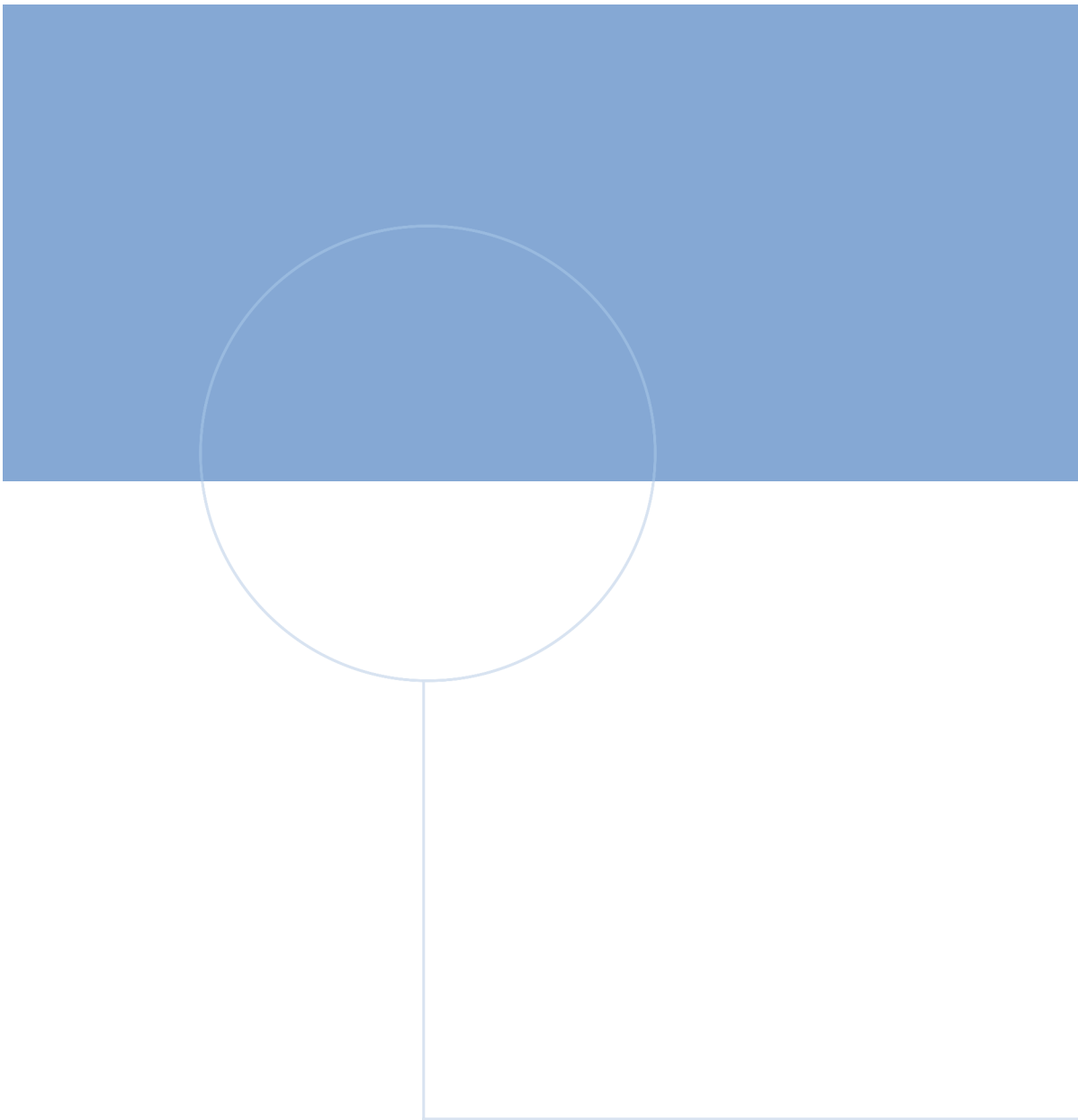
Worst ESG descile portfolios, S&P 500					
	Mean	**St.dev.**	**Max**	**Min**	**Obs**
2016	24.87	6.02	33.22	9.19	43
2017	28.13	5.67	35.93	14.21	43
2018	30.59	6.34	38.83	18.30	43
2019	33.81	6.70	42.83	19.78	43
2020	36.38	6.62	45.33	20.95	43
2021	41.94	8.16	51.02	6.38	43

Best ESG descile portfolios, Stoxx 600					
	Mean	**St.dev.**	**Max**	**Min**	**Obs**
2016	87.82	2.27	92.21	84.38	45
2017	88.64	2.96	94.43	84.87	45
2018	90.24	2.01	94.83	86.38	45
2019	89.96	2.20	94.18	86.87	45
2020	91.08	2.05	95.29	88.46	45
2021	91.49	2.05	95.44	88.66	45

Worst ESG descile portfolios, Stoxx 600					
	Mean	**St.dev.**	**Max**	**Min**	**Obs**
2016	26.49	8.06	35.94	3.91	45
2017	29.68	9.28	40.75	6.68	45
2018	33.74	9.34	44.75	8.96	45
2019	37.94	9.71	49.33	9.95	45
2020	42.22	9.77	53.05	11.44	45
2021	46.19	9.51	57.00	15.52	45

F – Results from Breusch-Godfrey test for autocorrelation

Cut-off rate	**20%**				**10%**			
Score	**ESG**		**ESGC**		**ESG**		**ESGC**	
Models	χ^2	p-value	χ^2	p-value	χ^2	p-value	χ^2	p-value
Fama & French three-factor	3.837	0.050	3.101	0.078	3.537	0.060	5.056	0.025
Carhart four-factor	3.666	0.056	2.946	0.086	3.042	0.081	4.893	0.027
Fama & French five-factor	2.892	0.089	2.712	0.100	2.151	0.143	4.595	0.032



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