Erasmus University Rotterdam
Erasmus School of Economics
Master Thesis Financial Economics

A multi-factor analysis on the impact of ESG metrics on institutional behaviour and stock performance

Sjoerd Ebbing (484123)

Supervisor:	Prof. S. Vogel
Date final version:	31st October 2023

Abstract

The heightened emphasis on sustainable and responsible investing underscores the current importance of environmental, social, and governance (ESG) metrics in the financial landscape. ESG metrics have developed into an essential and undeniable element of strategic decision-making, aligning with investors' preference for Corporate Social Responsibility (CSR) while influencing long-term financial performance. Through the analysis of U.S. firm-specific ESG scores over a sample period from January 2004 up until December 2022, this research examines the relationship between ESG metrics, institutional behaviour, and stock performance. The results reveal a positive correlation of ESG metrics with investor demand and firm valuation. Through the use of tilt strategies based on both ESG scores, as well as individual environmental, social, and governance scores, this research seeks to explore a possible relationship between stock performance and ESG metrics. On top of this, this paper explores changes over time by considering an actualised sample period, as well as the impact of varying degrees of institutional ownership and ESG scores on portfolio performance. This work thus attempts to bridge the gap in understanding the role of ESG metrics in financial performance.

Keywords: ESG, CSR, Institutional Ownership, SRI, Sustainable Investing

Contents

Section 1

Introduction

Over the past years, there has been an undeniable shift in the global financial landscape with a heightened emphasis on environmental, social, and governance (ESG) factors. Businesses, investors, stakeholders, and governments have become increasingly cognisant of the broader impacts and implications of corporate operations, decisions, and strategies, as ESG considerations have shifted from a trifle to a core component of strategic decision-making. This trend reflects not only a better alignment of investors' ethics with their contemporaneous investments, but it also has implications on long-term financial performance and risk profiles. The current literature, however, does not yet offer a consensus on the impact of sustainability measures on financial performance. This research therefore aims to explore the impact of ESG metrics on both institutional behaviour and stock performance.

The required data on U.S. firms for this research is obtained from the Refinitiv Eikon database and CRSP database. The main variables of interest are the firm-specific ESG scores, as well as the separate underlying environmental, social, and governance pillar scores, the financial firm performance and the ratio of institutional ownership. The time sample in this study covers a total of 19 years, ranging from January 2004 until December 2022.

This thesis starts with investigating the relationship between investor demand, using institutional ownership as a measure, and ESG metrics through the use of a pooled regression, clustered at stock level. The same approach is used to examine the relationship between a company's valuation and ESG metrics by looking at the price-to-book ratio. Furthermore, this paper delves into the possible existence of a relationship between stock performance and ESG measures. To do so, portfolio strategies are applicated for both the ESG scores, as well as for the individual environmental, social, and governance scores. Based on the absolute scores, quintiles are formed, whereby the ESG leaders will be bought long, while simultaneously, the ESG laggards will be sold short. This strategy is performed for both value-weighted and equal-weighted portfolios. The performance of the portfolios is then evaluated, controlling for both the Carhart four-factor model, as well as the Fama and French five-factor model, augmented with the momentum factor. To investigate whether or not recent developments influence the obtained results, the findings of the ESG score portfolio strategy are repeated for a truncated, more recent sample period. Finally, the research attempts to gain insight into the

impact of various degrees of institutional ownership and ESG scores through the composition of a bivariate matrix. The matrix tabulates the Jensen's alphas that are associated with different quintiles of ESG scores and institutional ownership, thus illuminating potential outperformance of the portfolios.

The results show a positive relation between investor demand and ESG metrics, as well as a positive relationship between a firm's valuation and ESG metrics. The long-short strategies provide evidence for a premium on both the returns of the equal-weighted portfolios based on ESG score, as well as those based on the separate pillar scores. These results, however, do not seem to hold for the value-weighted portfolios, which is in disagreement with prior research. Possible explanations for the discrepancy are the duration of the sample period, the choice of rating agencies, and the proxies used for the separate pillars, as this research uses the broad founded underlying pillar scores instead of one-dimensional and arbitrary proxies. Moreover, the contemporisation of the sample period resulted in underperformance to a lesser extent compared to the results of the full sample period. Lastly, it appears that the portfolios for moderate degrees of ESG and institutional ownership consistently display outperformance. This result, however, is not found for the border portfolios nor for an ESG tilt strategy that takes institutional ownership into consideration.

This study now proceeds as follows. Section 2 covers the literature review, which elaborates on Corporate Social Responsibility (CSR), Sustainable Investing (SI), ESG metrics and institutional investors. In Section 3, more insight is given into the gathering and transformation of the data. Section 4 sheds light on the methodology appropriate for this research. Subsequently, Section 5 presents and elaborates on the main findings. Finally, in Section 6, the concluding remarks on the main findings of this study are given, as well as the limitations and potential avenues for future research.

Section 2

Literature Review

This chapter aims to list a comprehensive overview of the current literature, the relevant concepts, and findings for this research. The chapter will be divided into two subsections and converges to motivate the main research question. The first section will provide an overview of sustainable investing, the concept of environmental, social, and governance (ESG) investing, ESG rating agencies, ESG scores, as well as the relationship between ESG scores and stock returns. In the second subsection, the current literature regarding institutional ownership, institutional trading, and its relationship with stock returns is reviewed.

2.1 Environmental, Social, and Governance

2.1.1 ESG and Sustainable Investing

In recent decades, sustainable investing (SI) has gained significant popularity, as evidenced by the increasing market share of ESG investing globally, projected to have a compound annual growth rate of 12.9 percent (PWC, 2022). ESG refers to environmental, social, and governance criteria of individual firms, that can be combined into a firm-specific ESG score. These scores are provided by ESG rating agencies, which are independent third parties. Firms usually approach a rating agency to be assigned an ESG score. This happens mainly due to the investors' demand for a well performing ESG company, as well as potential benefits of high ESG scores. There will be further elaboration on ESG rating agencies in Section 2.1.2. In 1970, The New York Times published an article, written by Milton Friedman, in which Friedman laid the fundament for the concept of Corporate Social Responsibility (CSR). Friedman wrote about how corporations are artificial persons, and that businesses, even in a vague sense, cannot be said to have responsibilities (Friedman, 1970). Friedman stated, 'In the present climate of opinion, with its widespread aversion to "capitalism", "profits", the "soulless corporation" and so on, this is one way for a corporation to generate goodwill as a by-product of expenditures that are entirely justified in its own self-interest'. With this, he was referring to corporations exercising social responsibility.

This article, with the concept of social responsibility, raised an issue, since it contrasted with the widespread assumption and belief that corporations should generally be run solely to

maximise shareholder value (Berle & Means, 1991), thereby implicating that they should not be concerned about CSR. Berle & Means (1991) state that the issue of corporate responsibility can be labelled as a waste of corporate resources and therefore as an agency problem. In contrast with this view, Ferrell et al. (2016) found that well-governed firms suffering less from agency concerns, such as cash abundance, positive pay-for-performance, a small control wedge and strong minority protection, engage more in CSR, which subsequently drives value. Furthermore, Giannarakis & Theotokas (2011) found that a higher level of environmental performance positively affects financial performance of corporations. In line with Berle & Means (1991), others state that there does not exist a significant positive association between corporate governance and financial performance (Shahwan, 2015). Additionally, evidence is found concerning an insignificant negative relationship between corporate governance practices and the likelihood of financial distress (Shahwan, 2015). Godfrey (2005) finds that participation in CSR activities provides an 'insurance-like' benefit. This research is later expanded by Godfrey et al. (2009), who added that CSR can temper punitive sanctions by stakeholders during a negative effect.

From the publication of Friedman's article in 1970 onwards, many different concepts regarding sustainability and CSR have been developed, such as Socially Responsible Investing (SRI) and Sustainable Investing (SI). The rise of these concepts was mainly driven by institutional investors, and later retail investors too were displaying increasing interest in CSR practices (Berg et al., 2022). ESG measures are a sequel of the beforementioned CSR and are inseparably related to CSR, SI, and SRI. Not only do the interests of investors change, also their investment objectives are gradually shifting. Both the institutional investors' demand, as well as the demand of retail investors tend towards sustainability-linked concepts.

Furthermore, the effect of crises on CSR and sustainability measures is studied by Leite & Cortez (2015), who found that in times of a crisis, socially responsible (SR) funds match the performance of their peers, whereas they underperform their characteristics-matched conventional fund counterparts during non-crisis periods. This suggests financial underperformance of SRI. Moreover, Giannarakis & Theotokas (2011) states that during crises, companies increase their CSR indicators to (re)build or sustain their brand name, consumers' trust, and redefine the relationship between companies and society.

Additionally, research has been performed on whether ESG ratings impact financial performance of exchange traded funds (ETFs) during the COVID-19 pandemic. Folger-Laronde et al. (2022) found that higher levels of sustainability performance of ETFs do not safeguard investments from financial losses during a severe market downturn. Other authors found that SRI indices outperform conventional indices during the COVID-19 pandemic, whereas ETFs focusing on responsible investments fail to obtain superior performance against the benchmark indices (Omura et al., 2021). However, non-financial firms that manage environmental and governance risks more effectively did perform better over the COVID-19 pandemic (Gregory, 2022). Overall, the results found in existing literature are

mixed, and there is no clear consensus on whether CSR, SI and SRI are correlated with financial performance.

The total global sustainable investment assets under management (AUM) surpassed US$35.3 trillion in 2020, whereas the global total AUM was US$98.4 trillion (Statista, 2021). Sustainable investment thus already accounts for well over 35 percent of the global AUM. The United States shows the largest growth in sustainable investment AUM, with more than 40 percent growth in the past two years (Bloomberg, 2022).

2.1.2 ESG Rating Agencies

Currently, there are well over 140 ESG rating agencies, all of which provide ESG data. These raters are key players in SI, nevertheless, confusion and discontent about ratings are growing. A company usually hires an ESG rating agency to get assigned an ESG rating. The ESG rating agency will perform an in-depth analysis of the company and award it with an ESG rating. Moreover, the rating agencies can be approached by third parties, such as institutional investors, to obtain an ESG rating regarding a company of their interest. More than 70 ESG rating providers were analysed by Li & Polychronopoulos (2020). Every provider has its own ESG score methodology, supported by their own key performance indicators (KPI). ESG scores are generally updated every year by the rating agencies. The fact that there are many ESG rating agencies ensures that there is no conventional or regulated ESG score, no 'golden standard' in the world of ESG scores. Subsequently, different ESG rating agencies can allocate a different ESG score to the same firm, according to their own methodology. To elaborate on this matter, correlations between the most prominent ESG rating providers' scoring of the same company can be as low as 0.38 (Berg et al., 2022). For referential purposes, the correlations between the regulated credit ratings are usually close to 0.99. At the time of writing this research, the Securities and Exchange Commission (SEC) has not yet regulated ESG ratings, so the ratings continue to contain issues with consistency, accuracy and especially transparency, leading to investor doubt regarding the credibility of ESG ratings.

Some practitioners argue that there is a need for more standardisation in the market, so that the market will be more aligned and consistent with the help of regulatory initiatives (BSR, 2023). In 2022, Japan's Financial Services Agency released a code of conduct for ESG rating and data providers (ESGInvestor, 2022). Japan herewith is the first country of which the national regulator issues such code of conduct regarding ESG practises, eliciting transparency around ESG methodologies and data sources through the use of a comply-or-explain approach. The growing relevance of regulating ESG practices is also displayed by the adoption of the Corporate Sustainability Reporting Directive by the European Union (European Parliament and Council, 2022). The directive aims at enhancing the consistency, comparability, and reliability of sustainability reporting by requiring companies to report on the impact of their activities on the environment and society.

Although there are many ESG rating agencies, there is some consensus concerning which

ESG rating agencies have the highest quality and are therefore the most trustworthy and prominent rating agencies. Environmental Resources Management (ERM), world's largest pure play sustainability consultancy, published their 'Rate the raters' report, tabulating the best ESG rating agencies from the perspective of both corporations and investors (ERM, 2023). The top three ESG ratings providers according to investors in the survey were: ISS-ESG, CDP and Sustainalytics. When looking at usefulness from the investors' point of view, the top three was: CDP, ISS-ESG and Sustainalytics. And finally, according to the corporates, the quality top three consisted of: CDP, S&P Global ESG, and Sustainalytics, while the usefulness top three was: CDP, Sustainalytics and MSCI. Other prominent ESG rating agencies are Bloomberg, Moody's ESG, FTSE4Good, Refinitiv, and Asset4 (ERM, 2023).

Prior research has shown that so called 'ESG rating disagreement', the discrepancies in ESG ratings among different providers, is positively related to stock returns (Gibson Brandon et al., 2021). This could indicate a risk premium for firms with higher ESG rating disagreement, which is mainly driven by the environmental dimension (Gibson Brandon et al., 2021).

2.1.3 ESG Score

ESG scores differentiate themselves from all other sustainability-linked measures, including CSR, SRI, and SI, due to their quantitative nature. ESG scores range from 0 to 100, whereas other sustainability-linked measures are less objective, quantitative, and especially less strictly defined. Due to this fact, ESG scores lend themselves well to quantitative analyses, since firms can easily be compared (Amel-Zadeh & Serafeim, 2018; Krüger et al., 2020).

The extensive growth of ESG investing and the incorporation of ESG measures in investment objectives and strategies can be attributed in part to a shift in investors' preferences for sustainable and economically friendly investing (Gibson Brandon et al., 2021), due to an increasing alignment of investors' ethics with their contemporaneous investments. Furthermore, there are additional reasons, such as the potential correlation of ESG measures with financial performance. Another possibility is the increase in availability and transparency of ESG data, due to the growth of both size and quantity of ESG rating agencies. The increase in competition causes the market to be more transparent, which leads to rating agencies' methodologies gradually becoming more insightful.

Investing corporations with high ESG scores, often titled green firms, generates positive societal impact in two ways. Firstly, firms will become greener due to the investor demand of green firms, and subsequently, it induces more real investments by green firms and less investment by brown firms (Pástor et al., 2021). In addition to the social impact, there is an ongoing debate in the literature about whether ESG measures, such as ESG score and ESG momentum, can predict higher expected returns and how these criteria should be incorporated into investment strategies. Amel-Zadeh & Serafeim (2018) find similar results to Bloomberg (2022), and report that the main motivation for considering ESG information is the relevance to investment performance, followed by the rising demand for sustainable practices from

clients. Additional to ESG measures, there furthermore exists a relationship between CSR and financial performance. The taste of investors shifted and is still shifting towards corporations with high CSR, which can and will influence asset prices, consequently leading to higher expected returns (Fama & French, 2007; Hong & Kacperczyk, 2009; Pástor et al., 2021).

Furthermore, ESG certification can lower a firm's cost of capital, while it can increase their Tobin's Q (Wong et al., 2021). Due to this lower cost of capital, firms with higher ESG scores have higher valuations (Sassen et al., 2016; Giese et al., 2019). Arlow & Gannon (1982) state that economic performance is not directly linked, in either a positive or negative fashion, to social responsiveness, whereas Cochran & Wood (1984) believe the relationship between CSR and financial firm performance to be both positive and significant. A Bloomberg (2022) study found that the main motivation for considering ESG measures among nearly 800 business decision makers was greater returns, followed by CSR and a greater opportunity for disruptive change.

Using a portfolio-based strategy in their research, Derwall et al. (2005) found that a best-in-class stock selection strategy based on ESG scores historically earned a higher market risk-adjusted and style-adjusted return of 6 percentage points compared to a worst-in-class portfolio. Other authors tend to find even higher alphas, by longing the best-in-class ESG firms and shorting the worst-in-class firms, of 8.7 percent (Kempf & Osthoff, 2007). Eccles et al. (2014) found that corporations with higher sustainability, and thus ESG performance, contain an annual abnormal performance of 4.8 percent value-weighted and 2.3 percent equal-weighted compared to the corporations with low ESG performance. Nagy et al. (2016) investigate whether an ESG tilt strategy, a strategy whereby stocks with higher ESG ratings are overweighted, could result in a positive Jensen's Alpha, and therefore whether a performance trade-off between stock returns and ESG implementation occurs. They find that over the years from 2008 to 2016 this strategy indeed outperforms the benchmark of Morgan Stanley Capital International (MSCI) World Index.

Friede et al. (2015) performed a meta-analysis, in which 2200 individual empirical studies were examined, on the relationship between ESG metrics and financial firm performance. They found that approximately 90 percent of the investigated studies reported a non-negative relationship on ESG measures and financial firm performance, considering both ESG score and ESG momentum. More specific, the majority of studies report a positive relationship between ESG measures and financial firm performance. Nevertheless, there is no consensus on the relationship, as several authors find a negative relation (Revelli & Viviani, 2015). This discrepancy in results can potentially be explained by the differences in portfolio creation processes, availability of data, source of data, and the considered sample period. Furthermore, research is dedicated to strategies regarding the separate drivers of ESG scores: the environmental, social and governance pillar. Noteworthy in this research is that many studies use relatively arbitrary proxies for environmental, social, and governance measures. This shortcoming will further be elaborated on in the Results section.

When looking at bonds in relationship to ESG measures, Gerard (2019) stated that, when looking at the returns, the issuers of bonds with both excellent and very poor ESG behaviour tend to underperform compared to the issuers of bonds with neither very strong nor very poor ESG. Furthermore, Giese et al. (2019) stated that ESG ratings have a small, but relatively long-term persistence on financial impact as opposed to classical factors, such as momentum, of which effects typically only for a few months.

Lastly, Krüger (2015) brings the causality issue of financial performance and ESG measures to the attention. Due to the relative infrequency of publication of ESG scores (i.e., annually) compared to other financial measures, the direction of the causality cannot be addressed. It is not clear whether companies do well because they do good, or do good because they do well. Krüger (2015) states: 'Hence, the mere observation of a positive correlation between some low-frequency CSR measure and value is consistent with at least two different interpretations: either more responsible firms tend to be more profitable or, alternatively, more profitable firms tend to channel more resources into projects that increase the wellbeing [and thus ESG and CSR measures] of stakeholders'. Consistent with the latter view, Hong et al. (2012) find a causality that indicates that less financially constrained firms ought to spend more on goodness and thus obtain higher ESG scores. They therefore state that earlier research on the relationship between CSR measures and financial firm performance suffers from omitted variable bias due to heterogeneity in firm financial constraints.

To summarise, ESG measures are a growing field and research has been carried out quite extensively regarding the relationship between ESG scores and financial firm performance. Although the meta-analysis executed by Friede et al. (2015) is, to my knowledge, the most exhaustive research so far, in which 90 percent of investigated research finds non-negative ESG measure and financial firm performance relationships, there is still no consensus concerning this relationship and the causality.

2.2 Institutional Investors

The investor universe can be separated into two types of investors, being institutional investors and retail investors. The latter are individuals that trade for themselves, whereas the former are companies, institutions, or organisations that invest on behalf of other companies, organisations, and individuals. Examples of the biggest institutional investors are pension funds, mutual funds, and insurance companies.

Davis & Steil (2004) predicted that the market share of institutional investors will increase and besides have an increasingly important impact on domestic and international financial market conditions, due to their size, knowledge, and market share. When comparing Anglo-Saxon/American countries (Canada, the United Kingdom, and the United States) with Europe and Japan, the former group is market-dominated, whereas the latter is bank-dominated. The distinction between the two lies in the degree of institutionalisation.

Anglo-Saxon/American countries are characterised by a higher degree of institutionalisation and therefore the market of these countries is impacted more heavily by institutional investors (Davis & Steil, 2004). This research considers the U.S. market, due to its high degree of institutionalisation, ESG AUM growth, and extensive availability in data. When looking at the Russell 3000, the broadest major U.S. stock index, retail investors account for a fraction of 10 percent of daily trading volume, and therefore by definition institutional investors account for 90 percent (Reuters, 2021). A 2017 study of pionline.com stated that 80 percent of equity market capitalisation is held by institutional investors (pionline, 2017). The majority of investments of institutional investors flows to equities and fixed income, whereas lesser amounts go to private equity, real estate, hedge funds, and other alternative investments. Institutional investors are often blockholders, that own a substantial amount of a company's outstanding shares or debt because of their significant size and market share. Due to this fact, sudden price movements can occur whenever institutional investors decide to trade with a substantial block. Moreover, due to the growth of institutional stock market share, the institutional investors tend to increase demand for large, liquid stocks, and simultaneously decrease their demand for stocks of smaller cap firms (Gompers & Metrick, 2001). This subsequently suggests the disappearance of the historical small-company stock premium (Gompers & Metrick, 2001). Furthermore, institutional investors are characterised by their sophistication in investment strategies and objectives, by having fiduciary responsibilities, having extensive resources and expertise, and by having access to exclusive opportunities, which is mainly caused by their substantial magnitude.

The relationship between institutional ownership and financial performance of the companies in their portfolio is heavily investigated. In the current literature, there is no consensus about whether the relationship is present, and if so, if this relationship is positive or negative. Navissi & Naiker (2006) state that firm value increases as the percentage of institutional ownership increases up to 30 percent, but that it decreases as institutional ownership increases beyond this threshold. This indicates a non-linear relationship between corporate value and institutional ownership. Others argue that there is no solid evidence that institutional investors destabilise prices of individual stocks (Lakonishok et al., 1992). Moreover, Bartov et al. (2000) argue that institutional ownership reduces inefficient pricing of earnings and remark that there exists a negative correlation between institutional holdings and the post-announcement abnormal returns. Jiambalvo et al. (2002) suggested that institutional investors tend to have better information-processing capabilities and that stock prices of firms with higher institutional ownership tend to reflect a relatively greater proportion of the information in future-period earnings, due to their characteristics. In contrast, Azzam (2010) found a significant and positive effect of institutional ownership on stock volatility, although no effect on stock returns was found.

Moreover, research is dedicated to whether institutional trading has a relationship with stock returns. One side of the literature field finds that stock returns Granger-cause institutional trading, with emphasis on purchases, and thus ownership of institutional investors

(Sias et al., 2001; Cai & Zheng, 2004). This attribute of institutional investors indicates positive feedback trading. Another suggestion is that herding of institutional investors impacts prices generally more than herding of individual retail investors (Nofsinger & Sias, 1999). Shortly after the occurrence of this positive feedback trading by institutional investors, stock returns appear to be negatively related to this lagged institutional trading (Cai & Zheng, 2004). Currently, there is no consensus on whether institutional ownership or institutional trading has impact on stock returns, let alone if this relationship is negative or positive.

In the last decades, institutional investors have become increasingly attentive to CSR, SRI and ESG practices. To illustrate, the number of institutional investors that sign the UN Principles for Responsible Investing (PRI) increases annually. Especially pension funds and large mutual funds tend to take sustainability measures heavily into consideration. Noteworthy is the longer-term horizon that institutional investors tend to have, frequently caused by their nature. For example, pension funds have a long-term investment horizon, as opposed to retail investors, that often aim at quick profits. This can be seen from the average holding periods of the different types of investors. Moreover, in accordance with the longer-term horizon, institutional investors tend to update their portfolios less frequent than retail investors (Galema & Gerritsen, 2023). In addition to this, the tilt towards CSR activities is driven by longer-term horizon investors for reputation insurance (Fu et al., 2019). In another study by Dyck et al. (2019), the authors state that there is an ongoing development of institutional investors that strengthen the environmental and social characteristics of their portfolios due to the increase in investors' demands. In this research, the emphasis will lie on investigating the relationship between institutional investors and ESG metrics by integrating the two concepts.

Section 3

Data

One of the main variables in this thesis is the percentage of institutional ownership of specific stocks. This refers to the proportion of shares outstanding that are held by institutional investors, as obtained from the Refinitiv Eikon database, formerly known as the Thomson Reuters Eikon database (Refinitiv Eikon, 2023). The percentage of institutional ownership cannot take on negative values, however, fractions larger than one are possible. The reason for this lies in the short selling possibility of investors. As a consequence of short selling, shares are counted as 'owned' by both the borrower and the lender of the shares. Since institutional investors employ the possibility of short selling more frequently than individual investors, due to their more sophisticated character, this double counting may result in fractions larger than one. In this research, the institutional ownership is winsorised at 1 percent and 99 percent, to control for possible outliers. Table 3.1 shows an average institutional ownership of around 77 percent over the sample period ranging from January 2004 up until December 2022.

Institutional investors with AUM over US$100 million are obliged to file Form 13F filings quarterly with the U.S. Securities and Exchange Commission (SEC). In these reports, which are publicly available, institutional investors provide information on their positions in publicly traded securities. In this research the focus lies on the U.S. stock market, since it has most available data, displaying the fastest growth in CSR and ESG AUM. Other relevant stock characteristics, on top of institutional ownership, that are appropriate to the research are obtained from the Center for Research in Security Prices (CRSP) database, and consist of stock prices, stock returns, market capitalisation, and shares outstanding (CRSP, 2023).

Furthermore, ESG measures are obtained from the Refinitiv Eikon database (Refinitiv Eikon, 2023). Refinitiv offers one of the most extensive ESG databases, that dates back to 2002, covers over 85 percent of the global market cap, and bases its ESG scores on more than 630 different ESG metrics. An overview of the rating methodology of Refinitiv Eikon can be found in Appendix A. While ESG measures are gradually becoming more transparent and publicly available, the biggest shortfall is the frequency with which they are reported, which is annually. Investment, divestments, changes in governance structures, strategy, innovation, and other characteristics are firm-specific, and therefore difficult, if not impossible, to time. For this reason, the assumption is made that ESG measures remain constant throughout the year.

Table 3.1
This table reports the summary statistics of the main examined variables, including the average (Mean), standard deviation (Std. dev.), minimum (Min.), maximum (Max.), and number of observations (N). The sample period ranges from January 2004 until December 2022. Institutional ownership represents the percentage of shares in possession of institutional investors, obtained from the Refinitiv Eikon database. The ESG scores and environmental, social, and governance scores represent the absolute values of these scores over the sample period, obtained from the Refinitiv Eikon database.

Variables	Mean	Std. dev.	Min.	Max.	N
Institutional ownership	0.773	0.250	0.001	1.702	239,531
ESG score	39.188	18.926	0.440	95.162	239,531
Environmental score	35.385	25.857	0.011	98.546	172,283
Social score	41.032	20.720	0.506	98.991	255,458
Governance score	48.002	22.229	0.161	99.463	255,321

The relevant ESG measures for this research include the ESG score, which is a combined score of the underlying environmental, social and governance pillars, as well as separate scores for each pillar. Both the combined ESG scores and the individual pillar scores range from 0 to 100. From Table 3.1 it can be seen that the average ESG score in the sample of this research is around 39, whereas the average environmental, social, and governance scores are around 35, 41 and 48, respectively. The Refinitiv Eikon database contains ESG data from January 2002 and onwards. Nevertheless, due to limited awareness and therefore limited ESG ratings in the first years after the introduction, the sample period of this research will be ranging from January 2004 up until December 2022.

The firm returns are calculated by taking the month-to-month percentage change of the adjusted closing prices, winsorised at 1 percent and 99 percent, to control for possible outliers in the data set. Furthermore, the risk-free rate is obtained, which is equal to the one-month treasury bill rate.

Section 4

Methodology

In the following section a description is given of the methodology that is applied in this thesis. The way of portfolio construction is described, as well as the accompanying strategies that were created to test whether a significant alpha can be generated. Additionally, several multi-factor asset pricing models are discussed. These include the Capital Asset Pricing Model, the Fama and French three-factor model, the Carhart four-factor model, and the Fama and French five-factor model.

4.1 Investor Demand and Firm Valuation

To start off, this research investigates whether ESG metrics can predict investor demand. Investor demand is represented by the demand of institutional investors, since institutional investors account for the majority of the stock market, and are more sophisticated as opposed to retail investors, as discussed earlier in Literature Review section. Therefore, institutional ownership is taken into consideration. Important to note is that for institutional ownership three-month ahead observations are utilised. The reason for this variable to be led by three months, is the time institutional investors need to adjust their portfolios to changes in ESG metrics. A pooled regression, clustered at stock level, of institutional ownership on the investors' demand for ESG metrics is performed. This offers a robust, analytical approach that captures the dynamics of responsible investing by institutional investors. By utilising a combination of cross-sectional and time-series data, this method increases the scope of observations, allowing for a comprehensive view of both within-stock and between-stock variations. Clustering standard errors at the stock level addresses potential correlations in the residuals for repeated observations of the same stock, mitigating concerns of serial correlation and yielding more accurate standard errors. The inclusion of fixed effects within pooled regressions further refines the analysis by accounting for unobserved heterogeneity, isolating the specific impact of ESG factors on investor demand. Such a regression provides insights into which ESG metrics are most valued by investors, reflecting the nuances of investor sentiment and decision-making in the realm of responsible investing.

Moreover, the relationship between ESG metrics and the value of companies is investigated. To test this, the price-to-book ratio, also known as the Tobin's Q, is the appropriate measure,

since it incorporates both the market value, i.e., the market capitalisation, and the book value of companies. The appropriate regression is again the pooled regression, clustered at stock level, including the market beta.

4.2 Portfolio Performance

To investigate the relationship between stock performance and ESG metrics, this research applies portfolio strategies. Another potential method is the performance of an Ordinary Least Squares regression analysis. However, such regressions assume a linear relationship between the dependent and independent variables, whereas a portfolio analysis does not make this strict assumption. Adopting portfolio strategies thus offers flexibility by avoiding unnecessary stringent assumptions about the nature of the relationship, potentially indicating more accurate results (Bali et al., 2016).

ESG criteria can be incorporated in investing in several ways, such as best-in-class investing, negative screening, positive screening, activism, and engagement (Van Duuren et al., 2016). In this research, the best-in-class investing method is applied, because the other mentioned methods have a more subjective character and are therefore harder to quantify. For example, both activism and engagement are influenced by shareholders and board members, whereas best-in-class screening utilises quantitative measures, such as ESG scores and the underlying individual pillar scores.

To test whether ESG drives stock returns, an ESG tilt portfolio strategy is performed. This is a strategy that gives more weight to ESG leaders, while underweighting ESG laggards. To test whether this strategy significantly outperforms the market, the companies within the data set are distributed into quintiles, based on their absolute ESG score. The method of Jegadeesh & Titman (1993), whereby a long-short zero-investment strategy is applied, is adhered to in this thesis. This method involves going long in (buying) the top portfolios, and shorting (selling) the bottom portfolios, and therefore effectively investing zero. The top ESG quintile, representing the ESG leaders, will be bought, whereas their counterparts, the bottom quintile, representing the ESG laggards, will be sold short.

In addition to the strategies based on ESG score, the separate underlying pillars are examined. For these strategies, the sample is again sorted into quintiles, now based on the individual environmental, social, and governance pillar scores that drive ESG scores. These quintiles are then bought and sold similar to the described ESG tilt strategy.

The research in this paper is an extension to the existing literature, since the proxies used for the separate pillars are obtained from the Refinitiv Eikon database, representing the actual underlying pillar scores that drive the combined ESG scores. The vast majority of earlier research, including that of Pedersen et al. (2021), however, utilise one-dimensional proxies, such as CO2 emissions for the environmental pillar, sin-stock indicators for the social pillar and low accruals for the governance pillar. This causes other relevant ESG characteristics to

be omitted. The proxies in prior research are not as suitable for ESG research as the variables used in this paper. The pillar scores provided by the Refinitiv Eikon database, on the contrary, are broadly founded, combining 10 categories that are subsequently divided in different themes. This grading methodology gives a more thorough overview and representative view of a company's underlying pillar characteristics, and therefore is a valuable addition to the existing literature and a more reliable measure for the separate pillar scores.

In the current literature, there is not yet a consensus on the cut-off points for portfolios. For example, Naffa & Fain (2022) base their cut-off points on absolute ESG score values, whereas others base the cut-off points on quantiles, such as Kempf & Osthoff (2007) and Dorfleitner et al. (2020). The latter two studies use a cut-off point of the 10% best-performing and worst-performing ESG companies to create the top and bottom portfolios, respectively. Furthermore, Halbritter & Dorfleitner (2015) use an initial cut-off of 20%, with additional incorporation of 1, 5, 10, 20, and 50% cut-off points. Due to the limited availability in ESG data in the years after introduction, diversification is harder to achieve when using more stringent cut-off points. Therefore, in this research, similar to Halbritter & Dorfleitner (2015), cut-off points of 20% are applied.

Furthermore, there is a separation between equal-weighted strategies and value-weighted, also referred to as market-weighted, strategies. Like the name suggests, when utilising equal-weighted portfolios, each firm in the sample gets assigned an equal weight, regardless of the market capitalisation of the firm. In value-weighted portfolios, on the contrary, the weight of a firm depends on the its market capitalisation. Nagy et al. (2013) based their analysis of three ESG tilted strategies on equal-weighted portfolios, whereas others use value-weighted portfolios for the construction of portfolios (Henriksson et al., 2019). In this study, both equal-weighted and value-weighted returns are evaluated, to check for robustness.

4.2.1 Capital Asset Pricing Model

The Capital Asset Pricing Model (CAPM) was developed by Sharpe (1964) and Lintner (1965) to estimate the expected return on an asset or portfolio. In this model, Sharpe and Lintner incorporate the risk-free rate, the market risk, and the market beta, and bundle this into a formula for expected return on an asset (Equation 4.1). This model became the building block for many multi-factor asset pricing models and its formula is given as follows:

$$R_{it} - R_{Ft} = \alpha_i + \beta_i(R_{Mt} - R_{Ft}) + \varepsilon_{it} \tag{4.1}$$

Here, at time t, R_{it} is the return on portfolio i, R_{Ft} is the risk-free rate, and α_i is the regression intercept (Jensen's alpha) of portfolio i. The market excess return, or market factor, is given by $R_{Mt} - R_{Ft}$ and its measure of sensitivity by β_i. Finally, ε_{it} is the zero-mean residual for portfolio i at time t.

4.2.2 Multi-Factor Asset Pricing Models

Fama & French (1993) augmented the CAPM with two additional factors (Equation 4.2), creating the Fama and French three-factor model. This model incorporates the market capitalisation (Small Minus Big) and the book-to-market value (High Minus Low) of stocks as important factors in forecasting the expected returns of an asset. The reason for the addition of market capitalisation in the equation is the tendency of smaller capitalisation firms to outperform large capitalisation firms. The book-to-market value was incorporated because growth stocks tend to outperform value stocks. The model is defined as:

$$R_{it} - R_{Ft} = \alpha_i + \beta_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + \varepsilon_{it} \tag{4.2}$$

Here, at time t the size premium (Small Minus Big), denoted by SMB_t, and the value premium (High Minus Low), denoted by HML_t, are added to the CAPM in Equation 4.1. The corresponding measures of sensitivity are s_i and h_i, respectively.

Subsequently, Carhart (1997) augmented the Fama and French three-factor model with the momentum factor (Winner Minus Loser) (Equation 4.3). This risk factor captures whether recent stock performance can be used to predict stock performance, thus if past winners will be future winners and past losers will be future losers. Several authors, including Novy-Marx (2013) and Titman et al. (2004) state that the Fama and French three-factor model cannot explain the portion of variation in average returns related to profitability and investments. Therefore, Fama & French (2015) extended this three-factor model with additional factors for profitability (Robust Minus Weak) and investments (Conservative Minus Aggressive), creating the Fama and French five-factor model (Equation 4.4). Ultimately, the Fama and French five-factor model can be augmented with the previously mentioned momentum factor, introduced by Carhart (1997), thus creating an asset pricing model with six factors (Equation 4.5). The described model equations are then given as follows:

$$R_{it} - R_{Ft} = \alpha_i + \beta_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + w_i WML_t + \varepsilon_{it}, \tag{4.3}$$

$$R_{it} - R_{Ft} = \alpha_i + \beta_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + \varepsilon_{it}, \tag{4.4}$$

$$R_{it} - R_{Ft} = \alpha_i + \beta_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + w_i WML_t + r_i RMW_t + c_i CMA_t + \varepsilon_{it}. \tag{4.5}$$

Here, the additional factors at time t are as follows: WML_t is the momentum factor (Winner Minus Loser), RMW_t is the profitability premium (Robust Minus Weak), and CMA_t is the investment premium (Conservative Minus Aggressive). The corresponding measures of sensitivity are given by, respectively, w_i, r_i, and c_i.

The measures of sensitivity reflect the portfolios' exposure to the underlying risk factors. The explanatory power of the factors over the portfolio returns is indicated by the significance of the corresponding betas. Moreover, a primary variable of interest is the regression intercept of each regression, the so-called Jensen's Alpha. These alphas tabulate a measure of outperformance of a strategy or portfolio, that cannot be explained by the risk factors in the model (Jensen, 1968). A positive alpha thus corresponds to outperformance of a portfolio, whereas a negative alpha

indicates underperformance. Both the regression intercepts and the betas will be evaluated. Ultimately, the monthly Fama and French risk factors, as well as the risk-free rate, and the Carhart momentum factor are obtained from the Kenneth-French web site at Dartmouth. For brevity, in this research, the portfolio returns and strategies will solely be controlled for the Carhart four-factor model (Equation 4.3) and the Fama and French five-factor model augmented with the momentum factor (Equation 4.5).

4.2.3 Contemporisation

As stated in the Section 2.1.1 in the Literature Review, ESG measures and CSR are gradually gaining popularity over the years. In more recent years, ESG score potentially becomes a more important factor for investors, and therefore could potentially drive stock returns up. Next to retail investors, who attach gradually more value to sustainability in their investment decisions, governments with their regulations are tilting more towards the implementation of sustainability by corporations. An example is the development concerning the upcoming CSRD regulation, as was mentioned in the Literature Review. Due to the increased importance of CSR, this research not only investigates whether ESG practices generate significant positive alphas, but also whether significant changes in alpha appear. This is done by actualising the alphas, through the consideration of a shorter, more recent sample period. To test this, the sample period is limited to 10 years ranging from January 2013 until December 2022 (n=120), as opposed to the initial sample size of 19 years starting at January 2004 (n=228).

4.3 ESG and Institutional Ownership

In the current literature, no clarification and further deepening on the relationship between institutional ownership, financial firm performance and ESG metrics is performed. To gain clear insight on the impact of various degrees of institutional ownership and ESG scores, this research composes a bivariate matrix, tabulating the Jensen's alphas associated with the ESG scores across the different quintiles of institutional ownership. This matrix can have important implications, both for institutional investors and retail investors, due to the nuanced and extensive insight it provides with respect to financial firm performance. Significant Jensen's alphas of the portfolios, controlled for the Fama and French five-factor model augmented with the momentum factor, would indicate consistent outperformance. Ultimately, the long-short strategy will be analysed, to investigate whether significant outperformance or underperformance can be observed, when a distinction in portfolio creation is made regarding the degree of institutional ownership.

Section 5

Results

The following section presents and discusses the results, corresponding to the earlier depicted methodology. First, the relationship between investor demand and ESG characteristics of firms is investigated. Then, results are discussed regarding the market's willingness to pay for ESG metrics. Moving on, this section elaborates on the performance of several ESG tilt strategies, adjusted for the Carhart four-factor model and the Fama and French five-factor model, augmented with the momentum factor. Finally, multiple portfolios are constructed using a bivariate matrix containing quintiles based on both ESG scores and institutional ownership, and their performance is evaluated.

5.1 Investor Demand and Firm Valuation

To test whether ESG characteristics impact investor demand, a regression is performed of institutional ownership on ESG metrics. Institutional ownership is considered to capture investors' interest and thus their demand for a given stock. Table 5.1 displays the results of the regression of ESG metrics on institutional ownership led by three months. As described earlier in Section 4.1, institutional investors are obliged to file their form 13F filings quarterly. The three-month lag is thus chosen to ensure that the ESG variables are known to the investors, before we observe the proportion of institutional holdings. The regression in Table 5.1 controls for the market beta, the logarithm of market capitalisation, and the logarithm of the price-to-book value. From the table can be seen that all ESG metrics, except for the environmental score, correlate positively with institutional holdings. Therefore, the conclusion can be drawn that ESG metrics, except for the environmental pillar, predict changes in institutional holdings, in line with Pedersen et al. (2021), and institutional investors thus incorporate the ESG metrics in their investment decision-making.

Table 5.1
This table reports the results of the pooled regression, clustered at stock level, where the dependent variable is the investors' demand, represented by institutional ownership, led by three months (t+3). The independent variables are the ESG characteristics, i.e., the environmental (Env.), social (Soc.), governance (Gov.), and the combined ESG score. The regression is controlled for the market beta (Market β), the logarithm of market capitalisation (Ln (MC)), and the logarithm of price-to-book (Ln(P/B)). Robust t-statistics are given in parentheses.

Dependent variable	Institutional ownership (t + 3)			
	(1)	(2)	(3)	(4)
Env.	-0.000***			
	(-2.88)			
Soc.		0.001***		
		(27.36)		
Gov.			0.001***	
			(38.82)	
ESG				0.001***
				(27.90)
Market β	-0.024**	-0.016	-0.017	-0.017
	(-2.14)	(-1.47)	(-1.57)	(-1.50)
Ln(MC)	-0.005***	-0.011***	-0.009***	-0.011***
	(-12.02)	(-27.63)	(-25.42)	(-28.37)
Ln(P/B)	0.020***	0.020***	0.021***	0.020***
	(31.84)	(32.17)	(34.20)	(33.23)
α	0.900***	0.995***	0.936***	1.001***
	(101.64)	(118.75)	(119.90)	(118.68)
R^2	0.008	0.013	0.018	0.013
Adj. R^2	0.007	0.013	0.018	0.013
N	144,312	144,312	144,312	144,312

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

To investigate whether the market is willing to pay for ESG practices and if so, how much they want to pay for ESG characteristics, a regression of (the logarithm of) a firm's valuation ratio on its ESG characteristics is performed. The results can be found in Table 5.2, which displays how both ESG scores and the underlying individual pillar scores correlate with the logarithm of the price-to-book ratio. The performed regressions are controlled for the market beta, whereas other control variables that are by construction related to valuation are omitted (i.e., size and book-to-market). In Table 5.2 similar results are observed to those of Pedersen et al. (2021), suggesting that stocks with high ESG metrics are priced higher in comparison to stocks with lower ESG metrics. This result holds true for all individual pillars (i.e., environmental, social and governance), as well as for the combined ESG scores, which can be seen from the significant positive coefficients with respect to each of the distinct scores.

Table 5.2
This table reports the results of the pooled regression, clustered at stock level, where the dependent variable is a firm's valuation ratio, represented by the logarithm of price-to-book (Ln(P/B)). The independent variables include the firm's environmental (Env.), social (Soc.), governance (Gov.), and combined ESG score. The regression is controlled for the market beta (Market β). Robust t-statistics are given in parentheses.

Dependent variable	Ln(P/B)			
	(1)	(2)	(3)	(4)
Env.	0.005***			
	(6.13)			
Soc.		0.009***		
		(9.83)		
Gov.			0.002***	
			(2.66)	
ESG				0.008***
				(8.36)
Market β	0.473***	0.506***	0.485***	0.499***
	(15.11)	(16.03)	(15.54)	(15.82)
α	0.745***	0.510***	0.803***	0.527***
	(26.14)	(12.83)	(18.45)	(11.99)
R^2	0.019	0.039	0.003	0.030
Adj. R^2	0.019	0.039	0.003	0.030
N	150,551	150,551	150,551	150,551

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

5.2 Portfolio Performance

To gain better insight into the individual ESG characteristics, the data set is divided into quintiles. This reduces the impact of noise of individual stocks and improves economic interpretability. Table 5.3 displays the descriptive statistics of the top quintiles minus the bottom quintiles, ultimately forming the long-short portfolio strategy. These portfolio strategies are displayed for the ESG score strategy, as well as the separate environmental, social and governance score strategies. From the t-statistics in Table 5.3 can be seen that in both value-weighted and equal-weighted portfolios, the governance pillar seems to exhibit significant positive average returns. Furthermore, the other results show neither economic nor statistically significant negative performance, except for the value-weighted social score strategy.

Furthermore, low standard deviations in all strategies are observed, indicating limited variance between the monthly returns of the top and bottom portfolios and thus relatively minor differences in the observed quintiles. This is in line with the low average return spreads of the strategies. A negative average return indicates a discount for the ESG characteristics strategies, whereas a positive average return indicates a premium.

Table 5.3
This table reports the summary statistics of the monthly returns of long-short strategy portfolios, based on top and bottom quintiles, of the ESG score strategy and the separate environmental, social, and governance score strategies. The summary statistics include the monthly average portfolio returns (Mean), monthly standard deviation (St. dev.), t-statistic (T-stat.), Sharpe Ratio, minimum observed monthly portfolio return (Min.), and maximum observed monthly portfolio return (Max.). The sample period ranges from January 2004 until December 2022 (n=228).

	Value-weighted					
	Mean	Std. dev.	T-stat.	Sharpe	Min.	Max.
ESG score	-0.249%	2.42%	-1.55	-0.103	-8.56%	8.03%
Env. score	-0.314%	2.52%	-1.88	-0.012	-7.22%	11.28%
Soc. score	-0.366%	2.51%	-2.20	-0.146	-9.47%	10.84%
Gov. score	0.572%	2.47%	3.57	0.231	-6.90%	9.49%
	Equal-weighted					
	Mean	Std. dev.	T-stat.	Sharpe	Min.	Max.
ESG score	0.100%	1.89%	0.80	0.053	-5.16%	5.20%
Env. score	-0.001%	1.96%	-0.01	-0.000	-7.23%	6.24%
Soc. score	-0.085%	1.61%	-0.68	-0.053	-6.89%	5.35%
Gov. score	0.229%	1.93%	2.81	0.118	-3.31%	5.13%

5.2.1 ESG Score

Following the methodology of Pedersen et al. (2021), Table 5.4 shows the results of the performance of high-ESG score portfolios minus low-ESG score portfolios. Similar to Pedersen et al. (2021), the stocks are separated into quintiles each month, whereby the returns of the worst performing ESG score stocks are subtracted from the best performing ESG score stocks. With this a long-short strategy is created, based on ESG scores. The results are controlled for both the Carhart four-factor model (FFC-4), as well as the Fama and French five-factor model augmented with the momentum factor, resulting in a six-factor model (FF-6), and are tabulated for both equal-weighted and value-weighted portfolios. In line with the summary statistics, the Jensen's alphas of the value-weighted portfolios are significantly negative, indicating a slight underperformance of the long-short strategy. This thus provides evidence for a small premium on ESG tilted stocks. When looking at the equal-weighted Jensen's alphas, the strategy controlled for the FFC-4 seems to outperform, whereas no significant results can be found when controlling for the FF-6, indicating that the profitability and investment factor presumably explain this outperformance.

The results found in Table 5.4 are in contrast to the findings of Pedersen et al. (2021), since they found significant positive Jensen's alphas for both the value- and equal-weighted strategies. This paper, on the other hand, generates negative significant Jensen's alphas on the value-weighted portfolios, and only generates a significant positive Jensen's alpha, in line with Pedersen et al. (2021), for the equal-weighted strategy, controlling for the Carhart four-factor model. The significant negative alphas are reported in Table 5.4 for the value-weighted portfolios indicate underperformance of the long-short strategy. A potential explanation for the discrepancy with prior research is the contrasting sample period, since Pedersen et al.

(2021) use a more narrow time sample, since they use data ranging from January 2009 through March 2019, whereas a broader sample period is covered in this research, including data from January 2004 through December 2022. Another potential explanation for the discrepancy is the difference in the chosen rating agency of the ESG scores, whereby the lack of correlation and consistency in ratings, as described by Li & Polychronopoulos (2020), is the main driver. Pedersen et al. (2021) used the MSCI ratings in their research, whereas in this research, the Refinitiv Eikon ESG scores are the chosen measure.

When analysing the factor exposures in Table 5.4, the return spreads of the ESG long-short strategy can largely be explained by the size and value effects. Both the value-weighted and equal-weighted portfolios display negative size betas (SMB) with a significance of 1%, indicating a high exposure of the ESG strategy to large-cap stocks. This can partially be attributed to the fact that larger capitalisation firms are more likely to be influenced by shareholders' demand for CSR. These firms will therefore be involved in and aware of the implications of ESG practices. Furthermore, positive significant value betas (HML) can be observed in both value-weighted and equal-weighted portfolio strategies. This indicates that the ESG score strategy has high exposure to value stocks (containing firms with high book-to-market ratios) relative to growth-stocks (containing firms with low book-to-market ratios). Moreover, the low and insignificant market beta coefficients observed in Table 5.4 are a result of the individual top and bottom portfolios' exposure to the market beta. The market exposure is neutralised to a large extent, leading to a hedged market risk position and low observed coefficients. Furthermore, the strategy generates a 5% level significance for the momentum factor in the value-weighted portfolio strategy. This momentum effect, however, disappears when equal-weighted portfolios are utilised.

To gain better insight in the return spreads of the long-short strategies, one might take a look at the summary statistics of the portfolios that are used to generate these strategies. For brevity, the summary statistics can be found in Appendix B, displaying the mean, standard deviation, t-statistic, and Sharpe ratios of both value-weighted and equal-weighted portfolios. From Appendix B it can be noticed that both the volatility and the returns are, on average, higher for the equal-weighted portfolios than for the value-weighted portfolios. This can potentially be explained by the size effect of the different weighting methods, with the equal-weighted strategy having a higher tilt towards smaller capitalisation stocks. These stocks tend to be more volatile in nature, thus explaining the difference in volatility and the higher returns. Another important finding is that for both the ESG score strategy and the individual pillar score strategies, the volatility of the top portfolios is lower than for the bottom portfolios, subsequently leading to higher Sharpe ratios. This could indicate that SRI lowers the portfolio's volatility, and therefore the portfolio's risk, in line with Gregory (2022). Furthermore, for robustness and to gain clearer insights in the factor exposures, the top and bottom ESG score portfolios are separately tabulated and controlled for the Fama and French five-factor model augmented with the momentum factor. The results can be found in Appendix C.

Table 5.4
This table reports the performance of high ESG scores minus low ESG scores, through the use of a long-short strategy. For each month, the sample is sorted into quintiles, based on their ESG scores. The excess returns of the top ESG quintile minus the bottom ESG quintile in the following month are reported, both for value-weighted and equal-weighted portfolios. The returns are controlled for both the Carhart four-factor model (FFC-4), and the Fama and French five-factor model augmented with the momentum factor (FF-6). The sample period ranges from January 2004 until December 2022 (n=228). Robust t-statistics are given in parentheses.

	Value-weighted		Equal-weighted	
	FFC-4	FF-6	FFC-4	FF-6
Market β	-0.048	-0.025	-0.077***	0.007
	(-1.42)	(-0.77)	(-3.23)	(0.29)
SMB	-0.513***	-0.414***	-0.451***	-0.447***
	(-8.75)	(-6.95)	(-10.86)	(-10.12)
HML	0.295***	0.184***	0.004	0.114***
	(6.32)	(3.28)	(0.13)	(2.73)
WML	0.077**	0.067**	0.030	0.036
	(2.23)	(2.00)	(1.24)	(1.44)
RMW		0.319***		0.299***
		(4.37)		(5.53)
CMA		0.223**		0.175***
		(2.57)		(2.73)
α	-0.003**	-0.005***	0.002**	-0.001
	(-2.35)	(-3.59)	(2.02)	(-1.20)
R^2	0.360	0.426	0.483	0.536
Adj. R^2	0.349	0.410	0.473	0.523
N	228	228	228	228

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

5.2.2 Environmental, Social, and Governance Scores

Table 5.5 displays separate pillar score strategies, whereby both value-weighted and equal-weighted portfolios are tabulated for robustness. When breaking apart ESG scores into their separate pillars, mixed results are noticed. All observed value-weighted Jensen's alphas are negative and significant, except for the Carhart four-factor model controlled governance strategy, indicating a premium on pillar score strategies. This is in agreement with the previously observed ESG score premium. However, when looking at the equal-weighted strategies tabulated in Panel B of Table 5.5, the significance of the alphas disappears, except for the governance score strategy, generating the only positive and significant alphas. This indicates that the governance pillar strategy in equal-weighted portfolios exhibits outperformance. The factor loading of the size factor (SMB) remains negative on a 1% significance level, whereas the value factor (HML) loses significance in the value-weighted social pillar score strategy and the equal-weighted environmental and social pillar score strategies. Moreover, to gain better understanding of the individual pillar score strategies, Appendix D, Appendix E, and Appendix F display both the separate top and bottom portfolios of the environmental, social and governance pillar score strategies, respectively.

These portfolios show minor differences in both the average returns of ESG score, as well as the underlying individual pillar scores. This finding corresponds with the high correlations between the top and bottom portfolios. The lowest observed correlation between the top and bottom portfolios is 0.87, with an average of 0.94. For brevity, the correlation matrix is left out

of this paper. The correlations, however, demonstrate once more the limited variance between the top and bottom portfolios of the environmental, social, and governance pillars, as well as the combined ESG score portfolios.

Table 5.5
This table reports the performance of high environmental (Env.), social (Soc.), and governance (Gov.) scores minus their low counterparts, through the use of a long-short strategy. For each month, the sample is sorted into quintiles, based on their corresponding score. The excess returns of the top quintile minus the bottom quintile in the following month are reported, both for value-weighted (panel A) and equal-weighted (panel B) portfolios (quintiles). The returns are controlled for both the Carhart four-factor model (FFC-4), and the Fama and French five-factor model augmented with the momentum factor (FF-6). The sample period ranges from January 2004 until December 2022 (n=228). Robust t-statistics are given in parentheses.

Panel A. Value-weighted						
	Environmental		Social		Governance	
	FFC-4	FF-6	FFC-4	FF-6	FFC-4	FF-6
Market β	-0.049	-0.024	0.005	0.025	-0.040	-0.025
	(-1.42)	(-0.69)	(0.17)	(0.86)	(-1.25)	(-0.80)
SMB	-0.562***	-0.511***	-0.485***	-0.444***	-0.337***	-0.253***
	(-9.35)	(-8.23)	(-9.37)	(-8.25)	(-6.06)	(-4.41)
HML	0.247***	0.101*	0.160***	0.045	0.237***	0.171***
	(5.17)	(1.73)	(3.89)	(0.89)	(5.36)	(3.16)
WML	-0.002	-0.022	-0.007	-0.023	0.093***	0.089***
	(-0.04)	(-0.64)	(-0.22)	(-0.76)	(2.83)	(2.76)
RMW		0.132*		0.109*		0.280***
		(1.74)		(1.66)		(3.99)
CMA		0.346***		0.272***		0.116
		(3.84)		(3.49)		(1.39)
α	-0.002*	-0.003**	-0.004***	-0.005***	-0.001	-0.003**
	(-1.73)	(-2.47)	(-3.41)	(-4.09)	(-1.05)	(-2.06)
R^2	0.334	0.388	0.313	0.356	0.252	0.308
Adj. R^2	0.322	0.371	0.301	0.338	0.239	0.289
N	228	228	228	228	228	228
Panel B. Equal-weighted						
	Environmental		Social		Governance	
	FFC-4	FF-6	FFC-4	FF-6	FFC-4	FF-6
Market β	-0.032	-0.023	0.061***	0.070***	-0.112***	-0.097***
	(-1.29)	(-0.92)	(2.99)	(3.40)	(-4.77)	(-4.33)
SMB	-0.500***	-0.477***	-0.471***	-0.437***	-0.218***	-0.142***
	(-11.73)	(-10.52)	(-13.25)	(-11.67)	(-5.38)	(-3.48)
HML	0.056	0.008	0.062**	0.019	0.129***	0.064*
	(1.64)	(0.18)	(2.19)	(0.54)	(4.00)	(1.67)
WML	0.034	0.028	-0.015	-0.020	-0.003	-0.008
	(1.35)	(1.09)	(-0.72)	(-0.93)	(-0.14)	(-0.34)
RMW		0.067		0.107**		0.118**
		(1.20)		(2.33)		(1.98)
CMA		0.109*		0.090		0.251***
		(1.66)		(1.65)		(5.01)
α	0.001	0.000	-0.001	-0.001	0.003***	0.002*
	(0.53)	(0.10)	(-0.91)	(-1.56)	(2.88)	(1.68)
R^2	0.460	0.470	0.445	0.464	0.281	0.364
Adj. R^2	0.450	0.455	0.435	0.450	0.269	0.347
N	228	228	228	228	228	228

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The results observed in Table 5.5 are not in accordance with prior research, as for example Pedersen et al. (2021) found positive returns for the separate pillar score strategies. As mentioned before, this could potentially be explained by the difference in used proxies for the individual pillars. This research utilises broadly founded environmental, social, and governance scores. This could ultimately be evidence for improperly chosen proxies in prior research. Additionally, the discrepancy could be caused by varying sample periods.

5.2.3 Contemporisation

Table 5.6 showcases the results of the shorter, more actualised sample period. It is noticed that the alphas in the value-weighted portfolios remain significantly negative. However, the alphas converge towards zero in comparison to the results for the initial sample period from Table 5.4. This is shown by the fact that the alphas, controlled for the Carhart four-factor model, and the Fama and French five-factor model augmented with the momentum factor, respectively, increase from -0.003 to -0.002 and from -0.005 to -0.004. This implicates that the premium on ESG metrics disappears for a more actualised sample period, resulting in underperformance to a lesser extent. Due to the insignificance that is observed for the Jensen's alphas in the equal-weighted portfolios, no conclusions can be drawn from these results.

Table 5.6
This table reports the performance of high ESG scores minus low ESG scores, through the use of a long-short strategy. For each month, the sample is sorted into quintiles, based on their ESG scores. The excess returns of the top ESG quintile minus the bottom ESG quintile in the following month are reported, both for value-weighted and equal-weighted portfolios. The returns are controlled for both the Carhart four-factor model (FFC-4), and the Fama and French five-factor model augmented with the momentum factor (FF-6). The sample period ranges from January 2013 until December 2022 (n=120). Robust t-statistics are given in parentheses.

	Value-weighted		Equal-weighted	
	FFC-4	FF-6	FFC-4	FF-6
Market β	-0.052	-0.076*	0.041	0.015
	(-1.18)	(-1.80)	(1.30)	(0.56)
SMB	-0.675***	-0.481***	-0.674***	-0.480***
	(-9.42)	(-6.33)	(-13.12)	(-9.88)
HML	0.334***	0.192***	0.294***	0.166***
	(6.04)	(2.80)	(7.42)	(3.80)
WML	-0.115*	-0.092*	-0.016	0.010
	(-1.96)	(-1.69)	(-0.38)	(0.29)
RMW		0.179*		0.145**
		(1.78)		(2.26)
CMA		0.428***		0.436***
		(4.62)		(7.38)
α	-0.002*	-0.004**	0.003	-0.000
	(-1.72)	(-2.61)	(0.78)	(-0.17)
R^2	0.523	0.611	0.640	0.768
Adj. R^2	0.506	0.591	0.628	0.756
N	120	120	120	120

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

As for the factor exposures in Table 5.6, it appears that the size effect (SMB) remains present for the truncated sample period. The same holds for the value effect (HML). The

momentum effect (WML), however, is not stable over time. Shortening the sample period also does not seem to alter the results with regards to the profitability (RMW) factor exposures. Noteworthy for the investment effect (CMA) is the fact that the corresponding coefficients become even more positive in the truncated sample period. This suggests a more pronounced investment effect: conservatively investing firms outperformed aggressively investing firms. Finally, the market factor exposure gains significance for the value-weighted portfolios.

In conclusion, when a contemporised sample period is taken into consideration, the value-weighed long-short strategy exhibits less severe underperformance when controlling for risk factors. This could potentially indicate the disappearance of the premium on ESG leaders, as well as the disappearance of rewards for ESG laggards, and thus suggests that the strategy has become more effective recently. This can potentially be explained by the market, being more favorable towards ESG leading firms.

5.3 ESG and Institutional Ownership

Table 5.7 showcases an overview of the Jensen's alphas associated with the ESG scores across the different quintiles of institutional ownership, factoring in the Fama and French five-factor model augmented with the momentum factor. Panel A and B display the results for the value-weighted and equal-weighted portfolios, respectively. The data spans from January 2004 to December 2022, tabulating an extensive perspective on the performance over nearly two decades. A noteworthy trend across the bivariate quintile matrix, when takin into account the value-weighted portfolios, is the statistical significance of the alphas in most of the observed intersections. As institutional ownership increases, the alphas exhibit slight variations, but they predominantly remain significant at a 1% significance level. Only the top and bottom quintiles of institutional ownership exhibit insignificant alphas.

However, the significance disappears when the portfolios are integrated into a long-short strategy that buys the top ESG quintile, and short sells the bottom ESG quintile. This can be seen from the last column of Table 5.7. This indicates neither consistent underperformance nor outperformance of the ESG tilt strategy, taking the ratio of institutional ownership into consideration. Another important finding can be observed in Panel B of Table 5.7, since the significance of the alphas disappears, in particular within the border portfolios, i.e., the bottom and top quintiles of ESG scores. This again indicates neither consistent underperformance nor outperformance and is a potential cause for institutional investors to shun these sorts of portfolios. Thus, the extension on the strategy displayed in Table 5.4 does not add to the earlier found results.

In conclusion, Table 5.7, Panel A displays that the Jensen's alphas of value-weighted portfolios remain stable and significant as institutional ownership changes. Panel B underscores the importance of considering both ESG scores and institutional ownership in equal-weighted portfolio performance analysis, as the significance disappears in the border portfolios. The results could potentially be an explanation for the findings of Fernando et al.

(2010), who find that institutional investors shun both the ESG laggards as well as the ESG leaders. This explanation is possible due to the significant, consistent outperformance that can be observed in all portfolios except for the border portfolios (quintiles), such that institutional investors do not invest in the border portfolios, due to a lack of significance.

Table 5.7
This table showcases an overview of the Jensen's alphas associated with the ESG scores across the different quintiles of institutional ownership (IO). The results are controlled for the Fama and French five-factor model augmented with the momentum factor. The last column tabulates the Jensen's alphas associated with the long-short strategy, whereby the top quintile of ESG scores is bought, and the bottom quintile is sold short. The sample period ranges from January 2004 until December 2022 (n=228). Robust t-statistics are given in parentheses.

Panel A. Value-weighted

	ESG scores					
IO	0 – 20%	20 – 40%	40 – 60%	60 – 80%	80 – 100%	Q5 -/- Q1
0 – 20%	0.006***	0.006***	0.002	0.005***	0.002	-0.004
	(2.66)	(3.13)	(1.06)	(2.79)	(1.54)	(-1.44)
20 – 40%	0.006***	0.008***	0.005***	0.007***	0.006***	-0.000
	(2.97)	(3.43)	(2.87)	(4.71)	(5.79)	(-0.05)
40 – 60%	0.006***	0.005***	0.004***	0.004***	0.007***	0.001
	(3.04)	(3.27)	(3.22)	(2.65)	(4.90)	(0.44)
60 – 80%	0.008***	0.005***	0.008***	0.007***	0.006***	-0.002
	(3.83)	(2.92)	(4.72)	(4.37)	(4.27)	(-0.79)
80 – 100%	0.007***	0.006***	0.008***	0.003*	0.003	-0.004
	(3.27)	(2.93)	(4.13)	(1.77)	(1.15)	(-1.34)

Panel B. Equal-weighted

	ESG scores					
IO	0 – 20%	20 – 40%	40 – 60%	60 – 80%	80 – 100%	Q5 -/- Q1
0 – 20%	0.003*	0.004**	0.004***	0.001	0.002*	-0.001
	(1.91)	(2.45)	(2.61)	(0.93)	(1.88)	(-0.32)
20 – 40%	0.002*	0.004***	0.003**	0.004***	0.005***	0.003
	(1.67)	(3.09)	(2.31)	(3.40)	(4.42)	(1.54)
40 – 60%	0.002	0.004***	0.003***	0.003*	0.004***	0.002
	(1.25)	(2.78)	(2.78)	(1.93)	(3.19)	(1.33)
60 – 80%	0.002	0.000	0.004**	0.003**	0.002*	0.000
	(1.58)	(0.18)	(2.57)	(2.37)	(1.76)	(0.01)
80 – 100%	0.000	0.001	0.002	0.000	0.001	0.000
	(0.09)	(0.64)	(1.24)	(0.13)	(0.30)	(0.15)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Section 6

Conclusion

In this research, an examination is performed on whether ESG metrics, specifically in association with institutional ownership, affect stock market valuation of a sample of U.S. firms. More than 50 years ago, Friedman (1970) introduced the concept of CSR. In today's society, the importance of CSR is undeniable. Firms now have the unavoidable obligation to engage in sustainable practices and responsible investing. This thesis set out to investigate the implications on financial performance of the involvement of ESG metrics in investment decisions, paying particular attention to the interaction with institutional investing and institutional ownership. This study applicates an innovative manner on the approximation of the separate pillars which ultimately form ESG scores, i.e., the environmental, social and governance scores, obtained from the Refinitiv Eikon database. The majority of studies on ESG metrics apply relatively arbitrary, one-dimensional pillar measures, such as CO2 emissions for the environmental pillar, a sin-stock indicator for the social pillar, and an accruals-based measure as governance proxy (Pedersen et al., 2021).

In this paper, it was brought to light that, except for the environmental pillar, all ESG metrics positively predict changes in investor demand, measured as the ratio of institutional ownership, in line with the findings of Pedersen et al. (2021). This finding was drawn from a pooled regression, clustered at stock level. Moreover, it was found that the market is willing to pay for ESG metrics. This result was obtained using a pooled regression, clustered at stock level, using the Tobin's Q as proxy for the willingness to pay, due to its underlying market value of individual stocks. The results hold for the individual environmental, social, and governance scores, as well as for the combined ESG score.

This research furthermore explored the use of an ESG tilt strategy that overweighted ESG leaders while underweighting ESG laggards through the use of quintile portfolios. It was found that an ESG tilt strategy, when using value-weighted portfolios, showed significantly underperformance in comparison to the benchmark Carhart four-factor model, as well as the Fama and French five-factor model augmented with the momentum factor. This finding contrasts with a significant body of preceding literature, notably the work of Pedersen et al. (2021). Potential causes for this discrepancy are the sample period, as well as the portfolio construction methodology, and difference in applicated rating agency.

Moreover, to elaborate further on the ESG tilt performance, the fundamental pillars that drive ESG performance were analysed, again applying a quintile-based long-short strategy. This strategy was applicated to examine whether the underperformance of the ESG tilt strategy was driven by a specific underlying pillar. The analysed pillar strategies exhibit Jensen's alphas in line with the expectations based on the ESG strategy. The social pillar strategy came to light as the most severe underperforming strategy, exhibiting a significant value-weighted monthly underperformance of 0.5 percent, when controlling for the Fama and French five-factor model, augmented with the momentum factor. This contradicts the findings of Giannarakis & Theotokas (2011), who find that environmental performance positively affects financial firm performance. However, utilising the equal-weighted portfolios, the observed alphas lose significance. Thus, in accordance with Shahwan (2015), no significant positive association between corporate governance and financial performance, measured as stock returns, is found.

Owing to the rising prominence and popularity of CSR, heightened awareness of sustainability, and the emphasis on ESG characteristics, this study examines the evolving significance of ESG metrics and probes whether their influence has altered over time. To assess this, the initial sample period has been truncated, aiming to contemporise the implications of ESG metrics and intensify the robustness of this study. The results show that the Jensen's alphas converge to zero for the actualised sample period, implicating disappearance of the premium on ESG metrics over time.

Finally, a bivariate quintile matrix tabulating the Jensen's alphas is generated, based on both ESG performance and institutional ownership, to gain deeper insights into the implications of both variables. In the value-weighted portfolios, the observed Jensen's alphas remained significant and positive over the different quintiles of institutional ownership, indicating no impact of institutional ownership on financial performance. However, the significance disappeared when considering equal-weighted portfolios, especially in the border portfolios based on ESG scores. This, due to insignificant, and thus inconsistent border portfolio performance, could be considered a potential clarification on the findings of Fernando et al. (2010), who find that institutional investors shun both ESG laggards and ESG leaders.

While this study provides a comprehensive analysis and offers valuable insights into the interplay between ESG metrics and institutional ownership, it is important to recognise and reflect on its inherent limitations. The main limitation of this study arises from the strict use of the considered ESG data. The data obtained from the Refinitiv Eikon databse, i.e., the combined ESG scores and the individual pillar scores, are published annually. Given that the scores change infrequently, the robustness of the study may be compromised. Furthermore, this annual frequency might not encapsulate the rapid changes within a year on firm specific ESG characteristics, which ultimately could impact the accuracy and immediacy of the observed correlations.

Moreover, the study is focused on ESG information sourced from a single rating agency. Different agencies adopt different rating methodologies and criteria, therefore making it possible that the results could differ if multiple agencies had been considered. This, due to the observed low correlations in rating agencies (Li & Polychronopoulos, 2020). Additionally, the study only covers U.S. firms, whereas other areas of the world, such as Europe, are subject to significant ESG-involved changes, due to both regulation and investor preferences. Therefore, this research has limited implications due to its regional boundaries.

An avenue for future research is the implementation of different geographical regions, such as Europe or Asia, due to the variation in investor sentiment and the difference in implementation and intensity of CSR across the globe. Furthermore, the development of the regulation concerning ESG practices in Europe, the CSRD (European Parliament and Council, 2022), will give rise to a possible ex-ante and ex-post analysis around the date of introduction of the regulation. Additionally, this study assumes that all institutional investors act the same, whereas there are potential differences in their investment behaviour, especially regarding ESG metrics, for example due to dissimilar investment horizons.

All in all, this study complements the growing body of literature on the intersection of ESG metrics and institutional ownership by providing nuanced and extensive insights in their relationship, considering investor demand, firm valuation and the performance of a variety of ESG related investment strategies. This paper contributes to this line of research, that is likely to grow in importance, as sustainability, and especially ESG metrics, will take a more central place in the decision-making of institutional investors and retail investors, as well as in the way that corporations will run their businesses.

References

Amel-Zadeh, A. & Serafeim, G. (2018). Why and how investors use ESG information: Evidence from a global survey. *Financial Analysts Journal*, *74*(3), 87-103.

Arlow, P. & Gannon, M. J. (1982). Social responsiveness, corporate structure, and economic performance. *Academy of Management Review*, *7*(2), 235-241.

Azzam, I. (2010). The impact of institutional ownership and dividend policy on stock returns and volatility: Evidence from Egypt. *International Journal of Business*, *15*(4), 443.

Bali, T. G., Engle, R. F. & Murray, S. (2016). *Empirical asset pricing: The cross section of stock returns*. John Wiley & Sons.

Bartov, E., Radhakrishnan, S. & Krinsky, I. (2000). Investor sophistication and patterns in stock returns after earnings announcements. *The Accounting Review*, *75*(1), 43-63.

Berg, F., Koelbel, J. F. & Rigobon, R. (2022). Aggregate confusion: The divergence of ESG ratings. *Review of Finance*, *26*(6), 1315-1344.

Berle, A. A. & Means, G. G. C. (1991). *The modern corporation and private property*. Transaction Publishers.

Bloomberg. (2022). ESG may surpass $41 trillion assets in 2022, but not without challenges, finds Bloomberg Intelligence. https://www.bloomberg.com/company/press/esg-may-surpass-41-trillion-assets-in-2022-but-not-without-challenges-finds-bloomberg-intelligence/.

BSR. (2023). Upcoming regulations in ESG ratings: Three implications for business. https://www.bsr.org/en/blog/upcoming-regulations-in-esg-ratings-three-implications-for-business.

Cai, F. & Zheng, L. (2004). Institutional trading and stock returns. *Finance Research Letters*, *1*(3), 178-189.

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

Cochran, P. L. & Wood, R. A. (1984). Corporate social responsibility and financial performance. *Academy of Management Journal*, *27*(1), 42-56.

CRSP. (2023). *Monthly stock file.* Retrieved from the Wharton Research Data Services database: https://wrds-www.wharton.upenn.edu/pages/get-data/center-research-security-prices-crsp/annual-update/stock-security-files/monthly-stock-file/.

Davis, E. P. & Steil, B. (2004). *Institutional investors.* MIT press.

Derwall, J., Guenster, N., Bauer, R. & Koedijk, K. (2005). The eco-efficiency premium puzzle. *Financial Analysts Journal*, *61*(2), 51-63.

Dorfleitner, G., Kreuzer, C. & Sparrer, C. (2020). ESG controversies and controversial ESG: About silent saints and small sinners. *Journal of Asset Management*, *21*(5), 393-412.

Dyck, A., Lins, K. V., Roth, L. & Wagner, H. F. (2019). Do institutional investors drive corporate social responsibility? International evidence. *Journal of Financial Economics*, *131*(3), 693-714.

Eccles, R. G., Ioannou, I. & Serafeim, G. (2014). The impact of corporate sustainability on organizational processes and performance. *Management Science*, *60*(11), 2835-2857.

ERM. (2023). Rate the raters 2023: ESG ratings at a crossroads. https://www.sustainability.com/thinking/rate-the-raters-2023/.

ESGInvestor. (2022). Japan finalises code of conduct for ESG data providers. https://www.esginvestor.net/japan-finalises-code-of-conduct-for-esg-data-providers/.

European Parliament and Council. (2022). *Directive (EU) 2022/2464 of 14 December 2022 amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU, as regards corporate sustainability reporting* (Vol. L322). https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32022L2464.

Fama, E. F. & French, K. R. (1993). Common Risk Factors in the Returns on Stocks and Bonds. *Journal of Financial Economics*, *33*, 3–56.

Fama, E. F. & French, K. R. (2007). Disagreement, tastes, and asset prices. *Journal of Financial Economics*, *83*(3), 667–689.

Fama, E. F. & French, K. R. (2015). A five-factor asset pricing model. *Journal of Financial Economics*, *116*(1), 1–22.

Fernando, C., Sharfman, M. & Uysal, V. (2010). Does greenness matter? The effect of corporate environmental performance on ownership structure, analyst coverage and firm value. In *FMA European Conference, Hamburg, Germany.*

Ferrell, A., Liang, H. & Renneboog, L. (2016). Socially responsible firms. *Journal of Financial Economics*, *122*(3), 585–606.

Folger-Laronde, Z., Pashang, S., Feor, L. & ElAlfy, A. (2022). ESG ratings and financial performance of exchange-traded funds during the COVID-19 pandemic. *Journal of Sustainable Finance & Investment*, *12*(2), 490–496.

Friede, G., Busch, T. & Bassen, A. (2015). ESG and financial performance: Aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance & Investment*, *5*(4), 210–233.

Friedman, M. (1970). A Friedman doctrine: The social responsibility of business is to increase its profits. *The New York Times Magazine*, *13*, 32–33.

Fu, X., Tang, T. & Yan, X. (2019). Why do institutions like corporate social responsibility investments? Evidence from horizon heterogeneity. *Journal of Empirical Finance*, *51*, 44–63.

Galema, R. & Gerritsen, D. (2023). ESG Rating Score Revisions and Stock Returns. *Available at SSRN 4218969*.

Gerard, B. (2019). ESG and socially responsible investment: A critical review. *Beta*, *33*(1), 61–83.

Giannarakis, G. & Theotokas, I. (2011). The effect of financial crisis in corporate social responsibility performance. *International Journal of Marketing Studies*, *3*(1), 2.

Gibson Brandon, R., Krueger, P. & Schmidt, P. S. (2021). ESG rating disagreement and stock returns. *Financial Analysts Journal*, *77*(4), 104–127.

Giese, G., Lee, L. E., Melas, D., Nagy, Z. & Nishikawa, L. (2019). Foundations of ESG investing: How ESG affects equity valuation, risk, and performance. *The Journal of Portfolio Management*, *45*(5), 69–83.

Godfrey, P. C. (2005). The relationship between corporate philanthropy and shareholder wealth: A risk management perspective. *Academy of Management Review*, *30*(4), 777–798.

Godfrey, P. C., Merrill, C. B. & Hansen, J. M. (2009). The relationship between corporate social responsibility and shareholder value: An empirical test of the risk management hypothesis. *Strategic Management Journal*, *30*(4), 425–445.

Gompers, P. A. & Metrick, A. (2001). Institutional investors and equity prices. *The Quarterly Journal of Economics*, *116*(1), 229–259.

Gregory, R. P. (2022). ESG scores and the response of the S&P 1500 to monetary and fiscal policy during the COVID-19 pandemic. *International Review of Economics & Finance*, *78*, 446–456.

Halbritter, G. & Dorfleitner, G. (2015). The wages of social responsibility—where are they? a critical review of esg investing. *Review of Financial Economics*, *26*, 25–35.

Henriksson, R., Livnat, J., Pfeifer, P. & Stumpp, M. (2019). Integrating ESG in portfolio construction. *The Journal of Portfolio Management*, *45*(4), 67–81.

Hong, H. & Kacperczyk, M. (2009). The price of sin: The effects of social norms on markets. *Journal of Financial Economics*, *93*(1), 15–36.

Hong, H., Kubik, J. D. & Scheinkman, J. A. (2012). *Financial constraints on corporate goodness* (Tech. Rep. No. w18476). Cambridge, U.S.A.: National Bureau of Economic Research.

Jegadeesh, N. & Titman, S. (1993). Returns to buying winners and selling losers: Implications for stock market efficiency. *The Journal of Finance*, *48*(1), 65–91.

Jensen, M. C. (1968). The performance of mutual funds in the period 1945-1964. *The Journal of Finance*, *23*(2), 389–416.

Jiambalvo, J., Rajgopal, S. & Venkatachalam, M. (2002). Institutional ownership and the extent to which stock prices reflect future earnings. *Contemporary Accounting Research*, *19*(1), 117–145.

Kempf, A. & Osthoff, P. (2007). The effect of socially responsible investing on portfolio performance. *European Financial Management*, *13*(5), 908–922.

Krüger, P., Sautner, Z. & Starks, L. T. (2020). The importance of climate risks for institutional investors. *Review of Financial Studies*, *33*(3), 1067–1111.

Krüger, P. (2015). Corporate goodness and shareholder wealth. *Journal of Financial Economics*, *115*(2), 304–329.

Lakonishok, J., Shleifer, A. & Vishny, R. W. (1992). The impact of institutional trading on stock prices. *Journal of Financial Economics*, *32*(1), 23–43.

Leite, P. & Cortez, M. C. (2015). Performance of European socially responsible funds during market crises: Evidence from France. *International Review of Financial Analysis*, *40*, 132–141.

Li, F. & Polychronopoulos, A. (2020). What a difference an ESG ratings provider makes. *Research Affiliates*, *15*.

Lintner, J. (1965, February). The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *Review of Economics and Statistics*, *47*, 13–37.

Naffa, H. & Fain, M. (2022). A factor approach to the performance of ESG leaders and laggards. *Finance Research Letters*, *44*, 102073.

Nagy, Z., Cogan, D. & Sinnreich, D. (2013). Optimizing environmental, social, and governance factors in portfolio construction. *MSCI ESG Research*, 2–16.

Nagy, Z., Kassam, A. & Lee, L. E. (2016). Can ESG add alpha? An analysis of ESG tilt and momentum strategies. *The Journal of Investing*, *25*(2), 113–124.

Navissi, F. & Naiker, V. (2006). Institutional ownership and corporate value. *Managerial Finance*, *32*(3), 247–256.

Nofsinger, J. R. & Sias, R. W. (1999). Herding and feedback trading by institutional and individual investors. *The Journal of Finance*, *54*(6), 2263–2295.

Novy-Marx, R. (2013). The other side of value: The gross profitability premium. *Journal of Financial Economics*, *108*(1), 1–28.

Omura, A., Roca, E. & Nakai, M. (2021). Does responsible investing pay during economic downturns: Evidence from the COVID-19 pandemic. *Finance Research Letters*, *42*, 101914.

Pástor, L., Stambaugh, R. F. & Taylor, L. A. (2021). Sustainable investing in equilibrium. *Journal of Financial Economics*, *142*(2), 550–571.

Pedersen, L. H., Fitzgibbons, S. & Pomorski, L. (2021). Responsible investing: The ESG-efficient frontier. *Journal of Financial Economics*, *142*(2), 572–597.

pionline. (2017). 80% of equity market cap held by institutions. https://www.pionline.com/article/20170425/INTERACTIVE/170429926/80-of-equity-market-cap-held-by-institutions.

PWC. (2022). ESG-focused institutional investment seen soaring 84% to US$33.9 trillion in 2026, making up 21.5% of assets under management: PwC report. https://www.pwc.com/gx/en/news-room/press-releases/2022/awm-revolution-2022-report.html.

Refinitiv Eikon. (2020). *ESG scores methodology.* https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/esg-scores-methodology.pdf.

Refinitiv Eikon. (2023). *Refinitiv ESG company scores.* Retrieved from the Refinitiv Eikon database: https://www.refinitiv.com/en/sustainable-finance/esg-scores.

Reuters. (2021). Retail traders account for 10% of U.S. stock trading volume - Morgan Stanley. https://www.reuters.com/business/retail-traders-account-10-us-stock-trading-volume-morgan-stanley-2021-06-30/.

Revelli, C. & Viviani, J. L. (2015). Financial performance of socially responsible investing (SRI): What have we learned? A meta-analysis. *Business Ethics: A European Review*, *24*(2), 158–185.

Sassen, R., Hinze, A. K. & Hardeck, I. (2016). Impact of ESG factors on firm risk in Europe. *Journal of Business Economics*, *86*, 867–904.

Shahwan, T. M. (2015). The effects of corporate governance on financial performance and financial distress: Evidence from Egypt. *Corporate Governance*, *15*(5), 641–662.

Sharpe, W. F. (1964, September). Capital asset prices: A theory of market equilibrium under conditions of risk. *Journal of Finance*, *19*, 425–42.

Sias, R. W., Starks, L. T. & Titman, S. (2001). The price impact of institutional trading. *Available at SSRN*. (283779)

Statista. (2021). Value of sustainable assets under management (AUM) and total assets under management worldwide from 2016 to 2020. https://www.statista.com/statistics/948492/value-sustainable-total-aum-worldwide/#:~:text=Value%20of%20sustainable%20AUM%20and%20total%20AUM%20worldwide%202016%2D2020&text=Sustainable%20investment%20AUM%20grew%20by,trillion%20U.S.%20dollars%20that%20year.

Titman, S., Wei, K. J. & Xie, F. (2004). Capital investments and stock returns. *Journal of Financial and Quantitative Analysis*, *39*(4), 677–700.

Van Duuren, E., Plantinga, A. & Scholtens, B. (2016). ESG integration and the investment management process: Fundamental investing reinvented. *Journal of Business Ethics*, *138*, 525–533.

Wong, W. C., Batten, J. A., Mohamed-Arshad, S. B., Nordin, S. & Adzis, A. A. (2021). Does ESG certification add firm value? *Finance Research Letters*, *39*, 101593.

Appendices

Appendix A

The table provides a detailed overview provided by Refinitiv Eikon on the ESG themes covered in each category, with the respective data points evaluated as proxies of ESG magnitude per industry group (Refinitiv Eikon, 2020).

Pillars	Catagories	Themes	Data points	Weight method
Environmental	Emmission	Emissions	TR.AnalyticCO2	Quant industry median
		Waste	TR.AnalyticTotalWaste	Quant industry median
		Biodiversity*		
		Environmental management systems*		
	Innovation	Product innovation	TR.EnvProducts	Transparency weights
		Green revenues, research and development (R&D) and capital expenditures (CapEx)	TR.AnalyticEnvRD	Quant industry median
	Resource use	Water	TR.AnalyticWaterUse	Quant industry median
		Energy	TR.AnalyticEnergyUse	Quant industry median
		Sustainable packaging*		
		Environmental supply chain*		
Social	Community	Equally important to all industry groups, hence a median weight of five is assigned to all		Equally important to all industry groups
	Human rights	Human rights	TR.PolicyHumanRights	Transparency weights
	Product responsibility	Responsible marketing	TR.PolicyResponsibleMarketing	Transparency weights
		Product quality	TR.ProductQualityMonitoring	Transparency weights
		Data privacy	TR.PolicyDataPrivacy	Transparency weights
	Workforce	Diversity and inclusion	TR.WomenEmployees	Quant industry median
		Career development and training	TR.AvgTrainingHours	Transparency weights
		Working conditions	TR.TradeUnionRep	Quant industry median
		Health and safety	TR.AnalyticLostDays	Transparency weights
Governance	CSR strategy	CSR strategy	Data points in governance category and governance pillar	Count of data points in each governance category/all data points in governance pillar
		ESG reporting and transparency		
	Management	Structure (independence, diversity, committees)	Data points in governance category and governance pillar	Count of data points in each governance category/all data points in governance pillar
		Compensation		
	Shareholders	Shareholder rights	Data points in governance category and governance pillar	Count of data points in each governance category/all data points in governance pillar
		Takeover defenses		

*No data points available that may be used as a proxy for ESG magnitude/materiality

Appendix B

This table reports the summary statistics of the monthly returns of the individual top and bottom portfolios of the ESG score strategy, as well as the separate environmental, social, and governance score strategies. The top portfolio corresponds to the quintile with the highest scores, whereas the bottom portfolio corresponds to the quintile with the lowest scores. The summary statistics include the monthly average portfolio returns (Mean), monthly standard deviation (St. dev.), t-statistic (T-stat.), Sharpe Ratio, minimum observed monthly portfolio return (Min.), and maximum observed monthly portfolio return (Max.). The sample period ranges from January 2004 until December 2022 (n=228).

	Value-weighted					
	Mean	Std. dev.	T-stat.	Sharpe	Min.	Max.
Top ESG Port.	0.826%	3.99%	3.13	0.207	-13.74%	13.09%
Top Env. Port.	0.691%	4.14%	2.52	0.167	-14.31%	12.89%
Top Soc. Port.	0.772%	4.16%	2.80	0.186	-15.18%	13.31%
Top Gov. Port.	0.901%	4.24%	3.21	0.213	-15.30%	13.44%
Bottom ESG Port.	0.822%	4.95%	2.51	0.166	-15.75%	15.30%
Bottom Env. Port.	0.799%	4.90%	2.47	0.163	-16.83%	15.92%
Bottom Soc. Port.	0.842%	4.75%	2.67	0.177	-17.25%	14.37%
Bottom Gov. Port.	0.835%	4.95%	2.55	0.167	-18.02%	16.21%
	Equal-weighted					
	Mean	Std. dev.	T-stat.	Sharpe	Min.	Max.
Top ESG Port.	0.986%	4.68%	3.18	0.211	-18.38%	16.95%
Top Env. Port.	0.955%	4.69%	3.07	0.204	-17.17%	15.29%
Top Soc. Port.	0.934%	4.89%	2.88	0.191	-19.71%	16.67%
Top Gov. Port.	1.012%	4.94%	3.08	0.205	-18.82%	16.78%
Bottom ESG Port.	1.045%	5.44%	2.90	0.192	-19.41%	19.07%
Bottom Env. Port.	0.985%	5.59%	2.66	0.176	-20.94%	20.93%
Bottom Soc. Port.	1.018%	5.27%	2.91	0.193	-20.37%	18.15%
Bottom Gov. Port.	0.912%	5.53%	2.49	0.165	-21.02%	19.07%
N	228					

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Appendix C
This table reports the performance of the top ESG score portfolios and the bottom ESG score portfolios individually. For each month, the sample is sorted into quintiles, based on their ESG scores. The excess returns of the highest ESG quintile form the top portfolio, whereas those of the lowest ESG quintile form the bottom portfolio. The results are reported for both value-weighted and equal-weighted portfolios, and controlled the Fama and French five-factor model augmented with the momentum factor (FF-6). The sample period ranges from January 2004 until December 2022 (n=228). Robust t-statistics are given in parentheses.

	Value-weighted		Equal-weighted	
	Top	Bottom	Top	Bottom
Market β	0.932***	0.952***	0.978***	0.962***
	(65.32)	(33.67)	(62.26)	(41.75)
SMB	-0.187***	0.209***	0.091***	0.542***
	(-7.22)	(4.07)	(3.20)	(12.93)
HML	0.013	-0.163***	0.109***	-0.033
	(0.54)	(-3.37)	(4.07)	(-0.85)
WML	0.033**	-0.061**	-0.061***	-0.109***
	(2.27)	(-2.11)	(-3.80)	(-4.62)
CMA	0.091**	-0.195**	0.125***	-0.031
	(2.41)	(-2.60)	(2.99)	(-0.51)
RMW	0.109***	-0.223***	0.113***	-0.212***
	(3.40)	(-3.52)	(3.21)	(-4.11)
α	0.001**	0.002**	0.002***	0.004***
	(2.10)	(2.10)	(3.74)	(4.54)
R^2	0.958	0.894	0.963	0.941
Adj. R^2	0.957	0.891	0.962	0.940
N	228	228	228	228

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Appendix D

This table reports the performance of the top environmental score portfolios and the bottom environmental score portfolios individually. For each month, the sample is sorted into quintiles, based on their environmental scores. The excess returns of the highest quintile form the top portfolio, whereas those of the lowest quintile form the bottom portfolio. The results are reported for both value-weighted and equal-weighted portfolios, and controlled the Fama and French five-factor model augmented with the momentum factor (FF-6). The sample period ranges from January 2004 until December 2022 (n=228). Robust t-statistics are given in parentheses.

	Value-weighted		Equal-weighted	
	Top	Bottom	Top	Bottom
Market β	0.937***	0.944***	0.983***	0.999***
	(58.49)	(35.30)	(68.47)	(43.30)
SMB	-0.244***	0.254***	0.050*	0.547***
	(-8.38)	(5.21)	(1.93)	(13.04)
HML	0.035	-0.066	0.109***	0.092**
	(1.29)	(-1.44)	(4.45)	(2.33)
WML	-0.049***	-0.038	-0.084***	-0.118***
	(-2.98)	(-1.38)	(-5.70)	(-5.02)
CMA	0.135***	-0.234***	0.145***	0.046
	(3.18)	(-3.29)	(3.80)	(0.75)
RMW	0.017	-0.132**	0.086***	0.023
	(0.46)	(-2.21)	(2.67)	(0.44)
α	0.000	0.002*	0.002***	0.002***
	(0.42)	(1.73)	(3.75)	(2.60)
R^2	0.951	0.903	0.970	0.944
Adj. R^2	0.950	0.901	0.969	0.943
N	228	228	228	228

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Appendix E
This table reports the performance of the top social score portfolios and the bottom social score portfolios individually. For each month, the sample is sorted into quintiles, based on their social scores. The excess returns of the highest quintile form the top portfolio, whereas those of the lowest quintile form the bottom portfolio. The results are reported for both value-weighted and equal-weighted portfolios, and controlled the Fama and French five-factor model augmented with the momentum factor (FF-6). The sample period ranges from January 2004 until December 2022 (n=228). Robust t-statistics are given in parentheses.

	Value-weighted		Equal-weighted	
	Top	Bottom	Top	Bottom
Market β	0.966***	0.947***	1.007***	0.937***
	(74.19)	(37.10)	(68.44)	(42.25)
SMB	-0.185***	0.236***	0.119***	0.556***
	(-7.83)	(5.08)	(4.44)	(13.79)
HML	0.039*	-0.008	0.100***	0.072*
	(1.75)	(-0.18)	(3.98)	(1.89)
WML	0.019	0.021	-0.085***	-0.064***
	(1.44)	(0.82)	(-5.63)	(-2.83)
CMA	0.124***	-0.206***	0.059	-0.019
	(3.59)	(-3.04)	(1.51)	(-0.32)
RMW	0.039	-0.064	0.020	-0.095*
	(1.34)	(-1.13)	(0.62)	(-1.91)
α	0.001	0.002*	0.002***	0.004***
	(1.30)	(1.88)	(3.48)	(4.04)
R^2	0.968	0.907	0.971	0.942
Adj. R^2	0.967	0.904	0.970	0.941
N	228	228	228	228

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Appendix F
This table reports the performance of the top governance score portfolios and the bottom governance score portfolios individually. For each month, the sample is sorted into quintiles, based on their governance scores. The excess returns of the highest quintile form the top portfolio, whereas those of the lowest quintile form the bottom portfolio. The results are reported for both value-weighted and equal-weighted portfolios, and controlled the Fama and French five-factor model augmented with the momentum factor (FF-6). The sample period ranges from January 2004 until December 2022 (n=228). Robust t-statistics are given in parentheses.

	Value-weighted		Equal-weighted	
	Top	Bottom	Top	Bottom
Market β	0.977***	1.011***	0.970***	0.998***
	(61.72)	(40.74)	(60.64)	(45.52)
SMB	-0.192***	0.050	0.238***	0.470***
	(-6.66)	(1.12)	(8.17)	(11.79)
HML	0.046*	-0.109**	0.170***	-0.074*
	(1.69)	(-2.56)	(6.20)	(-1.97)
WML	0.025	-0.069***	-0.098***	-0.127***
	(1.53)	(-2.71)	(-5.98)	(-5.66)
CMA	0.003	-0.118*	0.093**	-0.053
	(0.08)	(-1.79)	(2.19)	(-0.90)
RMW	0.103***	-0.202***	0.131***	-0.293***
	(2.91)	(-3.63)	(3.65)	(-5.97)
α	0.002***	0.002**	0.003***	0.003***
	(2.74)	(2.06)	(4.06)	(3.42)
R^2	0.955	0.918	0.966	0.949
Adj. R^2	0.954	0.916	0.965	0.947
N	228	228	228	228

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.