ERASMUS UNIVERSITEIT ROTTERDAM

The impact of Climate Policy and Environmental Social Governance on Corporate Financial Performance within Europe.

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Abstract

This thesis examines the relationship between Environmental, Social, and Governance (ESG) performance and Corporate Financial Performance (CFP) and the effect of Climate Policy (CP) on that relation. These relations were evaluated using panel data from 731 European companies from 2010 to 2021. Contrary to meta-analyses, the results did not indicate a significant relationship between ESG and CFP. This also holds when accounting for CP. The findings suggest investors cannot rely on ESG performance to predict financial outcomes. On the other hand, companies can pursue ESG goals without necessarily impacting their financial performance. From a governmental perspective, the results of this study indicate that financial reasoning is unlikely to motivate companies to increase their ESG activities. Therefore, CP is needed to shift towards a sustainable economy, which does not indicate significant economic risks. It is imperative that further research is conducted especially in specific countries and sectors, as well as climate policy implications to confirm this conclusion. The study contributes to the literature by introducing the CP score as a potential influencer of the ESG-CFP relationship and provides directions for future research.

Keywords:

Index

1. Introduction

In the last and most likely the coming decades, one of the most crucial developments in our society will be related to the transition towards a sustainable economy. This encompasses climate goals in the broadest definition, including climate and drought as well as food scarcity prevention. Additionally, a sustainable economy should be economically healthy and decrease wealth gaps within society. All of these topics feel more urgent every year. Its urgency is visible through the spike of interest in academic studies and discussion as well as through widespread attention in society towards corporate social responsibility (CSR). For this study, CSR is referred to as environmental, social and governance (ESG) as it relates directly to governments and businesses, which are the focus of this study. It should be noted that in this study, the subject is predominantly discussed from a developed country perspective. Different regions have different perspectives, and some may face more direct short-term problems. This is outside the scope of this study, which is more directed towards the general economic effect of ESG practices. It spikes interest for the work of governments and companies towards a more sustainable economy. This study aims to evaluate the effect of climate policy (CP) on the relationship between the ESG score and the corporate financial performance (CFP) of companies in Europe. A positive relationship can encourage companies and government bodies to pursue a more sustainable economy as it also positively affects CFP. A negative relationship, however, requires a framework where companies are more supported towards reaching these goals. The absence of an effect would indicate that these measures are to be treated alongside but not necessarily in collaboration with each other. This study will use a series of abbreviations to refer to specific terms or concepts. A summary of these is given in Appendix A.

To be able to test the effect of CP on the relationship between ESG and CFP, the CP measurement is done with a CP score (CPS) constructed for the Climate Change Performance Index (CCPI) by Germanwatch (2021). ESG will be reflected by the Thomson and Reuters ESG score (ESGS). Tobin's Q and return on assets (ROA) are selected as indicators for CFP. The literature review and data & methodology section will discuss additional controls and model specifications.

As visible in a wide variety of studies and most famously written down by Friedman (1970), the goal of companies has always been to increase their profits. Naturally, activities that

create profit will expand and increase and vice versa. Elaborating on this theory, any activity that supports the creation of profit will be pursued by a company. This forms a basis of interest for the relationship between ESG and CFP. This is elaborated on in studies such as by Prahalad & Hamel (1994), who discussed the influence of broadening strategic business decisions, suggesting traditional performance indicators no longer cover the full spectrum of competitive forces. Changing regulations, sector-specific shifts and the demand for environmental awareness have become part of strategic and therefore, financial and investor-related decision making (Prahalad & Hamel; 1994, Waddock & Graves; 1997, So & Jae; 2021).

As posited by the broader societal discourse and academic community, sustainable businesses on company strategies and performance have been the focus of extensive deliberation, empirical investigation, and information acquisition. As a result, within the field of economics, an increasing number of studies have focussed on the relationship between ESG and CFP. In 2015, aggregated results of over 2000 studies showed a peak of interest since 1995 (Friede et al., 2015).

Within the domain of economics, scholars are predisposed to examine the impact of economic influences on a firm's or country's economic performance, as well as the potential consequences and measurable indices through which these effects can be predicted and scrutinised. A substantial body of research has been dedicated to exploring the nexus between ESG and CFP. For organisations, the most direct method to evaluate their influence on society is through the assessment of provided ESG scores. There exists considerable ambiguity concerning the ESG-CFP relationship. However, meta-analysis studies have shown predominantly non-negative results. Friede et al. (2015) state that 90% of over 2000 studies evaluated found a non-negative relationship between ESG indicators and financial performance. Huang (2021) confirmed the notion of the theoretical existence of a non-negative relation between ESG and financial performance based on a literature study. Nevertheless, it is essential to acknowledge that the practical impact of this phenomenon on the economy is relatively limited. As findings in the study of Huang (2021) demonstrate an economically modest influence on CFP indicators. Additionally, the findings of Rost & Ehrmann (2017) show that the positive findings of the literature might result from reporting biases. It is suggested that collective cognitive structures influence the expected results and, thereby, this research discipline's measured results.

Regardless of the relationship's direction, the issue is crucial for the large-scale implementation of a socially responsible strategy for companies. Arguably, companies can only long-term contribute to these types of strategies if the economic effect is understood. Increasing environmentally friendly corporate practices potentially promotes social advancement while reducing sector specific's carbon imprint. The attention to ESG performance has persistently increased over the last few years. Public, as well as shareholder activism, has addressed social and environmental responsibilities. Therefore, the discussion on the connection between ESG and CFP has been under increased interest.

Nonetheless, there are still a lot of unresolved issues surrounding this relationship. Therefore, businesses must comprehend the connection between ESG and CFP in order to improve their long-term ESG performance. Understanding the role of CPS potentially creates a deeper understanding of the relationship between ESG and CFP, thereby creating the ability to improved forecasting analysation of ESG-CFP the relationship. This could improve policy- and investment decisions.

Understanding the relationship between ESG and CFP performance has taken an essential role in risk management, both in the light of reputational as well as regulatory and legal risks. Identifying the relationship is vital for managing ESG risks for businesses and estimating the consequences of government legislation. Understanding what factors influence this relationship is arguably as important as understanding the relationship itself. Recent developments of the European Committee underline this. Following up on US subsidies, it is likely that the European Committee will implement a set of measures in order to (further) incentivise sustainable businesses (Van De Wiel, 2023). This stresses the importance of a deeper understanding of the effect of the ESG – CFP relationship in order to more accurately forecast policy effects in companies and therefore, in society.

Worldwide, the goal of creating a more sustainable society is increasingly discussed in businesses and government entities. The introduction and increasingly prominent role of ESG in investment decisions, the "Doing well by doing good" approach, as discussed by Falck & Heblich (2007), is one of the potential tools to get there. The relationship between social responsibility and financial performance may also create an economic incentive for investors, thus stimulating these companies to change. Additionally, regulations are implemented to incentivise or discourage certain business activities or practices, thereby exerting further

influence on corporate behaviour. Which are essential in order to achieve the ambitious climate goals set by the Paris Agreement and elaborated on by the European Green Deal. The Paris Agreement has been formulated to limit temperature increases (United Nations Climate Change Conference, 2015). The European green deal elaborates on this goal by setting a growth strategy that aims for no net emission of greenhouse gasses by 2050 and decoupling economic growth from resource use. The ultimate goal is to protect, conserve and enhance the EU's natural capital and protect the health and well-being of citizens from environment-related risks and impacts. This transition must be done fairly over all regions (European Commission, 2019). The European green deal formulates an aim and has since 2019 been supported by more than 80 ongoing additional initiatives and regulations, such as the European Climate Pact (European Commission, 2020) and more recently, the agreement on more robust rules to boost energy efficiency (European Commission, 2023). It is to be expected that this change towards sustainable businesses is continued and accelerated.

The countries that are selected for this study are all in Europe. As discussed, the increase of CP in Europe creates additional interest in this region. An additional point of interest is the apparent mitigation of significant differences in ESG results between countries. Finally, Europe provides a suitable geography for this research due to its well-defined climate goals, extensive CP, abundant availability of data, and diverse industrial landscape.
Shu & Tan (2023) state that investment in sustainability is the primary driver of sustainable development in the global economy. For profit-orientated investors, it is of importance to know what the effect of CP will be on the valuation and performance of a company. For government bodies, it is desirable to know the effect of regulations on environmental and social issues to ensure the effectiveness of regulatory measures. The challenge is to bring these goals together.

Most recent studies predominantly support a win-win consensus (Delmas et al., 2015). However, there is limited attention directed towards developing the relationship between ESG and CFP over time and the effect of CP on this relationship. Since there is a clear ambition and a regulatory obligation to increase environmental policies further, its influence on the ESG-CFP relationship is of utmost importance.
In accordance with the evolving relationship between societal expectations and economic imperatives, an increase in the interest of investors in ESG criteria has been observed.

PricewaterhouseCoopers (PWC, 2022) stated that 83.6% of investors intend to augment their investments in ESG-oriented products, with an estimated 15 of the 28 trillion EUR in assets under management as of 2021 in Europe (PWC, 2022). This estimation likely underscores the significance of this trend. At the same time, government entities actively engaged in dialogues, drafting of legislation, forged international agreements and emphasised the necessity of a sustainable economy. Consequently, these efforts resulted in the introduction of regulations targeting specific corporate and individual behaviour by encouraging or discouraging certain practices through subsidies or restrictions, respectively. Although the interrelation between ESG-CFP and CP is potentially impactful and orientated towards the same goal, it has not been extensively examined in the existing literature. Therefore, a comprehensive understanding of this relationship cannot be understated, as it holds considerable relevance in the context of academic curiosity and practical relevance. Consequently, the primary objective of this research will be to answer the question: "What is the effect of CP and ESG on CFP within Europe?".

2. Literature review

In this literature review, scientific literature published on the relationship between ESG and CFP as well as the effect of CP on this relationship, will be evaluated. This will lead to two hypotheses that will be evaluated in the data analyses. I will first discuss the relationship between ESG and CFP. The academic literature is divided on its direction as well as its significance. Several theories and relationships are discussed. Not only the question of whether there is a relation between ESG and CFP is unclear in literature, but also the direction of that relationship. If a relationship between ESG and CFP is described, it has been found to have both a positive and a negative association. Ioannou and Serafeim (2019) studied the effects of Corporate Sustainability (CS) as a strategy and found evidence for its positive effect on performance and increased competitive advantage. Bruna et al. (2022) described, for instance, a significant positive impact of ESG on CFP when disclosure is mandatory, as by the Non-Financial Disclosure (NFD) regulation that has existed since 2014. Giese et al. (2019) showed that positive ESG information positively influenced performance and valuation.

If a positive relation between ESG and overall high CFP goals is described in the literature, its causality and measurement are often a point of interest. Wong et al. (2021) discuss whether or

not a positive effect is merely due to lower cost of capital, thereby creating the ability to pursue Net Positive Value (NPV) projects that would otherwise not be value-adding to the company. In this way, ESG activities result in performance gains via a supportive capital structure instead of outperforming competition due to efficiency as a side effect of fulfilling ESG acquirements.

Besides potential side effect measurement, companies' uptake of greenwashing decreases ESG scores' interpretability. Greenwashing describes the practice of creating false or misleading representations of a company. Delmas & Burbano (2011) give an insightful overview of its effects and implementations. The in-depth discussion is out of the scope of this study, but its findings show an uptake in the amount of greenwashing done by companies and severe difficulties addressing it amid limited and uncertain regulation should be incorporated when analysing the results of this study.

When assessing antecedents, Singh et al. (2022) found a significant negative ESG–CFP relationship for the 200 biggest listed Indian companies. For emerging markets, the relationship is found to be negative more often. Saygili et al. (2022) describe a negative relationship whilst noting that increased shareholder rights and stakeholder activity on the board did have a positive effect on the governance pillar.

Whelan et al. (2021) sum up the most used theoretical frameworks applied in studies related to ESG and CFP. These studies focussed primarily on the Stakeholder theory as first described by Freeman (1984). Less frequently used are the shared value theory, the legitimacy theory and the resource-based view. Where the stakeholder theory is characterised as managing optimally for all stakeholders, the shared value theory adds the effect of increased CFP as a result of the stakeholder theory (Whelan et al., 2021). The legitimacy theory is described as a figurative social contract between companies and society which, if broken, results in a decrease in demand for the product or service offered. The resource-based view is a framework emphasising the internal resources for the creation of competitive advantage (Barney, 1991).

In line with others, Busch & Friede (2018) find that most positive ESG-CFP relationships are rooted in the stakeholder theory and the resource-based view and are based on the institutional theory or are drawn from the organisational literature as described by Porter (1979). A negative ESG-CFP relationship most commonly refers to the theories from Levitt (1958) or

Friedman (1970). Both argue that focusing on anything other than their primary purpose of generating profit leads to inefficiency and harms shareholder value. The most notable theory supporting a neutral relationship is the efficient market hypothesis of Fama (1991). This hypothesis argues that all information is priced by the market at any time, including ESG information. Clearly, this only holds for market value measurements.

In line with the literature and in order to establish the ESG-CFP relationship first, the stakeholder and shareholder theory are assessed. When assessing the purpose of companies, one of the most discussed and underwritten theories is the stakeholder theory of Freeman (1984), which states that all stakeholders related to the business in its value-creating process will create company value when they are all being looked after. This will then result in a market advantage and an improved financial performance. This theory is distinctively different from the shareholder theory of Friedman (1970), which states that socially responsible activities should not be a corporation's objective or responsibility. In that approach, the only purpose of a company is to maximise financial value for the owner and the relevant shareholders. This theory, however, does not neglect social responsibilities entirely. Friedmans' approach assumes that social responsibility and social value creation (comparable to the in the ESG included categories) are an obvious side-effect of conventional business activities. Additionally, Smith (2003) described that social activities that do carry value for the core CFP objective of a company are worth pursuing under Friedman's theory.

Due to the increased activity of academics assessing the ESG-CFP relationship, studies have been dedicated to meta-analyses of earlier work to find a more solid relationship. The most notable study is the one done by Friede et al. (2015), where it is stated that in roughly 90% of 2200 studies evaluated, a non-negative relationship between ESG and CFP was described. The primary meta-analysis conclusions have led to Hypothesis 1. Adjacent to this hypothesis is the expectation of higher influence of accounting measurements then market measurements. This is based on a higher comparability and a stronger reflection- on ESG aspects in the daily management decision-making process than in an investor's valuation (Busch & Friede, 2018). As well as the market efficiency theory stating that all growth potential is already in the market price Fama (1991). Also, Huang (2021) described that a majority of studies find a stronger relationship between accounting measures.

H1: The relationship between ESG-CFP is positive

With respect to the second subject, the effect of CP on the ESG-CFP relation, the literature is less abundant. However, there is relevant literature related to the uncertainty generated by the unpredictability of CP, in line with market uncertainty (Fuss et al., 2008; Yang et al., 2008). In these studies the observed CP impact is predominantly associated with anticipated fuel prices and exhibits an increased influence when the investment decision-making period and policy determination coincide closely. This implies that the primary factor contributing to the reduction in investment is the uncertainty surrounding the situation rather than the policy measure.

Additionally, a number of studies investigated carbon emission strategies. The impact of environmental protection agencies (with the ability to give financial penalties) has been discussed by Romero et al. (2018). Their findings show that companies that disregard environmental policies and are fined for these actions, in the end, experience a statistically significant negative effect on their Net Income (NI). It should be noted that this effect can only be studied for firms that actually got a fine. Attention should also be given to differences in research questions focussing on enforcement policies or other approaches. Management based on enforcement likely significantly differs from management in companies that are intrinsically motivated to "well-behaving" or even "best of class" behaviour on the ESG subjects. These companies are often confirming the newly implemented policy in advance. This may lead to an underestimation of the potential positive effect of these measures when implemented. Besides regulatory aspects, CP comprises subsidies and other behavioural stimulating measures, which may also play a motivating role in implementing these policies. The Porter Hypothesis (Porter & van der Linde, 1995) states that environmental regulations incentivise companies to be innovative, thereby increasing efficiency and thus having a positive effect on CFP. Results from literature assessing the effect of environmental taxes (Bosquet, 2000; Patuelli et al., 2005) state that environmental regulations can have a positive financial effect under strict circumstances that are mostly tax related. One could hypothesise that CP strengthens the positive effect of ESG on CFP. It should be noted that the results of these studies were on a country level rather than on the company level, measuring the benefits in e.g., Gross Domestic Product (GDP) and employment. Effects on the company level were not taken into account.

Implementation of CP can have a positive effect on CFP via better management of certain risk factors due to decreased uncertainty and more fair competition. It might, however, also have a negative effect because it may increase compliance costs and reduce competition due to overly complex regulations or an unattainable increase in costs (Van Den Bergh, 2004; Houser et al., 2008). In addition, significant differences in investments needed to fulfil regulatory requirements can be seen in companies with varying ESG scores within the same sector. Obviously, low-scoring companies will generally require higher investments in order to fulfil new regulations.

As stated by Commins et al. (2011), there is relatively little information concerning the effect of environmental regulations on company behaviour. Most of the literature has focussed on the effect of environmental regulation on the environment. Commins et al. (2011), however, found positive effects of an environmental tax on productivity, although they noted there was a considerable variation between sectors. They found that the core driver of this increased productivity was based on the indirect incentive for technological innovation. Additional support for the positive effects of ESG via green innovation is found by Chouaibi et al. (2019).

The existing academic literature does not appear to contain any studies explicitly examining the effect of CP on ESG-CFP. This thesis aims to add to this discussion by providing insights on this aspect. It is hypothesised that the ESG score can indicate a company's willingness to adopt new ideas and comply with new regulatory requirements related to ESG. Based on the ESG score, a company's capability to decrease potentially adverse effects of compliance costs of new regulations whilst utilising innovative potential may be quantified. Thus, it is hypothesised that CP has an increasing effect on the ESG-CFP relationship. This leads to Hypothesis 2:

H2: CP has an increasing effect on the relationship between ESG and CFP

Both hypotheses, H1 and H2, will be tested in the analysis.

3. Data and methodology

This study aims to evaluate the effect of CP on the relationship between ESG and CFP. A quantitative analysis of panel data is done, including cross-country and cross-sector analysis of companies over the period 2010 – 2021. Data collection was done from 3 sources: "Eikon" (a tool provided by Refinitiv, for which Datastream is the economic database); "Compustat" (data retrieved through Wharton Research Data Services WRDS); and "CCPI" (the Climate Change Performance Index)[1]. The dataset is constructed from the Thomson Reuters ASSET4 database. After dropping observations that did not have data points, a database of 729 firms remained, with a total of 3.455 observations. The following sections will first describe the data sources; thereafter, the variables will be highlighted. Finally, data handling and initial analysis and methodology will be described.

3. 1 Data sources

The Eikon data source provides a comprehensive range of static and time series data for listed companies. This includes a wide range of company information, including financial ratios, valuations, market data, company financials and the Refinitv (formerly Thomson Reuters) ESG score.

The Compustat dataset consists of data on S&P Global Market Intelligence. Compustat has been included to check variables and add missing data. The selected data has been measured on an annual basis, on December 31, in each respective year. Both datasets, Eikon and Compustat, are limited to listed companies.

The CCPI database ranks countries based on their efforts to combat climate change. It is compiled by Germanwatch, the NewClimate Institute and the Climate Action Network. In the CCPI, information is provided on each country's greenhouse gas emissions, renewable energy deployment, energy use efficiency, as well as CPs. This study will only focus on the CPS of the different countries. Since 2010 there has been no change in the methodology for assessing the CPS. There are, therefore, no issues with the comparability of the panel data over the years.

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[1] CCPI data has been generously provided under NDA for educational purposes by Germanwatch e.V.

For all countries included in the financial database, there is CPS data available. Countries included have sufficient data for companies in both financial, ESG and CCPI databases. Countries included in the analysis are Austria; Belgium; the Czech Republic; Denmark; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Luxembourg; Malta; the Netherlands; Norway; Poland; Portugal; Spain; and Sweden.

3.2 Dependent variables

The dependent variables are selected to represent CFP. Relevant literature commonly applies both market and accounting measures (Choi & Wang, 2009; Velte, 2017 Saygili et al., 2021; Singh et al., 2022) that reflect CFP, thus creating the ability to evaluate both financial market and accounting related measures. As discussed by Choi and Wang (2009) and reiterated by Velte (2017), accounting-based measures can be diluted for various reasons. It is, therefore, essential to include market measures when book value and market value are evaluated.

For accounting-based measures, scholars apply a variety of measures to say something related to accounting profitability confidently. Return on Assets (ROA), Return on Equity (ROE), earning per share, and growth, such as applied by Christensen et al. (2010). This study makes use of ROA as applied by a variety of scholars (Velte, 2017; Singh et al., 2022; Almeyda & Darmansya, 2019) and described as the most fitting technique by Cochran and Wood (1984). In this evaluation, the following formula is used:

$$ROA = \frac{\text{Net Income}}{\text{Total Assets}} \qquad\qquad (\text{eq. 1})$$

This is a straightforward accounting measure, utilising the reported Net Income and Total Assets from the income statement and balance sheet, respectively. It shows the profit that is made relative to the total amount of assets. This is most applicable for this study as it is a straightforward measure helping interpret the results relative to the total assets and thus decrease differences based on the effect of the size of a company. There has been made use of one accounting variable because it increases the ability of interpretation.

Market measures include share price performance, price-earnings ratios and Tobin's Q (Singh et al., 2022). Market value is added as it represents the potential growth of a company. Other growth parameters are disregarded as they are generally highly influenced by acquisition and disinvestments inorganic growth (O'Shaughnessy & Flanagan, 1998). The market measure

selected is Tobin's Q, which was chosen because of its clear interpretation and broad adoption. Tobin's Q is a financial ratio compromised by the following formula:

$$\text{Tobin's Q} = \frac{\text{Market Enterprise Value}}{\text{Total Asset Replacement Value}} \qquad \text{(eq. 2)}$$

Market Enterprise Value is comprised of Market Capitalization at fiscal year-end date + Preferred Stock + Minority Interest + Total Debt minus Cash. Cash represents Cash & Due from Banks for Banks, Cash for Insurance Companies and Cash & Short-Term Investments for all other industries. Total Asset Replacement Value represents the sum of total current assets, long-term receivables, investment in unconsolidated subsidiaries, other investments, net property plant and equipment and other assets.

When Tobin's Q has a value between 0 and 1, that indicates that the company's cost to replace assets is greater than the value of its stock. This implies that the stock is undervalued. Conversely, a high Tobin's Q (greater than 1) indicates that the company's stock is considered to have more value than the replacement cost of its assets. This in turn implies that the stock is overvalued. Whilst acknowledging critiques of Tobin's Q for its lack of ability to capture the real company value (Bruna et al., 2022). As most studies in this field utilise the metrics of Tobin's Q and ROA, these were selected for comparative purposes.

3.3 Independent variables

Two independent variables and one interaction variable are used for the regression analysis. The first variable is the ESG score, formulated by Refinitiv (2022). The interaction variable is the interaction of ESG with CPS to test for the combined effect of these independent variables. For ESG, three different metrics are utilised in order to test different influences. First, the general ESG score (ESGS) is obviously comprised of the environmental, social and governance pillars. The second is the combined ESG score (ESGC), in which a controversy overlay is added to the general ESG score. Thirdly the environmental pillar is used separately in the environmental policy score (EPS). These scores are designed to transparently and objectively measure a company's relative ESG performance, as described by Refinitiv (2022). The scoring system is focussed on two main aspects the relative ESG performance and

transparency in reporting ESG data. A high score reflects an excellent relative ESG performance and a high degree of transparency, while a low score reflects poor relative ESG performance and a low degree of transparency. Scores are on a scale from 0 to 100 and are also assigned letters from D to A, as presented in Appendix B. A variety of 630 different ESG metrics are used, which, as of 2022, cover 85% of the total global market cap (Refinitiv, 2022). The metrics are carefully comprised of the relative performance of ESG factors with the company's sector for environmental and social and country of incorporation for governance. This is done using calculation principles, assigning weight to the materiality of the data points relative to their sector. This approach is used through the stated transparency objective. Metrics that are assigned significant materiality and are not reported or have low scores on these issues will greatly influence the overall score. Missing or low-scoring data on metrics with low assigned materiality will affect the overall score to a lesser degree. The underlying categories of the three main pillars, environment, social and governance, are described in Appendix C. These categories are assigned a weight that reflects the importance of that pillar in the respective sector and thus are sector dependent. The environmental pillar comprises three categories: emission, innovation and resource use. In Table 1, an exemplary table for several sectors is given with indicative weights for the three categories in the environmental pillar in 2022.

Table 1 Sample EPS Category weights by industry group

This table provides an illustrative example of category weights used in calculating the Environmental Pillar Score (EPS) for different industry groups based on sample data. The weights represent the relative importance of emissions, innovation, and resource use for each industry group. Please note that this is a demonstrative matrix and not the definitive one used for the final scoring in the study. The sample data is provided by Refinitiv.

Industry group name	Industry Group Code	Emission	Innovation	Resource use
Diversified Retail	534020	0.420	0.120	0.460
Oil & Gas	501020	0.320	0.300	0.390
Software & IT Services	572010	0.220	0.440	0.330

Table 1 shows the difference in materiality; for diversified retail, the weight of emission-related metrics weighs more heavily compared to the other sectors. For software, the most materiality lies on innovation, and for oil and gas, all three categories are weighted evenly. In practice, this will mean that a diversified retail company with low scores in the innovation category will experience a less negative effect on its total ESG score compared to software & IT services, and vice versa.

Of the three pillars (environment, social and governance), the environmental pillar arguably is the most interesting pillar related to CP. The environmental pillar is constructed out of resource use, emissions and innovation with each 20, 28, respectively 20 subsets of ESG metrics. These subsets are selected based on comparability and materiality and power the overall assessment. Two categories of scoring methods have been used, Boolean and numeric data. Boolean data typically consist of yes or no questions. These results are converted to numbers depending on whether yes or no indicates good or bad performance relative to the specific indicator. Numeric data is analysed relatively. Based on the three categories (emission, innovation, resource use), a ranking score (percentiles) is calculated. It reflects how many companies are worse than the one evaluated, as well as the number of firms with the same value. A relevant question is also how many companies have a category score on this issue. This is presented using the following formula:

$$ESG\ pillar\ score = \frac{\#\ companies\ with\ a\ worse\ value + \frac{\#\ companies\ with\ the\ same\ value\ included\ in\ the\ current\ one}{2}}{\#\ of\ companies\ with\ a\ value} \qquad \text{(eq. 3)}$$

These pillars (environmental, social and governance) are added together for the general ESG score; the environmental score only shows the environmental pillar. For the ESG controversies score, an overlay is added. This includes an examination of companies' behaviour in relation to their ESG commitments, with the intention of amplifying the influence of substantial controversies on the comprehensive ESG evaluation. The scoring methodology endeavours to counteract a market capitalisation bias affecting large enterprises. This is done by integrating severity weights that guarantee controversy scores which are appropriately adjusted in accordance with a company's size. When a respective firm has not been involved in controversy, this score is the same as the overall ESG score. This way, the difference in weight relative to increased media attention for larger companies is accounted for (Refinitiv, 2022). This was based on the assumption that certain information indeed has a

negative impact on some of the tested factors included in the ESG score, while they are not visible beforehand. Thus, this approach might lead to a more reliable score because it incorporates all available information, especially information the firm might not want to share publicly. On the other hand, this could also be the effect of climate activists targeting one specific company during a certain period while subsequently moving on to another company. On the other hand, once there has been controversy, it is not unlikely that this increased focus will persist for some time. Hence, possibly influencing the score incorrectly. The potential value of this controversy overlay is recognised, and therefore, both scores are implemented in separate regression analyses in order to compare the results. A visual overview of the metrics, measures and categories included in the score is given in Appendix D. Application of the ESG score by Refinitiv is commonly used within this study area. However, this rating also has its limitations. It may convey important insights into significant shortcomings in other objectives and methodologies. A detailed analysis, such as the one by Larcker et al. (2022), is out of the scope of this study.

For the CCPI, the CPS has been constructed. CCPI is an instrument that enables transparency in global climate politics. A standardised framework is used to compare 59 countries. It is based on four main categories, GHG emissions, Renewable Energy, Energy Use and CP. In this thesis, CP is solely assessed through PS. The basis of the CPS is the performance rating by climate and energy policy experts from non-governmental organisations, universities and think tanks within the countries that are evaluated. This is assessed by a questionnaire where a rating is given on a scale from one ("weak") to five ("strong"). These results are given a score between 0 and 100, where depending on the question, 0 either represents weak and 100 represents strong or vice versa. Hereafter the average is taken. Data is assessed per country on an annual basis in comprehensive research studies. It is constructed by policy experts from non-governmental organisations, universities and thinks tanks within the countries that are included in the evaluation (Burck et al., 2021).

European countries have been scored individually over the years, with roughly 400 national climate experts contributing on a yearly basis to these scores. Each evaluated their own country's national and international policy. The latter is also rated by CP experts who closely observe the participation of the respective countries at climate conferences. The score is divided into national and international scoring, both counting for 50% towards the overall score. A visual representation of the CCPI scoring system is presented in Appendix E.

3.4 Control variables

Various control variables are selected and used in the models to increase the reliability of the results. Singh et al. (2022) state that there is a lack of consensus with regard to the determination of factors that best explain the ESG-CFP relationship. This troubles comparability and might partly explain the ambiguity in research results. This underlined the findings in the meta-analysis of Busch & Friede (2018), who found that a lack of unity in control variables in the primary studies that were selected for their meta-analysis created difficulties in comparability of these studies. As there is much variance in control variables across studies, the most prominent control variables were selected from the relevant literature and were included in the analysis in this thesis. Some studies assigned different control variables for Tobins' Q and ROA. This decreases comparability, which, however, is often disregarded. The control variables used for both Tobin's Q and ROA are the following. Research & Development Expenses (R&D), Andrade et al. (2019) have connivingly supported the influence of R&D on firm performance via technological innovation. Historical Beta as a systematic risk indicator (HBeta). Allowing to control for the impact of market risk on firm performance. The unsystematic risk factor is added via debt ratio, as is commonly done in the literature, to control for unsystematic firm-specific risk via total debt over the 5-year average of total assets (Debt). Finally, total assets as size indicator (Size) is commonly used throughout literature to control for significant differences due to differences in firm size. These control variables are in line with relevant studies (Waddock & Graves, 1997; Velte, 2017; Aouadi & Marsat, 2018) as well as theoretical considerations. Additional control variables included were year, sector and country fixed effects. This is generally done in studies described in the literature, as large differences between sectors, periods, and countries are expected.

3.5 Data handling

All data analyses and corrections for sampling and measurement order have been performed using Stata SE/17.0. Company selection was made on Eikon via the ESG Asset 4 database (LA4RGNEU). An overview of Eikon Mnemonic codes is given in Appendix F and, where applicable, also presented with the variables below between brackets. The initial dataset contained information for 2,579 unique International Securities Identification Numbers (ISIN). Each ISIN consists of a 12-digit alphanumeric code that uniquely identifies a

company's security. The ESG variables used in this study are the ESG score (TRESGS), the ESG combined score (TRESGCS), and the Environmental Pillar Score (TRESGCS). The initial data analysis was done on the Eikon dataset, to which static company data and time-series financials were added. Initial data cleaning consisted of dropping companies with missing ISIN or Standard Industrial Classification (SIC) codes. Additionally, financial ratios were extracted from Eikon, consisting of Historical Beta (897E); Debt (WC08240); Cash (WC08115); and total assets (WC02999). All absolute financial data has been converted to euros using Eikon's calculated conversion rates. For ratios its original value was used. The Compustat database is used as a source of additional R&D data because this variable was shown to be incomplete in the Eikon database. Finally, European countries were selected from the CCPI dataset, leading to the group of European countries described above. These three datasets were subsequently merged based on the Compustat and Eikon databases based on ISIN code and subsequently for the CCPI database based on country code. Throughout the process of merging datasets, non-matched, missing and faulty data was dropped. The combined dataset is grouped per sector based on its respective SIC code. This is done using the Fama & French industry classification, as described by French (2023) and is presented in full in Appendix G. To ensure an unbiased representation of industries, 30 types of industry classifications are used. As shown in Appendix H. Tobacco products and Coal have a relatively low frequency. Unfortunately, this could not be improved by further segmentation or merging of sectors. In line with Velte (2017), companies in the financial sector (Banking, Insurance, Real Estate, Trading) were dropped because they are irrelevant to this study due to their significantly different business model and unique regulatory environment compared to companies in other sectors.

Appendix I presents the table of countries and their frequency in the dataset. Most notable is the relatively high number of observations in Sweden. This can be due to a higher reporting standard or to other specific factors in the country. However, as country-fixed effects were used in all of the regression analyses, this will not affect the results in this study. Comparable studies in the literature have used lagged ESG metrics (Velte, 2017; Naimy et al., 2021; Bruna et al., 2022). This was done in line with theoretical expectations, as the effect of ESG score is known to be delayed as certain strategies might not be impactful from the start. It also decreases the effect of a bidirectional relationship. The lagged value is also used for CPS. Policies, initiatives and regulations that compromise the CPS are more forward-looking as they require time to be fully implemented and take effect.

The dataset has been analysed to omit outliers and normalise values. Assessing the variables in the dataset show some extremes, e.g., a maxim value for Tobin's Q of 334.85 and of 176.8 for ROA. Even though these values are theoretically possible, the effect of these extreme values would decrease the model fit, while they are not contributing to realising the goal of the study. Therefore, the logarithm of assets (Size) and winsorization technique for the other relevant variables are applied. As outliers are expected to be exaggerations of the truth (Ghosh & Vogt, 2012), the logarithm of assets is taken as a size indicator. This is in line with the relevant literature (Velte, 2017; Andrade et al., 2019; Singh et al., 2022; Bruna et al., 2022). In literature, assets and revenue are used to indicate company size. In this study, company size is based on the company's assets, including property, equipment and other resources. These create the most valuable metrics, as it tends to be more stable over time.

The other non-ranked variables are winsorised. Winsorisation prevents outliers from influencing the analysis without losing observations because extreme values are reintroduced at the cut-off point. This has been done at the 1 and 99 per cent for Tobin's Q, as it cannot reach extreme negatives and creates a more fitting distribution. Other variables are winsorised at the 5 and 95 percentage points to omit outliers. The ranked variables (ESG, CPS) are between 0 and 100 and thus do not need modification.

Altering data in order to reduce outliers creates a potential risk of poor estimates of parameters of interest (Ghosh & Vogt, 2012). This study, however, focuses on the average impact, and outliers were not dropped but were reduced to a set maximum via winsorisation. I am therefore confident this will not lead to negative consequences with respect to the estimations. For dependent, independent as well as control variables, extreme data points have been reduced. The descriptive statistics of all included variables, including the interaction variable, which will be discussed in the next paragraph, are shown in Table 2.

Table 2 Descriptive statistics

This table provides summary statistics for the variables used in this study, including Tobin's Q, ROA, ESG, CPS, R&D expenses over assets, historical Beta, total debt over total assets, and firm size (ln of total assets), with details on the number of observations, means, standard deviations, minimum, and maximum values. Variables with * have been winsorised at the 5 and 95 per cent levels, and Tobin's Q denoted with ** is winsorised at the 1 and 99 per cent levels. This has been done based on individual variable characteristics, discussed in the data handling section. Size is the ln of total assets. The interaction variable denoted by [1] illustrates the mean of all interaction variables implemented; as the descriptive statistics of each interaction variable are highly similar, the average of the interaction variables is shown.

Variable	Obs	Mean	Std. Dev.	Min	Max
Tobin's Q**	4065	1.863	2.118	0.315	13.102
ROA*	4065	4.561	6.577	-12.010	17.000
ESGS	4065	57.263	20.136	0.630	94.570
ESGC	4051	57.257	20.149	0.630	94.580
EPS	4065	53.587	26.927	0.000	99.150
CPS*	4065	63.640	19.529	4.520	100.000
Interaction variable[1]	3223	1.406	1198.071	-2260.390	3715.983
R&D*	4065	0.033	0.042	0.000	0.152
HsBeta*	4065	1.010	0.479	-0.028	2.355
Debt	4065	0.230	0.137	0.001	0.624
lnSize	4065	14.886	2.028	7.521	19.535

The first data relationship assessment is performed with a straightforward correlation matrix. All variables included in the regression analysis are shown in Table 3. The correlation between Tobin's Q and all ESG indicators is shown to be negative (ESGC, -0.224; ESGS, -0.223; EPS. -0.281). Which would suggest a negative relationship for the regression model. For ROA, a positive correlation with the ESG indicators is measured (ESGC, 0.062; ESGS, 0.062; EPS, 0.078). Furthermore, size is shown to have a positive effect on the ESG indicators (ESGC, 0.654; ESGC, 0.654; EPS. 0.670). This indicates potential multicollinearity issues. The Variance Inflation Factor (VIF) was calculated to test for the presence of multicollinearity. This showed a value of 69.94 for Tobin's Q and 77.35 for ROA, proving a strong correlation between size and the CFP indicators. A common threshold for these factors is 10. All other variables did not go near this threshold. Multicollinearity can be an issue as the calculated VIF for Size is considerably higher than the threshold. In order to reduce collinearity between size and ESG, it was made orthogonal, in line with the suggestions of Van Der Meer & Jia (2012). This significantly reduced the variance inflation factor (VIF) for

size to 1.82 (Tobin's Q) and 1.76 (ROA), thus successfully removing the multicollinearity issue. Orthogonal variables, however, are more challenging to interpret, which will be elaborated on in the results & discussion section.

The effect of CP on the ESG-CFP relationship will be tested in the regression analysis, with an interaction variable of ESG with CP. The mean centralised values of CP and ESG were used for this. As a result of multiplying these centralised variables, the impacts of huge numbers were eliminated, which also increases interpretability. The interaction variable is centralised by running the regression without the interaction variable first, using the mean of variables used in this sample regression for ESG and CCPI. Subsequently, the interaction variable was created by multiplying the centralised values of ESG and CP. Centralised variables were created for each model as the observations for the respective independent variables differed slightly. The interaction variable shows a negative (-0.147) correlation with Tobin's Q and a positive correlation with ROA (0.039). These findings suggest a negative effect to be measured for CP on ESG-CFP for Tobin's Q and a positive effect of CP on ESG-CFP for ROA. Interaction variables were created for each ESG metric, but because the results were in line with the general scores, the means are shown in the table to conserve space. R&D showed a positive correlation (0.406) with Tobin's Q and a negative correlation with ROA (-0.082). CP shows a positive correlation with Tobin's Q (0.147) and a negative correlation with ROA (-0.038). The interaction variable ESG*CP shows correlations in the reversed direction compared to CP. This suggests that the positive effect of CP on Tobin's Q is turned into a negative effect when the combined effect of ESG and CP is evaluated. The opposite is true for ROA, which is in line with the direction of the respective ESG metrics.

Table 3 Correlation matrix of variables

This table reports the correlation matrix of all variables included in this study. The pairwise correlation coefficients between the variables are shown, indicating the strength and direction of the linear relationships between them. A positive correlation coefficient indicates a positive linear relationship, while a negative coefficient indicates an inverse linear relationship. The values range from -1 (perfect negative correlation) to 1 (perfect positive correlation), with 0 indicating no correlation. The size and direction of the correlation did not differ significantly for the individual interaction variables denoted by[1]; the average of the interaction variable for its respective independent variable is taken.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Tobin's Q	1.000											
(2) ROA	0.278	1.000										
(3) ESGC	-0.224	0.062	1.000									
(4) ESGS	-0.223	0.062	0.999	1.000								
(5) EPS Pillar	-0.281	0.078	0.853	0.854	1.000							
(6) CP	0.147	-0.038	-0.009	-0.008	-0.028	1.000						
(7)ESG*CP iv[1] (Tobin's Q)	-0.147	0.039	0.008	0.007	0.027	-1.000	1.000					
(8) ESG*CP iv[1] (ROA)	-0.147	0.039	0.008	0.007	0.027	-1.000	1.000	1.000				
(9) R&D	0.406	-0.082	-0.150	-0.150	-0.242	0.144	-0.145	-0.145	1.000			
(10) Hist. Beta	-0.139	-0.200	0.097	0.097	0.102	0.135	-0.135	-0.135	0.049	1.000		
(11) Debt	-0.246	-0.070	0.115	0.115	0.129	-0.112	0.111	0.111	-0.313	0.053	1.000	
(12) Size	-0.427	0.085	0.654	0.654	0.670	-0.124	0.124	0.124	-0.379	0.025	0.225	1.000

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Analysing dependent, independent, and control variables lead to the following regression equations, of which Equation 4 and Equation 5 are without CP, and Equation 6 and Equation 7 include CP and the interaction variable:

$$Tobins\ Q_{i,t} = \alpha + \beta_1[ESG]_{i,t-1} + \beta_2 R\&D_{i,t} + \beta_3 Historical\ Beta_{i,t} + \beta_4 Debt_{i,t} \quad \text{(eq. 4)}$$
$$+ \beta_5 Size_{i,t} + FE_1\ sector_i + FE_2\ year_i + FE_3\ country_i + \varepsilon_{i,t}$$

$$ROA_{i,t} = \alpha + \beta_1[ESG]_{i,t-1} + \beta_2 R\&D_{i,t} + \beta_3 Historical\ Beta_{i,t} + \beta_4 Debt_{i,t}$$
$$+ \beta_5 Size_{i,t} + FE_1\ sector_i + FE_2\ year_i + FE_3\ country_i + \varepsilon_{i,t} \quad \text{(eq. 5)}$$

$$Tobins\ Q_{i,t}\ =\ \alpha\ +\ \beta_1[ESG]_{i,t-1} + \beta_2 Climate\ Policy_{i,t-1}$$
$$+\ \beta_3 Interaction\ variable_{i,t} + \beta_4 R\&D_{i,t}\ +\ \beta_5 Historical\ Beta_{i,t}$$
$$+\ \beta_6 Debt\ _{i,t}\ +\ \beta_7 Size_{i,t}\ +\ FE_1\ sector_i + FE_2\ year_i + FE_3\ country_i$$
$$+\ \varepsilon_{i,t}$$

(eq. 6)

$$ROA_{i,t}\ =\ \alpha\ +\ \beta_1[ESG]_{i,t-1} + \beta_2 Climate\ Policy_{,t-1}$$
$$+\ \beta_3 Interaction\ variable_{,t} + \beta_4 R\&D_{i,t}\ +\ \beta_5 Historical\ Beta_{i,t}$$
$$+\ \beta_6 Debt\ _{i,t}\ +\ \beta_7 Size_{i,t} + FE_1\ sector_i + FE_2\ year_i + FE_3\ country_i\ +\ \varepsilon_{i,t}$$

(eq. 7)

Where

- Tobins $Q_{i,t}$ is the Tobin's Q ratio of firm i at time t
- $ROA_{i,t}$ is the Return On Assets of firm i at time t
- $[ESG]_{i,t-1}$ is the ESGS, ESGC, EPS score of firm i at time t-1
- ClimatePolicy$_{i,t-1}$ is the climate policy score of the country where firm i is located at time t - 1
- Sector$_i$ is a fixed effect representing the sector of firm i
- Country is a country in which firm i is operating
- Year is the year in which the data of firm i were collected
- α is the intercept
- β_{1-7} are regression coefficients to be estimated
- $\varepsilon_{i,t}$ is the error term representing unobserved factors affecting the dependent variable that is not accounted for by the independent variables for firm I at time t

3.6 Methodology

The data used in this study is panel data, consisting of observations over time. Broadly applied models to assess this type of data are random-effects and fixed-effects models. Both of these have previously been applied in relevant literature. Fixed-effects models focus on within-firm variation, while random-effects models capture both within- and between-firm variation. Analysing the differences between firms will indicate higher variances between variables, resulting in a broader potential for the interpretation of the results.
Additionally, a random effects model is preferred for this study because it has a higher R-squared value, which indicates a better match for the dataset in this study. Therefore, given

the theoretical preference and the ease of interpretation, the random-effects model was chosen for this study. Robust errors were introduced to reduce heteroskedasticity. Four series of regression analyses were exercised to test for the described relationship of ESG-CFP and the effect of CPS on ESG-CFP (eq. 4-7). First, the effect of ESG on CFP was examined in two series of analyses. The first series was done for all three categories of ESG scores on the dependent variable Tobin's Q. The second series of regressions used ROA as the dependent variable. For all of these regression models, the control variables were added individually to find their effect. This showed (modest) differences in significance but not in the direction of the coefficient. As differences were minimal, they are not shown in the results section.

The same steps were applied for the third and fourth series of regressions, where CPS and the interaction variable of CPS and ESG were included as independent variables. As discussed above, orthogonal variables were introduced in order to reduce the effect of the correlation between Size and ESG. Due to the construction of orthogonal variables, these are hard to interpret because they alter the size of the variables included. In order to be able to have insight into the size of the coefficient, all regressions were run with their original variables as well as with the orthogonal variables. The impact of Size and potential issues with its interpretation will be discussed in the results and discussion section.

4. Results and Discussion

The outcomes of the executed regression analysis are presented and discussed in this section. The first coefficients and their significance are shown for both the effect of ESG on CFP for Tobin's Q in Table 4 and for ROA in Table 5. The effect of the introduced CPS variable on CFP for Tobin's Q is shown in Table 6 and for ROA in Table 7. All tables consist of the regression analysis results as presented in the respective formulas in the methodology section. The first three models (denoted by (1), (2) and (3)) of each regression table show the results of the regression model based on orthogonal variables. The last three models (denoted by (4), (5) and (6)) show the results of the same models but include the original, non-orthogonal variables. The first model of each couple (models (1) and (5)) ESGS as independent variable, the second couple (models (2) and (6)) ESGC, and the third couple (models (3) and (7)) EPS. The main focus will be on the orthogonal variables as there the collinearity issue has been reduced.

4.1 Effect of ESG on CFP

First, I will show the main results and will discuss these in line with the hypothesis. In Table 4, the independent variables ESGS and ESGC show a negative insignificant relationship, while EPS shows a positive insignificant relationship (ESGS, -0.002; ESGC, -0.006; EPS, 0.023). The larger negative coefficient of ESGC, compared to ESGS, suggests ESG scores that include controversy overlay with a high score may have a more negative effect. Thus, with a lower score, less controversy will have a positive effect. This is also shown for the models without orthogonal variables. EPS shows a positive insignificant relationship. This effect is relatively large compared to the first two ESG metrics. The orthogonal size variable is significant ($p<0,01$) and negative for the six models.

Table 5 shows the effect of respective ESG scores on the dependent variable ROA. As fixed effects, year, country and sector were applied in line with the first series of regressions. Contrary to the results for Tobin's Q, the coefficients of the first three models with ROA as the dependent variable were all in the same direction and positive (ESGS, 0,323; ESGC, 0,223; EPS, 0,311), of which ESG shows a tendency towards significance ($p<0,10$), while ESGS and ESGC were not. Size shows to be positive, however insignificant. Noteworthy is the significant ($p<0,01$) large negative coefficient of R&D. This may be due to the fact that R&D expenses are incurred before its profits are visible in ROA. ROA is an accounting measure representing actual income and balance, while potential gains based on R&D expenses will become visible over time. ESGS also shows a positive relationship with a tendency to significance ($p<0,10$) for model (4) in Table 5, indicating a potentially positive relationship. As this is highly correlated to size due as it shows the non-orthogonal variables, its effect is hard to interpret. The insignificance of the orthogonal variable implies that the positive significant relationship is more related to size than the ESG score.

Table 4 –Regression analysis of ESG metrics and Tobin's Q

This table represents the results of the regression analysis between ESG factors and Tobin's Q, including control variables. It includes country, time and sector fixed effects. The analysis consists of six model specifications. The independent variable is the lagged ESG metric (ESGS, ESGC, EPSpillar). In addition, there is made use of orthogonal and non-orthogonal variables. Respective ESG metrics show orthogonal variables for the first three models (1), (2) and (3). For models (4), (5) and (6), the original values are used. This also holds for size, denoted by 2 representing the orthogonal size variable for models (1), (2) and (3). For models (4), (5) and (6), the original values are used. The orthogonal size variable is independently calculated for each orthogonal ESG metric. The separation between orthogonal and non-orthogonal variable inclusion is stressed by the double line between model (3) and model (4).

VARIABLES	(1) Tobin's Q	(2) Tobin's Q	(3) Tobin's Q	(4) Tobin's Q	(5) Tobin's Q	(6) Tobin's Q
L.ESGS	-0.002			-0.001		
	(0.043)			(0.003)		
L.ESGC		-0.006			-0.001	
		(0.043)			(0.003)	
L.EPSpillar			0.023			0.001
			(0.052)			(0.003)
Size	-0.561***	-0.563***	-0.561***	-0.272**	-0.270**	-0.283***
	(0.200)	(0.200)	(0.197)	(0.109)	(0.109)	(0.107)
R&D	6.953**	7.017**	6.927**	6.981**	6.994**	6.917**
	(2.899)	(2.892)	(2.880)	(2.915)	(2.917)	(2.897)
Historical Beta	-0.181***	-0.178**	-0.182***	-0.180**	-0.179**	-0.182***
	(0.070)	(0.070)	(0.070)	(0.070)	(0.070)	(0.070)
Debt	-0.756*	-0.773*	-0.742*	-0.759*	-0.760*	-0.749*
	(0.433)	(0.436)	(0.429)	(0.432)	(0.432)	(0.429)
Intercept	0.242	0.231	0.251	4.321***	4.305***	4.423***
	(0.325)	(0.326)	(0.323)	(1.605)	(1.606)	(1.589)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector fixed effects (ind30)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,223	3,211	3,223	3,223	3,223	3,223
Number of firms	727	724	727	727	727	727
R-squared	0.363	0.363	0.363	0.358	0.358	0.358

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

For both Tobin's Q and ROA (Table 4 and Table 5, respectively), negative significant ($p<0,10$; $p<0,01$) coefficients were estimated for debt. Historical Beta shows negative significant ($p<0,01$) estimations for Tobin's Q and negative significant ($p<0,01$) estimations for ROA. Their significance underlines their added value as a control variable. The lack of significance of the measured independent variables on Tobin's Q suggests no effect of ESG metrics on market value. The lack of significance in ESGC and EPS on ROA indicates the same. The tendency towards a positive effect for ESGS shows a potentially positive relationship between ESGS on ROA. Hypothesis 1 states that there is a positive relationship between ESG and CFP. There is no convincing evidence found that this is the case. The effect of ESG on Tobin's Q showed a (modest) negative relationship, but that relationship was not significant. The effect of ESGS is positive and shows a tendency towards a significant ($p<0,10$) effect on ROA. Suggesting there might be an influence of ESGS on ROA. The effect of ESGS and ESGC was positive as well, however insignificant. The marginal and insignificant results for Tobin's Q could indicate that the efficient market theory holds. Fama (1991) stated that all information is priced in the market and that potential benefits or losses by pursuing ESG strategies will not show a significant impact on the market value.

All in all, the relationship between ESG and CFP found in other studies, specifically the meta-analyses done by Friede et al. (2015), could not fully be confirmed in this dataset. It is important to note that meta-analyses, such as the one conducted by Friede et al. (2015), provide an overview of the available literature by aggregating the results of multiple studies, offering a broader perspective on the ESG-CFP relationship. The discrepancy between the findings of this study and those of the meta-analysis may be attributed to the differences in methodology and the inherent variation between individual studies. Furthermore, the difference in the results, when compared to Velte (2017), can be attributed to a difference in scope. As Velte focuses only on Germany and this study incorporates the broader Europe region. Nevertheless, the possibility of reporting bias, as suggested by Rost and Ehrman (2017), could also contribute to the predominantly positive effect observed in the literature, even if the actual relationship might not be as obvious.

Table 5 Regression analysis of ESG metrics and ROA

his table represents the results of the regression analysis between ESG factors and ROA, including control variables. It includes country, time and sector fixed effects. The analysis consists of six model specifications. The independent variable is the lagged ESG metric (ESGS, ESGC, EPSpillar). There is made use of orthogonal and non-orthogonal variables. Respective ESG metrics show orthogonal variables for the first three models (1), (2) and (3). For models (4), (5) and (6), the original values are used. This also holds for size, denoted by 2 representing the orthogonal size variable for models (1), (2) and (3). For models (4), (5) and (6), the original values are used. The orthogonal size variable is independently calculated for each orthogonal ESG metric. The separation between orthogonal and non-orthogonal variable inclusion is stressed by the double line between model (3) and model (4).

VARIABLES	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA
L.ESGS	0.323*			0.022*		
	(0.166)			(0.011)		
L.ESGC		0.223			0.004	
		(0.187)			(0.013)	
L.EPS			0.311			0.008
			(0.211)			(0.011)
Size	0.527	0.461	0.505	0.116	0.223	0.186
	(0.343)	(0.370)	(0.356)	(0.208)	(0.234)	(0.230)
R&D	-27.172***	-25.679***	-25.597***	-27.172***	-25.254***	-25.388***
	(7.200)	(8.253)	(8.204)	(7.200)	(8.270)	(8.247)
Historical Beta	-1.514***	-1.461***	-1.416***	-1.514***	-1.411***	-1.413***
	(0.363)	(0.404)	(0.405)	(0.363)	(0.406)	(0.405)
Debt	-4.663***	-5.929***	-5.869***	-4.663***	-5.986***	-5.961***
	(1.304)	(1.333)	(1.323)	(1.304)	(1.329)	(1.325)
Intercept	8.353***	8.378***	8.314***	5.390*	4.701	5.094
	(1.005)	(1.077)	(1.057)	(3.048)	(3.417)	(3.408)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector fixed effects (ind30)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,065	3,211	3,223	4,065	3,223	3,223
Number of firms	731	728	731	731	731	731
R-squared	0.122	0.123	0.125	0.127	0.128	0.131

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.2 CPS effect on ESG-CFP relationship

Table 6 shows basically the same three models as presented in Table 4, with Tobin's Q as the dependent variable, but now including CPS and the CPS*ESG interaction variable as independent variables. All three of the metrics show the same direction of coefficient when CPS is included compared to Table 4 (ESGS, -0.006; ESGC, -0,010; EPS, 0,021). CPS shows negative coefficients for ESGS and ESGC but a positive direction of the coefficient for EPS (model (1), -0.041; model (2) – 0.045; model (3), 0.196). The interaction variables are negative and insignificant (model (1), -0.001; model (2), -0.001; model (3), -0.000). The negative direction of the coefficients may indicate a potential decrease of Tobin's Q when the climate policy score and ESG score are at a higher level. This would mean a negative combined effect of CPS and ESG. The non-orthogonal variables depict the same pattern, the size of the coefficients measured being rather marginal. The control variable Size, however, is significant ($p<0,05$; $p<0,01$) and negative for all models. Thus, for larger-sized firms, there seems to be a negative effect on Tobin's Q. R&D expenses show a positive significant ($p<0,05$) effect on Tobin's Q. Historical beta has a significant ($p<0,05$) negative relationship of comparable size with Tobin's Q for all models. Debt has a negative tendency towards significance for the models in Table 6 (significance $p<0,10$).

Table 6 Regression analysis of CPS, ESG metrics and ROA

This table shows the regression analysis between CPS and the ESG-CFP relationship via Tobin's Q whilst controlling for sector, year and country effects. The independent variable are the three lagged ESG metrics: ESGS, ESGC and EPS. The analysis includes six model specifications, of which the first three ((1), (2) and (3)) include orthogonal size and ESG metrics. The last three ((4), (5) and (6)) use the original values. Size and the interaction variable (ESG*CPS iv) are uniquely created for each model but are referred to on the interaction variable row for all models. The centralised value is taken for computing the interaction variable to increase interpretability, discussed in the data handling section. Size represents the orthogonal size variable for models (1), (2) and (3) which is independently calculated for each ESG metric; for the sake of size conversion, it has been grouped together. For models (4), (5) and (6), the original values are used. The interaction variable is created individually for each ESG metric, with Size for its respective model grouped together for the sake of space.

Variables	(1) Tobin's Q	(2) Tobin's Q	(3) Tobin's Q	(4) Tobin's Q	(5) Tobin's Q	(6) Tobin's Q
l.ESGS	-0.006			-0.001		
	(0.043)			(0.003)		
l.ESGC		-0.010			-0.001	
		(0.043)			(0.003)	
l.EPS			0.021			0.001
			(0.053)			(0.003)
Size	-0.559***	-0.562***	-0.426**	-0.276**	-0.287***	-0.287***
	(0.199)	(0.198)	-0.560***	(0.112)	(0.110)	(0.110)
l.CPS	-0.041	-0.045	(0.196)	0.002	0.002	0.002
	(0.066)	(0.066)	(0.066)	(0.002)	(0.002)	(0.002)
ESG*CPS iv	-0.001	-0.001	-0.000	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
R&D	6.895**	6.959**	6.867**	7.272**	7.208**	7.208**
	(2.900)	(2.892)	(2.881)	(2.923)	(2.903)	(2.903)
Historical Beta	-0.174**	-0.172**	-0.176**	-0.165**	-0.167**	-0.167**
	(0.073)	(0.073)	(0.073)	(0.073)	(0.073)	(0.073)
Debt	-0.743*	-0.761*	-0.734*	-0.782*	-0.772*	-0.772*
	(0.432)	(0.435)	(0.428)	(0.437)	(0.435)	(0.435)
Intercept	2.933	3.168	1.163	4.292***	4.397***	4.397***
	(4.141)	(4.151)	(4.200)	(1.649)	(1.631)	(1.631)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector fixed effects (ind30)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,223	3,211	3,223	3,186	3,186	3,186
Number of firms	727	724	727	715	715	715
R-squared	0.361	0.361	0.362	0.357	0.357	0.357

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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Table 7 presents regression models with ROA as the dependent variable, representing the relationship between ESG and CFP. In line with Table 6, the independent variables are the ESG metrics, CPS and their interaction variable. For all three of the ESG indicators, there is an insignificant positive direction of the coefficients measured. CPS shows a positive but insignificant relationship with ROA. The interaction variable of ESG and CPS is, although insignificantly, also positive.

Size does not show significant but positive coefficients for all models. In line with Table 5, R&D expenses are significantly ($p<0,01$) negative and of relatively large size. The profits of R&D might not be immediately visible, whereas larger companies might have less risk and thus stronger accounting values. Historical Beta is also significantly ($p<0,01$) negative, as is Debt ($p<0,01$). The results have shown several effects for a year, country and sector, varying in size, direction and significance. Shows its added value as control variables, but no in-depth relationships were tested, thus are not included in the regression table in order to conserve space.

Hypothesis 2 states that CPS has an increasing effect on the relationship between ESG and CFP. This hypothesis is tested both by the interaction variable and by the comparison of coefficients between Table 4 and Table 6 for Tobin's Q and Table 5 and Table 7 for ROA. For Tobin's Q, there is shown a negative and consistently insignificant result for CPS suggesting a tendency towards a negative effect of more stringent climate policy on Tobin's Q. The negative direction of the interaction variable for all three models indicates that a high CP in combination with high ESG metric results in the relationship becoming more negative (or less positive). As shown by non-orthogonal variables, the size implication indicates a rather modest economic effect. For ROA, consistent positive (insignificant) coefficients are found for the ESG as well as for the interaction variable ESG*CPS. With a tendency towards significance ($p<0,10$) for ESGS. The size of the coefficients for the interaction variable shows an, although insignificant, modest positive relationship. The positive coefficient of this interaction variable indicates that higher ESG performance, as well as higher CPS, could result in an increase in ROA. This shows that for both the CFP metrics, CPS is in inline with the direction of the previously measured relationship. Thus, strengthening its relationship. Comparing the size of the non-orthogonal ESG metrics between Tables 4 and 6 shows no difference for Tobin's Q. Comparison between Table 5 and Table 7 shows a decrease in the size of the non-orthogonal coefficients. Thus, finding no evidence for an increase in

relationship when accounting for CPS. All in all, there is not enough evidence to support Hypothesis 2.

Table 7 ROA - ESG*CPS

This table shows the regression analysis between CPS and the ESG-CFP relationship via ROA whilst controlling for sector, year and country effects. The analysis includes six model specifications, of which the first three ((1), (2) and (3)) include orthogonal size and ESG metrics. The last three ((4), (5) and (6)) use the original values. Size and the interaction variable (ESG*CPS iv) are uniquely created for each model but are referred to on the interaction variable row for all models. The centralised value is taken for computing the interaction variable to increase interpretability, discussed in the data handling section. Size represents the orthogonal size variable for models (1), (2) and (3) which is independently calculated for each ESG metric; for the sake of size conversion, it has been grouped together. For models (4), (5) and (6), the original values are used. The interaction variable is created individually for each ESG metric with size for its respective model, grouped together for the sake of space.

VARIABLES	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA
l.ESGS[1]	0.228			0.005		
	(0.186)			(0.013)		
l.ESGC[1]		0.236			0.006	
		(0.188)			(0.013)	
l.EPS[1]			0.317			0.009
			(0.214)			(0.011)
Size[2]	0.463	0.503	0.449	0.175	0.169	0.129
	(0.364)	(0.354)	(0.365)	(0.230)	(0.231)	(0.227)
l.CPS	0.494	0.331	0.484	0.002	0.002	0.002
	(0.334)	(0.344)	(0.336)	(0.007)	(0.007)	(0.007)
ESG*CPS iv[3]	0.008	0.005	0.008	0.002	0.002	0.002
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
R&D	-25.729***	-25.434***	-25.700***	-25.125***	-25.169***	-25.295***
	(8.259)	(8.218)	(8.278)	(8.155)	(8.164)	(8.142)
Historical Beta	-1.414***	-1.408***	-1.448***	-1.430***	-1.432***	-1.433***
	(0.407)	(0.405)	(0.405)	(0.407)	(0.407)	(0.405)
Debt	-5.903***	-5.857***	-5.921***	-6.065***	-6.063***	-6.034***
	(1.316)	(1.317)	(1.324)	(1.310)	(1.311)	(1.308)
Intercept	-22.837	-12.566	-22.260	5.307	5.362	5.795*
	(21.312)	(21.863)	(21.397)	(3.371)	(3.374)	(3.369)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector fixed effects (ind30)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,223	3,223	3,211	3,211	3,211	3,211
Number of firms	727	727	724	724	724	724
R-squared	0.128	0.129	0.132	0.126	0.126	0.128

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5. Conclusions, limitations and recommendations

In this thesis, I studied the effect of CPS on the widespread and frequently discussed but complex relationship between ESG and CFP. In the analysis, CFP was estimated through Tobin's Q and ROA. The findings are based on data from 731 companies from all over Europe in the period 2010-2021 that were used to assess ESG scores, CFP and CPS.

First, the ESG-CFP relationship was tested. In contradiction to the results of meta-analysis (Orlitzky, 2011; Friede et al., 2015; Huang. 2021), a negative but insignificant relationship was found between ESG and Tobin's Q, while a positive but insignificant relationship was found between ESG and ROA. For ROA, there was a tendency towards significance (p<0.10) measured for the effect of one of the three metrics, namely ESGS. The negative coefficients found for Tobin's Q could indicate that the theory of Fama (1991) holds. That theory suggests there cannot be a significant relationship between ESG and CFP for market values because an efficient market incorporates potential growth value in its market price independent of where the growth comes from. Based on the positive relationship found, this theory could also be considered strengthened by the coefficients found for the relationship between ESG and ROA. However, because the relationships found were insignificant, there is insufficient evidence to enforce this claim.

The introduction of CPS alongside ESG via an interaction variable resulted in modest negative coefficients for Tobin's Q and modest positive coefficients for ROA, both of which were insignificant. The insignificance and marginal size of the coefficients for Tobin's Q can be understood by expanding on the efficient market theory of Fama (1991). The modest positive coefficients for the interaction variable related to ROA could indicate that high ESG-scoring firms profit from increased CP when assessed by accounting measure. It should, however, be noted that due to the insignificance of the results, not too much weight should be given to this because the findings could also be attributed to random measurement error. Thus, both hypothesis 1, stating there is a positive relationship between ESG and CFP and hypothesis 2, stating that the relationship between ESG and CFP is increased by CP, cannot be approved. All in all, I have to conclude that there is no convincing evidence for a significant relation between ESG and CFP, nor of a significant effect of CPS on the ESG-CFP relation.

Nevertheless, this finding and the rejection of both hypotheses provide meaningful information. As Huang (2021) highlighted, the motivations for pursuing ESG-related goals can vary significantly across companies, industries, and countries. Because there is no convincing evidence for a positive relationship between ESG and CFP, financial motivation for increased ESG is unlikely. This means that the removal of one of the important potential motivators, finances, creates a different perspective. This underlines that if a change in policy towards an environmentally sustainable economy is required, there is a need for regulatory actions.

Profit-maximising shareholders are unlikely to pursue ESG targets in the short term. Therefore, moving forward from the ESG perspective will not occur by itself based on market principles. If governments want to move in that direction, action has to be taken to motivate companies. However, the results also indicate there is no negative relationship, and the implications of additional CP measures are not expected to harm financial performance. Based on that, assuming no adverse financial side effects for companies, there seems to be room to implement CP measures to aim for ambitious ESG goals within Europe. Therefore, the results of this thesis indicate that to move towards a more sustainable economy, increased CP is necessary and can be implemented because, in general, it is not harmful to companies. Thus, these findings indicate there is more perspective for drafting not only incentive programs but also future regulations.

This thesis has its limitations. First, the measurement of ESG is debatable. The specific measurement used in this study is a relative measure. If the entire sector improves, this means a net improvement, but that is not expressed in the relative ESG score. Additionally, one can discuss the influence on ESG scores via greenwashing. Greenwashing may create an unfair image of the respective company. The possibility of greenwashing by companies may distort the ESG scores and, in turn, the relationship between ESG and CFP. Future research should address these limitations by exploring alternative ESG measurement methods and accounting for potential greenwashing effects in this relationship.
It should also be noted that thus far, the majority of CP measures implemented have, on forehand, likely been evaluated on their environmental and also their economic consequences. This likely has been done by thoroughly examining all these factors and with the goal of harming the economy as little as possible. Thus, climate policy measures with a harmful

effect on the economy may not have been implemented. Thus, our findings may be somewhat biased and may not be accurate for the climate policy in general, and additional research will be needed for overall conclusions. Additionally, findings depend on country and context, so these aspects should be further investigated. It could prove insightful to test the CPS, ESG and CFP relationship on the country level to assess country-specific implications and effects.

Further research into influences on the ESG-CFP relationship seems useful. In the current literature, the economic impact of the ESG-CFP is often found to be marginal. However, there is little information on the variables that create other incentives than financial ones. Further theoretical studies could help find motivational reasons for companies to strive for ESG-related goals. It should, however, also be noted that complex and mixed motivation for ESG activity potentially creates theoretical and methodological issues in analysing ESG-CFP relationships, as stated by Benabou and Tirole (2010). It is clear that the complexity due to a wide variety of influences are constantly associated with these topics, making interpretation of effects and relationships difficult. Thus, future ambiguity and variance in findings are not unlikely. Although these relationships are complex and dynamically changing over time, further research and activity towards ESG is valuable and could prove to help improve a change towards a more sustainable economy from all perspectives.

This study contributes to the literature by evaluating CPS as potential influencers for the ESG-CFP relationship. Finding no significant results on likely means there is no European-wide effect, which is an important finding. This, of course, does not exclude negative or positive effects for sectors or individual companies and countries. Future research should therefore explore the ESG-CFP relationship within specific sectors, such as the energy or manufacturing industries. It is essential to understand the role of sector-specific issues with respect to regulations and policies before implementing them.
Including CPS in the discussion adds a different perspective to the widely discussed relationship between ESG and CFP. Future studies are encouraged to also explore alternative relationships connected to CPS. A broader understanding of its effects could potentially be beneficial for the future implementation of CP.

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Appendix

Appendix A

Table A.1 Summary of abbreviations

This table provides a summary of used abbreviations in this study and a short description.

Abbreviation	Name	Description
CCPI	Climate Change Performance Index	An instrument to enable transparency in national and international climate politics constructed by Germanwatch
CFP	Corporate Financial Performance	Measure of a company's financial health and profitability, for this study Tobin's Q as well as ROA
CP	Climate Policy	Policies aimed at addressing climate change and its impacts
CPS	Climate Policy Score	Score reflecting a countries climate policy constructed by CCPI. It covers the most recent developments in national and international climate policy frameworks
CS	Corporate Sustainability	Business approach considering long-term social, environmental, and economic impact
CSR	Corporate Social Responsibility	Business practices that consider social, environmental, and ethical impact, throughout literature used interchangeably with ESG
EPS	Environmental Pillar Score	The environmental pillar of the Refinitiv (formerly Thomson Reuters) ESG score
ESG	Environmental, Social and Governance	Criteria used to evaluate corporate sustainability and responsibility, used interchangeably throughout literature with CSR
ESGC	Environmental, Social and Governance Combined	The ESG performance score with a controversy overlay, provided by Refinitiv (formerly Thomson Reuters).
ESGS	Environmental, Social and Governance Score	A score evaluating a company's ESG performance, for this study the Thomson Reuters ESG score.
GDP	Gross Domestic Product	The total value of goods and services produced within a country
ISIN	International Securities Identfication numbers	Unique identifier for securities, such as stocks and bonds
NFD	Non-Financial disclosure	Reporting of non-financial information, such as ESG factors
ROA	Return on Assets	Financial ratio showing return relative to total assets
SIC	Sector Industrial Classification	System for classifying industries by a four-digit code
WRDS	Wharton Research Data Services	Platform providing financial, accounting, and economic data

Appendix B

Table B.1 ESG Score Ranges

This table presents the classification of ESG performance and transparency scores into four categories: A, B, C and D. Each category represents a specific range of scores, reflecting the relative ESG performance and the degree of transparency in reporting material ESG data publicly. The higher the score, the better the ESG performance and transparency.

Score range	Grade	Description
$0.0 <= score <= 0.083333$	D-	'D' score indicates poor relative ESG performance and insufficient degree of transparency in reporting material ESG data publicly.
$0.083333 < score <= 0.166666$	D	
$0.166666 < score <= 0.250000$	D+	
$0.250000 < score <= 0.333333$	C-	'C' score indicates satisfactory relative ESG performance and moderate degree of transparency in reporting material ESG data publicly.
$0.333333 < score <= 0.416666$	C	
$0.416666 < score <= 0.500000$	C+	
$0.500000 < score <= 0.583333$	B-	'B' score indicates good relative ESG performance and above-average degree of transparency in reporting material ESG data publicly.
$0.583333 < score <= 0.666666$	B	
$0.666666 < score <= 0.750000$	B+	
$0.750000 < score <= 0.833333$	A-	'A' score indicates excellent relative ESG performance and high degree of transparency in reporting material ESG data publicly.
$0.833333 < score <= 0.916666$	A	
$0.916666 < score <= 1$	A+	

Appendix C

### Table C.1 Category score description and definitions form Refinitiv

The table provided shows scores included for specific categories by Refinitiv and their definition.

Score	Category	Definition
Refinitiv ESG resource use score	Environmental	The resource use score reflects a company's performance and capacity to reduce the use of materials, energy or water, and to find more eco-efficient solutions by improving supply chain management.
Refinitiv ESG emissions reduction score	Environmental	The emission reduction score measures a company's commitment and effectiveness towards reducing environmental emissions in its production and operational processes.
Refinitiv ESG innovation score	Environmental	The innovation score reflects a company's capacity to reduce the environmental costs and burdens for its customers, thereby creating new market opportunities through new environmental technologies and processes, or eco-designed products
Refinitiv ESG workforce score	Social	The workforce score measures a company's effectiveness in terms of providing job satisfaction, a healthy and safe workplace, maintaining diversity and equal opportunities, and development opportunities for its workforce.
Refinitiv ESG human rights score	Social	The human rights score measures a company's effectiveness in terms of respecting fundamental human rights conventions.
Refinitiv ESG community score	Social	The community score measures the company's commitment to being a good citizen, protecting public health and respecting business ethics.
Refinitiv ESG product responsibility score	Social	The product responsibility score reflects a company's capacity to produce quality goods and services, integrating the customer's health and safety, integrity and data privacy.
Refinitiv ESG management score	Governance	The management score measures a company's commitment and effectiveness towards following best practice corporate governance principles.
Refinitiv ESG shareholders score	Governance	The shareholders score measures a company's effectiveness towards equal treatment of shareholders and the use of anti-takeover devices.
Refinitiv ESG CSR strategy score	Governance	The CSR strategy score reflects a company's practices to communicate that it integrates economic (financial), social and environmental dimensions into its day-to-day decision-making processes.

Appendix D

### Figure D.1 – Visual representation of ESG score build up

The figure provided shows the different categories that are underneath ESGC score, the categories these are supported with and in line the amount of measures and metrics is shown.
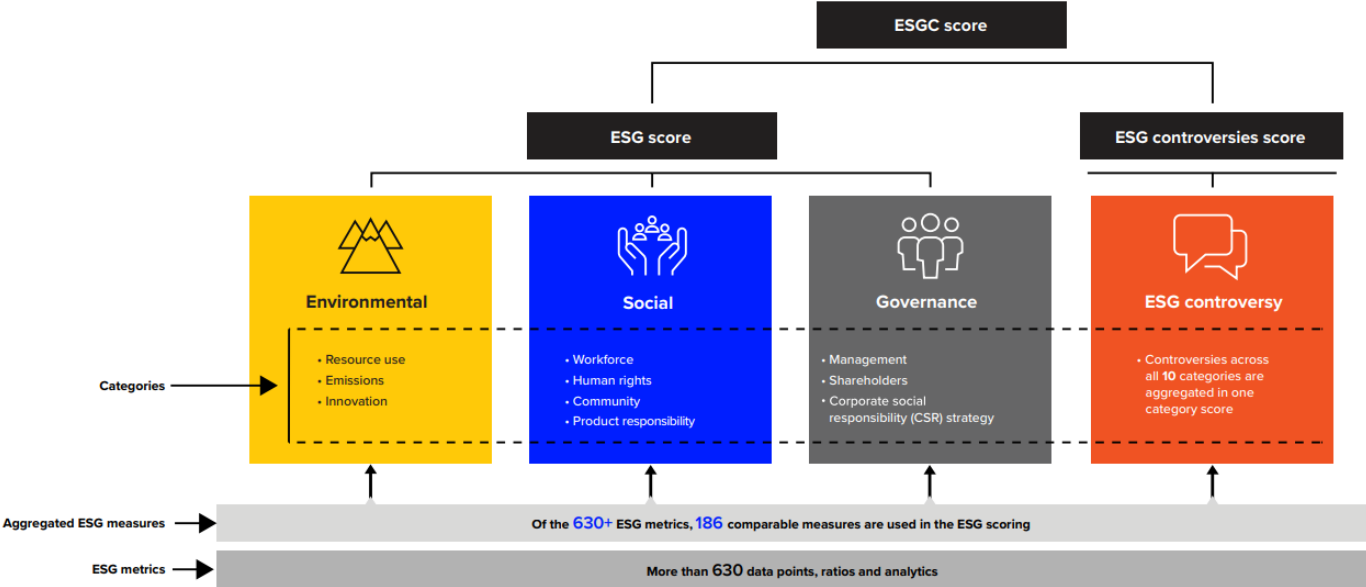
Appendix E

Figure E.1 – Weight of CCPI categories and Climate Policy indicator
This figure shows the four different categories used by CCPI for its climate performance index
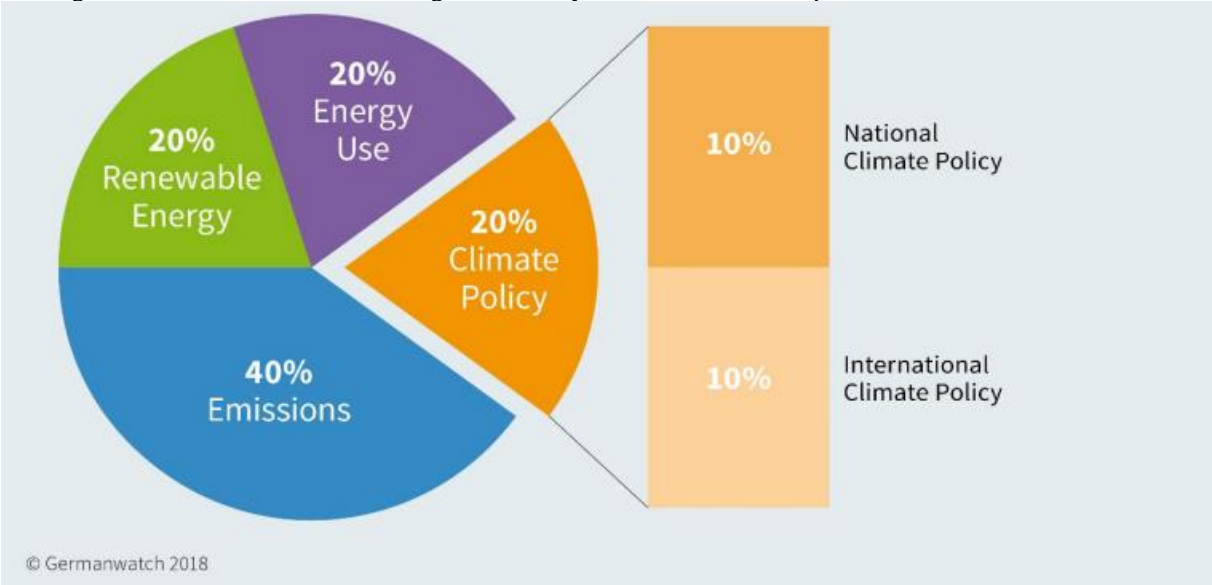
Appendix F

Table F.1 – overview of Mnemonic DataStream codes

This table provides an overview of the used Mnemonic codes, their names and description

Name	Datastream Mnemonic
Asset 4 database	LA4RGNEU
ROA	E008
Tobin's Q	168E
ESGS	TRESG
ESGC	TRESGC
EPS	ENSCORE
Hist. Beta	897E
Debt	WC08240
Cash	WC08115
CAPEX	WC08416
Total Assets	WC02999

Appendix G

Table G.1 - Fame-French SIC code industry categorization

The table provides shows the Fama-French industries, its sector description and the SIC codes that are included in the respective industry.

Fama-French Industries	Sector description	SIC label (SIC Code)
1 Food	Food Products	Agric production - crops (0100-0199); Agric production - livestock (0200-0299); Agricultural services (0700-0799); Commercial fishing (0910-0919); Food and kindred products (2000-2009); Meat products (2010-2019); Dairy products (2020-2029); Canned-preserved fruits-vegs (2030-2039); Flour and other grain mill products (2040-2046); Prepared feeds for animals (2048-2048); Bakery products (2050-2059); Sugar and confectionery products (2060-2063); Candy and other confectionery (2064-2068); Fats and oils (2070-2079); Bottled-canned soft drinks (2086-2086); Flavoring syrup (2087-2087); Misc food preps (2090-2092); Roasted coffee (2095-2095); Potato chips (2096-2096); Manufactured ice (2097-2097); Misc food preparations (2098-2099); Beverages (2080-2080); Malt beverages (2082-2082); Malt (2083-2083); Wine (2084-2084); Distilled and blended liquors (2085-2085);
2 Beer	Beer & Liquor	Beverages (2080-2080); Malt beverages (2082-2082); Malt (2083-2083); Wine (2084-2084); Distilled and blended liquors (2085-2085);
3 Smoke	Tobacco Products	Tobacco products (2100-2199);

4 Games	Recreation	Fishing, hunting & trapping (0920-0999); Household audio visual equip (3650-3651); Phonographic records (3652-3652); Boat building and repair (3732-3732); Musical instruments (3930-3931); Toys (3940-3949); Services - motion picture production and distribution (7800-7829); Services - motion picture theatres (7830-7833); Services - video rental (7840-7841); Services - amusement and recreation (7900-7900); Services - dance studios (7910-7911); Services - bands, entertainers (7920-7929); Services - bowling centers (7930-7933); Services - professional sports (7940-7949); Amusement and recreation services (?) (7980-7980); Services - misc entertainment (7990-7999);
5 Books	Printing and Publishing	Printing publishing and allied (2700-2709); Newspapers: publishing-printing (2710-2719); Periodicals: publishing-printing (2720-2729); Books: publishing-printing (2730-2739); Misc publishing (2740-2749); Commercial printing (2750-2759); Greeting card publishing (2770-2771); Book binding (2780-2789); Service industries for print trade (2790-2799); Signs, advertising specialty (3993-3993);
6 Hshld	Consumer Goods	Dog and cat food (2047-2047); Curtains, home furnishings (2391-2392); Household furniture (2510-2519); Misc furniture and fixtures (2590-2599); Soap & other detergents (2840-2843); Perfumes cosmetics (2844-2844); Luggage (3160-3161); Handbags and purses (3170-3171); Personal leather goods, except handbags (3172-3172); Leather goods (3190-3199); Pressed and blown glass (3229-3229); Pottery and related products (3260-3260); China and earthenware table articles (3262-3263); Pottery products (3269-3269); Glass products (3230-3231); Household appliances (3630-3639); Motorcycles, bicycles and parts (Harley & Huffy) (3750-3751); Misc inst, photo goods, watches (3800-3800); Photographic equip (Kodak etc, but also Xerox) (3860-3861); Watches clocks and parts (3870-3873); Jewelry-precious metals (3910-3911); Silverware (3914-3914); Jewelers' findings, materials (3915-3915); Costume jewelry and notions (3960-3962); Brooms and brushes (3991-3991); Burial caskets (3995-3995);
7 Clths	Apparel	Apparel and other finished products (2300-2390); Rubber and plastics footwear (3020-3021); Leather tanning and finishing (3100-3111); Boot, shoe cut stock, findings (3130-3131); Footware except rubber (3140-3149); Leather gloves and mittens (3150-3151); Fasteners, buttons, needles, pins (3963-3965);
8 Hlth	Healthcare, Medical Equipment, Pharmaceutical Products	Drugs (2830-2830); Biological products (2831-2831); Medicinal chemicals (2833-2833); Pharmaceutical preparations (2834-2834); In vitro, in vivo diagnostics (2835-2835); Biological products, except diagnostics (2836-2836); X-ray, electromedical app (3693-3693); Surg & med instru (3840-3849); Ophthalmic goods (3850-3851); Services - health (8000-8099);
9 Chems	Chemicals	Chemicals and allied products (2800-2809); Industrial inorganic chems (2810-2819); Plastic material & synthetic resin (2820-2829); Paints (2850-2859); Industrial organic chems (2860-2869); Agriculture chemicals (2870-2879); Misc chemical products (2890-2899);
10 Txtls	Textiles	Textile mill products (2200-2269); Floor covering mills (2270-2279); Yarn and thread mills (2280-2284); Misc textile goods (2290-2295); Nonwoven fabrics (2297-2297); Cordage and twine (2298-2298); Misc textile products (2299-2299); Textile bags, canvas products (2393-2395); Misc textile products (2397-2399);
11 Cnstr	Construction and Construction Materials	Forestry (0800-0899); Build construction - general contractors (1500-1511); Gen building contractors - residential (1520-1529); Operative builders (1530-1539); Gen building contractors - non-residential (1540-1549); Heavy Construction - not building contractors (1600-1699); Construction - special contractors (1700-1799); Lumber and wood products (2400-2439); Wood buildings-mobile homes (2450-2459); Misc wood products (2490-2499); Building paper and board mills (2660-2661); Paving & roofing materials (2950-2952); Stone, clay, glass, concrete etc (3200-3200); Flat glass (3210-3211); Cement hydraulic (3240-3241); Structural clay prods (3250-3259); Vitreous china plumbing fixtures (3261-3261); Porcelain electrical supply (3264-3264); Concrete gypsum & plaster (3270-3275); Cut stone and stone products (3280-3281); Abrasive and asbestos products (3290-3293); Non-metalic mineral products (3295-3299); Handtools and hardware (3420-3429); Heating equip & plumbing fix (3430-3433); Fabicated struct metal products (3440-3441); Metal doors, frames (3442-3442); Architectual or ornamental metal work (3446-3446); Pre-fab metal buildings (3448-3448); Misc

		structural metal work (3449-3449); Screw machine products (3450-3451); Bolts, nuts screws (3452-3452); Misc fabricated metal products (3490-3499); Hard surface floor cover (3996-3996);
12 Steel	Steel Works Etc	Primary metal industries (3300-3300); Blast furnaces & steel works (3310-3317); Iron & steel foundries (3320-3325); Prim smelt-refin nonfer metals (3330-3339); Secondary smelt-refin nonfer metals (3340-3341); Rolling & drawing nonferous metals (3350-3357); Non-ferrous foundries and casting (3360-3369); Steel works etc (3370-3379); Misc primary metal products (3390-3399);
13 FabPr	Fabricated Products andMachinery	Fabricated metal, except machinery and trans eq (3400-3400); Fabricated plate work (3443-3443); Sheet metal work (3444-3444); Metal forgings and stampings (3460-3469); Coating and engraving (3470-3479); Engines & turbines (3510-3519); Farm and garden machinery (3520-3529); Constr, mining material handling machinery (3530-3530); Construction machinery (3531-3531); Mining machinery, except oil field (3532-3532); Oil field machinery (3533-3533); Elevators (3534-3534); Conveyors (3535-3535); Cranes, hoists (3536-3536); Machinery (3538-3538); Metalworking machinery (3540-3549); Special industry machinery (3550-3559); General industrial machinery (3560-3569); Refrig & service ind machines (3580-3580); Automatic vending machines (3581-3581); Commercial laundry and drycleaning machines (3582-3582); Air conditioning, heating, refrid eq (3585-3585); Measuring and dispensing pumps (3586-3586); Service industry machinery (3589-3589); Misc industrial and commercial equipment and mach (3590-3599);
14 ElcEq	Electrical Equipment	Elec mach eq & supply (3600-3600); Elec transmission (3610-3613); Electrical industrial appar (3620-3621); Electrical industrial appar (3623-3629); Electric lighting, wiring (3640-3644); Residential lighting fixtures (3645-3645); Commercial lighting (3646-3646); Lighting equipment (3648-3649); Communication equip (3660-3660); Miscellaneous electrical machinery and equip (3690-3690); Storage batteries (3691-3692); Electrical machinery and equip (3699-3699);
15 Autos	Automobiles and Trucks	Tire cord and fabric (2296-2296); Auto trim (2396-2396); Tires and inner tubes (3010-3011); Trucks, tractors, trailers (3537-3537); Vehicular lighting (3647-3647); Elec eq, internal combustion engines (3694-3694); Transportation equipment (3700-3700); Motor vehicles and motor vehicle equip (3710-3710); Motor vehicles & car bodies (3711-3711); Truck & bus bodies (3713-3713); Motor vehicle parts (3714-3714); Truck trailers (3715-3715); Motor homes (3716-3716); Travel trailers and campers (3792-3792); Misc trans equip (3790-3791); Misc trans equip (3799-3799);
16 Carry	Aircraft, ships, and railroad equipment	Aircraft & parts (3720-3720); Aircraft (3721-3721); Aircraft engines, engine parts (3723-3724); Aircraft parts (3725-3725); Aircraft parts (3728-3729); Ship building and repair (3730-3731); Railroad Equipment (3740-3743);
17 Mines	Precious Metals, Non-Metallic, and Industrial Metal Mining	Metal mining (1000-1009); Iron ores (1010-1019); Copper ores (1020-1029); Lead and zinc ores (1030-1039); Gold & silver ores (1040-1049); Bauxite and other aluminum ores (1050-1059); Ferroalloy ores (1060-1069); Mining (1070-1079); Mining services (1080-1089); Misc metal ores (1090-1099); Anthracite mining (1100-1119); Mining and quarrying non-metalic minerals (1400-1499);
18 Coal	Coal	Bituminous coal (1200-1299);
19 Oil	Petroleum and Natural Gas	Oil and gas extraction (1300-1300); Crude petroleum & natural gas (1310-1319); Natural gas liquids (1320-1329); Petroleum and natural gas (1330-1339); Petroleum and natural gas (1370-1379); Oil and gas field services (1380-1380); Drilling oil & gas wells (1381-1381); Oil-gas field exploration (1382-1382); Oil and gas field services (1389-1389); Petroleum refining (2900-2912); Misc petroleum products (2990-2999);
20 Util	Utilities	Electric, gas, sanitary services (4900-4900); Electric services (4910-4911); Natural gas transmission (4920-4922); Natural gas transmission-distr (4923-4923); Natural gas distribution (4924-4925); Electric and other services combined (4930-4931); Gas and other services combined (4932-4932); Combination utilities (4939-4939); Water supply (4940-4942);

21 Telcm	Communication	Communications (4800-4800); Telephone communications (4810-4813); Telegraph and other message communication (4820-4822); Radio-TV Broadcasters (4830-4839); Cable and other pay TV services (4840-4841); Communications (4880-4889); Communication services (Comsat) (4890-4890); Cable TV operators (4891-4891); Telephone interconnect (4892-4892); Communication services (4899-4899);
22 Servs	Personal and Business Services	Rooming and boarding houses (7020-7021); Camps and recreational vehicle parks (7030-7033); Services - personal (7200-7200); Services - laundry, cleaners (7210-7212); Services - diaper service (7214-7214); Services - coin-op cleaners, dry cleaners (7215-7216); Services - carpet, upholstery cleaning (7217-7217); Services - industrial launderers (7218-7218); Services - laundry, cleaners (7219-7219); Services - photo studios, portrait (7220-7221); Services - beauty shops (7230-7231); Services - barber shops (7240-7241); Services - shoe repair (7250-7251); Services - funeral (7260-7269); Services - misc (7270-7290); Services - tax return (7291-7291); Services - misc (7292-7299); Services - business services (7300-7300); Services - advertising (7310-7319); Services - credit reporting agencies, collection services (7320-7329); Services - mailing, reproduction, commercial art (7330-7339); Services - services to dwellings, other buildings (7340-7342); Services - cleaning and builging maint (7349-7349); Services - misc equip rental and leasing (7350-7351); Services - medical equip rental (7352-7352); Services - heavy construction equip rental (7353-7353); Services - equip rental and leasing (7359-7359); Services - personnel supply services (7360-7369); Services - computer programming and data processing (7370-7372); Services - computer processing, data prep (7374-7374); Services - information retrieval services (7375-7375); Services - computer facilities management service (7376-7376); Services - computer rental and leasing (7377-7377); Services - computer maintanence and repair (7378-7378); Services - computer related services (7379-7379); Services - misc business services (7380-7380); Services - security (7381-7382); Services - news syndicates (7383-7383); Services - photofinishing labs (7384-7384); Services - telephone interconnections (7385-7385); Services - misc business services (7389-7390); Services - R&D labs (7391-7391); Services - management consulting & P.R. (7392-7392); Services - detective and protective (ADT) (7393-7393); Services - equipment rental & leasing (7394-7394); Services - photofinishing labs (School pictures) (7395-7395); Services - trading stamp services (7396-7396); Services - commercial testing labs (7397-7397); Services - business services (7399-7399); Services - auto repair, services (7500-7500); Services - truck, auto, trailer rental and leasing (7510-7519); Services - automobile parking (7520-7529); Services - auto repair shops (7530-7539); Services - auto services, except repair (car washes) (7540-7549); Services - Misc repair services (7600-7600); Services - Electrical repair shops (7620-7620); Services - Radio and TV repair shops (7622-7622); Services - Refridg and air conditioner repair (7623-7623); Services - Electrical repair shops (7629-7629); Services - Watch, clock and jewelry repair (7630-7631); Services - Reupholster, furniture repair (7640-7641); Services - Misc repair shops (7690-7699); Services - legal (8100-8199); Services - educational (8200-8299); Services - social services (8300-8399); Services - museums, galleries, botanic gardens (8400-8499); Services - membership organizations (8600-8699); Services - engineering, accounting, research, management (8700-8700); Services - engineering, accounting, surveying (8710-8713); Services - accounting, auditing, bookkeeping (8720-8721); Services - research, development, testing labs (8730-8734); Services - management, public relations, consulting (8740-8748); Services - private households (8800-8899); Services - misc (8900-8910); Services - engineering & architect (8911-8911); Services - misc (8920-8999);

23 BusEq	Business Equipment	Office computers (3570-3579); Industrial controls (3622-3622); Telephone and telegraph apparatus (3661-3661); Communications equipment (3662-3662); Radio TV comm equip & apparatus (3663-3663); Search, navigation, guidance systems (3664-3664); Training equipment & simulators (3665-3665); Alarm & signaling products (3666-3666); Communication equipment (3669-3669); Electronic components (3670-3679); Computers (3680-3680); Computers - mini (3681-3681); Computers - mainframe (3682-3682); Computers - terminals (3683-3683); Computers - disk & tape drives (3684-3684); Computers - optical scanners (3685-3685); Computers - graphics (3686-3686); Computers - office automation systems (3687-3687); Computers - peripherals (3688-3688); Computers - equipment (3689-3689); Magnetic and optical recording media (3695-3695); Search, detection, navigation, guidance (3810-3810); Engr lab and research equipment (3811-3811); Search, detection, navigation, guidance (3812-3812); Measuring and controlling equipment (3820-3820); Lab apparatus and furniture (3821-3821); Automatic controls - Envir and applic (3822-3822); Industrial measurement instru (3823-3823); Totalizing fluid meters (3824-3824); Elec meas & test instr (3825-3825); Lab analytical instruments (3826-3826); Optical instr and lenses (3827-3827); Meas and control devices (3829-3829); Optical instr and lenses (3830-3839); Computer integrated systems design (7373-7373);
24 Paper	Business Supplies and Shipping Containers	Wood containers (2440-2449); Office furniture and fixtures (2520-2549); Paper and allied products (2600-2639); Paperboard containers, boxes, drums, tubs (2640-2659); Paper and allied products (2670-2699); Manifold business forms (2760-2761); Glass containers (3220-3221); Metal cans and shipping containers (3410-3412); Pens pencils and office supplies (3950-3955);
25 Trans	Transportation	Railroads-line haul (4000-4013); Railway express service (4040-4049); Transit and passenger trans (4100-4100); Local passenger trans (4110-4119); Taxicabs (4120-4121); Intercity bus trans (Greyhound) (4130-4131); Bus charter (4140-4142); School buses (4150-4151); Motor vehicle terminals, service facilities (4170-4173); Misc transit and passenger transportation (4190-4199); Motor freight trans, warehousing (4200-4200); Trucking (4210-4219); Warehousing and storage (4220-4229); Terminal facilities - motor freight (4230-4231); Transportation (4240-4249); Water transport (4400-4499); Air transportation (4500-4599); Pipelines, except natural gas (4600-4699); Transportation services (4700-4700); Freight forwarding (4710-4712); Travel agencies, etc (4720-4729); Arrange trans - freight and cargo (4730-4739); Rental of railroad cars (4740-4749); Misc services incidental to trans (4780-4780); Inspection and weighing services (4782-4782); Packing and crating (4783-4783); Fixed facilities for vehicles, not elsewhere classified (4784-4784); Motor vehicle inspection (4785-4785); Transportation services (4789-4789);
26 Whlsl	Wholesale	Wholesale - durable goods (5000-5000); Wholesale - autos and parts (5010-5015); Wholesale - furniture and home furnishings (5020-5023); Wholesale - lumber and construction materials (5030-5039); Wholesale - professional and commercial equipment and supplies (5040-5042); Wholesale - photographic equipment (5043-5043); Wholesale - office equipment (5044-5044); Wholesale - computers (5045-5045); Wholesale - commerical equip (5046-5046); Wholesale - medical, dental equip (5047-5047); Wholesale - ophthalmic goods (5048-5048); Wholesale - professional equip and supplies (5049-5049); Wholesale - metals and minerals (5050-5059); Wholesale - electrical goods (5060-5060); Wholesale - electrical apparatus and equipment (5063-5063); Wholesale - electrical appliance TV and radio (5064-5064); Wholesale - electronic parts (5065-5065); Wholesale - hardware, plumbing, heating equip (5070-5078); Wholesale - machinery and equipment (5080-5080); Wholesale - machinery and equipment (?) (5081-5081); Wholesale - construction and mining equipment (5082-5082); Wholesale - farm and garden machinery (5083-5083); Wholesale - industrial machinery and equipment (5084-5084); Wholesale - industrial supplies (5085-5085); Wholesale - machinery and equipment (?) (5086-5087); Wholesale - trans eq except motor vehicles (5088-5088); Wholesale - misc durable goods (5090-5090); Wholesale - sporting goods, toys (5091-5092); Wholesale - scrap and waste materials (5093-5093); Wholesale - jewelry and watches (5094-5094); Wholesale - durable goods

			(5099-5099); Wholesale - nondurable goods (5100-5100); Wholesale - paper and paper products (5110-5113); Wholesale - drugs & propietary (5120-5122); Wholesale - apparel (5130-5139); Wholesale - groceries & related prods (5140-5149); Wholesale - farm products (5150-5159); Wholesale - chemicals & allied prods (5160-5169); Wholesale - petroleum and petro prods (5170-5172); Wholesale - beer, wine (5180-5182); Wholesale - non-durable goods (5190-5199);
27 Rtail		Retail	Retail - bldg material, hardware, garden (5200-5200); Retail - lumber & other building mat (5210-5219); Retail (5220-5229); Retail - paint, glass, wallpaper (5230-5231); Retail - hardward stores (5250-5251); Retail - nurseries, lawn, garden stores (5260-5261); Retail - mobile home dealers (5270-5271); Retail - general merchandise stores (5300-5300); Retail - department stores (5310-5311); Retail - general merchandise stores (?) (5320-5320); Retail - variety stores (5330-5331); Retail - catalog showroom (5334-5334); Retail (5340-5349); Retail - Misc general merchandise stores (5390-5399); Retail - food stores (5400-5400); Retail - grocery stores (5410-5411); Retail - convenience stores (5412-5412); Retail - meat, fish mkt (5420-5429); Retail - fruite and vegatable markets (5430-5439); Retail - candy, nut, confectionary stores (5440-5449); Retail - dairy product stores (5450-5459); Retail - bakeries (5460-5469); Retail - miscellaneous food stores (5490-5499); Retail - auto dealers and gas stations (5500-5500); Retail - auto dealers (5510-5529); Retail - auto and home supply stores (5530-5539); Retail - gasoline service stations (5540-5549); Retail - boat dealers (5550-5559); Retail - recreational vehicle dealers (5560-5569); Retail - motorcycle dealers (5570-5579); Retail - automotive dealers (5590-5599); Retail - apparel & acces (5600-5699); Retail - home furniture and equipment stores (5700-5700); Retail - home furnishings stores (5710-5719); Retail - household appliance stores (5720-5722); Retail - radio, TV and consumer electronic stores (5730-5733); Retail - computer and computer software stores (5734-5734); Retail - record and tape stores (5735-5735); Retail - musical instrument stores (5736-5736); Retail (5750-5799); Retail - misc (5900-5900); Retail - drug & proprietary stores (5910-5912); Retail - liquor stores (5920-5929); Retail - used merchandise stores (5930-5932); Retail - misc (5940-5940); Retail - sporting goods stores, bike shops (5941-5941); Retail - book stores (5942-5942); Retail - stationery stores (5943-5943); Retail - jewelry stores (5944-5944); Retail - hobby, toy and game shops (5945-5945); Retail - camera and photo shop (5946-5946); Retail - gift, novelty (5947-5947); Retail - luggage (5948-5948); Retail - sewing & needlework stores (5949-5949); Retail (5950-5959); Retail - non-store retailers (catalogs, etc) (5960-5969); Retail (5970-5979); Retail - fuel & ice stores (Penn Central Co) (5980-5989); Retail - retail stores (5990-5990); Retail - florists (5992-5992); Retail - tobacco stores (5993-5993); Retail - newsdealers (5994-5994); Retail - computer stores (5995-5995); Retail stores (5999-5999);
28		WholesaleRetail	Eating and drinking places (5890-5899); Hotels, other lodging places (7000-7000); Hotels motels (7010-7019); Membership hotels and lodging (7040-7049); Services - linen (7213-7213);
29		Banking, Insurance, Real Estate, Trading	Depository institutions (6000-6000); Federal reserve banks (6010-6019); Commercial banks (6020-6020); National commercial banks (6021-6021); State banks - Fed Res System (6022-6022); State banks - not Fed Res System (6023-6024); National banks - Fed Res System (6025-6025); National banks - not Fed Res System (6026-6026); National banks, not FDIC (6027-6027); Banks (6028-6029); Savings institutions (6030-6036); Banks (?) (6040-6059); Credit unions (6060-6062); Foreign banks (6080-6082); Functions related to deposit banking (6090-6099); Nondepository credit institutions (6100-6100); Federal credit agencies (6110-6111); FNMA (6112-6113); S&Ls (6120-6129); Agricultural credit institutions (6130-6139); Personal credit institutions (Beneficial) (6140-6149); Business credit institutions (6150-6159); Mortgage bankers (6160-6169); Finance lessors (6170-6179); Financial services (6190-6199); Security and commodity brokers (6200-6299); Insurance (6300-6300); Life insurance (6310-6319); Accident and health insurance (6320-6329); Fire, marine, property-casualty ins (6330-6331); Surety insurance (6350-6351); Title insurance (6360-

6361); Pension, health, welfare funds (6370-6379); Insurance carriers (6390-6399); Insurance agents (6400-6411); Real estate (6500-6500); Real estate operators (6510-6510); Operators - non-resident buildings (6512-6512); Operators - apartment buildings (6513-6513); Operators - other than apartment (6514-6514); Operators - residential mobile home (6515-6515); Lessors of real property (6517-6519); Real estate (6520-6529); Real estate agents and managers (6530-6531); Real estate dealers (6532-6532); Title abstract offices (6540-6541); Real estate developers (6550-6553); Real estate (6590-6599); Combined real estate, insurance, etc (6610-6611); Holding, other investment offices (6700-6700); Holding offices (6710-6719); Investment offices (6720-6722); Management investment, closed-end (6723-6723); Unit investment trusts (6724-6724); Face-amount certificate offices (6725-6725); Trusts (6730-6733); Investment offices (6740-6779); Miscellaneous investing (6790-6791); Oil royalty traders (6792-6792); Commodity traders (6793-6793); Patent owners & lessors (6794-6794); Mineral royalty traders (6795-6795); REIT (6798-6798); Investors, NEC (6799-6799);

| 30 | Everything Else | Sanitary services (4950-4959); Steam, air conditioning supplies (4960-4961); Irrigation systems (4970-4971); Cogeneration - SM power producer (4990-4991); |

Appendix H

Table H.1 Fama-French industry code sector segmentation

The provided table shows the frequency of specific sectors in the dataset. It shows the total

percentage of as well as the cumulative measurement

Fama-French industry code (30 industries)	Freq.	Percent	Cum.
Food Products	480	2.59	2.59
Beer & Liquor	144	0.78	3.37
Tobacco Products	12	0.06	3.43
Recreation	312	1.69	5.12
Consumer Goods	240	1.30	6.42
Apparel	204	1.10	7.52
Healthcare, Medical Equipment, Pharmaceutical Products	1260	6.80	14.32
Chemicals	492	2.66	16.98
Textiles	60	0.32	17.30
Construction and Construction Materials	1284	6.93	24.24
Steel Works Etc	312	1.69	25.92
Fabricated Products and Machinery	1044	5.64	31.56
Electrical Equipment	204	1.10	32.66
Automobiles and Trucks	600	3.24	35.90
Aircraft, ships, and railroad equipment	216	1.17	37.07
Precious Metals, Non-Metallic, and Industrial Metal Mining	132	0.71	37.78
Coal	24	0.13	37.91
Petroleum and Natural Gas	408	2.20	40.12
Utilities	636	3.43	43.55
Communication	516	2.79	46.34
Personal and Business Services	2868	15.49	61.83
Business Equipment	1368	7.39	69.22
Business Supplies and Shipping Containers	420	2.27	71.48
Transportation	612	3.31	74.79
Wholesale	492	2.66	77.45
Retail	768	4.15	81.59
Restaurants, Hotels, Motels	192	1.04	82.63
Banking, Insurance, Real Estate, Trading	3024	16.33	98.96
Everything Else	192	1.04	100.00
Total	18516	100.00	

Appendix I

Table I.1 – Country distribution in the data sample

The table below presents the distribution of data sample for the selected European countries. This includes frequency, percentage, and cumulative percentage for each country:

Country	Freq.	Percent	Cum.
Austria	146	3.59	3.59
Belgium	173	4.26	7.85
Czech Republic	9	0.22	8.07
Denmark	183	4.50	12.57
Finland	290	7.13	19.70
France	598	14.71	34.42
Germany	937	23.05	57.47
Greece	26	0.64	58.11
Hungary	19	0.47	58.57
Ireland	87	2.14	60.71
Italy	209	5.14	65.85
Luxembourg	38	0.93	66.79
Malta	14	0.34	67.13
Netherlands	218	5.36	72.50
Norway	187	4.60	77.10
Poland	76	1.87	78.97
Portugal	23	0.57	79.53
Spain	214	5.26	84.80
Sweden	618	15.20	100.00
Total	4065	100.00	