Market reactions to the Corporate Sustainability Due Diligence Directive

Insights from the European Union

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Abstract

The objective of this thesis is to study the market impact of the Corporate Sustainability Due Diligence Directive (CSDDD) on EU companies, which was proposed in February 2022 and implemented in July 2024.

Using an event study methodology, the research assesses affected firms' abnormal returns during periods surrounding the directive's announcement and implementation, focusing on variations within two and five-day windows. It also investigates how firm-specific control variables like emissions and ESG factors affect these returns and examines industry-specific differences.

Results indicate a significant negative market reaction to both the proposal and implementation of the CSDDD, particularly in the longer window analysis. The ESG score, along with the environmental and governance pillar scores, significantly impacted returns, with pronounced variances across industries based on the levels of emission and ESG variables. These findings offer valuable insights for investors and policymakers regarding the directive's implications for affected companies.

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Keywords: CSDDD, Sustainability, Efficient Market Hypothesis, Event Study, CAPM, 5FF model

Resumo

O propósito desta tese é estudar o impacto de mercado da Diretiva de Due Diligence de Sustentabilidade Corporativa (CSDDD) nas empresas da UE, proposta em fevereiro de 2022 e implementada em julho de 2024.

Utilizando uma metodologia de estudo de eventos, este estudo avalia os retornos anormais das empresas afetadas durante os períodos próximos ao anúncio e à implementação da diretiva, focando-se em variações entre janelas de dois a cinco dias. Além disso, analisa como variáveis de controlo específicas da empresa, como emissões e fatores ESG, afetam os retornos e examina diferenças específicas da indústria.

Os resultados indicam uma reação significativamente negativa do mercado tanto à proposta quanto à implementação da CSDDD, particularmente na análise de janela mais longa. A pontuação ESG, juntamente com as pontuações dos pilares ambiental e de governança, impactaram significativamente os retornos, com variações pronunciadas entre as indústrias com base nos níveis de emissão e variáveis ESG. Estas descobertas oferecem insights valiosos para investidores e formuladores de políticas sobre as implicações da diretiva para as empresas afetadas.

Título: Reações do mercado Diretiva de Due Diligence de Sustentabilidade Corporativa: Insights da União Europeia

Autora: Diana Byback

Palavras-chave: CSDDD, Sustentabilidade, Hipótese de Mercado Eficiente, Estudo de Eventos, CAPM, modelo 5FF

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List of Abbreviations

5FF	Five Fama and French Factor Model
CAPM	Capital Asset Pricing Model
CO2	Carbon Dioxide
CMA	Conservative minus Aggressive
CSDDD	Corporate Sustainability Due Diligence Directive
ESG	Environmental Social Global
ESGC	Environmental Social Global Combined
D/E	Debt to Equity
HML	High minus Low
RF	Risk-free rate
RMW	Robust minus Weak
ROA	Return on Assets
ROE	Return on Equity
SMB	Small minus Big

1. Introduction

The introduction gives a background to the Corporate Social Due Diligence Directive. Furthermore, this section outlines the research objectives, the significance of the topic, the research methods used, and the main findings and contributions.

European Environmental Social Global law has a long forward-looking objective to create a sustainable union and have a positive influence globally. The environmental goals are in line with the Paris Agreement, which is the international treaty on climate change, outlining the efforts all countries must make to limit global warming.[1] European lawmakers have noted that the incorporation and behavior of companies plays a crucial role in trying to facilitate the necessary changes that must be done to reach a climate-neutral and green economy[2] as well as achieving the UN Sustainable Development Goals.[3] Therefore, a proposal for a Corporate Sustainability Due Diligence Directive (CSDDD) was proposed on 23 February 2022 to strengthen sustainable corporate practices in companies´ operations and global value chains through mandatory Corporate Due Diligence.[4]

The motives behind the CSDDD were that companies have large and complex global value chains. These impact not only European citizens and markets but also international citizens and markets. Negative impacts from EU production have been observed inside and outside the Union. It has become more prominent that large companies already perform Due Diligence in their value chains due to increased competitive advantages and for risk mitigation purposes. Nevertheless, this has not been a mandatory praxis, which means that their current praxes' are not always effective and widespread among European companies.[5] The purpose of implementing the CSDDD is to establish a uniform legal framework within EU law. This will ensure that businesses adopt sustainable practices. The CSDDD officially entered into force

[1] Paris Agreement to the United Nations Framework Convention on Climate Change, Dec. 12, 2015, T.I.A.S. No. 16-1104
[2] Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021, establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law')
[3] Proposal for a Directive of the European Parliament and of the council on Corporate Sustainability Due Diligence and amending Directive (EU) 2019/1937, p.1
[4] Ibid p. 2
[5] Ibid p.1

on 25 July 2024.[6] This means that companies now have a mandatory duty to identify, prevent, mitigate, and address adverse human rights violations and environmental risks that could arise in their global upstream and downstream value chains.[7] The CSDDD is a strong contributor to existing regulatory instruments for ESG Governance and strengthens the EU´s commitments to the Paris Agreement and UN Sustainable Development Goals.[8]

Companies that are subject to the new regulations will inevitably face costs associated with transitioning to comply with the new legislation. These costs may include transition costs, possible investment costs to change value chains and costs for establishing and operating due diligence processes.[9] These costs can directly impact a company´s profitability and are therefore likely to influence investor sentiment toward the affected companies. However, according to the Efficient Market Hypothesis, a market is efficient if the prices fully reflect all available information.[10] Any anticipated cost or benefits imposed by the directive should therefore already be accounted for in the stock prices of the affected companies.

The objective of this thesis is therefore to research the effect that the new CSDDD has on the European markets. This includes looking at stock market reactions as well as providing a better understanding of environmental and social impact. This is important since the directive is expected to significantly influence corporate behaviour. Given that the directive was only recently adopted, existing studies on its effects are likely limited. By analysing investor sentiment, as reflected in stock market reactions to the new regulation, this thesis will assess if there is a significant market reaction, if certain industries are viewed more favourably than others and if certain firm characteristics influence the returns. The methods used in this thesis is an event study methodology and panel data linear regressions.

The contribution of this paper to existing research lies in the empirical evidence it provides on the impact of the CSDDD on stock markets. Given the limited research available due to the

[6] European Commission, "Directive on Corporate Sustainability Due Diligence: Frequently Asked Questions," 2024, p.3
[7] Proposal for a Directive on Corporate Sustainability Due Diligence 2019/1937, p.1
[8] Bird & Bird (2024), “One step closer to a sustainable EU; the European Parliament adopts the revised CSDDD proposal”, retrieved 16 September 2024
[9] European Commission, "Directive on Corporate Sustainability Due Diligence: Frequently Asked Questions," p. 14
[10] MacKinlay, A.C (1997). Event studies inn Economics and Finance. Journal of Economic Literature, 35(1), p. 13-39

directive's recent implementation this thesis helps to fill the current gap in the literature. Furthermore, this thesis also clarifies how Carbon emission and ESG variables are influencing the immediate market returns from the directive, clarifying how investors perceive regulatory risks and sustainability factors. Furthermore, by also focusing on industry variations this thesis offers an insight into how the directive impacts different sectors. The findings from this thesis contribute to academic discussions on market efficiency and sustainability and also offer insights to policymakers, investors and companies affected by the directive.

This thesis found that the market had a significant negative reaction to the final implementation of the CSDDD through all models and event windows as well as a significant negative reaction to the initial proposal of the directive with the extended window. The sustainability variables impacting the stock returns was the ESGC scores and the environmental pillar score as well as the governance pillar score. The ESGC score impacted the returns positively and the pillar scores impacted the returns negatively. Furthermore, the results displayed significant reactions to the emission variables and ESG scores. The impact on returns varied across industries depending on the level of emission levels and ESG scores. Some industries experienced positive effects from these variables while others experienced negative effects from the emission levels and ESG Scores.

2. Legal framework

This section provides an overview of the legal framework of the Corporate Sustainability Due Diligence Directive (CSDDD). The overview discusses the key areas the CSDDD aims to protect and the implication for business as well as which companies will be directly impacted by the directive.

The Corporate Sustainability Due Diligence Directive (Directive 2024/1760) was published in the Official Journal of the European Union on 5 July 2024 and entered into force on 25 July 2024. The directive enforces a corporate Due Diligence duty that mainly targets large corporations. The directive mandates European and non-European companies operating in the EU to conduct risk-based due diligence across their global value chains.[11] The Due Diligence involves identifying, preventing, mitigating and addressing adverse human rights violations and environmental risks that could arise in their operations through both global upstream and downstream value chains.[12] This means that companies must control that direct suppliers comply with human and environmental rights. Furthermore, it also entails that companies need to control their products and services in relation to their customers and consumers.[13] The human rights addressed in the directive include fundamental rights, such as the right to life and the prohibition of child labor.[14] Other types of workers' rights such as prohibition of unequal treatment in employment, the right to freedom of association, limitation of working hours and the right to enjoy just and favorable conditions of work, including a fair wage are among the rights covered in the directive.[15] The environmental impacts covered by the directive include the prohibition of import and export of endangered species, the use of certain chemicals and mercury compounds in the manufacturing processes, the prohibition of the unlawful handling, collection, storage and disposal of waste and the obligation to prevent, reduce and control pollution of the marine environment by dumping.[16] These are some of the rights that are covered and a full list of rights can be found in the appendix to the directive.

[11] European Commission, "Directive on Corporate Sustainability Due Diligence: Frequently Asked Questions," p. 3
[12] European Commission, Directive (EU) 2024/1760 of the European Parliament and of the Council of 13 June 2024 on Corporate Sustainability Due Diligence and Amending Directive (EU) 2019/1937 and Regulation (EU) 2023/2859, Art. 5
[13] Directive (EU) 2024/1760, 2024, Article 6,7 and 8
[14] European Commission, "Directive on Corporate Sustainability Due Diligence: Frequently Asked Questions," p. 9
[15] Directive (EU) 2024/1760, 2024, Appendix
[16] Directive (EU) 2024/1760, 2024, Appendix

The directive also includes an obligation to develop and implement a climate transition plan. The plan must disclose and address the company´s level of emissions (scope 1, 2 and 3) and document strategies to align their business model with global sustainability goals and the Paris Agreement.[17]

The CSDDD has a gradual entry into force. Member States have until 26 July 2026 to transpose the Directive into national law and a year later, on July 26, 2027, the rules will start to take effect for companies, with a gradual phase-in spanning 3 to 5 years following the directive's enforcement. The companies that the CSDDD targets in the first phase (26 July 2027) are EU-companies with more than 1 500 million euros worldwide net turnover and more than 5000 employees and non-EU companies generating more than 1 500 million euros in net turnover within the EU. The second phase (26 July 2028) incorporates EU companies with a net turnover exceeding 900 million euros and over 3000 employees, along with non-EU companies generating more than 900 million euros in net turnover within the EU. The last phase-in (26 July 2029) broadens the set of companies even more and includes EU companies with more than 450 million euros in net turnover with more than 1000 employees, including limited liability companies, partnerships, ultimate parent companies of a corporate group that meets the thresholds on a consolidated basis and franchisors/ licensors. Franchisors and licensors are required to meet specific conditions. The agreements they have must ensure a common identity and business concept and use the same business methods. They also must have generated over 22 500 000 Euro in the previous financial year and is or have been the ultimate parent company of a group with a net worldwide turnover exceeding 80 million euros in the last financial year. For non-EU companies the same set of rules apply, except that the net turnover must be generated within the union.[18] Financial Institutions partially fall within the scope of the directive as they are still subject to obligations for upstream due diligence and adhering to transition plan requirements. However, they are exempted from conducting due diligence on clients (downstream activities) for the time being.[19]

The implication for not adhering to the directive is civil liability. If companies do not comply with their duty to prevent, mitigate, end, and minimize adverse impacts of social and

[17] Directive (EU) 2024/1760, 2024, Article 1
[18] European Commission, "Directive on Corporate Sustainability Due Diligence: Frequently Asked Questions," p. 5-6
[19] European Commission, "Directive on Corporate Sustainability Due Diligence: Frequently Asked Questions," p. 6

environmental impacts they will be held liable for damages. Penalties include providing full compensation to affected victims. However, if the liability solely lies with a business partner in the company´s value chain, the company itself will not be held accountable. Although the CSDDD does not specify any further penalties for non-compliance it still mandates that sanctions need to be effective and proportionate. The penalties must have a maximum limit of no less than 5 percent of the company´s net worldwide turnover.[20]

[20] Directive (EU) 2024/1760, 2024, Preamble 76 and Article 27

3. Literature Review

This section describes the relevant literature and theories that this thesis is based on. The Efficient Market Hypothesis is a predominant theory that outlines the basics of the market. The section also describes support and evidence against ESG and CO2 rankings.

3.1 Efficient Market Hypothesis

A predominant theory within finance is the Efficient Market Hypothesis. A market is efficient if the prices fully reflect all available information. The theory assumes a market that is defined by market equilibrium. The market equilibrium is formed by expected returns that are based on the information from the market. If new information is available, prices will adjust accordingly without any delay and form the new market equilibrium. This would inevitably mean that it is impossible to consistently outperform the market and achieve higher risk-adjusted returns since all opportunities for excess returns are already incorporated in the asset pricing.[21]

The discussion of whether the market is efficient or not usually revolves around three forms of market efficiency. The first form of efficiency is called the Weak Form, which is characterized by a market that can be explained by historical prices. In this case all available information can be inferred from the historical price points of the securities. This market form efficiency rejects the efficacy of technical analysis. Usually, a random walk is used to test the market efficiency.[22] The second form is the semi-strong form which is described by stock prices that reflect both past and current public information. The prices therefore reflect both financial statements, company announcements and public market information. A common way to test this form is through event studies. This market form means that there is zero utility for investors who try to use fundamental analysis when conducting investment decisions.[23] Lastly, the strong form reflects both publicly and private information, including insider information. With this form of market efficiency even insider trading wouldn't be earning higher market-adjusted returns since the market already reflects all available information.[24] There is evidence that supports weak form efficiency. Furthermore, there is also evidence

[21] Fama, E. F. (1970). Efficient capital markets. *Journal of finance*, *25*(2), p. 383-385
[22] Ibid, p. 386-396
[23] Ibid p. 401-408
[24] Ibid p. 409-411

supporting the semi-strong efficiency for stock splits, annual earnings announcements, and new stock issues. These findings showcase a general market tendency that supports semi-strong efficiency.[25]

3.2 CSR and ESG

Corporate social responsibility (CSR) and ESG is becoming increasingly important for companies, their stakeholders and investors. A reason for this is that higher ESG scores have been linked to an increase in a company's equity valuation and a lower cost of capital.[26] Furthermore, it has been proposed that ESG scores are effective for risk mitigation for risks such as regulatory risks, systematic risks, and reputational risks. During the financial crisis in 2008, firms with higher ESG scores were less sensitive towards the market crash compared to their counterparties with lower ESG scores. Similarly, during periods of crisis where the market is characterised by low trust, firms with higher ESG scores have higher trust and yield higher returns. ESG scores have also been linked to an increase in stock returns since the scores increase companies' values, like an increase in intangibles.[27] For portfolio theory, ESG scores have been proven to be valuable to hedge against climate change risks.[28] Furthermore, they have also proven to dampen the effects of exogenous events such as Covid 19.[29] This is interesting in regards to the CSDDD since the directive is likely to be a trigger for increased investor awareness of ESG Scores since the directive has several requirements demanding companies to be more sustainable.

3.3 CO2 and Financial Performance

Carbon emission measurements display how much carbon dioxide a company produces. In the EU the carbon emissions are capped and companies that use less than they require can trade these rights. Companies with higher levels of carbon emissions can earn higher

[25] Ibid p. 414- 415
[26] Giese, G., Lee, L. E., Melas, D., Nagy, Z., & Nishikawa, L. (2019). Foundations of ESG investing: How ESG affects equity valuation, risk, and performance. The Journal of Portfolio Management, 45(5), 69-83, p.1
[27] Gillan, S. L., Koch, A., & Starks, L. T. (2021). Firms and social responsibility: A review of ESG and CSR research in corporate finance. *Journal of Corporate Finance*, p. 2-13
[28] Engle, R. F., Giglio, S., Kelly, B., Lee, H., & Stroebel, J. (2020). Hedging climate change news. The Review of Financial Studies, 33(3), 1184-1216, p. 35
[29] Gillan, S. L., Koch, A., & Starks, L. T. (2021). Firms and social responsibility: A review of ESG and CSR research in corporate finance. *Journal of Corporate Finance*, p. 2-13

returns.[30] This phenomenon is sometimes referred to as the carbon premium, as investors already factor in the additional risk that the high-level carbon emission companies have.[31] However, it is not certain that these premiums are consistent. The existing carbon emission studies show discrepancies. In another study, the level of carbon emissions' effect on firm value and voluntary disclosures were studied. The study concluded that for every additional thousand metric of carbon emissions resulted in a decreased firm value by $212 000. Furthermore, voluntary disclosures were seen as favourable by the market and the companies that voluntarily disclosed had higher firm values compared to their counterparties.[32]

3.4 Regulatory effects on stock performance

A study based on the US stock market tested how climate risks were priced in the market. The study found that actual climate risks such as catastrophes were not priced. Only policy-related transition risks from government interventions, such as emission regulation were priced by investors.[33] This should mean that the stocks with higher risk should be priced higher since investors demand a risk premium. However, another study found that stocks with high ESG Scores outperform stocks with lower ESG scores when unexpected and significant sustainability concerns hit the market.[34]

[30] Bolton, P., & Kacperczyk, M. (2021). Do investors care about carbon risk?. *Journal of financial economics*, *142*(2), 517-549, p. 28
[31] Oestreich, A. M., & Tsiakas, I. (2015). Carbon emissions and stock returns: Evidence from the EU Emissions Trading Scheme. *Journal of Banking & Finance*, p. 307-308
[32] Matsumura, E. M., Prakash, R., & Vera-Muñoz, S. C. (2014). Firm-value effects of carbon emissions and carbon disclosures. *The accounting review*, *89*(2), 695-724, p. 720-721
[33] Faccini, R., Matin, R., & Skiadopoulos, G. (2023). Dissecting climate risks: Are they reflected in stock prices?. *Journal of Banking & Finance*, *155*, 106948. p. 2-3
[34] Pástor, Ľ., Stambaugh, R. F., & Taylor, L. A. (2021). Sustainable investing in equilibrium. *Journal of financial economics*, *142*(2), 550-571. p. 566

4. Hypotheses

The section outlines 3 hypotheses based on what the potential implications of the directive might be.

This thesis will analyse the market reactions to the CSDDD, investigate whether firm-specific characteristics influence abnormal returns and explore industry-level variations in responses.

1) Market reactions

Since companies subject to the new regulation are expected to incur costs to comply with the new legislation the first pair of hypotheses can be formulated as the following:

H0: The market will not experience any significant market reactions to the directive.

H1: The market will have a significant negative reaction to the directive.

2) Firm-specific reactions

H2: Abnormal returns are influenced by carbon emission variables and ESG variables.

3) Industry reactions

H3a: Certain industries are more impacted by the directive.

H3b: The impact of carbon emission variables and ESG variables on abnormal returns varies across industries.

5. Data Collection

The section describes the data that was gathered for the study. The section also explains how the data was filtered and selected to comply with the restrictions of the directive as well as the variables used.

5.1 Data Collection and Sample Criteria

The data collected had to follow several restrictions to comply with the directive. The data was collected using Refinitiv Workspace. The directive is implemented through a gradual phase-in over the first 3 to 5 years and targets companies based on firm size. This study will focus on the final stage of the directive´s adaptation since this phase includes a broader range of companies, which offers a more comprehensive view of the market impact. After the final adaptation the directive states that effected firms must have annual net revenue above 450 million euros and employ over 1000 employees. The directive counts both the part-time employees and full-time employees to determine the workforce.[35] In Refinitiv the number of employees is calculated in the same manner as the directive which ensures that the selected firms closely align with the directive's requirements. Furthermore, the directive targets various business entities, including both EU-based and non-EU companies operating within the EU. These companies include limited liability companies, partnerships, ultimate parent companies, as well as franchisors and licensors. For strategic and practical reasons this study focuses exclusively on the selection of public limited liability companies within the EU. This choice is primarily driven by considerations such as limited data availability, public disclosure challenges, the complexity of corporate structures and concerns over data reliability. After applying the filters based on the directive´s criteria, the dataset consisted of the companies that would be directly impacted by the new legislation. The initial sample consisted of 1320 companies before data cleaning.

To continue the data collection process, a set of company key variables was selected over a defined period for the identified companies. The selected period spans 3 years, from January 1st, 2021, to December 31st, 2023. The variables chosen include industry classification and headquarters location. Furthermore, various financial metrics were retrieved such as total

[35] European Commission, "Directive on Corporate Sustainability Due Diligence: Frequently Asked Questions," p. 5-6

assets, liquidity ratios (quick and current), net debt to total equity (D/E) and Return on Equity (ROE). Lastly the environmental factors of direct and indirect CO2 emissions (Scopes 1, 2, and 3), total CO2 emissions, ESG overall, ESG combined, and pillar scores (environmental, social, and governance) were incorporated. Thereafter, the data cleaning process was initiated. Initially, the dataset included companies from both the EU and Europe. To ensure alignment with the scope of the directive, companies that had headquarters outside of the EU were excluded. Financial Institutions were also excluded since they are only partially included in the directive and are subject to several other regulations. Excluding Financial Institutions improves the comparability across sectors and reduces the risk of skewed results which likely enhances the relevance of the study´s findings. The remaining data was then cleaned by removing entries with missing variables and values using ESG scores as a baseline. As a final step, the data was transformed using the natural logarithm (except for the financial ratios). The data for 2024 did not fully reflect the entire year and some entries were missing. Therefore, all variables were lagged by one year to align with the events. The final processed dataset therefore covered the years 2021 to 2023 representing the years 2022 to 2024 in relation to the CSDDD.

To do an event study it is also necessary to retrieve stock price data. The data was gathered using Refinitiv Workspace filtering for Total Return. In Refinitiv the Total Return includes price changes and dividends and is compounded daily for the specified period. The daily Total Return was retrieved for 3 years between January 1st, 2021, to December 31st, 2023, to match the first dataset. Additionally, returns were also retrieved for January 1st, 2024, to September 15, 2024, since some of the events for the study occurred in 2024. Lastly, duplicated returns were removed as well as extreme outliers. There were also companies in the dataset that were not listed during the period of the estimation window. Therefore, they were also removed from the dataset. After the data cleaning was done for the yearly dataset and the daily stock price dataset the sample consisted of 742 companies. The same set of companies was used in both datasets.

Table 1: Country and Industry descriptives

The table describes the characteristics of the dataset such as country of origin as well as industry name according the ICB classification.

Country	Count
Germany	146
France	123
Sweden	102
Italy	60
Spain	46
Netherlands	44
Finland	37
Denmark	29
Ireland	28
Austria	26
Luxembourg	26
Belgium	25
Poland	19
Greece	12
Portugal	10
Hungary	4
Romania	2
Czech Republic	1
Malta	1
Slovenia	1
Total	742

ICB Industry name	Count
Industrials	229
Consumer Discretionary	156
Health Care	70
Basic Materials	62
Technology	62
Consumer Staples	60
Utilities	35
Telecommunications	30
Energy	28
Real Estate	10
Total	742

5.2 Asset pricing models, control variables and firm control variables

The study uses both the Capital Asset Pricing Model (CAPM) and the Five Fama and French Factor (5FF) to calculate expected market returns (see section 6. Method). The market return, risk-free rate and the factor variables that are used for the study were collected using the Kenneth R French Data Library.[36] The dataset called Fama/French European 5 Factors (daily) was retrieved which contains Excess Market Return, Risk-free rate, Small minus Big (SMB), High minus Low (HML), Robust minus Weak (RMW) and Conservative minus Aggressive (CMA). The firm control variables used in this thesis were sourced from the dataset from Refinitiv Workspace (see section 5.1) and included total assets, quick ratio, current ratio, D/E,

[36] Kenneth R. French Data Library, Retrieved 21 September 2024

ROE, CO2 Emissions and ESG Scores (including ESG combined and the individual pillar scores).

5.3 Summary Statistics

Below, the variable descriptions and summary statistics of the data are provided in the table 2 and 3.

Table 2: Descriptions of variables

The table presents and describes the variables that were used as well as their source.

Variable	Description	Type	Source
AR	Abnormal Return. Total Return – expected return for each company	Dependent	-
AAR	Average Abnormal Return. The average of abnormal returns for all companies by each day	Dependent	-
CAAR	Cumulative Average Abnormal Return. The sum of AAR based on the event window	Dependent	-
CAR	Cumulative Abnormal Return. The sum of AR for each individual company for each date	Independent	-
Raw Return	Daily Stock Return based on daily pricing data	Independent	Refinitiv Workspace
Risk Free Rate	The daily Risk-Free Rate Europe	Independent	Kenneth R. French Data Library
Market Return	The daily Market Return Europe	Independent	Kenneth R. French Data Library
SMB	Small Minus Big	Control Variable	Refinitiv Workspace
HML	High Minus Low	Control Variable	Refinitiv Workspace
RMW	Robust Minus Weak	Control Variable	Refinitiv Workspace
CMA	Conservative Minus Aggressive	Control Variable	Refinitiv Workspace
Industry	ICB Industry Name	Firm Control Variable	Refinitiv Workspace
Total Assets	Sum of Total Assets per company	Firm Control Variable	Refinitiv Workspace
Quick Ratio	Ratio of Total Current Assets excluding Total Inventories divided by Total Current Liabilities	Firm Control Variable	Refinitiv Workspace
Debt to Equity	Debt Divided by Equity	Firm Control Variable	Refinitiv Workspace
ROE	Return on Equity	Firm Control Variable	Refinitiv Workspace
CO2 Emissions Total	Total Carbon dioxide (CO2) and CO2 equivalents emission in tones.	Firm Control Variable	Refinitiv Workspace
CO2 Emissions Scope 1	CO2 Equivalent Emissions Direct Scope 1	Firm Control Variable	Refinitiv Workspace
CO2 Emissions Scope 2	CO2 Equivalent Emissions Direct Scope 2	Firm Control Variable	Refinitiv Workspace
CO2 Emissions Scope 3	CO2 Equivalent Emissions Direct Scope 3	Firm Control Variable	Refinitiv Workspace
ESG Score	Environmental Social Governance Score	Firm Control Variable	Refinitiv Workspace
ESGC Score	Environmental Social Governance Combined Score	Firm Control Variable	Refinitiv Workspace
Environmental Pillar Score	Evaluates a company's impact on both living and non-living natural systems	Firm Control Variable	Refinitiv Workspace
Social Pillar Score	Evaluates a company's ability to build trust and loyalty	Firm Control Variable	Refinitiv Workspace
Governance Pillar Score	Assesses a company's systems and processes that ensure its board members and executives act in the best interests of long-term shareholders.	Firm Control Variable	Refinitiv Workspace

Table 3: Data descriptives

Table 3 describes the number of observations, mean, standard deviation, median, min and max of the control variables.

Variable	N	Mean	SD	Median	Min	Max
Total Assets	2 220	22,23	1,46	22,08	19,14	27,12
Quick Ratio	2 102	1,09	0,85	0,93	0,07	15,48
Current Ratio	2 221	1,52	0,97	1,31	0,19	15,48
Debt to Total Equity	2 203	0,86	5,38	0,43	-4,19	179,63
Return On Equity	2 122	0,15	0,50	0,14	-5,10	20,23
CO2 Equivalent Emissions Total	2 062	11,53	2,51	11,32	2,99	18,76
CO2 Equivalent Emissions Scope 1	1 865	0,04	2,76	-0,64	-4,62	10,72
CO2 Equivalent Emissions Scope 2	1 972	10,43	2,32	10,38	0,34	16,91
CO2 Equivalent Emissions Scope 3	1 555	13,65	2,95	13,77	1,10	21,04
ESG Score	2 225	4,09	0,32	4,16	1,71	4,55
ESG Combined Score	2 225	4,05	0,31	4,11	1,71	4,55
Environmental Pillar Score	2 216	4,01	0,48	4,15	0,37	4,59
Social Pillar Score	2 225	4,17	0,34	4,26	1,87	4,59
Governance Pillar Score	2 225	3,93	0,52	4,07	1,04	4,59

5.4 Events

The process from the proposal of the CSDDD to its official entry into force is lengthy and involves numerous legislative steps such as proposals, discussions, and approvals. Both the Council and the European Parliament must reach an agreement for the directive to proceed. The various stages of this process are published in the Official Journal of the European Union. Twelve procedures took place between the initial proposal and the final publication of the directive. These twelve procedures will form the events that are analyzed in the study.

Table 4: Timeline of the CSDDD legal proceedings

This table outlines the key dates of the legal proceedings leading up to the final adaptation of the CSDDD when it entered into force. The first proposal for the directive was made on February 23, 2022. Throughout the process, the terms were renegotiated due to doubts from Member States and was finally accepted on 05 July 2024, and entered into force on 25, July 2024.

Event	Date	Event Description
1	23/2/2022	Proposal of Directive
2	01/12/2022	The Council adopted its general approach towards the directive
3	01/06/2023	The Euopean Parliament adopted its general approach towards the directive
4	06/06/2023	Trilogue negotiations commenced
5	14/12/2023	The European parliment and the European Council reached a provisional agreement
6	09/02/2024	Cancelled Corper meeting due to doubts from memberstates, which led to a renegotiation of the agreement
7	15/03/2024	Confirmation of the renegotiated Agreement by the EU Council (March Agreement)
8	19/03/2024	Confirmation of the new proposal by the European Parliament Committee on Legal Affairs
9	24/04/2024	Approved by the Eurpean Parliment
10	24/05/2024	Approved by the European Council
11	05/07/2024	Published in the Official Journal of the European Union
12	25/07/2024	The CSDDD entered into force

Source: Official Journal of the European Union

6. Method

To analyze the effects of the implementation of the CSDDD several approaches were used. Initially, an event study was conducted using the CAPM for two different event windows. Thereafter, the analysis is extended using a robustness test by incorporating the 5FF model using the same event windows. Lastly, the individual Cumulative abnormal returns for each company were analyzed through a series of panel data linear regressions accounting for firm-specific control variables.

6.1 Methodology choice and background

Event studies are commonly used to analyse the impact of an event on company stock returns. The underlying assumption of the event study methodology is that markets can be deemed as being efficient. Hence, an immediate stock price reaction should occur from the event since the market reflects all available information. Event studies can be used in fields such as accounting and finance. It is also commonly used within the field of law and economics to measure the economic effects of legislative issues.[37] An event study is appropriate to use in this thesis since the various key dates of the legal proceedings can be expected to impact the effected companies.

There are a few steps that need to be considered before conducting the actual study. Firstly, the event of interest must be defined as well as the time span of which the security prices will be analysed. The latter, also known as the event window, typically spans several days surrounding the event. The event window should as a minimum cover the day before and the day after the event to be able to capture anticipation reactions to the event, the event day reaction and the post-event reactions.[38] After the event or events have been identified, the companies that are included in the study must follow the correct selection criteria such as industry classification or for instance, in this thesis, the companies affected by the directive. The actual impact of the event is measured by the abnormal return and various asset pricing models can be used. To estimate the abnormal return, it is necessary to define the estimation window. It is common practice to use daily data somewhere between 90 up to 252 days prior to the event window as the estimation window. Lastly, the cumulated abnormal returns are

[37] MacKinlay, A.C (1997). Event studies inn Economics and Finance. Journal of Economic Literature, 35(1), p. 13
[38] Ibid, p. 15

calculated by aggregating the abnormal returns for the event window. These are thereafter tested for significance.[39]

6.2 Defining the timeline and the event windows

The dates that were chosen for the event study are the timeline for the CSDDD legal proceedings. All stages of the proceedings are relevant to analyse since it can be expected that stock market reactions might occur from the announcement, the continuing legal proceedings as well as the announcement of the final adaptation. Thus, 12 events were analysed (see section 5.3). The event window and the estimation window were then defined, ensuring that they did not overlap. To achieve this, each estimation window began one day before the start of the event window for the specific event. The implementation of the CSDDD is a delicate and complex process that involves large implications for the affected parties. To ensure that both immediate and delayed responses were captured correctly, the event study used two different event windows. The first event window was set to two days before the event and two days after the event [-2,2] to capture earlier market reactions. The second event window spanned five days before the event and five days after the event [-5,5], thus enabling the event study to capture delayed reactions. However, some of the events occurred close to each other, which might result in cross-sectional correlation.[40] Inevitably, this causes the previous event to become included in both the event window and the event estimation window. To combat this issue, the estimation window was set to a 252-day rolling window to minimize the variance of the daily stock returns.

6.3 Abnormal Returns

Abnormal returns represent one of the final steps of an event study and answer the question of whether a company's returns on a given day deviate from the expected return. The expected return describes the return a company should have if the markets are priced efficiently, and no new information is impacting the stock.[41] The Abnormal return is defined as the following:

$$AR_i = R_i - ER_i \quad (1)$$

[39] MacKinlay, A.C (1997). Event studies inn Economics and Finance. Journal of Economic Literature, 35(1), p. 15
[40] Ibid, p. 15
[41] Ibid, p. 18

Where the AR_i stands for the abnormal return per company, the R_i is the actual return for that day for that specific company and ER_i is the expected return.

6.3.1 Expected returns

It is common practice that the expected return is calculated using a market model.[42] In this thesis, the CAPM was used. The CAPM was inspired by Markowitz's mean-variance portfolio which stems from the notion that investors are risk averse and select portfolios based on the tradeoff between expected return and expected risk. The CAPM is further enhanced by introducing the risk-free rate and the belief that a stock should be priced relative to the market portfolio, meaning that all investors should have the same beliefs about a stock's return and risk if all information is available.[43] The CAPM is calculated as the following:

$$ER_i = \alpha_i + R_f + \beta_i(R_M - R_f) \quad (2)$$

The ER_i is the expected return, α is the alpha, R_f is the risk-free rate, the β_i signifies the beta of the stock and the R_M signifies the market return.

To calculate the expected return according to the CAPM, a few steps were followed. Firstly, the risk-free rate and the Market return were retrieved for Europe (see section 5.2). Since the event study seeks to measure abnormal returns, alpha and beta were calculated using excess returns, which isolate the effects of market movements and the risk-free rate. Therefore, the following calculations were made to retrieve the excess market return and excess stock return, which will be used for equations 5 and 6. The RP_i denotes the excess return of the stock while RP_M denotes the excess return on the market.

$$RP_i = R_i - R_f \quad (3)$$

$$RP_M = R_M - R_f \quad (4)$$

[42] MacKinlay, A.C (1997). Event studies inn Economics and Finance. Journal of Economic Literature, 35(1), p. 18

[43] Fama, E. F., & French, K. R. (2004). The capital asset pricing model: Theory and evidence. Journal of economic perspectives, p. 26

The beta captures the stock's systematic risk, which is the measure of the stock's sensitivity to market movements. To calculate the beta of the stock the following formula was used: [44]

$$\beta_i = COV\ \frac{(RP_i, RP_M)}{VAR\ (RP_M)} \tag{5}$$

Lastly, the alpha represents the portion of each stock's return that is not explained by its sensitivity to the market. The alpha was calculated using the following formula:

$$\alpha_i = RP_i - \beta_i(RP_M) \tag{6}$$

Since the estimation window is a rolling window, a unique beta and alpha were calculated each day for each stock. However, within the actual event window, the beta remained static and was based on the estimation window at the start of the event. If events overlapped and shared the same event window, the newly calculated beta and alpha for the second event overruled the beta and alpha from the first event. Once all the betas and alphas were calculated for each day for each stock, they could then be applied to equation 2 to calculate the expected return. Lastly, the abnormal returns were then calculated using equation 1.

6.4 Cumulative Average Abnormal Returns and statistical significance

After calculating the abnormal returns for each company during the period, the average abnormal return for each date across the entire sample can be calculated. The formula for the AAR can be seen below:

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it} \tag{7}$$

To understand the impact of the CSDDD across the full sample, a t-test is conducted using the Cumulative Average Abnormal Return (CAAR). The CAAR is calculated for each event by summarizing the average abnormal return for the event window [-2,2] and [-5,5].

$$CAAR(_{t-2,\ t2)} = \sum_{t=t-2}^{t2} AAR_t \tag{8}$$

$$CAAR(_{t-5,\ t5)} = \sum_{t=t-5}^{t5} AAR_t \tag{9}$$

[44] Fama, E. F., & French, K. R. (2004). The capital asset pricing model: Theory and evidence. Journal of economic perspectives, p. 26

A t-test is then performed to assess the significance of the CAAR across the entire sample, testing against the 1%, 5%, and 10% significance levels.

6.5 Firm specific Cumulative Abnormal return

Lastly, the individual CAR for each company for each event is calculated. The individual CARs will be used as the dependent variable in the regression analysis (see section 6.6). The abnormal returns for each company are cumulated from the beginning of the event window to the end of the event window for all events. As mentioned earlier in section 6.2 the event window for this event study is [-2,2] and [-5,5], thus the days before, during and after the event will be accumulated. The expression for this can be summarized as follows:

$$CAR_i(t_{-2}, t_{+2}) = \sum_{t-2}^{t2} AR_{it} \tag{10}$$

$$CAR_i(t_{-5}, t_{+5}) = \sum_{t-5}^{t5} AR_{it} \tag{11}$$

6.6 Robustness test

A robustness test was performed to verify the validity of the findings. The Robustness test was performed by adding additional factors to the original model.[45] The model that was chosen for the robustness test was the Fama-French 5 Factor model (5FF) to understand if the results hold under an alternative asset pricing model which includes additional factors. An alternative is the Fama-French 3 Factor model (3FF) but the 5FF was chosen since it controls for additional variables and generally performs better than the 3FF.[46] The 5FF model consists of the following components:

$$\mathrm{R_{it}} - \mathrm{R_{Ft}} = \alpha_i + \beta_i(\mathrm{R_{Mt}} - \mathrm{R_{Ft}}) + \mathrm{s_i SMB_t} + \mathrm{h_i HML_t} + \mathrm{r_i RMW_t} + \mathrm{c_i CMA_t} + \mathrm{e_{it}} \tag{12}$$

The $\mathrm{R_{it}}$ is the actual return of stock i, $\mathrm{R_{Ft}}$ is the risk-free rate, $\mathrm{a_i}$ is the alpha, $\mathrm{b_i}(\mathrm{R_{Mt}} - \mathrm{R_{Ft}})$ denotes the price sensitivity of stock i, the $\mathrm{s_i SMB_t}$ (Small minus Big), $\mathrm{h_i HML_t}$ (High minus Low), $\mathrm{r_i RMW_t}$ (Robust minus Weak) and $\mathrm{c_i CMA_t}$ (Conservative minus Aggressive).

[45] Lu, X., & White, H. (2014). Robustness checks and robustness tests in applied economics. *Journal of econometrics*, p. 2

[46] Fama, E. F., & French, K. R. (2015). A five-factor asset pricing model. *Journal of financial economics*, *p.2*

When performing the Robustness check, Equation (1) serves as the base equation, but Equation (2) is replaced with Equation (12). Excess return was used through Equation (3) and (4). The coefficients for each factor are calculated through an ordinary least squares (OLS) regression. The Cumulative Average Abnormal Returns and statistical significance was calculated using equation (7) - (9) and the individual CAR was calculated using equation (10) - (11).

6.7 Regression Analysis

After calculating the Cumulative Abnormal Return (CAR) for each company for each of the 12 events, I then conducted a series of panel data regressions to explore whether firm-specific control variables and factors influenced the returns. The regressions were done progressively, controlling, and adding one variable at a time to see the full impact of the newly added variable. The CAR serves as the dependent variable, the total assets, quick ratio, current ratio, D/E, ROE as the financial firm control variables; and the ESG, ESGC, Environmental Pillar Score (EPS), Social Pillar Score (SPS), and Governance Pillar Score (GPS), along with CO2 Emissions Total, CO2 Scope 1, CO2 Scope 2, CO2 Scope 3 served as the environmental firm control variables. All firm control variables, except the financial ratios, were transformed using the natural logarithm. All regression models include robust standard errors to account for any potential heteroskedasticity and variability across observations.

In general, ESG and emissions variables tend to have opposite directional impacts. Separate regressions were therefore conducted for ESG and the emission variables to allow for a clearer interpretation (see Regression Equation (13) and (14). Lastly, the two regressions are controlled for industry fixed effects. To determine whether fixed effects or random effects were more appropriate for the regressions, a Hausman test was conducted. The Hausman test was done on the two final equations and strongly indicated that the random effects model was the best choice for the regressions (P value 0.78 for Equation 13 and P value of 0.59 for Equation 14). The following equations were used to conduct the regressions:

$$\mathrm{CAR_i} = \alpha_i + \beta_1 \text{Financial Firm control Variables}_\mathrm{i} + \beta_2 \mathrm{ESG_i} + \beta_3 \mathrm{ESGC_i} + \beta_4 \mathrm{EPS_i} + \beta_5 \mathrm{SPS_i} + \beta_6 \mathrm{GPS_i} \quad (13)$$

$$\mathrm{CAR_i} = \alpha_i + \beta_1 \text{Financial Firm control Variables}_\mathrm{i} + \beta_2 \mathrm{CO2\ Total_i} + \beta_3 \mathrm{CO2\ Scope\ 1_i} + \beta_4 \mathrm{CO2\ Scope\ 2_i} + \beta_5 \mathrm{CO2\ Scope\ 3_i} + \beta_6 \mathrm{GPS_i} \quad (14)$$

6.7.1 Interaction Terms

As an additional step, interaction terms were incorporated into the analysis to capture how the effect of independent variables on the CAR differs across industries. First the variables ESG, ESGC and CO2 Total were split into three quartiles to better understand the impact on CAR between various levels of sustainability scores and emission levels. The lowest quartile serves as the baseline which allows the analysis to observe how CAR changes relative to the lowest levels of ESG, ESGC and CO2 Total. Furthermore, a baseline industry was chosen randomly by Stata. The industry that was chosen became Basic Materials, thus the rest of the industries will be compared to Basic Materials in terms of their effects on CAR.

For Equation 13, interaction terms were added between industry and ESG as well as between industry and ESGC. For Equation 14, an interaction term was added between industry and CO2 Total. The interaction terms enable a better understanding of whether ESG, ESGC, CO2 Total and CAR are influenced by industry classification. This analysis provides insights into whether certain industries experience a stronger or weaker impact from these variables regarding the CSDDD. This is especially important since the directive promotes sustainability, and the usage of an interaction term will show which industries might be impacted the most compared to the baseline industry.

7. Results

This section reports the results from the event study using CAPM for the [-2,2] and [-5,5] event window, the results from the robustness test using the 5FF for the [-2,2] and [-5,5] event window as well as the results from the regression analyses.

7.1 Event study using the CAPM

From the event study, it is possible to infer the general market reaction to the CSDDD legal proceedings, from the initial mandate suggestion to the final decision of implementation. Table 5 presents the results of the immediate market reactions to each event. From the table below we can see that the initial proposal of the directive (event 1) caused a negative market reaction of -1.2% and a negative CAAR of -1.6%. However, the reaction was not statistically significant. If the event was significant, it would have indicated a negative market reaction sentiment towards the CSDDD.

Moving through the legal proceedings, the results yielded a shift in response towards a positive market reaction for events 2 to 5, however, none of them showed any significance. A slight positive CAAR can be attributed to random fluctuations in the market or that investors were not particularly influenced by these events if they are seen as more general proceedings without much new information. Furthermore, a non-statistically significant CAAR can also indicate that the market already accounted for the new market information, which is in line with the theory of semi-strong market efficiency.

During event 6, a negative CAAR can be observed, however yet again, not statically significant. During event 6 in 2024, the Corper meeting was cancelled because member states had doubts surrounding the directive, particularly surrounding the inclusion of both upstream and downstream due diligence for financial institutions. The slight negative CAAR can be attributed to either the procedural nature of the event, random fluctuations in the market, or already anticipated information that is effectively priced by the market. However, during event 7 there was a notable change in the significance level of the market reaction. During event 7 the directive was renegotiated due to the previous concerns surrounding the directive. The market responded negatively with a CAAR of 1.94% at a significance level of 1%.

Investors might have reacted strongly to the renegotiated directive as the growing concerns from the member states became more apparent when a renegotiation was required.

For events 8-11, only a slight positive or negative CAAR was observed, and none were statistically significant. However, during the final official entry into force (event 12), the market reacted negatively with an AAR of -0,82% and, CAAR of -2,87% with a significance level of 1%. This signals that the market held a skeptical view toward the implementation of the CSDDD for the affected companies. As discussed in section 2 (Legal Framework) the directive imposes large operational controls which will increase costs for companies. A final negative response to the implementation can therefore be seen as quite expected given the operational challenges companies are anticipated to face.

Table 5: Returns and significance CAPM [-2,2] window

The table presents the results for the 12 events for the Average Abnormal Return (AAR), Cumulated Average Abnormal Return (CAAR) as well as the t-test of the CAAR for the entire sample. The event window is 2 days before the event and 2 days after. The asset pricing model that was used is the CAPM.

Event	Date	AAR	CAAR (-2,2)	t-test CAAR (-2,2)
1	23-02-2022	-1,20%	-1,60%	-0,4614
2	01-12-2022	0,96%	1,35%	1,0336
3	01-06-2023	0,68%	0,92%	0,3569
4	06-06-2023	0,04%	1,99%	1,1229
5	14-12-2023	2,39%	0,06%	0,0195
6	09-02-2024	-0,13%	-1,20%	-0,7007
7	15-03-2024	-0,63%	-1,94%	-4,6423***
8	19-03-2024	-0,27%	-0,51%	-0,4611
9	24-04-2024	-0,55%	0,11%	0,0471
10	24-05-2024	0,01%	-0,37%	-0,3828
11	05-07-2024	-0,04%	-1,15%	-0,6361
12	25-07-2024	-0,82%	-2,87%	-2,6379***

*The table presents the significance levels for the reported statistics. A single asterisk * indicates significance at the 10% level, double asterisks ** denote significance at the 5% level, and triple asterisks*

Following the event window of [-2,2] days, the results of the event window of [-5,5] days are presented in table 6. The extended event window allows for a comprehensive capture of market reactions by including potential pre-event anticipation and post-event drift. By examining the extended period, we can measure if the AAR and CAAR contain sustained market sentiment toward the CSDDD. The results in table 6 yield quite a similar pattern to table 5. However, the initial proposal of the directive (event 1) is met with a significant negative market reaction. Compared to the shorter event window, this event window has a negative AAR of -1,14%, and a high negative CAAR of -7,82% with a significance level of 5%. The difference can likely be attributed to pre-event anticipation from either leaked or anticipated information as well as post-event drift from investors that needed a longer time to process the information.

Events 2-4 had a positive trend and events 5-6 had a slight negative trend, however none of the events were significant. Event 7 was also not significant, which is a notable difference compared to the shorter event window. A potential explanation for this might be that the reaction to the renegotiated agreement was more immediate and a longer event window diluted the market reactions. Events 8-10 continued the slight negative pattern, although insignificant. Event 11 had a CAAR of 4,75%, which seems high. However, the event was not significant, and we cannot draw any further conclusions about the event. The high CAAR can be attributable to either noise caused by other unrelated factors or investors having already priced in the information. As discussed earlier, a lack of significance can be due to the mere produceorial nature of the events or that the market already accounted for the information. Lastly, for event 12 (final official entry into force), an observed statistical significance at the 1% level can be seen with a CAAR of -5,77% and AAR of -0,82%. This confirms the idea that the market reacted negatively to the final implementation of the CSDDD which is likely due to costs associated with the directive.

Table 6: Returns and significance [-5,5] window

The table presents the results for the 12 events for the Average Abnormal Return (AAR), Cumulated Average Abnormal Return (CAAR) as well as the t-test of the CAAR for the entire sample. The event window is 5 days before the event and 5 days after. The asset pricing model that was used is the CAPM.

Event	Date	AAR	CAAR (-5,5)	t-test CAAR (-5,5)
1	23-02-2022	-1,14%	-7,82%	-2,1771**
2	01-12-2022	0,98%	0,37%	0,1816
3	01-06-2023	0,67%	1,33%	0,5065
4	06-06-2023	0,04%	2,26%	0,9042
5	14-12-2023	2,39%	-0,17%	-0,0531
6	09-02-2024	-0,16%	-0,91%	-0,4689
7	15-03-2024	-0,62%	-1,50%	-0,8931
8	19-03-2024	-0,25%	-0,30%	-0,1931
9	24-04-2024	-0,55%	-1,55%	-0,5998
10	24-05-2024	0,01%	-1,59%	-0,7951
11	05-07-2024	-0,04%	4,75%	0,7552
12	25-07-2024	-0,82%	-5,77%	-2,6729***

*The table presents the significance levels for the reported statistics. A single asterisk * indicates significance at the 10% level, double asterisks ** denote significance at the 5% level, and triple asterisks *** signify significance at the 1% level.*

7.2 Robustness Test with the 5FF model

Expanding the analysis, the 5FF model provides a more comprehensive overview by incorporating additional controlling variables. This provides a deeper understanding of the market mechanisms and will offer means to validate or challenge the results from the CAPM.

The results from the 5FF model for the [-2,2] event window is seen in table 7. Event 1 shows similar results compared to the [-2,2] using CAPM. The initial event is slightly negative but not statistically significant. Events 2-5 shows a similar pattern to the CAPM, and no events were significant. A negative reaction can be observed for event 6, although not significant. Event 7 is not significant with the 5FF model in comparison to event 7 using the CAPM. The

difference might be attributed to the additional factor variables, which are capturing more of the market dynamics. This suggests that the event itself wasn't as triggering as shown in table 5 using the CAPM. Events 8 to 11 showed slight positive CAARs and a slight negative CAAR for event 10. These events were not significant, which is in line with table 5. Even though the direction of returns was not fully coherent between the models, this is to be expected. The 5FF model adjusts for additional factors and these adjustments might cause a slight directional shift in CAAR, especially for firms where these factors influence firm performance. Lastly, for event 12 an observed AAR of -0,81% and, CAAR of -2,27% can be seen. This is significant at the 5% significance level, although the significance is higher for the CAPM, the 5FF model confirms that the final official entry into force was indeed an impactful event with strong market reactions.

Table 7: 5FF Returns and significance [-2,2] window

The table presents the results for the 12 events for the Average Abnormal Return (AAR), Cumulated Average Abnormal Return (CAAR) as well as the t-test of the CAAR for the entire sample. The event window is 2 days before the event and 2 days after. The asset pricing model that was used is the 5FF.

Event	Date	AAR	CAAR (-2,2)	t-test CAAR (-2,2)
1	23-02-2022	-1,07%	-1,65%	-0,4865
2	01-12-2022	1,01%	1,17%	0,8878
3	01-06-2023	0,64%	1,05%	0,4136
4	06-06-2023	-0,10%	1,84%	0,9497
5	14-12-2023	2,00%	0,56%	0,2056
6	09-02-2024	-0,53%	-1,01%	-0,5633
7	15-03-2024	-0,69%	-1,05%	-1,1286
8	19-03-2024	0,40%	0,25%	0,2243
9	24-04-2024	-0,35%	0,57%	0,2111
10	24-05-2024	0,36%	-0,63%	-0,5109
11	05-07-2024	0,45%	0,33%	0,1428
12	25-07-2024	-0,81%	-2,27%	-2,0169**

*The table presents the significance levels for the reported statistics. A single asterisk * indicates significance at the 10% level, double asterisks ** denote significance at the 5% level, and triple asterisks *** signify significance at the 1% level.*

Lastly, the 5FF model with the extended window [-5,5] is seen in table 8. Firstly, event 1 (initial proposal of the CSDDD) was met with a high level of scepticism from the market. The AAR was at -1,02%, and the CAAR -7,94% with a significance level of 5%. This is in line with the extended window using the CAPM. The 5FF model applied with an extended window reinforces the initial findings from the CAPM by confirming a negative market reaction to the proposal when accounting for pre-event anticipation and post-event drift. Events 2-6 showed a positive trend but without any significant results. Event 7 showed a slightly negative CAAR, but similarly to the CAPM [-5,5] the event held no significance. Events 8 to 10 had fluctuations in both negative and the positive direction but none of the CAARs were significant. For event 11 the CAAR is again very high but showed no statistical significance which is like table 6. Lastly, event 12 had an AAR of -0,80%, a CAAR of -4,38% and a significance level at 5%. This confirms the findings that event 12 (the final implementation) is reacted to negatively by the market.

Tabe 8: 5FF Returns and significance [-5,5] window

The table presents the results for the 12 events for the Average Abnormal Return (AAR), Cumulated Average Abnormal Return (CAAR) as well as the t-test of the CAAR for the entire sample. The event window is 5 days before the event and 5 days after. The asset pricing model that was used is the CAPM.

Event	Date	AAR	CAAR (-5,5)	t-test CAAR (-5,5)
1	23-02-2022	-1,02%	-7,94%	-2,2428**
2	01-12-2022	1,07%	0,78%	0,3436
3	01-06-2023	0,61%	0,96%	0,3658
4	06-06-2023	-0,08%	2,36%	0,9562
5	14-12-2023	2,01%	0,52%	0,1944
6	09-02-2024	-0,56%	0,15%	0,0762
7	15-03-2024	-0,72%	-0,80%	-0,4062
8	19-03-2024	0,44%	0,04%	0,0229
9	24-04-2024	-0,34%	-0,58%	-0,2062
10	24-05-2024	0,37%	-0,79%	-0,2971
11	05-07-2024	0,44%	6,40%	0,9995
12	25-07-2024	-0,80%	-4,38%	-2,3084**

*The table presents the significance levels for the reported statistics. A single asterisk * indicates significance at the 10% level, double asterisks ** denote significance at the 5% level, and triple asterisks *** signify significance at the 1% level.*

In summary, the significant events are event 7 and event 12 with the CAPM model for the shorter window, event 1 and 12 using the CAPM for the extended window, event 12 using the 5FF model for the shorter window and finally, event 1 and 12 using the 5FF model for the extended window. Event 12 is consistently confirmed to negatively impact the market throughout all the asset pricing models and event windows. Event 1 is only significant with an extended window which shows that the market reaction to the initial proposal was more drawn out. Event 7 was only confirmed to be significant with the shorter event window with the CAPM and therefore not robust across windows and different models. General results from this event should therefore be carefully considered.

7.3 Regression analysis

The regression analysis is presented in table 9 (CAPM using the [-2,2] window), table 12 CAPM using the [-5,5] window table 15 (5FF model using the [-2,2] window), table 18 (5FF model using the [-5,5] window). The tables are listed in the appendix.

7.3.1 Table 9

As explained in the section methodology, the coefficients for the regressions are added one by one. When adding the financial ratios one by one the coefficient doesn't change much between the regressions, which indicates a low level of multicollinearity. None of the regressions that include financial ratios are significant, neither through the coefficients nor the constant. In regressions 6-9, the CO2 Total Emissions, CO2 scope 1, CO2 scope 2 and CO2 scope 3 were added. The emission variables only show slight individual positive coefficients and negative constants but none of them are significant. In regressions 10 – 14 the ESG, ESGC and ESG components were added. When adding ESG to the financial control variables, no significant change in the regressions effect on CAR is seen. However, when adding ESGC the coefficient is significant at the 10% level, but the constant is not significant (regression 11). The addition of the environmental pillar score and social pillar score (regression 12-13) does not provide significant coefficients. However, in regression 13 the ESGC has a significance of 5% with a coefficient of 0,015.

Lastly, for regression 14, the ESGC has a positive coefficient, the Environmental pillar score has a negative coefficient (-0,02) and the governance pillar scores has a negative coefficient (-

0,014), all three are significant at the 5% significance level. This means that a higher ESGC score positively impacts the CAR; a high environmental pillar score and governance pillar score negatively impact the CAR. The constant for regression 14 is -0,116 and is significant at the 10% level. Regression 15 is controlling for industry fixed effects for the financial controls and emission variables. However, no statistical significance could be found. For regression 16, industry fixed effects were included for the ESG, ESGC and pillar scores. The same pattern emerged as in regression 14, confirming that even when controlling for industry, investors still value these scores highly.

7.3.2 Table 12

For table 12, regressions 1-4 have positive coefficients and negative constants but they offered no significant results. In regression 5, the ROE was added to the model with a coefficient of 0,04 significant at the 10% significance level with a constant of -0.105, although not significant. Throughout the regression, the ROE is significant at the 10% level (except for regression 15). Continuing with regression 6-9 where the CO2 emissions are added, no significant results can be seen for the coefficients, however the constant for regression 8 has a value of -0.107 and is significant at the 10% significance level. The regressions including the ESG, ESGC and the pillars in regression 10 to 13 are not significant in the extended window compared to the shorter window. A reason for this is that the influence of ESG-related variables is more time-sensitive and is therefore not reflected well in the extended event window. Lastly, when controlling for industry fixed effects none of the variables are significant, except for the ROE in equation 16. Since the emission variables and ESG-related variables are not significant before controlling for industry, it is not surprising that they lack significance when controlling for the industry.

7.3.3 Table 15

Continuing the regression analysis, in table 15, the results are presented from the regressions where the CAR is calculated through the 5FF model. In this case, the only financial variable that is significant throughout the regressions is the current ratio, which is significant at the 5% level for regressions 3-14 and significant at the 10% level for regression 15-16. The coefficient is slightly positive throughout the regressions. Regressions 6-9 include the emission variables, however none of them indicates significance. For the ESG-related

variables, regression 12 showed that the Environmental pillar score had a coefficient of -0,007 at a significance level of 10% with a constant of -0,106 at a 10% significance level. For regression 14, the ESGC has a value of 0,013 and is significant at the 10% level, the Environmental pillar score has a coefficient of -0.02 with a 5% significance, and the governance pillar score has a significance of -0,019 with a significance of 5%. The constant is at -0,11 with a significance at 10%. The 5FF confirms the findings from the CAPM for regression 14, which implies that the ESGC has a positive impact on the CAR and investor expectations while the pillars social and governance score harms the CAR.

Lastly, when controlling for industry fixed effects, regression 15, which included the emission variables showed no significance. However, regression 16 had a positive coefficient for ESG (0,092) with a significance at the 10% level, a positive ESGC coefficient (0,014) with a significance at the 5% level, a negative coefficient (-0,019) for the environmental pillar score significant at the 5% level, a negative coefficient for the social pillar score (-0,058) significant at the 5% level and a negative governance pillar coefficient (-0,019) with a 5% significance level. The constant was also negative (-0,099) at a significance level of 10%. The robustness test confirms the results from the CAPM regression 16, with the 5FF model additionally identifying the ESG and social pillar scores as significant.

7.3.4 Table 18

In table 18, none of the coefficients or constants were significant for any of the regressions. Trying to explain fluctuations in CAR using the 5FF model with an extended window does not seem to be a good model fit.

7.3.5 Regression summary

In summary, the shorter window consistently confirms a positive and statistically significant ESGC score for both the CARs calculated through CAPM as well as the 5FF model. The ESGC score is significant and has a positive impact on CAR for both models when controlling for industry fixed effects as well. This shows that investors value these scores highly in the context of immediate stock market reactions to the CSDDD. The ESG score is only significant for the shorter window for the 5FF model when controlling for industry fixed effects which limits the conclusions that can be drawn from the score. Additionally, the

Environmental pillar scores and Governance pillar scores have a negative and statistically significant impact on CAR using both models. This can be seen as counterintuitive and there can be several reasons why they have a negative sign. One reason can be that the pillar scores reflect extra perceived costs for companies already heavily invested in these scores. Another reason might be due to collinearity between the pillar scores and the ESGC score since the ESGC already takes the pillar scores into account. The conclusions that can be drawn from the pillar scores should therefore not be overgeneralized.

In the extended window, neither the emission varaibles nor the ESG-related scores show any significance which signals that the effect of these scores is more time-sensitive to the event itself. The ROE and Current ratio exhibit limited but significant coefficients depending on which asset pricing model and which window is used. General conclusions from these financial scores should also therefore be considered carefully. In general, none of the models have a particularly high R-square which indicates that the model fit was not the best when trying to explain fluctuations in CAR.

7.4 Interaction terms and industry variation

7.4.1 Industry impact: CAPM [-2,2]

Through a simple regression between industry and CAR, the results in table 10 display that the industries which have the most pronounced effect on CAR is consumer staples (negative effect), real estate (positive effect) and telecommunications (negative effects). When adding the control variables and the emission variables to the regression the impact of industry on CAR are a bit different (table 11). The first list of industries in the interaction tables shows the baseline impact of industry on CAR when controlling for all included variables. Consumer discretionary, real estate, technology and telecommunication show significant results and are positively impacting the CAR compared to the baseline industry. Continuing analysing the interaction terms the table displays that the CO2 Emissions total for the second quartile has a significant positive impact on CAR for companies within the baseline category. This suggests that the market reacts positively to companies within the baseline category with moderately high CO2 emissions during the events.

The interaction terms for the second quartile (2#) are negative and significant for technology at the 1% level, telecommunication, and consumer discretionary at the 5% level and for

consumer staples at the 10% significance level. The third quartile only has consumer staples as a significant industry and it's impacting the CAR negatively, which is confirmed with a 10% significance level. The results convey that companies with moderately high CO2 emissions within the mentioned industries experience significant negative CARs during the event compared to the baseline industry. This can be attributed to higher perceived risks from investors and that companies within these industries and the level of emissions will be more impacted by the directive. In contrast, companies with the highest CO2 levels do not show a significant relationship (except consumer staples) between industry classification and CARs. A potential explanation for this is that investors are already pricing the companies with the highest CO2 levels efficiently since they are generally riskier.

For the ESG variables, the interaction between ESG and industry for the second quartile shows that the energy industry is significantly negatively impacting the CAR due to the level of the ESG score compared to the baseline industry. For the ESGC score, the main effects of the ESGC score on industry for the baseline industry are significantly positive for both quartiles 2 and 3, indicating that the higher the score a company has, the higher CAR a company receives. Controlling the interaction for the industry for the second quartile, utilities is the only industry with a significant impact (negative) on CAR compared to the baseline industry. For the third quartile, real estate has a significantly positive impact on CAR compared to the baseline industry and technology and telecommunications have a significantly negative impact on CAR compared to the baseline industry.

7.4.2 Industry Impact: CAPM [-5,5]

Table 13 (appendix) displays the simple regression between CAR and industry where only real estate is significant. In table 14 the interaction regression is displayed. Firstly, for the extended window using the CAPM none of the variables showed any significant results. For the ESG score, energy is the only industry that is significantly impacting the CARs positively compared to the baseline industry when controlling for the financial control variables and ESG variables. Continuing to the interaction between ESG Score and industry the main effect of the ESG score for quartiles 2 and 3 did not yield any significant results. The interaction between ESG Score and industry for quartiles 2 and 3 yielded significantly negative results for the industries energy sector and real estate industry, compared to the baseline. The ESGC Score's main effects are however positively statistically significant for both quartiles 2 and 3.

The statistically impacted industries are consumer discretionary, technology, telecommunication, and utilities, which had a negative impact compared to the baseline industry. Furthermore, the statistically significantly impacted industries for quartile 3 was the same as quartile 2 with the addition of real estate which was impacted positively compared to the baseline industry.

7.4.3 Industry Impact: 5FF [-2,2]

Table 16 displays the simple regression between CAR and industry and shows that consumer staples, telecommunication and utilities are impacting the CAR negatively and real estate is impacting the CAR positively. Continuing with the interaction between CO2 Emissions total and industry (table 17) the main effects of the CO2 emissions total yields no significant result on CAR for the baseline. For the second quartile, the industries that are significantly impacting the CAR compared to the baseline industry are the consumer discretionary, technology and telecommunication industries (negative impact). The third quartile shows the same results except that technology isn't significant. The ESG Score, showed for the second quartile, that energy is significantly negatively impacting the CAR compared to the baseline industry and that real estate is significantly negatively impacting the CAR compared to the baseline for the third quartile. The ESGC Score displayed a statistically significant positive main effect between ESGC and CAR for the second quartile. Consumer discretionary in the second quartile was the only statistically significant industry impacting the CAR (negatively).

7.4.4 Industry Impact: 5FF [-5,5]

For the simple regression between industry and CAR (table 19), consumer discretionary, consumer staples, technology, telecommunications and utilities have a significant negative impact on CAR. Table 20 displays the interaction regressions. The CO2 lacks significance overall for all industries and the main effect. The ESG score for the second quartile shows negative statistical significance for the energy industry compared to the baseline industry. The third quartile has a negative significant impact on the real estate industry compared to the baseline industry. Lastly, the ESGC score has a statistically significant positive impact on both the second and third quartile for the baseline industry. The interaction terms between ESGC and industry show that for the second quartile, the consumer discretionary and the technology sector had a negative statically significant effect on CAR compared to the baseline

industry. For the third quartile, the real estate, technology and telecommunication industries had a significantly negative impact on CAR compared to the baseline industry.

7.4.5 Conclusion Interaction regressions

The industries; Technology, Consumer Staples, Telecommunications and Consumer Discretionary are the industries that are affected by the CO2 Emissions Total. The Utility sector, Real Estate, Technology, Telecommunications and Consumer discretionary are impacted by the ESGC Score. The Energy sector is the only sector significantly impacted by the ESG Score.

As mentioned, the sectors that respond negatively or positively in response to the ESG, ESGC or the CO2 total emissions are the sectors that investors deem as sectors that will become impacted by the CSDDD compared to the baseline industry. The negative reactions likely occur when investors anticipate higher compliance costs and operational adjustments for those industries under the new directive.[47]

[47] European Commission, "Directive on Corporate Sustainability Due Diligence: Frequently Asked Questions," p. 14

8. Discussion, Limitations and Conclusion

This section discusses the results, highlights the limitations of this thesis, presents the conclusions that can be inferred from the results and consider their implications and relevance.

8.1 Discussion

The objective of this thesis was to research whether the CSDDD caused abnormal market reactions among the companies subject to the directive. Furthermore, this thesis tried to identify variables influencing these returns and assess whether certain industries were more impacted by emissions and ESG factors.

The results from this thesis indicate that the market response to the final implementation of the CSDDD was significantly negative. The proposal of the directive also yielded a negative market response when analysed over a longer event window, probably due to pre-event anticipation and post-event drift. This supports the Hypothesis 1 and suggests that investors view the implementation of the CSDDD negatively. This is somewhat expected since large operational and transformational costs are associated with the directive. The events where no significant market response were observed it is possible that fluctuations in market returns can be attributed to either random fluctuations, that the events were seen as more procedural or that the information was already priced by the market.

The regression analysis showed that the ESGC scores influenced the CARs positively and significantly within the shorter event window. This was confirmed both through the CAPM model and through the robustness test with the 5FF model. Even when controlling for industry fixed effects, the ESGC scores remained significant. This emphasize that these scores were seen as important to investors in immediate market reaction responses. However, the ESGC was not statistically significant for the extended event window which suggests that the scores are important to investors only for immediate reactions. The ESG and individual pillar scores were less consistent than the ESGC score. The ESG score was only significant for the shorter window in the 5FF model when controlling for industry fixed effects. This limits the generalizability of conclusions regarding this variable. Notably, the Environmental and Governance pillar scores exhibited a negative and significant negative impact on CAR across

both models. This seems counterintuitive and the reason for this might be due to collinearity between the pillar score and the ESGC score. Therefore, no broader conclusions will be assumed regarding the pillar scores since further research must be done to understand the dispersion. The carbon emission variables did not demonstrate any statistical significance throughout the models or windows. This may seem unexpected in the context of the CSDDD that promotes sustainability practices. However, it is possible that the ESGC score provide a more comprehensive reflection of a company's sustainability practices compared to relying solely on an emissions metric. A broader score might align better with the complexities and requirements of the CSDDD. These findings partly support hypothesis 2 which stated that abnormal returns are influenced by carbon emission and ESG variables. The ESGC supports this hypothesis but the emission variables, and ESG score did not. The pillar scores did support this hypothesis as well, although the scores were counterintuitive. The ESGC scores supports the existing literature regarding the risk mitigating capabilities which shows that investors value these scores when they are dealing with unexpected sustainability concerns.

Lastly, without controlling for any variables the CSDDD is impacting industries differently, supporting hypothesis 3a. The interaction terms showed that there were industries which were significantly impacted either positively or negatively by the Carbon Emissions total and the ESG and ESGC score compared to the baseline industry. This shows that investors are accounting for different responses within the industries and the impact on CAR depending on the various scores. Some industries were more impacted than others compared to the baseline industry, which reflects the volatility within the industries to the CSDDD. These results support hypothesis 3b. Investors should therefore be aware of the variations between industries depending on their investment practices and goals.

8.2 Limitations and contribution to further research

This thesis has a few limitations that need to be addressed. Firstly, cross-sectional correlation among abnormal returns from events that are close together is not controlled for, which can lead to an overestimation of statistical significance. Due to time limitations, this was not controlled for. Future research could address this through portfolio aggregation or dummy variables. However, this was ultimately not an issue in this thesis since none of the events which were closely related turned out to be significant. Nevertheless, the reader should be aware of this issue. Secondly, this study focuses on the immediate reactions to the CSDDD.

To answer the question if the market reactions to the CSDDD fully support the semi-strong form efficiency, further research could include a longer post-event window to see if long-term pricing abnormalities persists. Thirdly, the control variables for the CAR regressions did not have a high R^2. A better model fit could extend the research. Lastly, the analysis of the interaction term regressions only allows for a comparison of each industry to the baseline industry (basic materials). Direct pairwise comparisons between all industries could therefore not be made and future research could address this by using a different technique.

8.3 Conclusion

This thesis showed that the implementation of the CSDDD had a significant negative impact on stock performance for the affected companies within the EU, both during the CSDDDs final implementation for the shorter window and during the initial proposal for the extended window. The findings partially confirm the semi-strong market efficiency. The immediate reaction in the shorter window displays efficiently priced new information. The additional market reaction to the proposal of the CSDDD in the extended window challenges the semi-strong efficiency since delayed reactions were observed. Furthermore, the ESGC scores were shown to positively influence the CARs for the affected companies which supports the existing literature stating that ESGC scores are effective risk mitigation tools. This is interesting for investors that are seeking to hedge against sustainability-related concerns. The interaction regressions demonstrated that investors response to the directive varies between industries. Certain industries had stronger reactions to emissions and ESG variables which suggest that investors should be mindful and evaluate industry-specific dynamics when they formulate their investment strategies. Investors can use this information to either buy or short-sell stocks in industries that are more impacted by the directive and the emission and ESG variables compared to the baseline industry. Lastly, the findings from this thesis also have implications for policymakers. The CSDDD represents an important step towards a more sustainable union. However, it is essential that policymakers understand both the short-term implications as well as long-term implications of new regulation. This thesis aimed to shed light on the short-term implications for the effected parties and to contribute to a broader understanding of how sustainability-focused regulation influence financial markets.

Appendix

Table 9: CAPM [-2,2]

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Variables	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**
Total Assets	0.003	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Quick Ratio		0.004	-0.008	-0.008	-0.008	-0.008	-0.008	-0.008	-0.008	-0.008	-0.008	-0.008	-0.007	-0.007	-0.008	-0.007
		(0.005)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)	(0.007)	(0.006)
Curent Ratio			0.017	0.017	0.017	0.017	0.018	0.018	0.018	0.017	0.017	0.017	0.018	0.018	0.018	0.018
			(0.015)	(0.015)	(0.015)	(0.015)	(0.016)	(0.016)	(0.016)	(0.015)	(0.015)	(0.015)	(0.016)	(0.016)	(0.016)	(0.016)
Net Debt to Total Equity				0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Return on Equity					-0.001	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	0.000	0.000
					(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
CO2 Total Emissions						0.000	0.000	0.000	0.000						0.000	
						0.001	(0.001)	(0.001)	(0.001)						(0.001)	
CO2 Scope 1							0.002	0.002	0.002						0.002	
							(0.002)	(0.002)	(0.002)						(0.002)	
CO2 Scope 2								-0.000	-0.000						0.000	
								(0.001)	(0.001)						(0.001)	
CO2 Scope 3									0.001						0.001	
									(0.001)						(0.001)	
ESG Score										0.016	0.003	0.011	0.093	0.137		0.131
										(0.012)	(0.014)	(0.016)	(0.091)	(0.091)		(0.086)
ESG Combined Score											0.013*	0.013*	0.015**	0.015**		0.016**
											(0.007)	(0.007)	(0.007)	(0.007)		(0.007)
Environmental Pillar Score												-0.006	-0.013	-0.020**		-0.019**
												(0.004)	(0.008)	(0.009)		(0.008)
Social Pillar Score													-0.081	-0.102		-0.099
													(0.077)	(0.076)		(0.073)
Governance Pillar Score														-0.014**		-0.014**
														(0.006)		(0.007)
Constant	-0.059	-0.048	-0.057	-0.057	-0.057	-0.059	-0.057	-0.057	-0.055	-0.117	-0.120	-0.127	-0.107	-0.116*	-0.049	-0.110
	(0.048)	(0.042)	(0.049)	(0.049)	(0.049)	(0.052)	(0.051)	(0.051)	(0.049)	(0.086)	(0.085)	(0.086)	(0.071)	(0.070)	(0.045)	(0.066)
Observations	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904
R- Squared	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.002
Firm FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Time Fixed Effects	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Inudstry Fixed Effects	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES

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

Table 10: CAPM [-2,2] Simple linear industry regression

CAR	Coefficient (St.Err.)
Consumer Discretionary	0.001
	(0.002)
Consumer Staples	-0.011**
	(0.005)
Energy	0.002
	(0.004)
Health Care	0.002
	(0.003)
Industrials	-0.026
	0.025
Real Estate	0.012***
	(0.004)
Technology	-0.000
	(0.003)
Telecommunication	-0.009*
	(0.005)
Utilities	-0.004
	(0.003)
Constant	0.005***
	(0.001)
R-Squared	0.0017

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

Table 11: CAPM [-2,2] Interaction Regression

CAR	Coefficient	Robust std. Err.
Total Assets Actual	0.001	0.000
Quick Ratio	-0.008	0.007
Current Ratio	0.019	0.016
Net Debt to Total Equity	0.000	0.000
Return on Equity Actual	-0.000	0.000
CO2 Scope 1	0.003	0.002
CO2 Scope 2	-0.000	0.000
CO2 Scope 3	0.000	0.000
CO2 Emissions Total		
2	0.017**	0.008
3	0.005	0.007
Industry		
Consumer Discretionary	0.156**	0.007
Consumer Staples	0.010	0.009
Energy	0.007	0.018
Health Care	0.007	0.012
Industrials	-0.007	0.015
Real Estate	0.026*	0.014
Technology	0.011*	0.006
Telecommunication	0.022*	0.012
Utilities	-0.542	0.049
CO2 Emissions Total #industry		
2# Consumer Discretionary	-0.025**	0.011
2# Consumer Staples	-0.016	0.010
2# Energy	-0.015	0.026
2# Health Care	-0.017	0.014
2# Industrials	-0.034	0.022
2# Real Estate	-0.014	0.014
2# Technology	-0.029***	0.009
2# Telecommunication	-0.033**	0.016
2# Utilities	0.056	0.062
3# Consumer Discretionary	-0.003	0.009
3# Consumer Staples	-0.023*	0.012
3# Energy	-0.004	0.019
3# Health Care	-0.000	0.013
3# Industrials	0.000	0.011
3# Real Estate	-0.005	0.016
3# Technology	-0.007	0.007
3# Telecommunication	-0.023	0.015
3# Utilities	0.060	0.059
Constant	-0.059	0.039
R-Square	0.005	

CAR	Coefficient	Robust std. Err.
Total Assets Actual	0.000	0.000
Quick Ratio	-0.007	0.006
Current Ratio	0.017	0.015
Net Debt to Total Equity	0.000	0.000
Return on Equity Actual	0.000	0.001
Environmental Pillar Score	0.002	0.006
Social Pillar Score	-0.032	0.042
Governance Pillar Score	0.017	0.018
ESG Score		
2	-0.004	0.009
3	-0.014	0.013
Industry		
Consumer Discretionary	0.005	0.007
Consumer Staples	-0.008	0.013
Energy	0.033	0.020
Health Care	0.000	0.009
Industrials	-0.055	0.059
Real Estate	0.015	0.019
Technology	0.008	0.010
Telecommunication	0.007	0.016
Utilities	-0.014	0.002
ESG Score # Industry		
2# Consumer Discretionary	0.009	0.012
2# Consumer Staples	-0.003	0.014
2# Energy	-0.048**	0.021
2# Health Care	0.005	0.014
2# Industrials	0.159	0.151
2# Real Estate	-0.011	0.018
2# Technology	-0.000	0.014
2# Telecommunication	-0.001	0.025
2# Utilities	0.049	0.030
3# Consumer Discretionary	0.023*	0.014
3# Consumer Staples	0.013	0.017
3# Energy	-0.026	0.025
3# Health Care	0.014	0.019
3# Industrials	0.155	0.134
3# Real Estate	-0.095	0.023
3# Technology	0.043	0.029
3# Telecommunication	0.021	0.025
3# Utilities	0.057	0.028
ESG Combined Score		
2	0.018**	0.009
3	0.016*	0.009
ESG Combined # industry		
2# Consumer Discretionary	-0.016	0.010
2# Consumer Staples	-0.000	0.014
2# Energy	0.001	0.014
2# Health Care	-0.010	0.016
2# Industrials	-0.101	0.083
2# Real Estate	0.007	0.016
2# Technology	-0.013	0.014
2# Telecommunication	-0.015	0.014
2# Utilities	-0.025*	0.013
3# Consumer Discretionary	-0.016	0.011
3# Consumer Staples	-0.004	0.017
3# Energy	0.009	0.018
3# Health Care	-0.001	0.016
3# Industrials	-0.090	0.070
3# Real Estate	0.103***	0.019
3# Technology	-0.039**	0.019
3# Telecommunication	-0.029*	0.017
3# Utilities	-0.024	0.015
Constant	0.017	0.087
R- Squared	0.012	

Table 12: CAPM [-5,5]

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Variables	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**
Total Assets	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.002	0.003	0.003	0.003	0.003	0.003	0.002	0.003
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)
Quick Ratio		0.01	0.000	0.000	0.000	0.000	-0.001	-0.001	-0.002	-0.000	-0.001	-0.001	0.000	0.000	-0.001	0.001
		(0.012)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.006)	(0.008)
Curent Ratio			0.012	0.013	0.013	0.013	0.014	0.014	0.016	0.013	0.013	0.013	0.013	0.014	0.014	0.012
			(0.008)	(0.008)	(0.008)	(0.008)	(0.009)	(0.009)	(0.011)	(0.008)	(0.008)	(0.008)	(0.009)	(0.009)	(0.010)	(0.008)
Net Debt to Total Equity				0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.001
				(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Return on Equity					0.004*	0.004*	0.004*	0.004*	0.004*	0.004*	0.005*	0.005*	0.005*	0.005*	0.004	0.005*
					(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
CO2 Total Emissions						0.001	0.000	0.001	0.000						0.001	
						(0.001)	(0.001)	(0.002)	(0.001)						(0.002)	
CO2 Scope 1							0.004	0.004	0.004						0.004	
							(0.004)	(0.004)	(0.004)						(0.004)	
CO2 Scope 2								-0.001	-0.002						-0.002	
								(0.002)	(0.002)						(0.003)	
CO2 Scope 3									0.003						0.003	
									(0.002)						(0.002)	
ESG Score										0.006	0.015	0.009	0.110	0.181		0.166
										(0.014)	(0.020)	(0.025)	(0.109)	(0.156)		(0.140)
ESG Combined Score											-0.010	-0.010	-0.008	-0.007		-0.005
											(0.012)	(0.012)	(0.012)	(0.012)		(0.011)
Environmental Pillar Score												0.005	-0.003	-0.016		-0.014
												(0.007)	(0.012)	(0.020)		(0.018)
Social Pillar Score													-0.099	-0.132		-0.126
													(0.088)	(0.110)		(0.101)
Governance Pillar Score														-0.022		-0.021
														(0.016)		(0.015)
Constant	-0.089	-0.095	-0.105	-0.105	-0.105	-0.106	-0.106	-0.107*	-0.090	-0.126	-0.122	-0.117	-0.091	-0.106	-0.071	-0.082
	(0.091)	0.098)	(0.104)	(0.105)	(0.105)	(0.105)	(0.105)	(0.107)	(0.093)	(0.138)	(0.136)	(0.141)	(0.118)	(0.128)	(0.079)	(0.114)
Observations	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904
R- Squared	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.003	0.000	0.000	0.000	0.001	0.001	0.003	0.002
Firm FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Time Fixed Effects	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Inudstry Fixed Effects	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES

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

Table 13: CAPM [-5,5] Simple linear industry regression

CAR	Coefficient (St.Err.)
Consumer Discretionary	0.000
	(0.006)
Consumer Staples	-0.002
	(0.009)
Energy	0.004
	(0.006)
Health Care	0.004
	(0.005)
Industrials	-0.036
	(0.035)
Real Estate	0.023**
	(0.015)
Technology	0.004
	(0.007)
Telecommunication	-0.009
	(0.006)
Utilities	-0.009
	(0.005)
Constant	-0.082
	(0.015)
R-Squared	0.002

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

Table 14: CAPM [-5,5] Interaction Regression

CAR	Coefficient	Robust std. Err.
Total Assets Actual	0.022	0.002
Quick Ratio	0.000	0.006
Current Ratio	0.138	0.009
Net Debt to Total Equity	0.000	0.000
Return on Equity Actual	0.004	0.003
CO2 Scope 1	0.004	0.004
CO2 Scope 2	-0.000	0.001
CO2 Scope 3	0.003	0.002
CO2 Emissions Total		
2	-0.019	0.015
3	-0.018	0.015
Industry		
Consumer Discretionary	-0.013	0.001
Consumer Staples	0.004	0.013
Energy	0.014	0.052
Health Care	-0.221	0.023
Industrials	-0.023	0.021
Real Estate	0.013	0.013
Technology	-0.014	0.011
Telecommunication	0.003	0.021
Utilities	-0.110	0.082
CO2 Emissions Total #industry		
2# Consumer Discretionary	0.018	0.017
2# Consumer Staples	0.004	0.019
2# Energy	0.007	0.052
2# Health Care	0.029	0.026
2# Industrials	-0.056	0.061
2# Real Estate	0.011	0.018
2# Technology	0.005	0.018
2# Telecommunication	-0.008	0.029
2# Utilities	0.122	0.087
3# Consumer Discretionary	0.007	0.013
3# Consumer Staples	-0.111	0.017
3# Energy	-0.036	0.053
3# Health Care	0.018	0.024
3# Industrials	0.008	0.015
3# Real Estate	0.006	0.022
3# Technology	0.121	0.0129
3# Telecommunication	-0.019	0.026
3# Utilities	0.097	0.081
Constant	-0.070	0.002
R-Square	0.005	

CAR	Coefficient	Robust std. Err.
Total Assets Actual	0.001	0.001
Quick Ratio	0.000	0.007
Current Ratio	0.012	0.008
Net Debt to Total Equity	0.000	0.000
Return on Equity Actual	0.005	0.003
Environmental Pillar Score	0.006	0.005
Social Pillar Score	-0.062	0.047
Governance Pillar Score	0.009	0.014
ESG Score		
2	0.007	0.012
3	0.002	0.016
Industry		
Consumer Discretionary	0.003	0.009
Consumer Staples	0.006	0.013
Energy	0.062**	0.032
Health Care	0.007	0.012
Industrials	-0.064	0.067
Real Estate	0.016	0.033
Technology	0.021	0.012
Telecommunication	0.013	0.022
Utilities	-0.018	0.029
ESG Score # Industry		
2# Consumer Discretionary	0.024	0.016
2# Consumer Staples	-0.007	0.020
2# Energy	-0.075**	0.035
2# Health Care	0.008	0.023
2# Industrials	0.235	0.219
2# Real Estate	-0.014	0.021
2# Technology	-0.002	0.019
2# Telecommunication	0.005	0.034
2# Utilities	0.057	0.052
3# Consumer Discretionary	0.026	0.016
3# Consumer Staples	0.008	0.021
3# Energy	-0.046	0.033
3# Health Care	0.027	0.026
3# Industrials	0.224	0.019
3# Real Estate	-0.068***	0.029
3# Technology	0.026	0.027
3# Telecommunication	0.037	0.033
3# Utilities	0.056	0.043
ESG Combined Score		
2	0.032***	0.010
3	0.034***	0.010
ESG Combined # industry		
2# Consumer Discretionary	-0.030**	0.015
2# Consumer Staples	-0.016	0.021
2# Energy	-0.013	0.014
2# Health Care	-0.021	0.023
2# Industrials	-0.206	0.181
2# Real Estate	0.005	0.025
2# Technology	-0.032**	0.017
2# Telecommunication	-0.041**	0.021
2# Utilities	-0.036***	0.015
3# Consumer Discretionary	-0.029*	0.015
3# Consumer Staples	-0.027	0.022
3# Energy	-0.005	0.018
3# Health Care	-0.033	0.020
3# Industrials	-0.163	0.136
3# Real Estate	0.076***	0.027
3# Technology	-0.051**	0.025
3# Telecommunication	-0.066***	0.023
3# Utilities	-0.038***	0.016
Constant	0.125	0.083
R- Squared	0.010	

Table 15: 5FF [-2,2]

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Variables	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**
Total Assets	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Quick Ratio		0.005	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.003
		(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.005)	(0.006)
Curent Ratio			0.005**	0.004**	0.004**	0.004**	0.004**	0.004**	0.005**	0.004**	0.004**	0.004**	0.004**	0.005**	0.004*	0.003*
			(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Net Debt to Total Equity				0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Return on Equity					0.000	0.000	-0.001	-0.001	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000	0.000	0.000
					(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
CO2 Total Emissions						0.000	0.000	0.000	-0.001						0.000	
						(0.000)	(0.000)	(0.000)	(0.001)						(0.001)	
CO2 Scope 1							0.002	0.002	0.002						0.002	
							(0.002)	(0.002)	(0.002)						(0.002)	
CO2 Scope 2								0.000	0.000						-0.000	
								(0.001)	(0.001)						(0.001)	
CO2 Scope 3									0.001						0.001	
									(0.001)						(0.001)	
ESG Score										0.008	-0.003	0.006	0.038	0.099		0.092*
										(0.011)	(0.012)	(0.015)	(0.036)	(0.062)		(0.055)
ESG Combined Score											0.012	0.012	0.012	0.013*		0.014**
											(0.008)	(0.008)	(0.008)	(0.007)		(0.007)
Environmental Pillar Score												-0.007*	-0.010	-0.020**		-0.019**
												(0.004)	(0.005)	(0.010)		(0.009)
Social Pillar Score													-0.032	-0.061		-0.058*
													(0.028)	0.039		(0.035)
Governance Pillar Score														-0.019**		-0.019**
														(0.009)		(0.008)
Constant	-0.059	-0.061	-0.065	-0.065	-0.065	-0.064	-0.064	-0.064	-0.058	-0.092	-0.097	-0.106*	-0.097	-0.110*	-0.048	-0.099*
	(0.048)	0.050)	(0.051)	(0.051)	(0.051)	(0.051)	(0.052)	(0.052)	(0.047)	(0.060)	(0.059)	(0.141)	(0.059)	(0.0061)	(0.042)	(0.056)
Observations	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904
R- Squared	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.003	0.001	0.001	0.001	0.001	0.001	0.003	0.002
Firm FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Time Fixed Effects	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Inudstry Fixed Effects	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES

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

Table 16: 5FF [-2,2] Simple linear industry regression

CAR	Coefficient (St.Err.)
Consumer Discretionary	0.000
	0.002)
Consumer Staples	-0.012**
	(0.006)
Energy	0.001
	(0.004)
Health Care	0.001
	(0.002)
Industrials	-0.021
	(0.020)
Real Estate	0.013***
	(0.004)
Technology	-0.001
	(0.003)
Telecommunication	-0.009**
	(0.004)
Utilities	-0.005*
	(0.003)
Constant	0.007***
	(0.002)
R-Squared	0.001

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

Table 17: 5FF [-2,2] Interaction Regression

CAR	Coefficient	Robust std. Err.
Total Assets Actual	0.002	0.001
Quick Ratio	0.002	0.005
Current Ratio	0.003	0.002
Net Debt to Total Equity	0.000	0.000
Return on Equity Actual	-0.000	0.002
CO2 Scope 1	0.002	0.001
CO2 Scope 2	-0.000	0.000
CO2 Scope 3	0.000	0.001
CO2 Emissions Total		
2	0.010	0.008
3	0.000	0.008
Industry		
Consumer Discretionary	0.010	0.006
Consumer Staples	0.005	0.007
Energy	-0.009	0.017
Health Care	0.003	0.011
Industrials	-0.003	0.011
Real Estate	0.013	0.008
Technology	0.004	0.006
Telecommunication	0.011	0.012
Utilities	-0.037	0.035
CO2 Emissions Total #industry		
2# Consumer Discretionary	-0.021**	0.009
2# Consumer Staples	-0.010	0.009
2# Energy	0.011	0.021
2# Health Care	-0.011	0.012
2# Industrials	-0.040	0.028
2# Real Estate	-0.005	0.011
2# Technology	-0.023***	0.009
2# Telecommunication	-0.029**	0.015
2# Utilities	0.031	0.036
3# Consumer Discretionary	-0.009	.007
3# Consumer Staples	-0.025*	0.014
3# Energy	0.004	0.014
3# Health Care	-0.003	0.012
3# Industrials	-0.004	0.008
3# Real Estate	-0.002	0.014
3# Technology	-0.003	0.007
3# Telecommunication	-0.028*	0.014
3# Utilities	0.028	0.033
Constant	-0.065	0.042
R-Square	0.005	

CAR	Coefficient	Robust std. Err.
Total Assets Actual	0.002	0.001
Quick Ratio	0.002	0.005
Current Ratio	0.003	0.001
Net Debt to Total Equity	0.000	0.000
Return on Equity Actual	-0.000	0.001
Environmental Pillar Score	-0.000	0.002
Social Pillar Score	-0.003	0.017
Governance Pillar Score	0.007	0.006
ESG Score		
2	-0.004	0.008
3	-0.014	0.011
Industry		
Consumer Discretionary	0.008*	0.005
Consumer Staples	-0.005	0.009
Energy	0.026*	0.015
Health Care	-0.002	0.006
Industrials	-0.009	0.015
Real Estate	0.012	0.017
Technology	0.006	0.006
Telecommunication	0.000	0.013
Utilities	-0.017	0.012
ESG Score # Industry		
2# Consumer Discretionary	0.002	0.010
2# Consumer Staples	-0.007	0.011
2# Energy	-0.049***	0.018
2# Health Care	0.006	0.010
2# Industrials	0.019	0.021
2# Real Estate	-0.003	0.012
2# Technology	0.004	0.011
2# Telecommunication	-0.009	0.017
2# Utilities	0.029	0.023
3# Consumer Discretionary	0.007	0.010
3# Consumer Staples	-0.002	0.012
3# Energy	-0.023	0.019
3# Health Care	0.006	0.013
3# Industrials	0.041	0.003
3# Real Estate	-0.097***	0.014
3# Technology	0.036*	0.021
3# Telecommunication	0.006	0.018
3# Utilities	0.035*	0.021
ESG Combined Score		
2	0.017**	0.008
3	0.012	0.008
ESG Combined # industry		
2# Consumer Discretionary	-0.018*	0.009
2# Consumer Staples	0.000	0.012
2# Energy	-0.001	0.012
2# Health Care	-0.015	0.012
2# Industrials	-0.053	0.040
2# Real Estate	-0.008	0.013
2# Technology	-0.018	0.011
2# Telecommunication	-0.009	0.012
2# Utilities	-0.018	0.013
3# Consumer Discretionary	-0.011	0.010
3# Consumer Staples	-0.001	0.015
3# Energy	0.007	0.014
3# Health Care	0.000	0.013
3# Industrials	-0.035	0.022
3# Real Estate	0.096	0.013
3# Technology	-0.039	0.017
3# Telecommunication	-0.017	0.013
3# Utilities	-0.016	0.012
Constant	-0.071	0.068
R- Squared	0.005	

Table 18: 5FF [-5,5]

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Variables	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**	**CAR**
Total Assets	0.004	0.004	0.004	0.004	0.004	0.004	0.005	0.005	0.003	0.005	0.004	0.004	0.005	0.004	0.003	0.005
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Quick Ratio		0.009	0.011	0.011	0.011	0.012	0.011	0.011	0.010	0.012	0.012	0.012	0.012	0.012	0.013	0.015
		(0.011)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.018)	(0.018)	(0.019)	(0.019)	(0.019)	(0.020)	(0.020)	(0.020)	(0.022)
Curent Ratio			-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	0.000	-0.002	-0.002	-0.002	-0.002	-0.002	-0.003	-0.006
			(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.007)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.012)
Net Debt to Total Equity				0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Return on Equity					0.006	0.006	0.005	0.005	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.007
					(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)
CO2 Total Emissions						-0.001	0.000	0.000	-0.001						0.000	
						(0.001)	(0.001)	(0.001)	(0.001)						(0.001)	
CO2 Scope 1							0.004	0.004	0.004						0.004	
							(0.003)	(0.003)	(0.003)						(0.003)	
CO2 Scope 2								-0.001	-0.002						-0.002	
								(0.001)	(0.002)						(0.003)	
CO2 Scope 3									0.002						0.002	
									(0.002)						(0.002)	
ESG Score										-0.009	-0.006	-0.006	0.040	0.110		0.096
										(0.007)	(0.014)	(0.016)	(0.044)	(0.103)		(0.087)
ESG Combined Score											-0.003	-0.003	-0.002	-0.002		0.001
											(0.012)	(0.012)	(0.012)	(0.012)		(0.011)
Environmental Pillar Score												-0.000	-0.004	-0.017		-0.015
												(0.006)	(0.008)	(0.018)		(0.017)
Social Pillar Score													-0.046	-0.078		-0.072
													(0.033)	0.061		(0.053)
Governance Pillar Score														-0.021		-0.020
														(0.019)		(0.017)
Constant	-0.099	-0.106	-0.1.04	-0.104	-0.104	-0.105	-0.108	-0.109	-0.085	-0.076	-0.075	-0.075	-0.062	-0.078	-0.063	-0.052
	(0.086)	(0.093)	(0.085)	(0.085)	(0.085)	(0.086)	(0.088)	(0.091)	(0.072)	(0.078)	(0.077)	(0.082)	(0.074)	(0.086)	(0.060)	(0.073)
Observations	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904	8904
R- Squared	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.002	0.001
Firm FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Time Fixed Effects	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Inudstry Fixed Effects	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES

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

Table 19: 5FF [-5,5] Simple linear industry regression

CAR	Coefficient (St.Err.)
Consumer Discretionary	-0.007**
	(0.003)
Consumer Staples	-0.010***
	(0.003)
Energy	0.000
	(0.005)
Health Care	-0.002
	(0.003)
Industrials	-0.349
	(0.029)
Real Estate	0.010*
	0.006
Technology	-0.007**
	(0.003)
Telecommunication	-0.015***
	(0.006)
Utilities	-0.013***
	(0.004)
Constant	0.012***
	(0.004)
R-Squared	0.0005

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

Table 20: 5FF [-5,5] Interaction Regression

CAR	Coefficient	Robust std. Err.
Total Assets Actual	0.004	0.003
Quick Ratio	0.015	0.021
Current Ratio	-0.004	0.009
Net Debt to Total Equity	0.003	0.000
Return on Equity Actual	0.006	0.005
CO2 Scope 1	0.004	0.003
CO2 Scope 2	-0.001	0.002
CO2 Scope 3	0.002	0.002
CO2 Emissions Total		
2	-0.013	0.014
3	0.018	0.017
Industry		
Consumer Discretionary	-0.013	0.014
Consumer Staples	-0.000	0.012
Energy	-0.012	0.039
Health Care	-0.023	0.025
Industrials	-0.152	0.016
Real Estate	0.002	0.015
Technology	-0.018	0.016
Telecommunication	-0.012	0.031
Utilities	-0.090	0.065
CO2 Emissions Total #industry		
2# Consumer Discretionary	0.005	0.013
2# Consumer Staples	0.000	0.015
2# Energy	0.027	0.036
2# Health Care	0.020	0.023
2# Industrials	-0.057	0.057
2# Real Estate	0.004	0.015
2# Technology	-0.006	0.016
2# Telecommunication	-0.012	0.025
2# Utilities	0.081	0.055
3# Consumer Discretionary	-0.010	0.011
3# Consumer Staples	-0.010	0.016
3# Energy	-0.011	0.033
3# Health Care	0.011	0.023
3# Industrials	0.000	0.012
3# Real Estate	0.002	0.019
3# Technology	0.009	0.014
3# Telecommunication	-0.02	0.027
3# Utilities	0.062	0.053
Constant	-0.081	
R-Square	0.003	

CAR	Coefficient	Robust std. Err.
Total Assets Actual	0.004	0.003
Quick Ratio	0.015	0.021
Current Ratio	-0.006	0.011
Net Debt to Total Equity	0.000	0.000
Return on Equity Actual	0.007	0.006
Environmental Pillar Score	-0.003	0.005
Social Pillar Score	-0.032**	0.016
Governance Pillar Score	-0.002	0.003
ESG Score		
2	0.004	0.008
3	0.004	0.010
Industry		
Consumer Discretionary	-0.000	0.007
Consumer Staples	0.002	0.009
Energy	0.045	0.022
Health Care	-0.006	0.013
Industrials	-0.023	0.024
Real Estate	0.012	0.027
Technology	0.007	0.008
Telecommunication	-0.003	0.021
Utilities	-0.027	0.020
ESG Score # Industry		
2# Consumer Discretionary	0.015	0.013
2# Consumer Staples	-0.006	0.015
2# Energy	-0.067***	0.026
2# Health Care	0.009	0.017
2# Industrials	0.109	0.101
2# Real Estate	0.013	0.0132
2# Technology	0.010	0.015
2# Telecommunication	-0.006	0.023
2# Utilities	0.031	0.033
3# Consumer Discretionary	0.004	0.013
3# Consumer Staples	-0.010	0.014
3# Energy	-0.046	0.023
3# Health Care	0.016	0.019
3# Industrials	0.115	0.099
3# Real Estate	-0.068***	0.015
3# Technology	0.031	0.028
3# Telecommunication	0.014	0.028
3# Utilities	0.031	0.026
ESG Combined Score		
2	0.03***	0.009
3	0.023***	0.008
ESG Combined # industry		
2# Consumer Discretionary	-0.023*	0.014
2# Consumer Staples	-0.009	0.015
2# Energy	-0.010	0.012
2# Health Care	-0.013	0.019
2# Industrials	-0.015	0.137
2# Real Estate	-0.024	0.024
2# Technology	-0.031***	0.013
2# Telecommunication	-0.025	0.017
2# Utilities	-0.026*	0.014
3# Consumer Discretionary	-0.013	0.014
3# Consumer Staples	-0.015	0.017
3# Energy	0.004	0.017
3# Health Care	-0.014	0.013
3# Industrials	-0.010	0.018
3# Real Estate	0.063***	0.084
3# Technology	-0.047**	0.024
3# Telecommunication	-0.037**	0.021
3# Utilities	-0.022	0.019
Constant	0.056	0.046
R- Squared	0.005	

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