Martina Badidová

How environmental ESG performance can weaken business financial performance

Evidence from the Nordics, the United States, and China

School of Accounting and Finance
Master's Thesis in Finance
Master's Degree Programme in Finance

Vaasa 2026

UNIVERSITY OF VAASA
School of Accounting and Finance
Author: Martina Badidová
Title of the Thesis: How environmental ESG performance can weaken business financial performance: Evidence from the Nordics, the United States, and China
Degree: Master of Science in Economics and Business Administration
Degree Programme: Finance
Supervisor: Nebojsa Dimic
Year: 2026 **Pages:** 114

ABSTRACT:
This study examines the negative relationship between environmental performance and a firm's financial performance. The study analyzes publicly listed companies within three markets: the Nordics (main market, OMXN40), the United States (S&P 500), and China (CSI300) over a ten-year period, 2015–2024. Environmental performance is proxied by the Environmental pillar score of the ESG total score, while financial performance is assessed through return on assets (ROA), return on equity (ROE), and market value (Tobin's Q).

The negative relationship is examined both long-term and short-term. A long-term relationship is examined by employing a two-way fixed-effects panel regression (TWFE), while a short-term relationship is examined by a complementary event study capturing Nordic market reactions on selected environmental mandates. The event study serves the purpose of a robustness test as well.

The findings communicate limited support for the negative relationship between environmental ESG performance and financial performance. A plausible finding was found in the Nordics, where a weak and non-linear relationship between environmental performance and ROA was discovered, suggesting that environmental performance has a negative effect on operational efficiency. However, no statistically significant negative effects were observed across other measurements of financial performance, neither in the US nor in the Chinese markets. In addition, the hypothesis of negative effects being more pronounced in capital-intensive industries was not supported either. Similarly, the event study findings also suggest only minimal support for market reactions on selected environmental mandates. In the end, Hypothesis 1 is partially rejected, and Hypothesis 2 is fully rejected.

In conclusion, the findings communicate that the relationship between environmental ESG performance and financial performance is complex and market-dependent. It is viewed that environmental commitment may result in increases in a firm's operational expenses, but the engagement does not affect either positively or negatively the financial performance in the long run. In the short term, when an environmental mandate is introduced and adopted in a well-established market with strict environmental regulatory frameworks, it also does not pose any risk.

KEYWORDS: ESG (Environmental, Social, and Governance), environmental performance, financial performance, Green Deal mandates

Acknowledgements

I would like to express my sincere gratitude to my supervisor, Nebojsa Dimic, for supporting the idea of the thesis, his feedback throughout the journey of writing the thesis and his valuable insights and perspectives.

This thesis is dedicated to my grandfather, whose only wish was to see me graduate. He has been gone for more than ten years or, as he would have said, “smelling wallflowers from underneath”.

Table of contents

Figures

Tables

1 Introduction

In this section introduces the background, motivation and purpose of the study, followed by review of previous studies done on the topic.

1.1 Background of the study

The Nordic market is often seen in the world as an example of countries where ESG is a core pillar in corporate and political identity, thus fully implemented in most enterprises. It is frequently discussed that the Nordics are a so-called pioneering area of the ESG successful application in practice and being world dominant (Scanlon, 2020; Nordic Capital, 2024). However, it is true that the successful implementation of the ESG framework, especially the first pillar – Environmental, is challenging.

According to Kovvali & Listokin (2024), environmental commitment under the ESG framework is viewed as an issue in terms of firms being put under the decision of balancing profitability and environmental commitments. However, within this framework, It is not explained how to balance these two conflicting areas of interest, leading to uncertainty in corporate decision-making.

Nowadays, many companies – especially within the United States, started to back out from ESG and other world environmental and climate-related commitments, such as the Paris Agreement, to boost their businesses' financial performance and competitiveness. In the US, these particular steps were also delivered with a narrative of boosting the overall economy. The message was communicated as the US's need to unburden itself from strict regulations and disclosure with its 'America first' strategy (The White House, 2025).

Similarly, arguments for ESG framework criticism from China indicate that due to specifics of the Chinese markets (e.g., mostly state-owned firms), China is continuously ranking low on the ESG scores when Western models are applied (Laroia & Zeng, n.d.). To address this problematic, the country is taking actions and developing its own ESG China

fitting framework for its listed companies (The ESG Institute, 2024). This modification of the framework promises better alignment with national interests as well as meeting national targets (e.g., local carbon accounting standards designed by the Chinese Ministry of Ecology and Environment – MEE), particularly within capital-intensive industries (e.g., energy and manufacturing). Such includes national agendas such as 'Dual carbon goals' or, in other words, carbon peaking by 2030 and carbon neutrality by 2060 (Interesse, 2025; Zhou, 2025), which reflects the more suitable scenario for this particular country model and economy (Chiam & Janknecht, 2026).

The motive behind considering the Chinese market for this research purpose is mainly their own development of an ESG framework, hence interesting to see how the ESG performance behaves there and compare it to the West. In addition, another reason is the discussed criticism of China's market being 'punished' for a low ESG score and investor avoidance caused by the peculiar market structured mostly by state-owned party-controlled companies together with the emphasis of putting own economic interests (e.g., strategies such as 'common prosperity' or 'rural revitalization') (Bloomberg News, 2022) before foreign ones, such is the case of the US (The ESG Institute, 2024).

With the example of China and its development of a unique ESG approach that emphasizes the competitive advantage and blends the market model with climate interests (Van Zijl, 2025), these presented points can be concluded as a criticism of overly ambitious targets within the EU or worldwide. With the competitiveness or financial health and stability of companies put in second place, particularly within the capital-intensive industries, there is a conviction that a healthy balance between environmental aims and financial performance is missing. In addition, both the United States and China appear to recognize this.

Given this reality, it can be argued that, despite good intentions, increases in ESG environmental performance may have unintended consequences on firms' profitability and financial health. This thesis aims to analyze the potential negative impact of

environmental performance (proxied by ESG Environmental pillar score – E score) on firms' financial performance (measured through return on assets – ROA, return on equity – ROE, and market valuation –Tobin's Q). The rationale behind it is the thesis that the environmental targets are often overly optimistic and lack realism. Naturally, it is assumed that the effects are then more pronounced within capital-intensive industries compared to low-carbon ones, due to stricter regulations around carbon dioxide emissions.

1.2 Research motivation

The motivation for this research stems from rejection and negative feedback within the European Commission (EC) and the European Parliament (EP) on the Green Deal and other climate & sustainability-related agendas, as well as the contradictory viewpoints in academia towards the reliability of the ESG framework-related policies and strategy implementation across various industries. To further investigate these motives, this thesis analyzes recent events within the EC and EP, reviews relevant prior research focusing on the negative aspects of the ESG policies implementation and presents original research findings.

1.3 Previous studies

Limited attention has been paid to previous studies regarding only the Environmental Pillar of ESG performance and its negative influence on financial performance. The context of Nordic market is also being so far relatively unexplored.
Despite the limitations, this type of research is expected to gradually increase due to recent events and the discussed criticism around the ESG framework and environmental protection mandates. This criticism is further explored in Chapter 2.

However, similar research published and serving as a building block for this thesis is presented as follows.

Vaihekoski & Yahya (2025) investigate the external audit quality and its influence on Environmental, Social, and Governance (ESG) performance, measured by ESG scores (from LSEG Workspace) on the firm valuation (measured by the Tobin's Q). The focus of their studies is the Nordics (i.e., Finland, Denmark, Iceland, Norway, and Sweden) within the period 2010–2022. This region was picked because of the trustworthiness and transparency, mirroring a strong reporting culture, which is ideal for conducting research for audit quality. This is observed through a fixed-effect panel regression model, with Tobin's Q being the dependent variable and ESG score as the independent variable. They communicate the results that audit quality plays a key role in the relationship between the ESG performance and Tobin's Q (i.e., market value of the firm). However, the increase in a firm's value caused by ESG influence is realized only when the company is audited by the Big Four auditing firms (i.e., KPMG, PwC, Deloitte, or EY). Hence, communicated is the premise that audit, mainly the audit external performer, is the key determinant of whether a firm's ESG initiative (measured by ESG score) contributes to a better market valuation of a firm.

Chen et al. (2023) focus on the impact of ESG score and its impact on financial performance, measured by ROA and ROE. The premise behind the research is the idea of stakeholder and transmitting signal theory, communicating that strong ESG performance of the company reduces information asymmetry and builds trust, hence ESG efforts lead to increased financial performance of the company. Within the range 2011-2020, they investigate listed organizations on a worldwide scope (e.g., USA, Europe, China, Canada, Australia, Japan, etc.) with fixed-effect panel regression with ROA as the dependent variable and ESG score as the independent variable. The authors then demonstrate a significant positive relationship between corporate financial performance and ESG performance, with the effect pronounced within large companies (i.e., more resources for management of ESG efforts), developed economies (i.e., Europe and the United States, hence the strict regulatory compliance), and environmentally sensitive industries (i.e., real estate, energy, and pharmaceutical manufacturing). The message communicated is that all ESG pillars combined not only improve financial performance

but also enable the companies to achieve long-term sustainability and carbon neutrality goals, which also increases their reputation on the market and stakeholder trust.

Similar to Chen et al. (2023) is the research of Al-Tarawneh et al. (2024) of the impact of the ESG score on the financial performance of non-financial firms in the UK, measured by Tobin's Q and ROA. After performing fixed and random panel regression over the period 2015–2023, they communicate a negative relationship between the combined ESG score and Tobin's Q, G score, and Tobin's Q, as well as E score and both Tobin's Q and ROA. However, reported is also insignificancy between combined ESG score and ROA or S score and Tobin's Q. Conclusion delivered from these results suggest that environmental efforts within the company require big investment and are expensive, hence due to their high costs they may not be financially beneficial in the short term. The important message communicated from this research is the emphasis of ESG alignment with financial objectives, a recommendation for the management, since financial gains from ESG efforts are something to be realized in the long run.

The same thought was an objective of the research of Jin & Xu (2020) on listed companies on the Shanghai and Shenzhen stock exchanges. Conducted research over the period 2012–2016 to try to understand the relationship between environmental investment and ROA. Activities that were understood under the environmental investment are categorized as spending on environmental R&D, environmental facilities and systems, pollution control, clean production, taxes paid to the government related to environmental impact, spending regarding preservation of ecosystems, and others. Concluded was the U-shaped quadratic curve between financial performance and environmental investing, suggesting that below the turning point of around 1,3% of the company's total assets, the environmental investment decreases the value of ROA. This threshold value was fulfilled only in the case of 11% of the total sample. The effect was also more pronounced within State-Owned Enterprises (SOEs) compared to private ones, communicated by the better access to resources to implement environmental strategies, however, the effect across different industries was not significant. Hence, a similar thesis to Al-Tarawneh et al. (2024), Jin & Xu (2020) discuss that the benefits of environmental

investment are realized in the long run and after exceeding a certain threshold, thus a comprehensive strategy for these types of investment activities must be implemented.

Similarly, Tutar et al. (2025) investigate the relationship between a firm's ESG performance and its financial performance on a global level. The study is built upon three theories: stakeholder theory, legitimacy theory, and resource-based view, to explain why firms engage in environmental efforts both externally and internally. The authors examine the relationship, gathering the total ESG score from different ESG rating platforms (e.g., Bloomberg, MSCI, and Refinitiv Eikon ESG rating providers) and financial performance through financial metrics such as ROA (as the main focus), ROE, and Tobin's Q, during the ten-year period of 2015–2025. After examining publicly listed companies from Europe, North America, and Asia through fixed-effects panel regression, they report the positive relationship between ESG and ROA, communicating that the long-term ESG engagement results in an increase in the financial health of the firm. Besides that, reported is also the predictive power of ESG performance in relation to financial outcomes of ROA and Tobin's Q. As a robustness test, they decided to pick ROE as an alternative performance indicator of financial performance to ROA, reporting also a positive and significant relationship.

Concluded are also differences across different industries and regions, hence communicated that the relationship is stronger within Europe (i.e., leader of the sustainable fund market), the technology and finance sector, but also a significant relationship was confirmed within retail and manufacturing. Weaker, but still significant results are reported within transportation and healthcare, and geographically-wise, the sustainability efforts, measured through ESG investing in the US and Asia-Pacific, are quite low (i.e., around 19% of funds in Europe are within ESG focus, compared to the US – 1% and Asia-Pacific – 2%). It is also important to mention the positive correlation between E score and profit margin and market capitalization, compared to S or G score, E showing the most stable positive correlation. Comparing high- and low carbon-intensive sectors, the relationship is stronger within the sectors of high-carbon intensity, which is explained through a fact that firms within this sector have directly observable

environmental footprint (i.e., easier measurement compared to low-carbon sectors such as finance or technology), are more exposed to regulations and face higher reputational risks, hence the relationship within ESG performance and financial performance is more pronounced.
With this study presented, the authors conclude that ESG efforts result in value creation and should not be seen as a regulatory burden, but rather a strategic tool.

Yoon et al. (2024), investigate the Corporate Social Responsibility (CSR) effects on the financial performance within the Korean market. With this research, they try to prove the negative association between ESG score and ROA, ROE, and Tobin's Q, as a contradiction to previous studies done and the positive association mentioned. With fixed effects panel regression on publicly listed Korean companies over the period 2011–2020, they communicate the negative relationship between the combined ESG score and ROA and Tobin's Q, where S and G pillars were assessed as primary drivers of this outcome. The relationship between the E pillar and financial metrics, as well as the Total ESG and ROE, was insignificant. This is one of the few studies that highlights the view of CSR as a 'financial burden' rather than a long-term investment benefit, which is at least the case found in the Korean market, where short-term interests of shareholders are prioritized.

When referring to environmental efforts pronounced through climate policies and their economic outcomes, Berthold (2024) investigates the impacts on Switzerland, communicating the influences on the country's GDP as well as the valuation of firms. With his research, he delves into a particular case of low-carbon economy transition efforts and their macroeconomic and microeconomic outcomes. The event study performed by him gives a closer look at 32 "transition risk events" that happened over the period 2001–2022 (e.g., domestic events: News regarding climate change and large costs for Swiss infrastructure, CO2 tax discussions and introduction, fuel oil tax, international events:, EC's new agenda for CO2 reductions, EU stricter climate goals for 2030, IPCC reports regarding planet and climate concerns, and combined: Swiss

ratification of the Paris Agreement, etc.), to see reflection of Climate Policy Risk (CPR) in the asset prices and its persisting decline, especially within brown (i.e., CO2-intensive industries based on Scope 1 and 2 emissions and ESG scores) firms. The conclusions delivered are negative macroeconomic impacts (i.e., caused by an unexpected increase in climate policy risk), such as a decline in real GDP or increased economic uncertainty, but on the other hand, reduced CO2 emissions, as well as negative microeconomic impacts, such as underperformance of the CO2-intensive industry group (i.e., caused by investors' penalization of these firms in reaction to transition risks)compared to their green peers, with the persistent decline reported. This study directly shows the negative consequences of transitioning toward a low-carbon economy (e.g., explicitly one of the events assessed being the domestic climate neutrality plan by 2050) but also presents hedging opportunities for investors to explore (e.g., Green Minus Brown (BMW) portfolio).

Another recent event study was performed by Shi et al. (2025) regarding the EU's Carbon Border Adjustment Mechanism (CBAM) and its financial impacts on the European market, being also the first study on this topic. CBAM was introduced in 2023 by the European Union as a reaction to "carbon leakage" or firms' relocation of manufacturing activities to countries with loosened or no emission pricing. Hence, CBAM represents a carbon-based fee instrument serving as the world's first carbon tax border, as a supporting mechanism towards the EU Emission Trading System (EU ETS). After investigating EU firms and their non-EU suppliers' cumulative abnormal returns (CAR) around 13th December 2022 (i.e., day of the provisional agreement on CBAM), the authors report CAR 1,3 percentage lower as well as market capitalization losses over 1 billion EUR for the affected firms compared to their non-affected peers. In addition, Shi et al. (2025) report cross-border spillover effects throughout international supply chains, suggesting shared financial burden stemming from the CBAM, hurting both groups of EU enterprises as well as the non-EU suppliers. In conclusion, the research portrays a direct negative influence of climate policies on the financial performance of firms directly and indirectly affected.

1.4 Purpose of the study and hypothesis

The purpose of this thesis is to explore the impact of the ESG E score (i.e., one of the three pillars of the Environmental, Social, and Governance sustainability evaluation framework of company's impact) on the organization's financial performance, with examples of Nordics, represented by the index OMXN40 (e.g., countries: Finland, Sweden and Denmark), the US market, represented by the index SP500, as well as the China mainland, represented by the CSI300 index.

With this master's thesis, the aim is to look only at the behavior of the environmental pillar of the ESG score and prove the opposite as most of the cases of previous research done (i.e., negative significant relationship between E score and ROA, ROE and Tobin's Q) with the example from Europe – the Nordic region (i.e., region portrayed as a sustainability pioneer in the EU and worldwide), the United States (i.e., the example of "ESG backlash" region as described by Picken & Carter, 2026, or in other words, a direct example of decreasing corporate ESG efforts), and China (i.e., example of the market developing its own suitable ESG framework to measure the efforts accordingly). Also, the combination of a supplementary event study of the Nordic market reaction to recently criticized environmental mandates will help to assess the relationship accordingly. The main regression examined the long-term relationship, whereas the event study functions as a robustness check by capturing short-term effects on the main market, providing a more complete picture.

The premise behind this is that companies are engaging in sustainability activities – particularly those related to the environmental impact of the company (e.g., climate change and carbon emissions, sustainable management of natural resources, pollution and waste management, and energy and resource consumption) (LSEG Data & Analytics, 2024) for two particular reasons – to seek investors' (Tutar et al., 2025; Saikia & Mako, 2024) and market attractiveness (Tonnarello et al.,2024)and own image and reputation improvement (Saikia & Maji, 2024; Bothello et al., 2023;) or to ensure compliance with

environmental mandates of the main regulators (e.g., United Nations – UN, European Commission – EC, U.S. Securities and Exchange Commission – SEC, or China Securities Regulatory Commission – CSRC) (Inrate, 2025). Also, as previous research suggests (Al-Tarawneh et al., 2024; Jin & Xu, 2020), the benefits of environmental efforts are realized in the long run.

With this being presented, I hypothesize that the current reality regarding ESG portrays an assumption that environmental targets are not set realistically enough, with many countries backing away from them in order to secure their existence, financial performance, and health or competitiveness, because they simply cannot be fulfilled without putting some important industries in danger.

On the one hand, a similar scenario to the US, especially in the Nordics or the European Union, is highly unpredictable. On the other hand, this research presents a unique opportunity to evaluate the financial performance of the area that is known for successful implementation and pioneering in this sphere.

With this stated, the **research question** of this thesis is formulated as: **"Does ESG environmental performance negatively affect the financial performance of firms in selected countries?"**

This research question is supported by research objectives, presented in the form of hypotheses:

H1: ESG environmental performance is negatively associated with the financial performance of firms in selected countries.

H2: The negative association between ESG environmental performance and firms' financial performance is more pronounced in capital-intensive industries

(H0: There is no statistically significant relationship between ESG environmental performance and the financial performance of firms in selected countries)

1.5 Construction of the study

The study is divided into five chapters. Chapter 1 introduces the topic of the study and the main idea. Chapter 2 dives deeper into the motivation of the selected study by recent events and conclusions from the previous literature. Chapter 3 explains the study model and data. Chapter 4 breaks down the results delivered by the study. In Chapter 5, the conclusions drawn from the results are presented. In addition, it summarizes the study and discusses the results with potential ideas for further research.

2 Literature review

This section provides the reader with further explanation of the research motivation, together with a literature review that presents the theoretical foundation for this master's thesis study.

2.1 Overview of recent events and debates within EU Institutions and public

The current atmosphere in the European Union institutions, such as the European Parliament and the European Commission, is negatively inclined regarding the proposed policies of the Green Deal from 2019, which is the EU's strategy towards decarbonization by the year 2050 (Council of the European Union, n.d.). Direct examples of the criticism include the perception of business interests and consultation favoritism toward certain companies (e.g., Airbus, ExxonMobil, Nestlé, Ferrero, or Unilever), which gives them disproportionate influence and individual treatment in ESG-related regulatory compliance. Critics argue this resembles lobbying, risk diluting ESG regulations, and lacks transparency due to behind-closed-doors discussions with EU representatives (Hodgson, 2025), also communicating the risk of those activities leading to greenwashing of regulatory simplification. Similarly, the Carbon Border Adjustment Mechanism (CBAM), or in other words, importer charges on high-emission products, is expanding to car parts and household appliances (before mainly raw materials – steel, aluminum, cement and components), which mainly targets trading partners of the EU (e.g., China, India, and South Africa) due to the risk of climate policy avoidance or "carbon leakage" (Abnett, 2025). Criticism does not come only from the trading partners (Abnett, 2025) but from the parliament itself (Bolotova, 2025), highlighting excessive regulations and burdens, stagnating income growth of the EU, and losing the competitive advantage of Europe compared to its peers (e.g., the US and China). Lastly, the automotive industry, especially diesel engines, has been a discussion topic for a while, currently being at the point of arguments within the EP parties, with the pushing of EC's proposal of 2035 elimination ban of combustion engines, with the arguments of market freedom on one side and a

sustainable electric future on the other side (Bonini, 2025). In addition, the matters of market freedom, industry and employment protection, and socio-economic inequality (e.g., exclusion of the poorest from social and transport opportunities, hand-in-hand with widening living standards gap due to the inability to afford new CO2-emitting vehicles) have been at the core of the legal proceedings between Poland and the EU Court of Justice, wherein Poland sought the cancellation of the EU's climate-related policies (Jones, 2023).

Similar negative opinions are shared across the public as well as experts through media platforms, discussing concerns of the destruction of the EU and economy, pointing out that the EU needs to ease the strategy policy requirements. Regarding CBAM, for instance, European chemical industry companies are facing high costs due to carbon taxation and strict regulations as well as bureaucratic burdens, which they communicate can weaken the industrial competitiveness and global trade (Cieppe, 2025).
The viewpoint of boosting domestic manufacturing under the 'Made in Europe' strategy proposed by the EC is also heavily criticized by the car manufacturers of the EV sector and renewable energy producers, communicating concerns of supply-chain complications, slowing down of manufacturing activities, together with the risk of the EU losing its competitive advantage on a global level (Hancock et al., 2025).

2.2 Overview of recent events and debates within US Institutions and public

In the United States, the setting of ESG regulations, international agreements on climate change, green investing, and other environmental efforts can be described with only one adjective – turbulent. These turbulent times for ESG within the US, when excluding the presidency of Joe Biden (2021–2025), started already during the First Trump administration in 2017 (BBC Bitesize, 2026). Thus, the narrative of the climate 'rollbacks' can be clearly seen as a motivation of one's political party ideology; hence, both presidents (i.e., Joe Biden for Democrats, Donald Trump for Republicans) represent their own party's agendas.

Firstly, the most significant milestone within this ‘disengagement from international climate commitments’ timeline is Trump’s aim of withdrawal of the US from the Paris Agreement (PA). According to the Congressional Research Service (2025), PA is characterized as a legally binding international agreement of United Nations organization addressing global climate change. This initiative is a part of the United Nations Framework Convention on Climate Change (UNFCCC) that was established in 1992. 195 states ratified the PA in 2015 in Paris (hence the name) and legally bound themselves towards targets focusing on lowering greenhouse gas emissions (GHG), boosting international collaboration towards combating climate change in terms of financial assistance in achieving these targets, and promoting sustainable development and the elimination of poverty. One of the main targets addressing climate change was, for instance, the commitment to reduce the rise in global average temperature well below 2 degrees Celsius and 1,5 degrees Celsius within an ideal case (Hansen, 2022).

The PA became active in 2016, with the US formally accepting and joining the initiative in that same year. The intention of withdrawal was communicated by Trump in 2017 and later came into force in 2020. However, the withdrawal ended with readmission back in 2021. The second, and recent, withdrawal from the PA shall take place on 27 January 2026, and as confirmed by a more recent source (Noor, 2026), it officially took effect on that date.

Under the “Putting America First” strategy, a statement by the White House from 20th January 2025, besides PA withdrawal, other important steps regarding internal environmental politics were the withdrawal from the U.S. International Climate Finance Plan under the argument that it poses an economic burden for American taxpayers, and it does not bring any benefit, rather the money should be invested into the domestic economy. In addition, additional funding pauses with a focus on environmental efforts, such as clean energy (i.e., discontinuation of the Clean Power Plan), climate protection, or electric vehicle (EV) infrastructure (i.e., a cease of 5 billion USD from charging EV infrastructure program), were further announced later on, justified as limiting fossil fuel development not falling under the current economic agenda of the U.S. (Reuters, 2025; Przychodzen et al. 2020; Yang, 2025).

Besides the mentioned actions, other important international withdrawals regarding sustainability that take place in 2026 are, for instance, withdrawal from the Green Climate Fund (GCF), UNESCO, and the World Health Organization (WHO) (Green Climate Fund, 2026; UNESCO, 2025; The White House, 2025).

2.3 Overview of recent events and debates within Chinese Institutions and public

The current situation around ESG in the Chinese market is relatively specific. The reason is their unique approach towards ESG and its market implementation. In comparison with the European or US market, China continues to develop its own market-fitting frameworks, which are driven purely by the government, not investors or markets, as in the case of the EU or the US.

According to Shen et al (2023), ESG practices in China are defined by a "top-down approach", covering full scope, meaning disclosure, rating, as well as investing (p. 15). Meaning that the ESG framework in China is different compared to those used in developed markets, such as the US and the EU, because it is not driven by the market or stakeholders, but the practices are fully led by the government and its own agendas. The differences mentioned in the paper are, for instance, that ESG practices must be aligned with national plans, which in this case are the Five-Sphere Integrated Plan (i.e., national development strategy for integrated development in the economic, political, cultural, social, and environmental fields) or the Dual Carbon national strategy (i.e., strategy with the main goals of CO2 peak by 2023 and carbon neutrality by 2060). Both strategies have sustainability development, awareness, and environmental initiatives as their main goals. Another difference is, for instance, the role of state-owned enterprises (SOEs) when it comes to ESG implementation. As opposed to the majority of publicly-listed companies within the US and EU being privately-led, hence being individually responsible for ESG regulatory compliance or voluntary efforts beyond the compliance, in China, SOEs fall under the oversight of the State-owned Assets Supervision and Administration Commission of the State Council (SASAC), which is a governmental organization responsible for their SOEs management. Hence, unlike the cases in privately-led markets,

SOEs are a direct subject of the government and are required to implement ESG policies based on national strategy plans. This relationship is crucial for understanding the uniqueness of ESG implementation compared to the global setting.

Besides that, it is also reported that the Chinese ESG framework provides disclosure beyond the ISSB benchmark, since it is enriched with specific domestic objectives, such as corporate charity, disaster relief, or poverty alleviation, which are not included in the original ESG global framework. This is communicated by the unique approach of the Chinese understanding of ESG as a tool of impact, companies acting as responsible community members, rather than the Western approach of the use of ESG as a risk management instrument. In addition, the sustainability disclosure is no longer a subject of voluntary effort, but rather a compulsory requirement when a company has expansion initiatives (Lee, 2022).

On the contrary, Zhou (2025) also agrees with the statement that ESG in China is no longer voluntary disclosure but a structured, mandatory regulatory system; however, the author points out the lack of alignment with the UN worldwide principles, which poses challenges in comparability to its Western peers in terms of rating and compliance. The same point of this alignment gap is communicated by Lee (2022) as well. Zhou (2025) then adds that SOEs' dominance in ESG implementation can also be seen critically, as their strong governmental control can result in monitoring issues that present various concerns for the foreign investors regarding efficiency or accountability of the SOE.

To summarize these points, the ESG in China has a unique nature that, on the positive side, ensures better alignment with the market nature and its aims, but on the negative side, some aspects of the framework still fall behind the global framework utilized in developed economies, which poses various challenges regarding the ESG performance evaluation of Chinese publicly-listed companies on a Western market or in foreign investors' uncertainty within decision-making due to a certain information asymmetry.

2.4 Green Deal mandates and their effects

Recent attention is driven towards the European Green Deal policy framework launched in 2019, with included regulations having a substantial financial impact not only on the

companies within the EU (and within Nordics), but also on the EU's trading partners, such as the United States and China. The European Green Deal strategy is built upon different regulatory frameworks matching the agenda of the European Union to become the first climate-neutral continent by 2050 (European Commission, n.d.). The main regulatory instruments of interest within the Green Deal are nowadays the Corporate Sustainability Reporting Directive (CSRD), Corporate Sustainability Due Diligence Directive (CSDDD), EU Taxonomy and Emission Trading System (ETS), and Carbon Border Adjustment Mechanism (CBAM). Worldwide, in addition, with the direct impact on the countries' assignment widely discussed are, for instance, the Paris Agreement and Kyoto Protocol, representing essential international agreements with the aim of coordinating efforts in emission reductions and addressing climate change.

In this case of this research, four main regulatory instruments (i.e., CSRD, CSDDD, EU Tax, and CBAM) should be explained in detail, since they are the key regulations of the discussion of the Omnibus Package introduced in the following subchapter.

The Corporate Sustainability Reporting Directive, or CSRD, is characterized by the European Commission (2025) as a mandate that aims to promote responsible corporate practices and higher transparency in sustainability reporting. The goal of CSRD is to offer credible and comparative sustainability data that further serves as a guiding tool for sustainable investment, with the purpose of promoting the EU's climate neutrality goal of 2050. It is applied to all listed EU companies (large and SMEs) as well as non-EU companies operating in the EU market. In a nutshell, this mandate is legally binding the firm to treat and track its sustainable practices and overall impact (i.e., climate and social impact as well as governance practices) as financial reporting, which can be utilized by investors further on during decision-making. In conclusion, this mandate can be interpreted in two ways.

On the one hand, it presents additional workload and resource demands for firms, as they must gain the ability to comply with the mentioned reporting standards. On the

other hand, it brings reliable and transparent sustainability data for investors and lowers the chances of greenwashing.

The Corporate Sustainability Due Diligence, or CSDDD, according to the European Commission (2024), is a mandate that focuses on the sustainable corporate behavior of a firm. Under environmental protection and protection of human rights supporting actions across its whole supply chain, the companies should also establish and apply due diligence processes. In practice, it means that a company is obliged to detect in advance and resolve possible human rights or environmental protection violations stemming from their own activities, subsidiaries' activities, or activities of their business partners. In addition, with their actions, the company should be aligned with the Paris Agreement's 2050 climate neutrality goal and the European Climate Law goals. This alignment should be presented in the form of a comprehensive agenda and its associated concrete KPIs. This active corporate behavior also leads to an increase in workload, hence higher financial costs, but also financial costs in terms of resource allocation for new investments into monitoring systems and their development, as well as many other activities connected to the implementation process of effective compliance mechanisms. However, the company in return benefits from increased trust from its investors and customers' side, while also improving its risk management through the new enhanced systematic monitoring of its activities.

EU Taxonomy (European Commission, 2026a) is a mandatory framework that provides guidance for companies in their economic activities' classification. This classification is built upon the climate neutrality target and overall environmental protection of the EU. Under this framework, the company is obliged to classify which of its operations are 'taxonomy-aligned' and which are not, which results in enhanced transparency and current disclosure in their reports. This information is further utilized by investors as well as prevents greenwashing by correct and honest assessment and classification of the firm's operations, for example, through KPIs assessing alignment with the EU Taxonomy. On the other hand, this requires constant updates, resulting in increased administrative

burden and potential data collection issues, since data is frequently gathered manually across fragmented systems (Ernst & Young, 2026).

Lastly, the Carbon Border Adjustment Mechanism (CBAM) is a mandate defined by the European Commission (2026b) as a tool of fair carbon pricing for carbon-intensive imported goods into the EU, supporting the functioning of the EU Emissions Trading System (ETS). Under this mandate, the company is obliged to register itself as a CBAM declarant, ensure correct measurement and report on the embedded emissions in imported items, purchase CBAM certificates based on the number of mentioned emissions, as well as fill in the yearly declaration and report the deduction of carbon expenses paid abroad, if it is the case. Consequently, it increases the complexity of monitoring and reporting emissions of the mentioned import, while also creating data-related challenges arising from inaccurate or incomplete information provided by suppliers, which may result in penalties (PwC, 2024). In addition, it may require a full reconstruction of the already established supply chain structures.

Table 1. Overview of presented mandates

Tool	Objective	Type
CSRD	Transparency	Mandate
CSDDD	Responsibility	Mandate
EU Taxonomy	Classification	Mandatory framework
CBAM	Pricing	Mandate

In conclusion, the presented mandates affect companies through increased administrative burden and financial costs, as well as pose data-related challenges in terms of data accuracy and availability, along with other previously presented implementation difficulties. On the other hand, companies may improve their risk management, transparency, and credibility profile for their investors and customers. In addition, overall greenwashing is reduced, and long-term compliance with the EU carbon neutrality agenda is supported.

2.5 Omnibus Package

Continuing on the recent events to better understand the market environment and its regulations, especially within the case of the EU, the Omnibus Package legislative initiative of the EC from 26th February 2025, should be introduced to the reader.

The Omnibus Package (other names: Omnibus I, Sustainability Omnibus, Simplification Package) is the set of legislative proposals to strengthen the overall competitiveness of the European Union as well as lighten the compliance burden (Baines et al., 2025). It targets both recent and previously accepted regulations, all being established under the European Green Deal agenda adopted in December 2019 (Council of the European Union, n.d.), such as:

1. Corporate Sustainability Reporting Directive (CSRD) from November 2022 (Baines et al., 2025),
2. Corporate Sustainability Due Diligence Directive (CSDDD) from May 2024 (Adelphi, 2025),
3. EU Taxonomy from July 2020 (Baines et al., 2025), and
4. Carbon Border Adjustment Mechanism (CBAM) from May 2023 (Tiberghien, 2023)

and calls for simplification and refinement of these instruments (Baines et al., 2025).

The reason for such an act stems from a viewpoint that such regulations present a substantial regulatory burden, which puts in danger domestic manufacturers (e.g., cases of France and Germany).

By the Greens and the European Free Alliance (EFA) (2025) European Parliament group is however argued that mentioned deregulation (e.g., especially within CSDDD and CSRD) will harm compliance-proactive companies (presented as sustainability front-runners), but mainly, such simplification presents a step backward in sustainability. The negative outcome is explained through loss of oversight in high human rights and environmental risk industries (e.g., mining, construction, textile, oil & gas), a decrease in disclosure for the financial sector (e.g., decreased ESG data availability, hence less information

available, increasing the investment uncertainty), as well as less transparency in supply chain, reduction in workers' rights (e.g., reduced legal accountability, limited access to justice, or restricting due diligence obligations), and increased lobbying from mentioned high-risk parties (Joint CSO Statement, 2025; Greens/EFA, 2025).
In addition, concerns regarding regulations, especially regarding CSRD, were communicated directly by different parties, such as the Federation of German Industries (BDI) or the French government (Iozzelli, 2025).

There are different opinions regarding this Omnibus package, both agreement and disagreements from either the EU countries themselves, groups of interests, or the public. According to Baines et al. (2025), the most discussed are the cases of the lobbying group Federation of German Industries (Bundesverband der Deutschen Industrie – BDI) and the French government itself. Iozzelli (2025) reports then, that in the German case, discussed was particularly requesting of delays regarding the CSRD regulation of 2 years to protect the competitive advantage of domestic manufacturers against their peers worldwide. Besides that, on the table are presented arguments of financial and administrative burden that come with the implementation of this regulation and put in danger around 13 thousand companies. With the opening of the discussion around the implementation issues of this regulation and understanding the seriousness of the situation and outside pressure, the president of EC, Ursula von der Leyen, admitted the reopening of discussions around CSRD and the plan's deadlines, bringing the Omnibus Package. On the other hand, this step was understood in two ways: reduction of regulatory burden and protection of the competitive advantage of manufacturers of the European Union, or industry lobbying pressure. The second way, the industry/corporation favoritism, was brought up by Anna Cavazzini, a member of the European Parliament (MEP) from the Alliance 90/The Greens, where Ursula von der Leyen was criticized for her decision to "cut red tape" (Baines et al., 2025, p. 1). In addition, another member of the Greens party, Marie Toussaint, adds an opinion that this decision serves as punishment for the sustainability front-runners, who already invested in new systems regarding CSRD compliance (Greens/EFA, 2025). This type of

disagreement comes from a viewpoint that many firms have already invested in new compliance but now will face unpredictability and certain instability due to changes in regulations, which were not in force yet, and fitting their agenda to the new ones published (Greens/EFA, 2025). Hence, on both sides, this brings more future uncertainty within implementation, economic situation, disharmony, and strained relationships across institutions and firms (Iozzelli, 2025; ClientEarth, 2025).

The case of France is more sophisticated than the German one. According to Greens/EFA (2025) and Baines et al. (2025), France was the “front-runner” as a country itself, with the implementation of CSRD regulation into its national law for better alignment with the Green Deal initiatives. However, in January 2025, France decided to join Germany and demanded a thorough examination of the existing regulatory framework of CSRD and CSDDD. Proposed were the two-year delay for the CSRD as well as a one-year delay for CSDD. Besides those, requested was also the reduced scope of reporting was also reduced, simplification of reporting standards, and limits regarding due diligence obligations. The reasons behind were the same: simplification, competitiveness enhancement, high costs of compliance and its reduction, but the motives were also stemming from the current political environment and its ideological shifts within the EU parliament and domestic government shift, which naturally created pressure.

Besides Germany and France, posing as the main drivers of the Omnibus Package release, other EU member states also stated their opinion. According to Greens/EFA (2025), supporting countries included Poland and Hungary. On the contrary side of the Omnibus package and defending the old regulations were countries such as Spain or Denmark (e.g., in the case of CSDDD) and Belgium (e.g., in the case of CSRD), supporting continuous rather than delayed implementation of the mentioned regulations. Neutral position was present from Italy and the Netherlands. When it comes to deregulation in CSRD and CSDD as a whole, important to mention that the overall reporting obligations should result in around by 25% reduction for large private firms and around 35% for the cases of SMEs (Energy Advice Hub, 2025).

Regarding EU Taxonomy and CBAM regulations, Omnibus Package introduced also other simplifications prompted by concerns of France and Germany (Baines et al., 2025) coming from the argument of simplification of compliance burden, such as exclusion of SMEs and individuals from the CBAM duties, emission calculation simplification, and authorizing CBAM declarations simplification as well as the reduction of financial burdens on declarants through lowering the percentage of certificates from 80% (i.e., the previous value) to 50% the declarants must manage or hold. Regarding the new EU Taxonomy changes, they naturally stem from the changes applied within the CSRD, such as reduced scope of reporting or flexibility within voluntary reporting for SMEs (e.g., choice of disclosing sustainability KPIs or scope of alignment with EU Taxonomy).

With these being presented, it gives an idea of how fragmented and uncertain the current situation is. Presented both pro and contra viewpoints within this decision, summarized can be that overall, the Omnibus Simplification Package adds flexibility to the dynamic environment, while prioritizing the competitiveness of the region. In addition, it seeks to reduce the administrative burden and regulatory and financial costs faced by SMEs. However, it needs to be emphasized that under current pressures and deadlines, the simplification package is not enough and there is still a lot of unclarity how the mandates of The European Green Deal will shape in the future.

2.6 Common challenges of ESG's E implementation or environmental investing pay-off, view: ESG as a cost to organizations

There are various challenges when speaking about the implementation of particular operations and decision-making regarding the implementation of ESG Environmental operations. Based on the research published, the challenges can be categorized into 4.

Financial or resource constraints

1. Complexity burden and regulatory compliance (Li & Li, 2020)
2. Internal organizational barriers
3. Uncertainty of the financial payoff

Firstly, with the implementation of environmental reforms, initial investment needs to take place. According to Li & Li (2020), a viewpoint of a “cost hypothesis” (Li & Li, 2020, p. 2667) is presented, suggesting that investment into regional and industrial environmental compliance naturally increases operating costs, which results in possible limitations in assets available for other short-term profit-generating operations. Gao et al. (2021), suggest that such a high volume of capital expenditure (e.g., into pollution control in the case of pulp and paper industry in China) has a consequence of a downturn in productivity growth, hence communicating the negative link between environmental efforts and economic development. With the example of the fossil fuel industry by Chen et al. (2025), discuss financial performance declines as a consequence of the world’s transition towards clean energy (e.g., Paris Agreement-related steps), presenting oil and gas as stranded assets (i.e., estimated at 13–17 trillion in assets). This reality leads to major profitability losses stemming from the transition, but it also views the link of fossil fuel becoming an unattractive and more expensive commodity in the carbon-neutral market.

Secondly, challenges arising from regulatory compliance and its complexity also present a certain bureaucratic and uncertainty burden for firms in their operational workflow. Baehr et al. (2024), with their study raises criticism on Greenhouse-gas (GHG) reporting and its shift from voluntary to mandatory due to the European Green Deal agenda adoption. They depict the evolution of environmental reporting frameworks but mostly focus on new reporting schemes stemming from the European Green Deal (e.g., European Climate Law, EU Taxonomy, CSRD). Even though the aim of those new regulatory frameworks is to support the EU’s climate-neutrality ambition by 2050, the authors’ viewpoint is that they bring unnecessary confusion and complexity caused by overlapping with the previously introduced reporting frameworks, which, according to authors, may result in overall disclosure firms’ discouragement, causing decreased reporting quality, data inconsistency, and possible data unreliability, but most importantly causing increase in unnecessary workload.

Thirdly, to ensure regulatory compliance, firms face internal challenges, including business model reconstruction or managerial resistance. According to Liu et al. (2025),

the EU Taxonomy regulation forces firms to reshape their business models by mandating higher transparency regarding the sustainability of their fundamental financial operations. These include, for instance, specific classification on how much of the operating and capital expenses as well as revenue flows to green investments, hence quantification of the environmental efforts of the entity is forced by regulation to ensure green transparency. With this being said, authors communicate that such activities require a complete transformation of the firm's business model to ensure a lucrative position and competitiveness on the market, as well as attractiveness in the eyes of potential investors, shareholders, and to ensure their high environmental rating for the same reasons stated. Hence, Liu et al. (2025) provide a direct example of how the mandate shapes the business operations to ensure regulatory compliance, which may not be always the best decision for the company's profitability (i.e., supporting operations with achieving the firm's best potential), rather it can be viewed as a situation where an organization is forces to act in particular way to not to risk losing their position on the market and be able to compete with its peers. In addition, David et al. (2007) report on a firm's behavior when the firm faces regulatory changes. The authors communicate that managers respond to mandates often opportunistically, meaning that they often attempt to resist regulatory compliance, which results in a firm's lobbying or engagement in political activities, to maintain control over strategic decision-making and maintain the status quo. To sum up, the current situation regarding the Omnibus package and firms' lobbying, which was discussed in detail in the previous subchapter, provides a clear illustration of this type of behavior in practice.

Lastly, the topic of financial payoff of the ESG regulatory compliance is criticized by several sources, presenting a challenge a firm faces. It must be stated that investments into ESG-related environmental efforts are translated into a firm's long-term profitability and enhanced market value (Tutar et al., 2025). However, to see this critically, Mohammed et al. (2025) argue that sustainability efforts can be understood as a form of benefits and gains with high-level uncertainty, especially in the case of emerging economies, as proven by their case study (i.e., BSE 500 firms in India). Communicated is the viewpoint that sustainability-related investments require a long-term horizon in

order to materialize. This reality, in connection with the blind following of sustainable regulatory compliance without a comprehensive environmental strategy built in advance, creates an environment where the realization of tangible payoff (e.g., ROA, ROE, Tobin's Q, and Net Profit Margin) of these efforts is uncertain. On the other hand, they report intangible gains stemming from the principles of resource-based theory (RBT), such as enhancements in human capital (e.g., stakeholders and community), customer loyalty, and enhanced image and reputation. In addition to the compliance and strategy relationship, Walker & Wan (2012) address the financial effects of only symbolic environmental actions by explaining the theory of "green talk" vs "green walk" (i.e., the gap between those two is understood as "green washing") (p. 227). It is understood that when an entity engages in environmental efforts only in a symbolic way, the payoff is not realized, but rather the firm is punished for its opportunistic behavior and low credibility by the market, which has negative consequences on its financial performance. Regarding the payoff time itself, Saikia & Maji (2024) emphasized long-term strategy building and commitment to environmental efforts, with the example of Science-based Targets (SBTi) investment assessment. It is pointed out by the authors that the SBTi framework requires around 5–15 years to achieve full transition, but financial payoff in the form of enhancements in market value can be realized sooner, depending on the investors' recognition of the long-term sustainability and truthful efforts of the company. Active engagement can also result in a payoff from 1–2 years, as reported by research done by Przychodzen et al. (2019) or Mahapatra et al. (2021).

In conclusion, with the presented information, there is a positive relationship between ESG investment and financial performance without discussion. However, those efforts must be supported by the long-term comprehensive strategy and active engagement from the firm's side. Nevertheless, there are naturally companies present on the market that do so, but as can be seen, managers tend to engage in opportunistic behavior, short-termism, as well as try to stick with status quo, meaning that cutting costs on unnecessary innovations, sticking with old business models and do not engage in above

regulatory compliance activities, which raises a question how much financial payoff can be expected and when.

2.7 Drivers of environmental engagement within a company

Besides protecting the environment, there are also other theories stemming from the literature that drive the company's environmental efforts.

Tutar et al. (2025), in their study about ESG performance and its effects on financial performance, introduce three major theories as drivers of environmental engagement:

1. Legitimacy theory (LT), defined by Suchman (1995)
2. Stakeholder theory (ST), defined by Freeman (1984)
3. (Natural) Resource-based view (RBV), defined by Hart (1995)

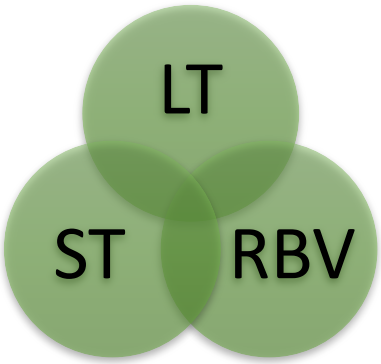

Figure 1. Theoretical framework of a firm's environmental engagement

Firstly, legitimacy theory is defined by the authors simply as a behavior of a firm seeking public approval and long-term sustainability, fitting the societal norms, beliefs, and expectations. Hence, a firm acts in a way that they are accepted by society with their goals and methods, crucial for their organizational existence. Within ESG performance, the application of legitimacy theory principles means a certain risk reduction by aligning with external environmental expectations and regulatory norms, thus a firm reduces the risk coming from the external environment through public scrutiny, legal, or media pressure. According to Tutar et al. (2025), those environmental efforts can have either a

symbolic or a substantive motive behind them, meaning that overall engagement might be either an honest firm's motivation or simply fulfillment of necessary regulation in order to avoid sanctions or public pressure, and to protect the firm's image and reputation.

Secondly, stakeholder theory (ST) by the authors is seen as meeting the expectations of various groups within and outside the organization (e.g., employees, investors, and society) to improve long-term performance. When speaking about ESG, this theory understands the engagement in ESG efforts as a strategic instrument for achieving the environmental expectations of the mentioned interested groups. Hence, through the firm's engagement in such activities, it increases enterprise credibility and enhances overall investor trust that possibly leads to favorable market views or, on the contrary, enterprise penalization for the actions not within the alignment of groups' expectations. In this case, regulations pay a essential role, pointing out that the firm's stakeholder-oriented approach directly aligns with regulatory compliance. With the example from the study (Tutar et al., 2025), regulatory compliance under CSDDD means a firm is obliged to carry out an evaluation of human rights and their environmental impact across its entire supply chain.

Thirdly, the resource-based view (RBV) is then defined by Tutar et al. (2025) as an internal motivation of a firm to engage in ESG-related activities, in comparison with LT and ST, which are mainly motivated by external pressures. Within this theory, a firm builds a competitive advantage by the strategic use of ESG compared to its peers, which strengthens its position on the market due to its proactive approach. Reported is then an example, that when firms use ESG as a strategic tool, it translates to long-term value creation (measured by Tobin's Q) and profitability (measured by ROA).

In conclusion, environmental efforts within ESG performance should be understood not only as one's motivation to protect the environment, but also as the fulfillment of regulatory compliance, as well as a response to internal and external pressures.

2.8 Research gap

This thesis seeks to address a research gap by examining a so-far unexplored region as well as the viewpoint. As presented above, while existing discussions about the negative effects of the environmental performance (i.e., the basis for the E component of the ESG framework) mainly focus on the EU, individual EU member states, the US, or Asia, the Nordics, often regarded as pioneers in sustainability, have received comparatively little attention. Consequently, the potential negative effects of implementing these policies in this region remain unexplored.

3 Data and methodology

In this chapter, data and methodology are introduced to understand what and how the research was performed.

3.1 Data

The dataset used to perform this research, was gathered from Refinitiv database (formerly part of Thomson Reuters) as well as the official website of the European Commission (EC). For financial information and ratios, Thomson Reuters was used. For specific dates when and what particular mandate was introduced and adopted, the information from the website of the EC was utilized. Important limitation realized during the research performance was that due to market politics regarding outside ESG-rating providers in China, there was missing ESG score – in all three spectrums for some companies, especially for the years 2015 and 2018. After having a research into this problematic, it is communicated that until the year 2015, ESG reporting was still in its early stage of implementation, with 2018 being close to that period, indicating fragile and immature stages of implementation, since companies were not obliged to disclose this type of data (Cui, 2025).

In total, there are three samples, each symbolizing a different market as well as geographic regions. Representing the main market – Nordics, the index of 40 largest, most actively-traded companies of the region, OMX Nordics 40 (Nasdaq: OMXN40) was studied. As the representation of the United States market, the index Standard and Poor's 500 (NYSE/Nasdaq: SPX or S&P 500), which mirrors 500 leading companies in the US. Lastly, the index Shanghai Shenzhen CSI300 (SHA: 000300), 300 leaders of the Chinese mainland market, was picked as an example of the Chinese market environment.

For each company, financial information, environmental information, and main financial ratios were gathered from the database. The sample period covers the ten-year period from the year 2015 to 2024, with yearly frequency. This period was selected due to

capturing the most recent effects of environmental mandates across the markets; hence, the most recent unified published financial information is from the year 2024. Yearly frequency was utilized due to ESG data being updated annually.

Financial information gathered and used for further calculations was common shareholders' equity, total debt, total assets, and market capitalization. Financial ratios included return on assets (ROA) and return on equity (ROE). The environmental information utilized was the environmental pillar (E) of the total environmental, social, and governance (ESG) score (scale: 0 – 100). In addition to environmental information and characteristics, the industry where the company works was gathered as well, and further used for the carbon-intensity classification.

Environmental mandates are communicated through four main regulations covered in The Omnibus Package, previously discussed in detail in Chapter 2. Those are the Corporate Sustainability Reporting Directive (CSRD), Corporate Sustainability Due Diligence Directive (CSDDD), EU Taxonomy, and Carbon Border Adjustment Mechanism (CBAM). In Table 1 presented below, it can be found the announcement date together with the adoption date of each.

Table 2. Environmental mandates – Omnibus Package

Event name	Announcement date	Adopted
EU Taxonomy	24.5.2018	12.7.2021
EU Green Deal	11.12.2019	-
CSRD	21.4.2021	10.11.2022
CBAM	14.7.2021	10.5.2023
CSDDD	23.2.2022	24.5.2024

In further tables (Table 2 – 4), a summary of descriptive statistics of each market is presented. For each, assessed are the financial ratios and environmental score as well as further characteristics, such as size and leverage.

Table 3. Descriptive statistics summary of financial information of the OMXN40 (Nordics) from January 2015 – 2024

Descriptive statistics, OMXN40

	Count	Mean	Median	Std. Dev.	Min	Max	Skewness	Kurtosis
ROA	368	8.723000	6.610000	9.769000	-35.920000	45.490000	1.163000	3.468000
ROE	368	18.572000	15.390000	20.974000	-147.950000	96.230000	-0.316000	12.883000
TobinQ	368	2.353000	1.363000	2.716000	0.262000	16.771000	2.633000	7.456000
EScore	368	73.246000	79.255000	18.799000	0.000000	97.970000	-1.380000	1.931000
Size	368	16.877000	16.693000	1.523000	12.526000	20.372000	0.494000	0.099000
Leverage	368	1.497000	0.495000	2.522000	0.000000	11.528000	2.354000	4.387000

Based on the reported summary in Table 2, the Nordic (main) market contains a total of 368 observations. It is interesting to point out that the highest mean (73,25) and median (79,25) E Score reported, which supports the thesis of the Nordics being the world's sustainability leaders. Even though presented are large-cap firms of relatively small market, there are notable differences between the highest and the lowest ROA and ROE. This reality underpins significant differences in the profitability of those 40 firms. Similarly, market value (measured by Tobin's Q) shows the same pattern, as can be seen in the max and min values and in kurtosis levels, which represent large differences in market valuation across firms. When one compares it to the size and ROA, which show relatively small disproportions based on skewness and kurtosis, these other pointed-out variables (i.e., ROE, Tobin's Q, and Leverage) show extremes compared with the rest within the sample. This reality should be kept in mind while making conclusions about this market.

Table 4. Descriptive statistics summary of financial information of the SP500 (the United States) from January 2015 – 2024

Descriptive statistics, SP500

	Count	Mean	Median	Std. Dev.	Min	Max	Skewness	Kurtosis
ROA	4557	7.787000	6.530000	8.175000	-61.350000	91.190000	0.934000	11.415000
ROE	4557	50.659000	16.050000	852.954000	-24850.000000	31560.000000	19.289000	974.284000
TobinQ	4557	2.402000	1.682000	2.414000	0.012000	32.751000	3.363000	19.740000
EScore	4557	56.197000	61.340000	25.179000	0.000000	98.280000	-0.643000	-0.482000
Size	4557	16.972000	16.904000	1.438000	12.284000	22.110000	0.318000	0.432000
Leverage	4557	1.208000	0.776000	15.675000	-776.587000	422.100000	-25.432000	1516.004000

Table 5. Descriptive statistics summary of financial information of the CSI300 (China) from January 2015 – 2024

Descriptive statistics, CSI300

	Count	Mean	Median	Std. Dev.	Min	Max	Skewness	Kurtosis
ROA	2051	6.675000	4.660000	6.898000	-19.630000	51.460000	1.764000	5.945000
ROE	2051	13.179000	11.830000	11.817000	-90.920000	100.890000	-0.035000	12.837000
TobinQ	2051	2.252000	1.148000	3.102000	0.065000	40.907000	4.200000	27.944000
EScore	2051	46.316000	48.180000	24.169000	0.000000	97.080000	-0.129000	-0.927000
Size	2051	16.780000	16.522000	1.911000	12.174000	22.622000	0.685000	0.178000
Leverage	2051	1.248000	0.628000	1.522000	0.000000	11.357000	1.899000	3.845000

Tables 3 and 4 represent descriptive statistics of our two comparison markets – the US and China. Compared to Table 2, it can be seen that those markets are notably bigger, based on the observations – 4557 (SP500) and 2051 (CSI300). Similarly, as was the case with OMXN40, notable here is the extreme behavior of ROE and Tobin's Q (see kurtosis and skewness values). When comparing all three, the SP500 shows the greatest volatility when it comes to financial performance. To see things critically, based on the fact that the index is the most prominent and influential in the world, one should interpret the results with caution.

E-Score-wise, the Chinese market has the lowest ESG value reported (mean = 46,31), which confirms the thesis that the Chinese market is pushing in developing its own frameworks as well as being often punished by international ESG rating providers, rather than a confirmation that the Chinese market is the worst while implementing ESG.

Leverage notes some extreme observations as well, especially in the case of SP500 (Table 3), compared to the other two markets. However, the US market is known for having a highly developed debt market; thus, in such an environment, the companies tend to rely more on debt when it comes to financing their activities (Hohmann et al., 2025), which can explain these extremes.

Table 6. Correlation coefficient matrix and P-value matrix for OMXN40

Correlation coefficient matrix, OMXN40

	ROA	ROE	TobinQ	EScore	Size	Leverage
ROA	1.000	0.887	0.767	−0.288	−0.536	−0.345
ROE	0.887	1.000	0.577	−0.137	−0.316	−0.153
TobinQ	0.767	0.577	1.000	−0.273	−0.569	−0.307
EScore	−0.288	−0.137	−0.273	1.000	0.440	0.277
Size	−0.536	−0.316	−0.569	0.440	1.000	0.758
Leverage	−0.345	−0.153	−0.307	0.277	0.758	1.000

P-value matrix, OMXN40

	ROA	ROE	TobinQ	EScore	Size	Leverage
ROA	0.0	0.0	0.0	0.0	0.0	0.0
ROE	0.0	0.0	0.0	0.0083	0.0	0.0033
TobinQ	0.0	0.0	0.0	0.0	0.0	0.0
EScore	0.0	0.0083	0.0	0.0	0.0	0.0
Size	0.0	0.0	0.0	0.0	0.0	0.0
Leverage	0.0	0.0033	0.0	0.0	0.0	0.0

Table 5 represents the correlation coefficient matrix and P-value matrix for our main market. What can be seen here is the negative relationship between the E Score and financial performance (i.e., ROA, ROE, Tobin's Q), which is within the alignment with our Hypothesis 1 (see Chapter 1). The strongest negative relationship between E Score and financial performance can be seen between E Score and ROA, continuing with ROE and lastly Tobin's Q. Regarding size and leverage, it can be summarized that larger firms are associated with higher E Score and are also higher in leverage. Hence, based on this table and supplementary p-value matrix table, concluded is that E Score has negative effects on a firm's financial performance (measured by profitability – ROE and operational efficiency – ROA) as well as market valuation (measured by Tobin's Q). These presented points serve as a solid baseline for performing our regression analysis.

Table 7. Correlation coefficient matrix and P-value matrix for CSI300

Correlation coefficient matrix, CSI300

	ROA	ROE	TobinQ	EScore	Size	Leverage
ROA	1.000	0.812	0.564	-0.135	-0.481	-0.447
ROE	0.812	1.000	0.332	-0.043	-0.162	-0.255
TobinQ	0.564	0.332	1.000	-0.257	-0.550	-0.350
EScore	-0.135	-0.043	-0.257	1.000	0.387	0.140
Size	-0.481	-0.162	-0.550	0.387	1.000	0.617
Leverage	-0.447	-0.255	-0.350	0.140	0.617	1.000

P-value matrix, CSI300

	ROA	ROE	TobinQ	EScore	Size	Leverage
ROA	0.0	0.0	0.0	0.0	0.0	0.0
ROE	0.0	0.0	0.0	0.0502	0.0	0.0
TobinQ	0.0	0.0	0.0	0.0	0.0	0.0
EScore	0.0	0.0502	0.0	0.0	0.0	0.0
Size	0.0	0.0	0.0	0.0	0.0	0.0
Leverage	0.0	0.0	0.0	0.0	0.0	0.0

Table 8. Correlation coefficient matrix and P-value matrix for SP500

Correlation coefficient matrix, SP500

	ROA	ROE	TobinQ	EScore	Size	Leverage
ROA	1.000	0.082	0.494	-0.035	-0.282	0.043
ROE	0.082	1.000	0.032	0.015	0.001	0.035
TobinQ	0.494	0.032	1.000	-0.187	-0.461	0.004
EScore	-0.035	0.015	-0.187	1.000	0.474	0.048
Size	-0.282	0.001	-0.461	0.474	1.000	-0.002
Leverage	0.043	0.035	0.004	0.048	-0.002	1.000

P-value matrix, SP500

	ROA	ROE	TobinQ	EScore	Size	Leverage
ROA	0.0	0.0	0.0	0.0198	0.0	0.0036
ROE	0.0	0.0	0.0321	0.2987	0.927	0.0171
TobinQ	0.0	0.0321	0.0	0.0	0.0	0.7942
EScore	0.0198	0.2987	0.0	0.0	0.0	0.0013
Size	0.0	0.927	0.0	0.0	0.0	0.8822
Leverage	0.0036	0.0171	0.7942	0.0013	0.8822	0.0

Tables 6 and 7 communicate a slightly different narrative. Compared to our main market (Table 5), the relationship between E Score and all three values of financial performance is in the case of China still negative, but notably weaker than in the case of OMXN40, but in the case of the US, the values presented are even lower and barely above zero values (in the case of ROE even positive), suggesting almost no relationship. The strongest, but still weak, relationship presented in the case of SP500 is the negative association between E Score and Tobin's Q, which should be kept in mind when interpreting our

regression results. In conclusion, in both markets, E Score tends to be higher in cases of bigger firms. Leverage-wise, the relationship is stronger in the case of the Chinese market (negative association in all three cases of performance). The p-value matrix in the CSI300 table suggests higher statistical significance compared to SP500, with keeping in mind marginal significance in the case of ROE (p-value = 0,0502).

To conclude points from descriptive statistics and correlation matrices, the situation in all three markets is heterogeneous. The relationship of our Hypothesis 1: ESG environmental performance is negatively associated with the financial performance of firms in selected countries., can be seen so far only within the case of our main market, the Nordics. In the case of the US and China, the relationship seems to be less pronounced.

3.2 Methodology

In this subchapter, the methodology to perform this research is presented.

The methodology used in this research was selected on the basis of two previously presented research studies of Tutar et al. (2025) and Shi et al. (2025) (see Chapter 2). In addition, the student self-classification of carbon-intensiveness was created as a supplementary component of this research.

As a proxy for environmental performance, the Environmental Pillar score of the total ESG score is utilized. Financial performance is assessed through return on assets (ROA), return on equity (ROE), and market value (Tobin's Q). These metrics were selected based on previous studies.

While assessing the time frame selected for carrying out this research, the focus was to capture the current situation in the main market (Nordics) and compare it to two additional markets where the topic of ESG and its changes is also frequently discussed (the US and China). Therefore, 2024 is selected as the final year, as it represents the most

recent period with complete environmental and financial data in all three markets, which was not the case for the year 2025. A ten-year period was selected for making robust conclusions from the sample, but it is also a common practice in financial research previously done.

Based on the research article of Tutar et al. (2025), the methodology implemented for carrying out the research was a fixed-effects (FE) panel regression model, ideal for treating panel data and extreme values, which is also the case of ours. This method allows us to examine the long-term relationship between environmental performance and financial performance.

In addition, the authors suggest this method is suitable for capturing unobserved firm-specific heterogeneity and time-fixed effects, removing the biases stemming from time-fixed effects (i.e., external shocks) or firm-specific heterogeneity (i.e., unique characteristics). For this reason, this method was utilized to improve the precision of the model and the reliability of the conclusions delivered.

The model used for all three dependent variables is following:

$$(1)\quad ROA_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 {ESG_{i,t}}^2 + \beta_3 Size_{i,t} + \beta_4 Leverage_{i,t} + \alpha_i + \gamma_t + \varepsilon_{i,t}$$

$$(2)\quad ROE_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 {ESG_{i,t}}^2 + \beta_3 Size_{i,t} + \beta_4 Leverage_{i,t} + \alpha_i + \gamma_t + \varepsilon_{i,t}$$

$$(3)\quad TobinQ_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 {ESG_{i,t}}^2 + \beta_3 Size_{i,t} + \beta_4 Leverage_{i,t} + \alpha_i + \gamma_t + \varepsilon_{i,t}$$

where $ROA_{i,t}$ is the return on assets of a firm *i* in year *t*, $ROE_{i,t}$ is the return on equity of a firm *i* in year *t,* with both values directly gathered from the database, and $TobinQ_{i,t}$ being the market valuation ratio, calculated manually through the sum of market capitalization and total debt in proportion to the firm's total assets (i.e., communicating

the market value compared to its assets' replacement cost, serving as a proxy of competitive advantage). $ESG_{i,t}$ is the E score extracted from the total ESG score of the firm (i.e., Environmental pillar score). $Size_{i,t}$ represents the firm size, which is calculated through the natural logarithm of total assets. $Leverage_{i,t}$ represents the firm's leverage, which is calculated through total debt in proportion to common shareholders' equity. This regression setting is used to test Hypothesis 1.

In our research, the regression was enriched by an additional component – E Score squared was utilized, hence the two-way fixed effects panel regression method (TWFE or 2FE). The reason for using this slightly different method is to check for unit and time fixed effects simultaneously (Klosin & Vilgalys, 2022), compared to regular FE, which only controls for unit fixed effects. The use of the quadratic term is to see potential nonlinear relationships between the independent and dependent variables, known as a U-shape curve (Quantifying Health, n.d.). Similarly, dependent variables of financial performance – ROA, ROE, and Tobin's Q were selected as in the case of Tutar et al. (2025). On the contrary, for this research purpose, the objective is to investigate the negative influence of environmental mandate on financial performance, hence only the Environmental pillar of the total ESG score was utilized, being selected as the independent variable. Compared to the authors' control variables selection (e.g., firm size, leverage, sector, and country effects), this study includes only firm size, leverage, and industry, which is explained through the industry dummy variable. A dummy variable was built through self-assessment of carbon intensity based on the industry in which the firm operates, as presented in Figure 2 below. The list of industries was gathered from the Refinitiv database itself, based on the firm characteristics within each index. The term "self-assessment" is used here due to Refinitiv's different scaling of what is a carbon-intensive industry and what is not, which was specifically the case of the industry 'Industrial Support Services' (see Appendix 1–3). Within the database, the terms might have suggested that this particular industry is carbon-heavy, but when looking at company examples (e.g., within SP500: Visa, MasterCard, American Express, etc.), one understands the reason why critical self-assessment was needed and why, for instance,

this industry is considered within this research a low-carbon industry. As presented in the figure below, a carbon-intensive industry has a value of 1; otherwise 0.

Figure 2. Industry dummy – Carbon-intensity assessment

The equation for observing the industry differences is following:

$$(1) \quad ROA_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 (ESG_{i,t} \times CaptInt_i) + \beta_3 Size_{i,t} + \beta_4 Leverage_{i,t} + \alpha_i + \gamma_t + \varepsilon_{i,t}$$

$$(2) \quad ROE_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 (ESG_{i,t} \times CaptInt_i) + \beta_3 Size_{i,t} + \beta_4 Leverage_{i,t} + \alpha_i + \gamma_t + \varepsilon_{i,t}$$

$$(3) \quad TobinQ_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 (ESG_{i,t} \times CaptInt_i) + \beta_3 Size_{i,t} + \beta_4 Leverage_{i,t} + \alpha_i + \gamma_t + \varepsilon_{i,t}$$

where $(ESG_{i,t} \times CaptInt_i)$ is the E score multiplied by our dummy variable.
This regression setting is used to test Hypothesis 2 (see Chapter 1), whether the negative effect is more pronounced in capital-intensive industries.

To ensure the robustness of the study performed, a method of event study based on the discussion paper of Shi et al. (2025) is performed. This allows us to capture the short-term effect of the environmental performance on financial performance by assessing how the main market reacts to selected mandates.

The authors utilize the causal event study method, with the focus on the whole European Union area around the event date of the introduction of CBAM from 13th December 2022, selected as their main event date. In comparison to their discussion paper, this research's event study focuses on four main mandates stemming from the Omnibus Package. Abnormal returns are calculated based on an estimation window, which is, in their case, 180 days prior to the event, and a 5-day *(t – 2, t + 2)* and 10-day *(t – 5, t + 5)* event window. The same logic was applied in this research as well. The benchmark selected for this event study is the STOXX Europe 600, an index of the largest companies across Europe.

The utilized event study equations are following:

$$(1) \quad AR_{i,t} = R_{i,t} - (\alpha_i + \beta_i R_{m,t})$$

$$(2) \quad CAR_{i,t} = \Sigma_{t=t_1}^{t_2} AR_{i,t}$$

On the basis of the Capital Asset Pricing Model (CAPM), where $AR_{i,t}$ is the abnormal return of firm *i* at time *t*, $R_{i,t}$ is the actual return of firm *i*, $R_{m,t}$ is the market return at time *t*, and α_i, β_i are estimates from the pre-event period.

4 Empirical results and discussions

4.1 Two-way fixed-effects panel regression results – Long-term relationship

In this section, the results of the 2WFE for each market are explained, and conclusions about the fulfillment of Hypothesis 1: ESG environmental performance is negatively associated with the financial performance of firms in selected countries, are delivered.

4.1.1 Nordics – OMXN40

Table 9. ROA and ESG E score

PanelOLS Estimation Summary

Dep. Variable:	ROA	R-squared:	0.1714
Estimator:	PanelOLS	R-squared (Between):	-69.123
No. Observations:	368	R-squared (Within):	0.1919
Date:	Wed, Apr 15 2026	R-squared (Overall):	-59.614
Time:	17:14:24	Log-likelihood	-1093.4
Cov. Estimator:	Clustered		
		F-statistic:	16.397
Entities:	38	P-value	0.0000
Avg Obs:	9.6842	Distribution:	F(4,317)
Min Obs:	6.0000		
Max Obs:	10.0000	F-statistic (robust):	9.1368
		P-value	0.0000
Time periods:	10	Distribution:	F(4,317)
Avg Obs:	36.800		
Min Obs:	34.000		
Max Obs:	38.000		

Parameter Estimates

	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
EScore_c	-0.0007	0.0555	-0.0119	0.9905	-0.1099	0.1086
EScore_c_sq	-0.0019	0.0009	-1.9934	0.0471	-0.0037	-2.415e-05
Size	-5.2323	1.7297	-3.0249	0.0027	-8.6355	-1.8290
Leverage	-2.3410	0.9139	-2.5615	0.0109	-4.1390	-0.5429

F-test for Poolability: 13.687
P-value: 0.0000
Distribution: F(46,317)

Included effects: Entity, Time

Table 10. ROE and ESG E score

PanelOLS Estimation Summary

Dep. Variable:	ROE	R-squared:	0.0534
Estimator:	PanelOLS	R-squared (Between):	-29.960
No. Observations:	368	R-squared (Within):	0.0618
Date:	Wed, Apr 15 2026	R-squared (Overall):	-23.677
Time:	17:23:27	Log-likelihood	-1443.7
Cov. Estimator:	Clustered		
		F-statistic:	4.4719
Entities:	38	P-value	0.0016
Avg Obs:	9.6842	Distribution:	F(4,317)
Min Obs:	6.0000		
Max Obs:	10.0000	F-statistic (robust):	4.4628
		P-value	0.0016
Time periods:	10	Distribution:	F(4,317)
Avg Obs:	36.800		
Min Obs:	34.000		
Max Obs:	38.000		

Parameter Estimates

	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
EScore_c	0.0036	0.1107	0.0321	0.9744	-0.2143	0.2214
EScore_c_sq	-0.0025	0.0015	-1.6356	0.1029	-0.0056	0.0005
Size	-6.6563	3.8032	-1.7502	0.0811	-14.139	0.8264
Leverage	-3.4960	2.5024	-1.3971	0.1634	-8.4195	1.4274

F-test for Poolability: 10.938
P-value: 0.0000
Distribution: F(46,317)

Included effects: Entity, Time

Table 11. Tobin's Q and ESG E score

PanelOLS Estimation Summary

Dep. Variable:	TobinQ	R-squared:	0.3039
Estimator:	PanelOLS	R-squared (Between):	-134.93
No. Observations:	368	R-squared (Within):	0.2695
Date:	Wed, Apr 15 2026	R-squared (Overall):	-123.06
Time:	17:24:45	Log-likelihood	-533.52
Cov. Estimator:	Clustered		
		F-statistic:	34.596
Entities:	38	P-value	0.0000
Avg Obs:	9.6842	Distribution:	F(4,317)
Min Obs:	6.0000		
Max Obs:	10.0000	F-statistic (robust):	3.9854
		P-value	0.0036
Time periods:	10	Distribution:	F(4,317)
Avg Obs:	36.800		
Min Obs:	34.000		
Max Obs:	38.000		

Parameter Estimates

	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
EScore_c	0.0085	0.0104	0.8180	0.4140	-0.0120	0.0291
EScore_c_sq	-8.319e-05	0.0001	-0.5932	0.5535	-0.0004	0.0002
Size	-2.2004	0.5874	-3.7458	0.0002	-3.3561	-1.0446
Leverage	-0.2320	0.2247	-1.0322	0.3028	-0.6741	0.2102

F-test for Poolability: 23.590
P-value: 0.0000
Distribution: F(46,317)

Included effects: Entity, Time

After performing the regression analysis, hypothesis 1 was supported only in one case, in the case of return on assets (ROA). These results communicate that after controlling for firm-specific unobserved characteristics (heterogeneity), time, size, and leverage, the firm's environmental performance (measured by centered ESG E score) is not associated with neither a decrease or an increase in the firm's financial performance on linear terms.

Based on the p-value reported, the case of a negative relationship pronounced through ROA and ESG E score squared communicates that there is a negative relationship, but it is not linear, rather U-shaped. The U-shaped (downward curving) relationship between the ROA and ESG E Score squared can be interpreted in a way that there is a relationship between the ESG E score and ROA; however, it should be interpreted with caution. The reason behind this is that the centered E Score term itself remained insignificant, hence the evidence for proving this relationship is still weak across the sample, hence even the evidence of the nonlinear relationship is limited and needs further deeper research that is beyond the scope of this thesis.

The results that the model communicates are that the ROA (i.e., measurement of operational efficiency generated from the firm's assets) is sensitive and somehow influenced by the ESG E score, which gives an idea that firm may experience internal challenges stemming from the environmental ESG-related implementation, in the form of possible resource allocation decision making, financial costs and possible administrative burden, as discussed in the Chapter 2. In the case of ROE, the relationship is not statistically significant, nor in the case of Tobin's Q, which communicates that the implementation strategy does not affect shareholder returns, nor market valuation of a firm, which makes logical sense. It might be caused by the fact that the market is small, as previously characterized, as well as in the ESG E score, which had the highest mean value (73,25/100) as well as median values (79,25/100), which might cause the ROE and Tobin's Q insignificance. That is possibly due to the reality that the market is already well-established in ESG framework implementation. Companies in this market are characterized by a high ESG profile; there is no additional value to be further gathered, because in this market it is recognized as a standard rather than something distinguishing that might attract the abnormal attention of shareholders or potential investors.

With this being said, concluded relationship is that only in one of the three cases of the financial performance measurement, we can conclude weak support of the hypothesis that one of the negative effects of the environmental performance on the financial performance. Connecting it through the theory, the thesis that projects related to the environmental agenda negatively influence the internal processes of a firm, which is

mirrored in the negative relationship between ESG squared and ROA, rather than in other measurements of performance mentioned. However, the evidence is once again not strong enough, thus proving only a weak relationship. In other cases (ROE and Tobin's Q), the squared term was also negative, but statistically insignificant.

In addition, leverage and size are negative and statistically significant in all three cases. With the relationship win the ROA case, it can be concluded that efficiency generated from the assets decreases when the firm expands. Leverage-wise, means that the higher debt level decreases the operational performance of a firm.

4.2 The United States – SP500

Table 12. ROA and ESG E score

PanelOLS Estimation Summary

Dep. Variable:	ROA	R-squared:	0.0044
Estimator:	PanelOLS	R-squared (Between):	-3.0444
No. Observations:	4779	R-squared (Within):	0.0024
Date:	Wed, Apr 15 2026	R-squared (Overall):	-2.2826
Time:	16:41:10	Log-likelihood	-1.526e+04
Cov. Estimator:	Clustered		
		F-statistic:	4.6841
Entities:	494	P-value	0.0009
Avg Obs:	9.6741	Distribution:	F(4,4272)
Min Obs:	1.0000		
Max Obs:	10.0000	F-statistic (robust):	1.6527
		P-value	0.1582
Time periods:	10	Distribution:	F(4,4272)
Avg Obs:	477.90		
Min Obs:	456.00		
Max Obs:	492.00		

Parameter Estimates

	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
EScore_c	0.0007	0.0119	0.0600	0.9522	-0.0226	0.0240
EScore_c_sq	-0.0007	0.0003	-2.2103	0.0271	-0.0012	-7.424e-05
Size	-0.6667	0.9942	-0.6706	0.5025	-2.6159	1.2825
Leverage	0.0112	0.0088	1.2826	0.1997	-0.0059	0.0284

F-test for Poolability: 8.3427
P-value: 0.0000
Distribution: F(502,4272)

Included effects: Entity, Time

Table 13. ROE and ESG E Score

PanelOLS Estimation Summary

Dep. Variable:	ROE	R-squared:	0.0008
Estimator:	PanelOLS	R-squared (Between):	-2.5579
No. Observations:	4559	R-squared (Within):	0.0015
Date:	Wed, Apr 15 2026	R-squared (Overall):	-0.5156
Time:	16:56:27	Log-likelihood	-3.687e+04
Cov. Estimator:	Clustered		
		F-statistic:	0.7940
Entities:	487	P-value	0.5289
Avg Obs:	9.3614	Distribution:	F(4,4059)
Min Obs:	1.0000		
Max Obs:	10.0000	F-statistic (robust):	0.5173
		P-value	0.7231
Time periods:	10	Distribution:	F(4,4059)
Avg Obs:	455.90		
Min Obs:	443.00		
Max Obs:	465.00		

Parameter Estimates

	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
EScore_c	-0.0635	0.9498	-0.0668	0.9467	-1.9257	1.7987
EScore_c_sq	-0.0103	0.0228	-0.4521	0.6512	-0.0551	0.0344
Size	39.417	92.221	0.4274	0.6691	-141.39	220.22
Leverage	1.2053	1.8673	0.6454	0.5187	-2.4557	4.8662

F-test for Poolability: 1.4020
P-value: 0.0000
Distribution: F(495,4059)

Included effects: Entity, Time

Table 14. Tobin's Q and ESG E score

PanelOLS Estimation Summary

Dep. Variable:	TobinQ	R-squared:	0.0184
Estimator:	PanelOLS	R-squared (Between):	-14.297
No. Observations:	4786	R-squared (Within):	-0.0205
Date:	Wed, Apr 15 2026	R-squared (Overall):	-12.997
Time:	16:57:43	Log-likelihood	-7791.7
Cov. Estimator:	Clustered		
		F-statistic:	20.032
Entities:	494	P-value	0.0000
Avg Obs:	9.6883	Distribution:	F(4,4279)
Min Obs:	1.0000		
Max Obs:	10.0000	F-statistic (robust):	1.6150
		P-value	0.1675
Time periods:	10	Distribution:	F(4,4279)
Avg Obs:	478.60		
Min Obs:	456.00		
Max Obs:	493.00		

Parameter Estimates

	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
EScore_c	0.0041	0.0032	1.2999	0.1937	-0.0021	0.0104
EScore_c_sq	-4.654e-05	7.92e-05	-0.5876	0.5569	-0.0002	0.0001
Size	-0.6243	0.2480	-2.5176	0.0119	-1.1104	-0.1381
Leverage	0.0003	0.0009	0.2839	0.7765	-0.0015	0.0020

F-test for Poolability: 19.406
P-value: 0.0000
Distribution: F(502,4279)

Included effects: Entity, Time

The results of the regression performed in the US market can be summarized as follows.

In all three cases of the financial performance measurements – ROA, ROE, and Tobin's Q, the relationship between the centered ESG E score is statistically insignificant. With this said, the environmental performance neither decreases nor increases the firm's financial performance in linear terms.

On the other hand, the same result as in the case of the Nordic market holds: the squared ESG E score term is negative in all three cases, but statistically significant only for ROA. However, one can argue that the relationship is stronger, since the sample is considerably larger, thereby providing stronger evidence. But overall, it is still weaker to prove the support of hypothesis 1 regarding the ROA and centered ESG E score term, and ROE and Tobin's Q insignificance in all results. Hence, concluding the same point, a curved relationship between operational performance and ESG E score, suggesting that an increase in ESG E score may decrease ROA in some way. However, based on these results, it is concluded that currently, the environmental performance does not seem to be a strong driver of the financial performance.

Additionally, firm size is negative and statistically significant only in the case of the regression with the Tobin's Q as dependent variable, showing that when a firm grows bigger, it tends to decrease in its market valuation, which can be logically concluded from the firm's reaching maturity, being a part of the natural firm's life-cycle process. Speaking about the debt, as previously mentioned in Chapter 3, the US is a very developed debt market; this reality is proven by the insignificance in all three regressions run, that the debt does not have any effect on the firm's performance.

4.3 China – CSI300

The results of the Chinese market should also be pointed out by the limitations in the ESG score in general, where some values for years are missing because of China's late ESG implementation, as well as a unique ESG approach within this specific market; hence, any conclusions should be taken with caution.

Table 15. ROA and ESG E Score

PanelOLS Estimation Summary

Dep. Variable:	ROA	R-squared:	0.0159
Estimator:	PanelOLS	R-squared (Between):	0.4608
No. Observations:	2053	R-squared (Within):	0.0199
Date:	Wed, Apr 15 2026	R-squared (Overall):	0.3841
Time:	17:37:26	Log-likelihood	-5956.9
Cov. Estimator:	Clustered		
		F-statistic:	7.0980
Entities:	287	P-value	0.0000
Avg Obs:	7.1533	Distribution:	F(4,1753)
Min Obs:	2.0000		
Max Obs:	10.0000	F-statistic (robust):	2.6537
		P-value	0.0316
Time periods:	10	Distribution:	F(4,1753)
Avg Obs:	205.30		
Min Obs:	60.000		
Max Obs:	286.00		

Parameter Estimates

	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
EScore_c	-0.0077	0.0100	-0.7713	0.4406	-0.0274	0.0120
EScore_c_sq	-0.0001	0.0004	-0.2446	0.8068	-0.0009	0.0007
Size	0.2777	0.8407	0.3304	0.7412	-1.3712	1.9267
Leverage	-1.1393	0.5201	-2.1903	0.0286	-2.1594	-0.1191

F-test for Poolability: 6.3657
P-value: 0.0000
Distribution: F(295,1753)

Included effects: Entity, Time

Table 16. ROE and ESG E Score

PanelOLS Estimation Summary

Dep. Variable:	ROE	R-squared:	0.1053
Estimator:	PanelOLS	R-squared (Between):	-4.0753
No. Observations:	2054	R-squared (Within):	0.0993
Date:	Wed, Apr 15 2026	R-squared (Overall):	-3.5088
Time:	17:38:39	Log-likelihood	-7211.3
Cov. Estimator:	Clustered		
		F-statistic:	51.616
Entities:	287	P-value	0.0000
Avg Obs:	7.1568	Distribution:	F(4,1754)
Min Obs:	2.0000		
Max Obs:	10.0000	F-statistic (robust):	7.3913
		P-value	0.0000
Time periods:	10	Distribution:	F(4,1754)
Avg Obs:	205.40		
Min Obs:	61.000		
Max Obs:	286.00		

Parameter Estimates

	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
EScore_c	-0.0155	0.0208	-0.7472	0.4550	-0.0563	0.0252
EScore_c_sq	0.0003	0.0006	0.5570	0.5776	-0.0009	0.0015
Size	3.3081	2.2651	1.4604	0.1443	-1.1345	7.7507
Leverage	-5.6979	1.1102	-5.1323	0.0000	-7.8753	-3.5204

F-test for Poolability: 5.8693
P-value: 0.0000
Distribution: F(295,1754)

Included effects: Entity, Time

Table 17. Tobin's Q and ESG E Score

```
                          PanelOLS Estimation Summary
================================================================================
Dep. Variable:                  TobinQ   R-squared:                        0.0542
Estimator:                    PanelOLS   R-squared (Between):            -63.115
No. Observations:                 2059   R-squared (Within):              0.0458
Date:                Wed, Apr 15 2026   R-squared (Overall):            -65.732
Time:                        17:35:57   Log-likelihood                  -3749.4
Cov. Estimator:             Clustered
                                        F-statistic:                      25.220
Entities:                         287   P-value                           0.0000
Avg Obs:                       7.1742   Distribution:                  F(4,1759)
Min Obs:                       2.0000
Max Obs:                      10.0000   F-statistic (robust):             9.2589
                                        P-value                           0.0000
Time periods:                     10   Distribution:                  F(4,1759)
Avg Obs:                      205.90
Min Obs:                      62.000
Max Obs:                      286.00

                             Parameter Estimates
================================================================================
              Parameter  Std. Err.     T-stat    P-value    Lower CI    Upper CI
--------------------------------------------------------------------------------
EScore_c       -0.0017     0.0040    -0.4304     0.6669     -0.0096      0.0062
EScore_c_sq -2.957e-05     0.0001    -0.2667     0.7897     -0.0002      0.0002
Size           -1.7262     0.4379    -3.9417     0.0001     -2.5851     -0.8673
Leverage        0.0941     0.0492     1.9109     0.0562     -0.0025      0.1907
================================================================================

F-test for Poolability: 11.819
P-value: 0.0000
Distribution: F(295,1759)

Included effects: Entity, Time
```

With respect to the results delivered after performing the regression, what can be concluded is that the environmental performance does not have any effect when it comes to determining the financial performance of the company. This reality can be partially described with still not-full implementation of the ESG framework, as well as the development of its own ESG framework suitable for the particular market characteristics. In addition, missing data and punishment captured from the previous

research by the outside ESG-rating providers towards the Chinese companies should be taken into consideration.

However, what can be seen from the results is that control variables, size, and leverage play an important role when it comes to firm performance in this market. So, what matters more in terms of measuring a firm's performance is the overall firm characteristics and financial structure. In the leverage case, there is a negative and statistically significant relationship in the case of ROA and ROE, suggesting that firms' operating efficiency and profitability decrease when the debt level increases. Positive and marginal significance is in the case of Tobin's Q, suggesting weak support that higher debt levels are associated with greater market valuation. In addition to the firm's characteristics, the size is negative and statistically significant only in the case of Tobin's Q, suggesting the same thesis as was drawn in the case of the US market, suggesting that when the firm grows bigger, it tends to lose on its market valuation, and becomes mature, being one of the explanations. Others might experience a decrease in growth, lowered flexibility, and fewer expansion opportunities stemming from the maturity stage.

In conclusion, there is no evidence to support Hypothesis 1 in the Chinese market, recalling neither the centered ESG E score nor the squared term showing statistical significance. Rather, firm characteristics presented through selected control variables in our regression proved to be a key determinant of the firm's financial performance in all three cases.

4.4 Industry effect – Carbon intensity

The industry effect helps us to either accept or reject Hypothesis 2: The negative association between ESG environmental performance and firms' financial performance is more pronounced in capital-intensive industries.

With hypothesis 1 being only weakly supported after performing the first set of regression analysis, this particular part may give some characteristics of what kind of firms, whether carbon-intensive or low-carbon, have the effect more pronounced.

However, since the results of the first hypothesis were not plausible, this is an interesting detail to know, but there are not as high chances that something might be visible.

4.4.1 Nordics – OMXN40

Table 18. ROA and Carbon intensity

PanelOLS Estimation Summary

Dep. Variable:	ROA	R-squared:	0.1618
Estimator:	PanelOLS	R-squared (Between):	-63.694
No. Observations:	368	R-squared (Within):	0.1862
Date:	Sun, Apr 19 2026	R-squared (Overall):	-54.891
Time:	16:53:53	Log-likelihood	-1095.5
Cov. Estimator:	Clustered		
		F-statistic:	15.302
Entities:	38	P-value	0.0000
Avg Obs:	9.6842	Distribution:	F(4,317)
Min Obs:	6.0000		
Max Obs:	10.0000	F-statistic (robust):	7.2154
		P-value	0.0000
Time periods:	10	Distribution:	F(4,317)
Avg Obs:	36.800		
Min Obs:	34.000		
Max Obs:	38.000		

Parameter Estimates

	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
EScore	0.0533	0.0390	1.3675	0.1724	-0.0234	0.1300
ESG_CapInt	0.0933	0.0739	1.2623	0.2078	-0.0521	0.2388
Size	-5.3896	1.5867	-3.3966	0.0008	-8.5114	-2.2677
Leverage	-2.4225	0.9384	-2.5814	0.0103	-4.2688	-0.5761

F-test for Poolability: 12.808
P-value: 0.0000
Distribution: F(46,317)

Included effects: Entity, Time

Table 19. ROE and Carbon intensity

PanelOLS Estimation Summary

Dep. Variable:	ROE	R-squared:	0.0501
Estimator:	PanelOLS	R-squared (Between):	-27.464
No. Observations:	368	R-squared (Within):	0.0606
Date:	Sun, Apr 19 2026	R-squared (Overall):	-21.691
Time:	16:56:25	Log-likelihood	-1444.4
Cov. Estimator:	Clustered		
		F-statistic:	4.1842
Entities:	38	P-value	0.0026
Avg Obs:	9.6842	Distribution:	F(4,317)
Min Obs:	6.0000		
Max Obs:	10.0000	F-statistic (robust):	2.9137
		P-value	0.0217
Time periods:	10	Distribution:	F(4,317)
Avg Obs:	36.800		
Min Obs:	34.000		
Max Obs:	38.000		

Parameter Estimates

	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
EScore	0.0786	0.0775	1.0148	0.3110	-0.0738	0.2310
ESG_CapInt	0.1156	0.1391	0.8310	0.4066	-0.1581	0.3892
Size	-6.8628	3.6395	-1.8856	0.0603	-14.023	0.2980
Leverage	-3.6114	2.5229	-1.4314	0.1533	-8.5750	1.3523

F-test for Poolability: 10.527
P-value: 0.0000
Distribution: F(46,317)

Included effects: Entity, Time

Table 20. Tobin's Q and Carbon intensity

PanelOLS Estimation Summary

Dep. Variable:	TobinQ	R-squared:	0.3478
Estimator:	PanelOLS	R-squared (Between):	-128.57
No. Observations:	368	R-squared (Within):	0.3186
Date:	Sun, Apr 19 2026	R-squared (Overall):	-117.11
Time:	16:57:40	Log-likelihood	-521.54
Cov. Estimator:	Clustered		
		F-statistic:	42.260
Entities:	38	P-value	0.0000
Avg Obs:	9.6842	Distribution:	F(4,317)
Min Obs:	6.0000		
Max Obs:	10.0000	F-statistic (robust):	6.0821
		P-value	0.0001
Time periods:	10	Distribution:	F(4,317)
Avg Obs:	36.800		
Min Obs:	34.000		
Max Obs:	38.000		

Parameter Estimates

	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
EScore	0.0008	0.0092	0.0874	0.9304	-0.0174	0.0190
ESG_CapInt	0.0671	0.0187	3.5857	0.0004	0.0303	0.1040
Size	-2.2476	0.5452	-4.1224	0.0000	-3.3203	-1.1749
Leverage	-0.2090	0.2078	-1.0057	0.3153	-0.6179	0.1999

F-test for Poolability: 21.986
P-value: 0.0000
Distribution: F(46,317)

Included effects: Entity, Time

Based on the results delivered, where the interaction term of capital intensity delivered by the industry dummy (ESG_CapInt), in the Nordic market, there is no significance in the cases of ROA and ROE. With this being presented, it can be concluded that there is no relationship between environmental performance and industry's capital intensity where a firm operates in any of these two forms of financial performance – operational efficiency or profitability. However, in the third case – market valuation, measured by Tobin's Q, a positive and statistically significant relationship is found, communicating the message that firms within capital-intensive industries in Nordics with high ESG E score are enjoying a so-called "environmental premium" for their ESG engagement, hence

mirrored in their higher market valuation. This suggests that the E score and investment into those activities, especially within capital-intensive industries, are valued more than in low-carbon ones. However, the second hypothesis is hence rejected because the effect is negative. On the other hand, this result is aligned with previous studies done on this topic, with a firm being rewarded by the market for its environmental engagement.

In regards size and leverage, size is negative and statistically significant in all three cases of financial performance, suggesting that the bigger firm the worse it performs on the market (i.e., decrease efficiency in generating profits – ROA, lower shareholder returns– ROE, and less growth opportunities – Tobin's Q) even though the relationship in the case of ROE is weaker, compared to ROA and Tobin's Q. Leverage in the case of ROA is negative and statistically significant, communicating that higher debt decreases performance efficiency. In the case of ROE or Tobin's Q, the relationship remains insignificant.

With this communicated, the relationship found is not negative, but positive, and only in the case of Tobin's Q, thus, hypothesis 2 for the Nordic market is rejected.

4.4.2 The United States – SP500

Table 21. ROA and Carbon intensity

PanelOLS Estimation Summary

Dep. Variable:	ROA	R-squared:	0.0022
Estimator:	PanelOLS	R-squared (Between):	-1.7974
No. Observations:	4779	R-squared (Within):	0.0002
Date:	Sun, Apr 19 2026	R-squared (Overall):	-1.3487
Time:	17:00:49	Log-likelihood	-1.526e+04
Cov. Estimator:	Clustered		
		F-statistic:	2.3439
Entities:	494	P-value	0.0525
Avg Obs:	9.6741	Distribution:	F(4,4272)
Min Obs:	1.0000		
Max Obs:	10.0000	F-statistic (robust):	0.7445
		P-value	0.5616
Time periods:	10	Distribution:	F(4,4272)
Avg Obs:	477.90		
Min Obs:	456.00		
Max Obs:	492.00		

Parameter Estimates

	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
EScore	0.0161	0.0139	1.1625	0.2451	-0.0111	0.0434
ESG_CapInt	-0.0068	0.0260	-0.2623	0.7931	-0.0579	0.0442
Size	-0.5214	1.0029	-0.5199	0.6031	-2.4876	1.4448
Leverage	0.0110	0.0087	1.2702	0.2041	-0.0060	0.0281

F-test for Poolability: 8.1484
P-value: 0.0000
Distribution: F(502,4272)

Included effects: Entity, Time

Table 22. ROE and Carbon intensity

PanelOLS Estimation Summary

Dep. Variable:	ROE	R-squared:	0.0008
Estimator:	PanelOLS	R-squared (Between):	-2.9294
No. Observations:	4559	R-squared (Within):	0.0015
Date:	Sun, Apr 19 2026	R-squared (Overall):	-0.5878
Time:	17:02:06	Log-likelihood	-3.687e+04
Cov. Estimator:	Clustered		
		F-statistic:	0.8082
Entities:	487	P-value	0.5198
Avg Obs:	9.3614	Distribution:	F(4,4059)
Min Obs:	1.0000		
Max Obs:	10.0000	F-statistic (robust):	0.5954
		P-value	0.6660
Time periods:	10	Distribution:	F(4,4059)
Avg Obs:	455.90		
Min Obs:	443.00		
Max Obs:	465.00		

Parameter Estimates

	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
EScore	0.3451	1.4101	0.2447	0.8067	-2.4196	3.1097
ESG_CapInt	-1.1265	1.2931	-0.8712	0.3837	-3.6618	1.4087
Size	41.249	89.285	0.4620	0.6441	-133.80	216.30
Leverage	1.2057	1.8675	0.6456	0.5186	-2.4556	4.8670

F-test for Poolability: 1.4010
P-value: 0.0000
Distribution: F(495,4059)

Included effects: Entity, Time

Table 23. Tobin's Q and Carbon intensity

PanelOLS Estimation Summary

Dep. Variable:	TobinQ	R-squared:	0.0182
Estimator:	PanelOLS	R-squared (Between):	-13.164
No. Observations:	4786	R-squared (Within):	-0.0207
Date:	Sun, Apr 19 2026	R-squared (Overall):	-11.965
Time:	17:03:06	Log-likelihood	-7792.3
Cov. Estimator:	Clustered		
		F-statistic:	19.775
Entities:	494	P-value	0.0000
Avg Obs:	9.6883	Distribution:	F(4,4279)
Min Obs:	1.0000		
Max Obs:	10.0000	F-statistic (robust):	1.7205
		P-value	0.1425
Time periods:	10	Distribution:	F(4,4279)
Avg Obs:	478.60		
Min Obs:	456.00		
Max Obs:	493.00		

Parameter Estimates

	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
EScore	0.0050	0.0040	1.2363	0.2164	-0.0029	0.0129
ESG_CapInt	0.0012	0.0064	0.1827	0.8551	-0.0113	0.0136
Size	-0.6134	0.2448	-2.5056	0.0123	-1.0934	-0.1334
Leverage	0.0002	0.0009	0.2749	0.7834	-0.0015	0.0020

F-test for Poolability: 18.886
P-value: 0.0000
Distribution: F(502,4279)

Included effects: Entity, Time

In the US, the interaction term of capital-intensity term ESG_CapInt is insignificant in all three cases of financial performance – ROA, ROE, and Tobin's Q. Both controls of size and leverage are insignificant as well. Hence, with this being said, it can be concluded that there is no effect of capital intensity in terms of the moderation of the relationship between environmental performance and financial performance, and hypothesis 2 is fully rejected in this market. It is even suggested that the E score in this market seems not to matter at all, which is at least potentially aligned with the current topics discussed

in public regarding the skeptical view on the whole ESG framework and environmental protection and like subjected actions in general.

4.4.3 China – CSI300

Table 24. ROA and Carbon intensity

PanelOLS Estimation Summary

Dep. Variable:	ROA	R-squared:	0.0177
Estimator:	PanelOLS	R-squared (Between):	0.4175
No. Observations:	2053	R-squared (Within):	0.0215
Date:	Sun, Apr 19 2026	R-squared (Overall):	0.3497
Time:	17:06:13	Log-likelihood	-5955.0
Cov. Estimator:	Clustered		
		F-statistic:	7.9188
Entities:	287	P-value	0.0000
Avg Obs:	7.1533	Distribution:	F(4,1753)
Min Obs:	2.0000		
Max Obs:	10.0000	F-statistic (robust):	3.0094
		P-value	0.0173
Time periods:	10	Distribution:	F(4,1753)
Avg Obs:	205.30		
Min Obs:	60.000		
Max Obs:	286.00		

Parameter Estimates

	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
EScore	-0.0153	0.0105	-1.4561	0.1455	-0.0358	0.0053
ESG_CapInt	0.0213	0.0142	1.5044	0.1327	-0.0065	0.0491
Size	0.2695	0.8308	0.3244	0.7457	-1.3600	1.8990
Leverage	-1.1284	0.5093	-2.2154	0.0269	-2.1274	-0.1294

F-test for Poolability: 6.2689
P-value: 0.0000
Distribution: F(295,1753)

Included effects: Entity, Time

Table 25. ROE and Carbon intensity

PanelOLS Estimation Summary

Dep. Variable:	ROE	R-squared:	0.1080
Estimator:	PanelOLS	R-squared (Between):	-3.4404
No. Observations:	2054	R-squared (Within):	0.1013
Date:	Sun, Apr 19 2026	R-squared (Overall):	-2.9847
Time:	17:06:06	Log-likelihood	-7208.2
Cov. Estimator:	Clustered		
		F-statistic:	53.093
Entities:	287	P-value	0.0000
Avg Obs:	7.1568	Distribution:	F(4,1754)
Min Obs:	2.0000		
Max Obs:	10.0000	F-statistic (robust):	7.8439
		P-value	0.0000
Time periods:	10	Distribution:	F(4,1754)
Avg Obs:	205.40		
Min Obs:	61.000		
Max Obs:	286.00		

Parameter Estimates

	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
EScore	-0.0356	0.0212	-1.6808	0.0930	-0.0771	0.0059
ESG_CapInt	0.0516	0.0252	2.0477	0.0407	0.0022	0.1011
Size	3.2091	2.2156	1.4484	0.1477	-1.1364	7.5546
Leverage	-5.6437	1.1084	-5.0919	0.0000	-7.8176	-3.4699

F-test for Poolability: 5.8060
P-value: 0.0000
Distribution: F(295,1754)

Included effects: Entity, Time

Table 26. Tobin's Q and Carbon intensity

PanelOLS Estimation Summary

Dep. Variable:	TobinQ	R-squared:	0.0557
Estimator:	PanelOLS	R-squared (Between):	-63.472
No. Observations:	2059	R-squared (Within):	0.0508
Date:	Sun, Apr 19 2026	R-squared (Overall):	-66.083
Time:	17:05:58	Log-likelihood	-3747.9
Cov. Estimator:	Clustered		
		F-statistic:	25.923
Entities:	287	P-value	0.0000
Avg Obs:	7.1742	Distribution:	F(4,1759)
Min Obs:	2.0000		
Max Obs:	10.0000	F-statistic (robust):	8.1848
		P-value	0.0000
Time periods:	10	Distribution:	F(4,1759)
Avg Obs:	205.90		
Min Obs:	62.000		
Max Obs:	286.00		

Parameter Estimates

	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
EScore	-0.0041	0.0046	-0.8832	0.3772	-0.0131	0.0049
ESG_CapInt	0.0065	0.0039	1.6871	0.0918	-0.0011	0.0141
Size	-1.7284	0.4411	-3.9182	0.0001	-2.5936	-0.8632
Leverage	0.0973	0.0488	1.9933	0.0464	0.0016	0.1930

F-test for Poolability: 11.075
P-value: 0.0000
Distribution: F(295,1759)

Included effects: Entity, Time

In terms of the Chinese market, the results are a bit more plausible than in the case of the US when the ESG E score is interacted with the capital-intensity term. In terms of ROA, there is statistical insignificance. In the case of ROE and Tobin's Q, the results communicate a positive and significant relationship in both cases. This can be interpreted that in capital-intensive industries, the ESG E score becomes valuable, because it has a potentially positive effect on shareholder returns (ROE) and an increase in market valuation (Tobin's Q), which is the same thesis of market valuation as delivered in the case of Nordics.

In terms of size and leverage, only the leverage is negative and statistically significant in the ROA and ROE model, but positive in the Tobin's Q model, which indicates that a higher debt level in this market is associated with higher market valuation, with stronger support compared to the marginal significance in the case of the first hypothesis regression. This proves the thesis that in the Chinese market, the financial performance of a firm is tied to a company's characteristics rather than environmental performance.

With this being said, also in this case, the second hypothesis is rejected.

4.5 Robustness test – Short-term relationship

After performing the event study, which served the purpose of a robustness check and proof of the short-term relationship between the environmental performance and financial performance, explain through Nordics market reaction (our main market), the four concrete European Green Deal mandates, which are the subject of the Omnibus Package, discussed mandates requiring simplification – CSRD, CSDDD, EU Taxation, and CBAM. The reason was to prove to what extent the market reacts the most to help to unify the conclusions of the overall relationship between the environmental pillar score and its influence on financial performance.

CSRD Adoption (5-day window)

		Constant Return	Market Adjusted	CAPM
S.E.	Stdev	0,0136	0,0074	0,0074
	Stdev(10)	0,0429	0,0234	0,0233
	Stdev(21)	0,1965	0,1072	0,1068
Return (CAR)	Event	2,90 %	0,17 %	0,28 %
	Anticipation	0,76 %	0,30 %	0,26 %
	Adjustment	-0,47 %	-0,67 %	-0,73 %
	Total (EW)	3,19 %	-0,20 %	-0,19 %
t-stat (5%)	Event	2,14	0,23	0,38
t-stat (10%)	Anticipation	0,18	0,13	0,11
	Adjustment	-0,11	-0,29	-0,31
	Total (EW)	0,16	-0,02	-0,02

Figure 3. CSRD Adoption – 5-day window, results

CSRD Adoption (10-day window)

		Constant Return	Market Adjusted	CAPM
S.E.	Stdev	0,0138	0,0074	0,0073
	Stdev(10)	0,0436	0,0233	0,0232
	Stdev(21)	0,1996	0,1066	0,1064
Return (CAR)	Event	2,91 %	0,17 %	0,29 %
	Anticipation	1,95 %	0,26 %	0,18 %
	Adjustment	-2,91 %	-2,10 %	-2,33 %
	Total (EW)	1,95 %	-1,67 %	-1,86 %
t-stat (5%)	Event	2,11	0,23	0,39
t-stat (10%)	Anticipation	0,45	0,11	0,08
	Adjustment	-0,67	-0,90	-1,00
	Total (EW)	0,10	-0,16	-0,18

Figure 4. CSRD Adoption – 10-day window, results

After performing the event study, both through a 5-day and 10-day window (see Appendix 4) and around the announcement and adoption date, the statistical significance, measured by the t-test, was only in the case of CSRD adoption day, with the effect weakening when applying a 10-day window. The only plausible value (above the t-statistics 5% critical value) was measured in one of three abnormal return models – constant return (return of the index – OMXN40 minus its overall average return calculated across the whole sample) and only at the day of the event, with the t-stat values dropping even during anticipation and afterwards in the adjustment period too. To justify the presence of this value in the adoption date may be understood in a way that such a framework obliges the firms with an extensive financial and administrative burden and calls for investments in the scope of new monitoring and reporting, which has been discussed in Chapter 2 in more detail. The reaction can be understood that until the adoption of the new framework above the sustainability reporting framework that is already extensive, nobody believed that it may be applied because, as discussed in the theory section, this new framework requires duplicated and overlapping

requirements to the previously sustainability reporting compliance, such as EU Taxonomy, SFDR, and international TCFD and GRI, hence found unnecessary.

With other mandates discussed, the surprising non-significance was in the case of CBAM or the Green Deal as a whole, because those, based on subjective critical judgment as well as supported with prior research, were proven to be significant and are openly and extensively criticized by the public.

In conclusion, there is weak support for the market reactions; the short-term relationship between the environmental performance and financial performance cannot be proven with such weak evidence. This can be justified by the already mentioned narrative that the Nordic market is already well-developed in the implementation of such mandates. The market is probably used to tight regulations and frequent changes; hence it does not react to them to a significant extent.

5 Conclusion

The purpose of this thesis was to explore the negative effects of the environmental performance, measured by the ESG Environmental pillar score, on the firms' financial performance across three different markets: the Nordics (OMXN40), the United States (S&P 500), and China (CSI300). After performing a two-way fixed-panel effects panel regression and a supplementary event study to address both long and short-term relationship following can be concluded.

The empirical findings provide only weak support for hypothesis 1: a negative relationship between environmental performance and financial performance. The relationship was most notably found in the case of ROA in our main market – Nordics, which is quite plausible. However, the relationship was proven to be not linear, but rather U-shaped and weak. Other measurements of financial performance – ROE and Tobin's Q were insignificant. In the case of the United States and China, the results were even less clear. However, the statistical insignificance in this case may be justified by the limitation on ESG score data (case of China), market structure and characteristics, and overall maturity of the ESF framework implementation.

The second hypothesis, examining whether the negative effect of environmental performance on financial performance is more pronounced in capital-intensive industries, was not supported. On the contrary, in some cases in the Chinese market, a positive relationship was found. This finding rejects our hypothesis but also suggests that carbon-intensive industries may even benefit from the environmental engagement rather than financially suffer.

The supplementary event study showed minimal market reactions, suggesting the relationship is rather long-term than short-term. Only one case of statistical significance was reported in the case of the period around the adoption of the Corporate Sustainability Reporting Directive (CSRD). This was justified by the fact that the CSRD framework overlaps with other already implemented sustainability reporting

frameworks, which might have caused a significant market reaction. In addition, overall findings communicate that the Nordic market may not react because of the well-developed implementation of environmental mandates.

In conclusion, this thesis indicates that environmental ESG performance neither helps nor necessarily hurts financial performance due to weak evidence. Rather, it communicates that environmental performance is a difficult strategic choice that must balance short-term financial constraints with long-term sustainability targets.

5.1 Further research ideas

Based on the research performed, there are some ideas on how this research can be potentially extended in the future and what has not been explored until now.
Firstly, the inverted pattern of the ESG E score squared can be one of the objectives for how this relationship can be further examined. The calculation and further explanation of the turning points and their meanings across different markets might be beneficial and is beyond the objective of this thesis. The possibility of further explanation of those marginal effects at different ESG values would benefit the research to explain the negative nonlinear relationship better.

Secondly, the difference-in-difference regression method across different geographical areas with hand-collected data on the companies that already have a particular environmental mandate implied and the ones that do not have might be extremely valuable for academic research to measure the effects of the mandates themselves on the firms' financial performance.

References

Abnett, K. (2025, December 16). EU to widen carbon border levy to close loopholes on polluting goods, draft shows. Reuters. Retrieved 2025-12-16 from https://www.reuters.com/sustainability/boards-policy-regulation/eu-extend-carbon-border-levy-new-products-drafts-show-2025-12-16/#:~:text=BRUSSELS%2C%20Dec%2016%20(Reuters),manufacturers%20to%20dodge%20climate%20costs.

Adelphi. (2025, April 7). Omnibus package in a nutshell. Retrieved 2026-03-10 from https://adelphi.de/en/news/omnibus-package-in-a-nutshell

Al-Tarawneh, A., Tayeh, M., Iskandrani, M., & Obeidat, M. (2024). The impact of ESG scores on corporate financial performance: A study of non-financial firms listed in the UK. *Asian economic and financial review, 14*(11), 852-867. https://doi.org/10.55493/5002.v14i11.5229

Baehr, J., Zenglein, F., Sonnemann, G., Lederer, M., & Schebek, L. (2024). Back in the Driver's Seat: How New EU Greenhouse-Gas Reporting Schemes Challenge Corporate Accounting. *Sustainability, 16*(9), 3693. https://doi.org/10.3390/su16093693

BBC Bitesize. (2026, January). *Who was the first US president and who has held the position since?* BBC. Retrieved 2026-03-04 from https://www.bbc.co.uk/bitesize/articles/zrxn239#z2gk3qt

Berthold, B. (2024). The macro-financial effects of Climate Policy Risk: Evidence from Switzerland. *Schweizerische Zeitschrift für Volkswirtschaft und Statistik, 160*(1), 6-13. https://doi.org/10.1186/s41937-024-00122-5

Bharali Saikia, M., & Maji, S. G. (2026). Corporate carbon emissions, science-based targets initiatives and firm performance: Evidence from India. *International journal of law and management, 68*(1), 22-42. https://doi.org/10.1108/IJLMA-05-2024-0161

Baines, T., Eastwood, S., Pears, P., Weichbrodt, J., Geraets, D., Ford, J., Stojković, D., Gerhold-Kempf, T., Scholl, P., Dany, L.-S., & Hörauf, M. (2025, February 27). *European Commission presents "Omnibus" simplification package with amendments to CSRD, CSDDD, CBAM and taxonomy*. Mayer Brown. Retrieved 2026-03-01 from https://www.mayerbrown.com/en/insights/publications/2025/02/european-

commission-presents-omnibus-simplification-package-with-amendments-to-csrd-csddd-cbam-and-taxonomy

Bloomberg News. (2022, August 16). *China unveils ESG reporting guidelines to catch peers.* Bloomberg Professional Services. Retrieved 2025-03-10 from https://www.bloomberg.com/professional/insights/markets/china-unveils-esg-reporting-guidelines-to-catch-peers/

Bolotova, J. (2025, January 21). *Largest European political party suggests putting CBAM on hold for at least 2 years.* Eurometal. Retrieved 2025-12-16 from https://eurometal.net/largest-european-political-party-suggests-putting-cbam-on-hold-for-at-least-2-years/

Bonini, E. (2025, December 16). *Socialist-EPP rift extends to the 2035 ban on conventional engines.* Eunews. Retrieved 2025-12-16 from https://www.eunews.it/en/2025/12/04/more-power-to-esma-single-market-operator-eu-seeks-to-centralize-financial-markets/

Bothello, J., Ioannou, I., Porumb, V., & Zengin-Karaibrahimoglu, Y. (2023). CSR decoupling within business groups and the risk of perceived greenwashing. *Strategic management journal, 44*(13), 3217-3251. https://doi.org/10.1002/smj.3532

Chen, S., Song, Y., & Gao, P. (2023). Environmental, social, and governance (ESG) performance and financial outcomes: Analyzing the impact of ESG on financial performance. Journal of environmental management, 345, 118829. https://doi.org/10.1016/j.jenvman.2023.118829

Chen, Y., Zhou, C., Zhang, D., Xie, J., & Managi, S. (2025). Mitigating Climate Policy Shocks Through Mergers and Acquisitions? An Empirical Investigation of International Oil and Gas Firms. *Corporate social-responsibility and environmental management, 32*(3), 2921-2949. https://doi.org/10.1002/csr.3108

Chiam, L., & Janknecht, H. (2026, January 15). *What enterprises need to know about China's new corporate climate disclosure standards*. Compliance & Risks. Retrieved 2025-03-10 from https://www.complianceandrisks.com/blog/china-advances-2030-esg-roadmap-with-public-consultation-on-draft-climate-disclosure-standard/

Cieppe, P. (2025, November 1). *Punitive energy prices fail to spark any sense of urgency in Europe.* Brussels Report. Retrieved 2025-12-16 from https://www.brusselsreport.eu/2025/11/01/punitive-energy-prices-fail-to-spark-any-sense-of-urgency-in-europe/

ClientEarth. (2025, April 18). *NGOs challenge European Commission's undemocratic "Omnibus" process*. Retrieved 2026-03-10 from https://www.clientearth.org/latest/press-office/press-releases/ngos-challenge-european-commission-s-undemocratic-omnibus-process/

Council of the European Union. (n.d.) *European Green Deal.* Retrieved 2025-12-12 from https://www.consilium.europa.eu/en/policies/european-green-deal/.

Cui, X. (2025). *The Evolution and Future Trajectory of ESG Information Disclosure in China: Building a Harmonized Disclosure System in the Context of Global Integration. Global Academic Frontiers, 3(2),* 225–256. https://doi.org/10.5281/zenodo.15583449

David, P., Bloom, M., & Hillman, A. J. (2007). Investor activism, managerial responsiveness, and corporate social performance. *Strategic management journal, 28*(1), 91-100. https://doi.org/10.1002/smj.571

Energy Advice Hub. (2025, April 2). CSRD and CSDDD delayed as European Parliament backs Omnibus proposal. Retrieved 2026-03-04 from https://energyadvicehub.org/csrd-and-csddd-delayed-as-european-parliament-backs-omnibus-proposal/

Ernst & Young (EY). (2026). *EU Taxonomy Barometer 2025: Key insights and next steps*. Retrieved 2026-20-04 from https://www.ey.com/en_gl/insights/assurance/eu-taxonomy-report

European Commission. (2024, July 25). *Corporate sustainability due diligence.* Retrieved 2026-20-04 from https://commission.europa.eu/topics/business-and-industry/doing-business-eu/sustainability-due-diligence-responsible-business/corporate-sustainability-due-diligence_en

European Commission. (2025, December 9). *Corporate sustainability reporting.* Retrieved 2026-20-04 from https://finance.ec.europa.eu/financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en

European Commission. (2026a, 17 March). *EU Taxonomy for sustainable activities*. Retrieved 2026-20-04 from https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en

European Commission. (2026b). Carbon border adjustment mechanism. Retrieved 2026-20-04 from https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en

European Commission. (n.d.). *The European Green Deal: Striving to be the first climate-neutral continent*. European Commission. Retrieved 2026-03-04 from https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

Gao, Z., He, D., & Niu, S. (2021). On What Could Chinese Mining Enterprises Achieve High-Level Environmental Performance?—Based on the fsQCA Method. *International journal of environmental research and public health, 18*(14), 7290. https://doi.org/10.3390/ijerph18147290

Green Climate Fund. (2026, January 9). *Statement on the United States' withdrawal from GCF*. Retrieved 2026-03-04 from https://www.greenclimate.fund/statement/green-climate-fund-statement-united-states-withdrawal-gcf

Greens/EFA. (2025, February 26). *Omnibus simplification package puts Green Deal at risk.* Retrieved 2026-03-10 from https://www.greens-efa.eu/en/article/press/omnibus-simplification-package

Hancock, A., Inagaki, K., & Millard, R. (2025, December 11). *Carmakers warn EU 'Made in Europe' rules could slow transition to electric vehicles.* Financial Times. Retrieved 2025-12-16 from https://www.ft.com/content/02a52b64-4dc5-49f6-b2bb-b31b5addf1c7

Hansen, T. (2022). Stranded assets and reduced profits: Analyzing the economic underpinnings of the fossil fuel industry's resistance to climate stabilization. *Renewable & sustainable energy reviews, 158*, 112144. https://doi.org/10.1016/j.rser.2022.112144

Hodgson, R. (2025, February 4). *Commission accused of rushing through review of corporate sustainability rules*. Euronews. Retrieved 2025-12-12 from

Hohmann, N., Brennan, T., Ackler, J., Rourke, T., Ling, C., & Nutautas, V. (2025, October 1). *Investment opportunities in nonbank lending.* Brown Brothers Harriman. Retrieved

2026-03-04 from https://www.bbh.com/us/en/insights/capital-partners-insights/investment-opportunities-in-nonbank-lending.html

https://www.euronews.com/my-europe/2025/02/04/commission-accused-of-rushing-through-review-of-corporate-sustainability-rules

Inrate. (2025, April 23). *Who regulates ESG? A global ESG standard and frameworks.* Retrieved 2025-03-10 from https://inrate.com/blogs/who-regulates-esg-global-standards/

Interesse, G. (2025, October 15). *China's new application guide for ESG disclosure standards: Implications for businesses.* China Briefing. Retrieved 2025-03-10 from https://www.china-briefing.com/news/chinas-new-application-guide-for-esg-disclosure-standards-implications-for-businesses/

Iozzelli, L. (2025, July 16). *The Omnibus Simplification Package proposal: A test of the EU's unity.* GreenDeal-NET. Retrieved 2026-03-10 from https://www.greendealnet.eu/Omnibus-Simplification-Package-Proposal

Jin, Z. & Xu, J. (2020). Impact of Environmental Investment on Financial Performance: Evidence from Chinese listed Companies. *Polish Journal of Environmental Studies, 29*(3), 2235–2245. https://doi.org/10.15244/pjoes/111230

Joint CSO Statement. (2025, March 10). *Disastrous Omnibus proposal erodes EU's corporate accountability commitments and slashes human rights and environmental protections*. Retrieved 2026-03-04 from https://corporatejustice.org/wp-content/uploads/2025/03/Joint-CSO-statement-reacting-to-Omnibus-publication-March-2025.pdf

Jones, M. G. (2023, August 28). *Poland asks EU Court of Justice to cancel three EU climate policies.* Euronews. Retrieved 2025-12-12 from https://www.euronews.com/my-europe/2023/08/28/poland-asks-eu-court-of-justice-to-cancel-three-eu-climate-policies

Klosin, S., & Vilgalys, M. (2022). *Estimating continuous treatment effects in panel data using machine learning with a climate application*. Retrieved 2026-04-18 from https://arxiv.org/html/2207.08789v3

Kovvali A., & Listokkin, Y. (2024). *Valuing ESG. BYU Law Review, 49(30),* 705. https://www.repository.law.indiana.edu/facpub/3126/

Laroia, S., & Zeng, Y. (n.d.). *Policy brief: The negative influence of low ESG scores in China.* Vanguard Think Tank. Retrieved 2025-03-10 from https://vanguardthinktank.org/policy-brief-the-negative-influence-of-low-esg-scores-in-china

Lee, S. T. T. (2022, August 16). *China unveils ESG reporting guidelines to catch peers.* Bloomberg Professional Services. Retrieved 2026-03-04 from https://www.bloomberg.com/professional/insights/markets/china-unveils-esg-reporting-guidelines-to-catch-peers/.

Li, M. & Li, Z. (2022). Industry and Regional Environmental Regulations: Policy Heterogeneity and Firm Performance. Polish Journal of Environmental Studies, 31(3), 2665–2682. https://doi.org/10.15244/pjoes/144552

Liu, R., Wang, Y., & Liu, C. (2025). Can Green Policy Enhance Corporate Environmental Performance? Evidence from China's New Energy Demonstration City Policy. *Energies*, *18*(19), 5238. https://doi.org/10.3390/en18195238

LSEG Data & Analytics. (2024, October). *Environmental, Social and Governance scores from LSEG*. Retrieved 2025-03-10 from https://www.lseg.com/content/dam/data-analytics/en_us/documents/methodology/lseg-esg-scores-methodology.pdf

Mahapatra, S. K., Schoenherr, T., & Jayaram, J. (2021). An assessment of factors contributing to firms' carbon footprint reduction efforts. *International journal of production economics, 235*, 108073. https://doi.org/10.1016/j.ijpe.2021.108073

Mohammed, S. S., Saeed, M. M., Kumari, M., Borugadda, P., & Mohamed Ismail, N. B. (2025). Corporate social responsibility (CSR) and corporate financial performance (CFP): A panel data analysis of BSE 500 companies in India. *Discover sustainability, 6*(1), 310-15. https://doi.org/10.1007/s43621-025-01113-z

Noor, D. (2026, January 27). *'Abdication': Trump takes US out of Paris climate agreement for a second time.* The Guardian. Retrieved 2026-03-04 from https://www.theguardian.com/us-news/2026/jan/27/trump-withdraws-paris-climate-agreement

Nordics Capital. (2024, September 10). Driving sustainable change at Nordic Capital. Nordic Capital. Retrieved 2025-12-12 from https://www.nordiccapital.com/news-views/views/driving-sustainable-change-at-nordic-capital/

Pickens, C., & Carter, C. (2026, January 23). *What the ESG backlash of 2025 means for Corporate America in 2026.* SLR Consulting. Retrieved 2025-03-10 from https://www.slrconsulting.com/insights/what-esg-backlash-means-for-america/

Przychodzen, W., Leyva-de la Hiz, D. I., & Przychodzen, J. (2020). First-mover advantages in green innovation—Opportunities and threats for financial performance: A longitudinal analysis. *Corporate social-responsibility and environmental management, 27*(1), 339-357. https://doi.org/10.1002/csr.1809

PwC. (2024). Carbon border adjustment mechanism. Retrieved 2026-20-04 from https://www.pwc.com/gx/en/issues/esg/carbon-border-adjustment-mechanism.html

Quantifying Health. (n.d.). Quadratic term in regression: When to add it and how to interpret it. Retrieved 2026-04-18 from https://quantifyinghealth.com/quadratic-term-in-regression/#:~:text=When%20to%20add%20a%20quadratic,%2B%CE%B22X2)

Reuters. (2025, January 22). *White House says order pausing IRA disbursements only applies to some programs*. Retrieved 2026-03-04 from https://www.reuters.com/sustainability/sustainable-finance-reporting/white-house-says-order-pausing-ira-disbursements-only-applies-some-programs-2025-01-22/

Scanlon, M. J. (2020). *The Nordics are pioneering the future of ESG.* ESG Investing. Retrieved 2025-12-12 from https://www.esginvesting.co.uk/the-nordics-are-pioneering-the-future-of-esg/

Shen, H., Lin, H., Han, W., & Wu, H. (2023). ESG in China: A review of practice and research, and future research avenues. *China journal of accounting research, 16*(4), 100325. https://doi.org/10.1016/j.cjar.2023.100325

Shi, M., Zhang, Y., & Meinerding, C. (2025). *The impact of climate policies on financial markets: Evidence from the EU Carbon Border Adjustment Mechanism* (Discussion Paper No. 14/2025). Deutsche Bundesbank. Retrieved 2025-12-12 from https://www.bundesbank.de/en/publications/research/discussion-papers/the-impact-of-climate-policies-on-financial-markets-evidence-from-the-eu-carbon-border-adjustment-mechanism-925468

The ESG Institute. (2024, February 3). China's corporate sustainability disclosure standards: A roadmap for foreign companies doing business in China. Retrieved 2025-03-10 from

https://www.the-esg-institute.org/blog/chinas-corporate-sustainability-disclosure-standards-a-roadmap-for-foreign-companies-doing-business-in-china

The White Hourse. (2025, January 2020). *Putting America first in international environmental agreements.* Retrieved 2025-12-12 from https://www.whitehouse.gov/presidential-actions/2025/01/putting-america-first-in-international-environmental-agreements/

The White House. (2025, January 20). *Putting America First in international environmental agreements*. Retrieved 2026-03-04 from https://www.whitehouse.gov/presidential-actions/2025/01/putting-america-first-in-international-environmental-agreements/

Tiberghien. (2023, July 10). *CBAM regulation adopted on 10 May 2023.* Retrieved 2026-03-10 from https://tiberghien.com/en/3731/cbam-regulation-adopted-on-10-may-2023#:~:text=Tiberghien%20%2D%20CBAM%20regulation%20adopted%20on%2010%20May%202023

Tonnarello, F., Vermiglio, C., Migliardo, C., & Naciti, V. (2025). The Impact of EU Taxonomy for Sustainable Activities on European Utilities' Performance. *Business strategy and the environment, 34*(3), 2848-2862. https://doi.org/10.1002/bse.4128

Tutar, H., Štreimikienė, D., & Mutlu, H. T. (2025). The Relationship Between ESG and Financial Performance in Global Firms: A Multidimensional Study Across Sectors and Regions for the Period 2015–2025. *Corporate social-responsibility and environmental management, 32*(6), 8280-8294. https://doi.org/10.1002/csr.70136

Tutar, H., Štreimikienė, D., & Mutlu, H. T. (2025). The Relationship Between ESG and Financial Performance in Global Firms: A Multidimensional Study Across Sectors and Regions for the Period 2015–2025. *Corporate social-responsibility and environmental management, 32*(6), 8280-8294. https://doi.org/10.1002/csr.70136

UNESCO. (2025, July 22). *Withdrawal of the United States of America from UNESCO: Statement by Audrey Azoulay, Director-General*. Retrieved 2026-03-04 from https://www.unesco.org/en/articles/withdrawal-united-states-america-unesco-statement-audrey-azoulay-director-general

Vaihekoski, M., & Yahya, H. (2025). Environmental, Social, and Governance (ESG) and Firm Valuation: The Moderating Role of Audit Quality. *Journal of risk and financial management, 18*(3), 148. https://doi.org/10.3390/jrfm18030148

Van Zijl, R. (2025, October 27). *China's ESG pivot: From compliance to competitiveness.* Strategy&Ops Consultancy. Retrieved 2025-03-10 from https://strategyandops.net/chinas-esg-pivot-from-compliance-to-competitiveness/#:~:text=China's%20environmental%2C%20social%2C%20and%20governance,the%20global%20net%2Dzero%20transition.&text=China%20has%20rapidly%20established%20ESG,governance%20issues%20alongside%20environmental%20stewardship

Walker, K., & Wan, F. (2012). The Harm of Symbolic Actions and Green-Washing: Corporate Actions and Communications on Environmental Performance and Their Financial Implications. *Journal of business ethics, 109*(2), 227-242. https://doi.org/10.1007/s10551-011-1122-4

Yang, M. (2025, February 7). *Trump electric vehicle charging station program halted by administration*. The Guardian. Retrieved 2026-03-04 from https://www.theguardian.com/us-news/2025/feb/07/trump-electric-vehicle-charging-station-program

Zhou, D. (2025, December 11). *China ESG: All you need to know*. MSA Advisory. Retrieved 2026-03-04 from https://msadvisory.com/china-esg/

Appendices

Appendix 1. Industry dummy for OMXN40 (alphabetical order)

Full Name	Sector	Dummy
ABB Limited N (Stockholm)	Electronic and Electrical Equipment	0
Alfa Laval	Electronic and Electrical Equipment	0
Assa Abloy B	Construction and Materials	1
Astrazeneca (Stockholm)	Pharmaceuticals and Biotechnology	0
Atlas Copco A	Industrial Engineering	1
Atlas Copco B	Industrial Engineering	1
Boliden Ordinary Shares	Industrial Metals and Mining	1
Carlsberg B	Beverages	0
Coloplast B	Medical Equipment and Services	0
Danske Bank	Banks	0
DSV	Industrial Transportation	1
Epiroc A	Industrial Engineering	1
Equitable	Investment Banking and Brokerage Services	0
Ericsson B	Telecommunications Equipment	0
Essity B	Personal Care, Drug and Grocery Stores	0
Evolution	Travel and Leisure	0
Fortum	Electricity	1
Genmab	Pharmaceuticals and Biotechnology	0
Hennes and Mauritz B	Retailers	0
Hexagon B	Software and Computer Services	0
Investor B	Investment Banking and Brokerage Services	0
Kone B	Industrial Engineering	1
Nokia	Telecommunications Equipment	0
Nordea Bank	Banks	0
Novo Nordisk 'B'	Pharmaceuticals and Biotechnology	0
Novozymes B	Pharmaceuticals and Biotechnology	0
Oersted	Electricity	1
Pandora	Personal Goods	0
Saab B	Aerospace and Defense	1
Sampo A	Non-life Insurance	0
Sandvik	Industrial Engineering	1
Skandinaviska Enskilda Banken A	Banks	0
SKF B	Industrial Metals and Mining	1
Svenska Handelsbanken A	Banks	0
Swedbank A	Banks	0
TELE2 B	Telecommunications Service Providers	0
Telia Company	Telecommunications Service Providers	0

UPM-Kymmene	Industrial Materials	1
Vestas Windsystems	Alternative Energy	1
Volvo B	Industrial Transportation	1

Appendix 2. Industry dummy for SP500 (alphabetical order)

Full Name	Sector	Dummy
3M	General Industrials	0
Abbott Laboratories	Medical Equipment and Services	0
Abbvie	Pharmaceuticals and Biotechnology	0
Accenture Class A	Industrial Support Services	0
Adobe (Nasdaq Non-National)	Software and Computer Services	0
Advanced Micro Devices	Technology Hardware and Equipment	0
AES	Electricity	1
Aflac	Life Insurance	0
Agilent Technologies	Medical Equipment and Services	0
Air Products and Chemicals	Chemicals	1
Airbnb A	Travel and Leisure	0
Akamai Technologies	Software and Computer Services	0
Albemarle	Chemicals	1
Alexandria Real Estate Equities REIT	Real Estate Investment Trusts	0
Align Technology	Medical Equipment and Services	0
Allegion	Electronic and Electrical Equipment	0
Alliant Energy (XSC)	Electricity	1
Allstate Ordinary Shares	Non-life Insurance	0
Alphabet 'A'	Software and Computer Services	0
Alphabet 'C'	Software and Computer Services	0
Altria Group	Tobacco	0
Amazon Com	Retailers	0
Amcor	General Industrials	0
Ameren	Gas, Water and Multi-utilities	1
American Electric Power	Electricity	1
American Express	Industrial Support Services	0
American International Group	Non-life Insurance	0
American Tower	Real Estate Investment Trusts	0
American Water Works	Gas, Water and Multi-utilities	1
Ameriprise Financial	Investment Banking and Brokerage Services	0
Ametek	Electronic and Electrical Equipment	0
Amgen	Pharmaceuticals and Biotechnology	0
Amphenol 'A'	Technology Hardware and Equipment	0
Analog Devices	Technology Hardware and Equipment	0
AON Class A	Non-life Insurance	0
APA	Oil, Gas and Coal	1
Apollo Global Management	Investment Banking and Brokerage Services	0

Apple	Technology Hardware and Equipment	0
Applied Materials	Technology Hardware and Equipment	0
Applovin A	Software and Computer Services	0
Aptiv	Automobiles and Parts	1
Arch Capital Group	Non-life Insurance	0
Archer Daniels Midland	Food Producers	0
Ares Management A	Investment Banking and Brokerage Services	0
Arista Networks	Telecommunications Equipment	0
Arthur J Gallagher	Non-life Insurance	0
Assurant	Non-life Insurance	0
AT&T	Telecommunications Service Providers	0
Atmos Energy	Gas, Water and Multi-utilities	1
Autodesk	Software and Computer Services	0
Automatic Data Processing	Industrial Support Services	0
Autozone	Retailers	0
Avalonbay Communities	Real Estate Investment Trusts	0
Avery Dennison	Industrial Materials	1
Axon Enterprise	Aerospace and Defense	1
Baker Hughes A	Oil, Gas and Coal	1
Ball	General Industrials	0
Bank of America	Banks	0
Bank of New York Mellon	Investment Banking and Brokerage Services	0
Baxter International	Medical Equipment and Services	0
Becton Dickinson	Medical Equipment and Services	0
Berkshire Hathaway 'B'	Investment Banking and Brokerage Services	0
Best Buy	Retailers	0
Bio-Techne	Medical Equipment and Services	0
Biogen	Pharmaceuticals and Biotechnology	0
Blackrock	Investment Banking and Brokerage Services	0
Blackstone	Investment Banking and Brokerage Services	0
Block A	Industrial Support Services	0
Boeing	Aerospace and Defense	1
Booking Holdings	Travel and Leisure	0
Boston Scientific	Medical Equipment and Services	0
Bristol Myers Squibb	Pharmaceuticals and Biotechnology	0
Broadcom	Technology Hardware and Equipment	0
Broadridge Financial Solutions	Investment Banking and Brokerage Services	0
Brown and Brown	Non-life Insurance	0

Brown-Forman 'B'	Beverages	0
Builders Firstsource	Construction and Materials	1
Bunge Global	Food Producers	0
BXP	Real Estate Investment Trusts	0
Cadence Design Systems	Software and Computer Services	0
Camden Property Trust	Real Estate Investment Trusts	0
Capital One Financial	Industrial Support Services	0
Cardinal Health	Pharmaceuticals and Biotechnology	0
Carnival	Travel and Leisure	0
Carrier Global	Construction and Materials	1
Carvana 'A'	Retailers	0
Caterpillar	Industrial Engineering	1
CBOE Global Markets (BTS)	Investment Banking and Brokerage Services	0
Cbre Group Class A	Real Estate Investment and Services	0
CDW	Technology Hardware and Equipment	0
Cencora	Personal Care, Drug and Grocery Stores	0
Centene	Health Care Providers	0
Centerpoint Energy	Gas, Water and Multi-utilities	1
CF Industries Holdings	Chemicals	1
CH Robinson Worldwide	Industrial Transportation	1
Charles River Laboratories International	Pharmaceuticals and Biotechnology	0
Charles Schwab	Investment Banking and Brokerage Services	0
Charter Communications Class A	Telecommunications Service Providers	0
Chevron	Oil, Gas and Coal	1
Chipotle Mexican Grill	Travel and Leisure	0
Chubb	Non-life Insurance	0
Church and Dwight Company	Personal Care, Drug and Grocery Stores	0
Ciena	Telecommunications Equipment	0
Cigna	Health Care Providers	0
Cincinnati Financial	Non-life Insurance	0
Cintas	Industrial Support Services	0
Cisco Systems	Telecommunications Equipment	0
Citigroup	Banks	0
Citizens Financial Group	Banks	0
Clorox	Personal Care, Drug and Grocery Stores	0
CME Group	Investment Banking and Brokerage Services	0
CMS Energy	Electricity	1
Coca Cola	Beverages	0
Cognizant Technology Solutions 'A'	Software and Computer Services	0

Coinbase Global A	Investment Banking and Brokerage Services	0
Colgate-Palmolive	Personal Care, Drug and Grocery Stores	0
Comcast A	Telecommunications Service Providers	0
Comfort Systems USA	Construction and Materials	1
Conagra Brands	Food Producers	0
ConocoPhillips	Oil, Gas and Coal	1
Consolidated Edison	Electricity	1
Constellation Brands 'A'	Beverages	0
Constellation Energy	Electricity	1
Cooper Companies	Medical Equipment and Services	0
Copart	Consumer Services	0
Corning	Technology Hardware and Equipment	0
Corpay	Industrial Support Services	0
Corteva	Food Producers	0
Costar Group	Real Estate Investment and Services	0
Costco Wholesale	Retailers	0
Coterra Energy	Oil, Gas and Coal	1
CRH Public Limited	Construction and Materials	1
Crowdstrike Holdings A	Software and Computer Services	0
Crown Castle	Real Estate Investment Trusts	0
CSX	Industrial Transportation	1
Cummins	Industrial Engineering	1
CVS Health	Personal Care, Drug and Grocery Stores	0
D R Horton	Household Goods and Home Construction	0
Danaher	Medical Equipment and Services	0
Darden Restaurants	Travel and Leisure	0
Datadog A	Software and Computer Services	0
Davita	Health Care Providers	0
Deckers Outdoor	Personal Goods	0
Deere	Industrial Engineering	1
Dell Technologies C	Technology Hardware and Equipment	0
Delta Air Lines	Travel and Leisure	0
Devon Energy	Oil, Gas and Coal	1
Dexcom	Medical Equipment and Services	0
Diamondback Energy	Oil, Gas and Coal	1
Digital Realty Trust	Real Estate Investment Trusts	0
Dollar General	Retailers	0
Dollar Tree	Retailers	0
Dominion Energy	Electricity	1
Domino's Pizza	Travel and Leisure	0
Doordash A	Software and Computer Services	0

Dover	General Industrials	0
Dow Ordinary Shares	General Industrials	0
DTE Energy	Electricity	1
Duke Energy	Gas, Water and Multi-utilities	1
Dupont de Nemours	General Industrials	0
Eaton	General Industrials	0
EBay	Consumer Services	0
Ecolab	Chemicals	1
Edison International	Electricity	1
Edwards Lifesciences	Medical Equipment and Services	0
Electronic Arts	Leisure Goods	0
Elevance Health	Health Care Providers	0
Eli Lilly	Pharmaceuticals and Biotechnology	0
Emcor Group	Construction and Materials	1
Emerson Electric	Electronic and Electrical Equipment	0
Entergy	Electricity	1
EOG Resources	Oil, Gas and Coal	1
Epam Systems	Software and Computer Services	0
Equifax	Industrial Support Services	0
Equinix REIT	Real Estate Investment Trusts	0
Equitable	Oil, Gas and Coal	1
Equity Residential Trust Properties SHBI	Real Estate Investment Trusts	0
Erie Indemnity 'A'	Non-life Insurance	0
Essex Property Trust	Real Estate Investment Trusts	0
Estee Lauder Companies 'A'	Personal Goods	0
Everest Group	Non-life Insurance	0
Evergy	Electricity	1
Eversource Energy	Electricity	1
Exelon	Electricity	1
Expand Energy	Oil, Gas and Coal	1
Expedia Group	Travel and Leisure	0
Expeditors International of Washington A	Industrial Transportation	1
Extra Space Storage	Real Estate Investment Trusts	0
Exxon Mobil	Oil, Gas and Coal	1
F5	Software and Computer Services	0
Factset Research Systems	Finance and Credit Services	0
Fair Isaac	Industrial Support Services	0
Fastenal	Industrial Metals and Mining	1
Federal Realty Investment Trust	Real Estate Investment Trusts	0
Fedex	Industrial Transportation	1
Fidelity National Information Services	Industrial Support Services	0

Fifth Third Bancorp	Banks	0
First Solar	Alternative Energy	1
Firstenergy	Electricity	1
Fiserv	Industrial Support Services	0
Ford Motor	Automobiles and Parts	1
Fortinet	Software and Computer Services	0
Fortive	Electronic and Electrical Equipment	0
Fox A	Media	0
Fox B	Media	0
Franklin Resources	Investment Banking and Brokerage Services	0
Freeport-Mcmoran	Industrial Metals and Mining	1
Garmin	Leisure Goods	0
Gartner 'A'	Software and Computer Services	0
GE Aerospace	Aerospace and Defense	1
GE Healthcare Technologies	Medical Equipment and Services	0
GE Vernova	General Industrials	0
Generac Holdings	Industrial Engineering	1
General Digital	Software and Computer Services	0
General Dynamics	Aerospace and Defense	1
General Mills	Food Producers	0
General Motors	Automobiles and Parts	1
Genuine Participations	Automobiles and Parts	1
Gilead Sciences	Pharmaceuticals and Biotechnology	0
Global Payments	Industrial Support Services	0
Globe Life	Life Insurance	0
Godaddy Class A	Software and Computer Services	0
Goldman Sachs Group	Investment Banking and Brokerage Services	0
Halliburton	Oil, Gas and Coal	1
Hartford Insurance Group	Non-life Insurance	0
Hasbro	Leisure Goods	0
HCA Healthcare	Health Care Providers	0
Healthpeak Properties	Real Estate Investment Trusts	0
Henry Schein	Medical Equipment and Services	0
Hershey	Food Producers	0
Hewlett Packard Enterprise	Software and Computer Services	0
Hilton Worldwide Holdings	Travel and Leisure	0
Hologic	Medical Equipment and Services	0
Home Depot	Retailers	0
Honeywell International	General Industrials	0
Hormel Foods	Food Producers	0
Host Hotels and Resorts REIT	Real Estate Investment Trusts	0

Howmet Aerospace	Aerospace and Defense	1
HP	Technology Hardware and Equipment	0
Hubbell	Electronic and Electrical Equipment	0
Humana	Health Care Providers	0
Hunt JB Transport Services	Industrial Transportation	1
Huntington Bancshares	Banks	0
Huntington Ingalls Industries	Aerospace and Defense	1
Idex	Electronic and Electrical Equipment	0
Idexx Laboratories	Medical Equipment and Services	0
Illinois Tool Works	General Industrials	0
Incyte	Pharmaceuticals and Biotechnology	0
Ingersoll Rand	Industrial Engineering	1
Insulet	Medical Equipment and Services	0
Intel	Technology Hardware and Equipment	0
Interactive Brokers Group A	Investment Banking and Brokerage Services	0
Intercontinental Exchange	Investment Banking and Brokerage Services	0
International Business Machines	Software and Computer Services	0
International Flavors and Fragrances	Chemicals	1
International Paper	Industrial Materials	1
Intuit	Software and Computer Services	0
Intuitive Surgical	Medical Equipment and Services	0
Invesco	Investment Banking and Brokerage Services	0
Invitation Homes	Real Estate Investment Trusts	0
Iqvia Holdings	Health Care Providers	0
Iron Mountain	Real Estate Investment Trusts	0
J M Smucker	Food Producers	0
Jabil	Technology Hardware and Equipment	0
Jack Henry and Associates	Industrial Support Services	0
Jacobs Solutions	Industrial Support Services	0
Johnson and Johnson	Pharmaceuticals and Biotechnology	0
Johnson Controls International	Electronic and Electrical Equipment	0
JP Morgan Chase and Company	Banks	0
Kenvue	Personal Care, Drug and Grocery Stores	0
Keurig DR Pepper	Beverages	0
Keycorp	Banks	0
Keysight Technologies	Electronic and Electrical Equipment	0
Kimberly-Clark	Personal Care, Drug and Grocery Stores	0
Kimco Realty	Real Estate Investment Trusts	0
Kinder Morgan	Oil, Gas and Coal	1
KKR and Company Ordinary Shares	Investment Banking and Brokerage Services	0

KLA	Technology Hardware and Equipment	0
Kraft Heinz	Food Producers	0
Kroger	Personal Care, Drug and Grocery Stores	0
L3HARRIS Technologies	Aerospace and Defense	1
Labcorp Holdings	Medical Equipment and Services	0
Lam Research	Technology Hardware and Equipment	0
Lamb Weston Holdings	Food Producers	0
Las Vegas Sands	Travel and Leisure	0
Leidos Holdings	Software and Computer Services	0
Lennar A A	Household Goods and Home Construction	0
Lennox International	Construction and Materials	1
Linde (New York)	Chemicals	1
Live Nation Entertainment	Travel and Leisure	0
Lockheed Martin	Aerospace and Defense	1
Loews	Non-life Insurance	0
Lowe's Companies	Retailers	0
Lululemon Athletica	Personal Goods	0
Lyondellbasell Industries Class A	Chemicals	1
M&T Bank	Banks	0
Marathon Petroleum	Oil, Gas and Coal	1
Marriott International 'A'	Travel and Leisure	0
Marsh	Non-life Insurance	0
Martin Marietta Materials	Construction and Materials	1
Masco	Construction and Materials	1
Mastercard	Industrial Support Services	0
Match Group	Software and Computer Services	0
Mccormick and Company Non Voting	Food Producers	0
McDonald's	Travel and Leisure	0
Mckesson	Personal Care, Drug and Grocery Stores	0
Medtronic	Medical Equipment and Services	0
Merck and Company	Pharmaceuticals and Biotechnology	0
Meta Platforms A	Software and Computer Services	0
Metlife	Life Insurance	0
Mettler Toledo International	Electronic and Electrical Equipment	0
MGM Resorts International	Travel and Leisure	0
Microchip Technology	Technology Hardware and Equipment	0
Micron Technology	Technology Hardware and Equipment	0
Microsoft	Software and Computer Services	0
Mid-American APT Communities	Real Estate Investment Trusts	0
Moderna	Pharmaceuticals and Biotechnology	0
Molina Healthcare	Health Care Providers	0
Molson Coors Beverage Company B	Beverages	0

Mondelez International Class A	Food Producers	0
Monolithic Power Systems	Technology Hardware and Equipment	0
Monster Beverage	Beverages	0
Moody's	Finance and Credit Services	0
Morgan Stanley	Investment Banking and Brokerage Services	0
Mosaic	Chemicals	1
Motorola Solutions	Telecommunications Equipment	0
MSCI	Finance and Credit Services	0
NASDAQ	Investment Banking and Brokerage Services	0
Netapp	Technology Hardware and Equipment	0
Netflix	Media	0
Newmont	Precious Metals and Mining	1
News 'A'	Media	0
News 'B'	Media	0
Nextera Energy	Electricity	1
Nike 'B'	Personal Goods	0
Nisource	Gas, Water and Multi-utilities	1
Nordson	Industrial Engineering	1
Norfolk Southern	Industrial Transportation	1
Northern Trust	Investment Banking and Brokerage Services	0
Northrop Grumman	Aerospace and Defense	1
Norwegian Cruise Line Holdings	Travel and Leisure	0
NRG Energy	Electricity	1
Nucor	Industrial Metals and Mining	1
Nvidia	Technology Hardware and Equipment	0
NVR	Household Goods and Home Construction	0
NXP Semiconductors	Technology Hardware and Equipment	0
O Reilly Automotive	Retailers	0
Occidental Petroleum	Oil, Gas and Coal	1
Old Dominion Freight Lines	Industrial Transportation	1
Omnicom Group	Media	0
On Semiconductor	Technology Hardware and Equipment	0
Oneok	Oil, Gas and Coal	1
Oracle	Software and Computer Services	0
Otis Worldwide	Industrial Engineering	1
Paccar	Industrial Transportation	1
Packaging Corporation of America	General Industrials	0
Palantir Technologies A	Software and Computer Services	0
Palo Alto Networks	Software and Computer Services	0
Paramount Skydance B	Media	0

Parker-Hannifin	General Industrials	0
Paychex	Industrial Support Services	0
Paycom Software	Software and Computer Services	0
Paypal Holdings	Industrial Support Services	0
Pentair	Electronic and Electrical Equipment	0
Pepsico	Beverages	0
Pfizer	Pharmaceuticals and Biotechnology	0
PG&E	Electricity	1
Philip Morris International	Tobacco	0
Phillips 66	Oil, Gas and Coal	1
Pinnacle West Capital	Electricity	1
PNC Financial Services Group	Banks	0
Pool	Leisure Goods	0
PPG Industries	General Industrials	0
PPL	Electricity	1
Principal Financial Group	Investment Banking and Brokerage Services	0
Procter and Gamble	Personal Care, Drug and Grocery Stores	0
Progressive Ohio	Non-life Insurance	0
Prologis REIT	Real Estate Investment Trusts	0
Prudential Financial	Life Insurance	0
PTC	Software and Computer Services	0
Public Service Enterprise Group	Electricity	1
Public Storage	Real Estate Investment Trusts	0
Pultegroup	Household Goods and Home Construction	0
Qnity Electronics	Technology Hardware and Equipment	0
Qualcomm	Technology Hardware and Equipment	0
Quanta Services	Construction and Materials	1
Quest Diagnostics	Medical Equipment and Services	0
Ralph Lauren Class A	Personal Goods	0
Raymond James Financial	Investment Banking and Brokerage Services	0
Realty Income	Real Estate Investment Trusts	0
Regency Centers	Real Estate Investment Trusts	0
Regeneron Pharmaceuticals	Pharmaceuticals and Biotechnology	0
Regions Financial New	Banks	0
Republic Services 'A'	Waste and Disposal Services	1
Resmed	Medical Equipment and Services	0
Revvity	Medical Equipment and Services	0
Robinhood Markets A	Investment Banking and Brokerage Services	0
Rockwell Automation	Electronic and Electrical Equipment	0
Rollins	Consumer Services	0

Roper Technologies	Software and Computer Services	0
Ross Stores	Retailers	0
Royal Caribbean Group	Travel and Leisure	0
RTX	Aerospace and Defense	1
Salesforce	Software and Computer Services	0
Sandisk	Technology Hardware and Equipment	0
SBA Communications	Real Estate Investment Trusts	0
Seagate Technology Holdings	Technology Hardware and Equipment	0
Sempra	Gas, Water and Multi-utilities	1
Servicenow	Software and Computer Services	0
Sherwin-Williams	General Industrials	0
Simon Property Group	Real Estate Investment Trusts	0
Skyworks Solutions	Technology Hardware and Equipment	0
SLB	Oil, Gas and Coal	1
Smith (ao)	Construction and Materials	1
Smurfit Westrock	General Industrials	0
Snap-On	Industrial Engineering	1
Solventum	Medical Equipment and Services	0
Southern	Electricity	1
Southwest Airlines	Travel and Leisure	0
Standard and Poor's Global	Finance and Credit Services	0
Stanley Black and Decker	Industrial Engineering	1
Starbucks	Travel and Leisure	0
State Street	Investment Banking and Brokerage Services	0
Steel Dynamics	Industrial Metals and Mining	1
Steris	Medical Equipment and Services	0
Stryker	Medical Equipment and Services	0
Super Micro Computer	Technology Hardware and Equipment	0
Synchrony Financial	Industrial Support Services	0
Synopsys	Software and Computer Services	0
Sysco	Personal Care, Drug and Grocery Stores	0
T Rowe Price Group	Investment Banking and Brokerage Services	0
T-Mobile United States	Telecommunications Service Providers	0
Take Two Interactive Software	Leisure Goods	0
Tapestry	Retailers	0
Targa Resources	Oil, Gas and Coal	1
Target	Retailers	0
TE Connectivity	Technology Hardware and Equipment	0
Teledyne Technologies	Electronic and Electrical Equipment	0
Teradyne (XSC)	Technology Hardware and Equipment	0
Tesla	Automobiles and Parts	1

Texas Instruments	Technology Hardware and Equipment	0
Texas Pacific Land Trust	Oil, Gas and Coal	1
Textron	Aerospace and Defense	1
The Campbell S Company	Food Producers	0
Thermo Fisher Scientific	Medical Equipment and Services	0
TJX	Retailers	0
TKO Group Holdings A	Media	0
Tractor Supply	Retailers	0
Trade Desk Class A	Media	0
Trane Technologies	Construction and Materials	1
Transdigm Group	Aerospace and Defense	1
Travelers Companies	Non-life Insurance	0
Trimble	Electronic and Electrical Equipment	0
Truist Financial	Banks	0
Tyler Technologies	Software and Computer Services	0
Tyson Foods 'A'	Food Producers	0
Uber Technologies	Consumer Services	0
UDR	Real Estate Investment Trusts	0
Ulta Beauty	Retailers	0
Union Pacific	Industrial Transportation	1
United Airlines Holdings	Travel and Leisure	0
United Parcel Service 'B'	Industrial Transportation	1
United Rentals	Industrial Transportation	1
United States Bancorp	Banks	0
UnitedHealth Group	Health Care Providers	0
Universal Health Services 'B'	Health Care Providers	0
Valero Energy	Oil, Gas and Coal	1
Ventas	Real Estate Investment Trusts	0
Veralto	Electronic and Electrical Equipment	0
Verisign	Software and Computer Services	0
Verisk Analytics Class A	Industrial Support Services	0
Verizon Communications	Telecommunications Service Providers	0
Vertex Pharmaceuticals	Pharmaceuticals and Biotechnology	0
Viatris	Pharmaceuticals and Biotechnology	0
Vici Pptys	Real Estate Investment Trusts	0
Visa 'A'	Industrial Support Services	0
Vistra	Electricity	1
Vulcan Materials	Construction and Materials	1
W R Berkley	Non-life Insurance	0
Wabtec	Industrial Transportation	1
Walmart	Retailers	0
Walt Disney	Media	0
Warner Brothers Discovery Series A	Media	0

Waste Management	Waste and Disposal Services	1
Waters	Medical Equipment and Services	0
WEC Energy Group	Gas, Water and Multi-utilities	1
Wells Fargo and Company	Banks	0
Welltower	Real Estate Investment Trusts	0
West Pharmaceutical Services	Medical Equipment and Services	0
Western Digital	Technology Hardware and Equipment	0
Weyerhaeuser	Real Estate Investment Trusts	0
Williams	Oil, Gas and Coal	1
Williams-Sonoma	Retailers	0
Willis Towers Watson	Non-life Insurance	0
Workday Class A	Software and Computer Services	0
WW Grainger	Industrial Support Services	0
Wynn Resorts	Travel and Leisure	0
Xcel Energy	Electricity	1
Xylem	Electronic and Electrical Equipment	0
Yum! Brands	Travel and Leisure	0
Zebra Technologies 'A'	Electronic and Electrical Equipment	0
Zimmer Biomet Holdings	Medical Equipment and Services	0
Zoetis A	Pharmaceuticals and Biotechnology	0

Appendix 3. Industry dummy for CSI300 (alphabetical order)

Full Name	Dummy
360 Security Technology 'A'	0
ACM Research (Shanghai) 'A'	0
Advanced Micro- Fabrication Equipment 'A'	0
Aecc Aviation Power 'A'	1
Agricultural Bank of China 'A'	0
Aier Eye Hospital Group 'A'	0
Air China Cargo 'A'	1
Air China Limited 'A'	0
Aluminum Corporation of China 'A'	1
Anhui Conch Cement 'A'	1
Anhui Gujing Distillery 'A'	0
Anker Innovations Technology 'A'	0
Avary Holding (Shenzhen) 'A'	0
Avic Airborne Systems 'A'	1
Avic Chengdu Aircraft 'A'	0
Avic Shenyang Aircraft 'A'	1
Avic XI An Aircraft Industry Group 'A'	1
Bank of Beijing 'A'	0
Bank of Chengdu 'A'	0
Bank of China 'A'	0
Bank of Communications 'A'	0
Bank of Hgzo 'A'	0
Bank of Jiangsu 'A'	0
Bank of Nanjing 'A'	0
Bank of Ningbo 'A'	0
Bank of Shanghai 'A'	0
Baoshan Iron and Steel 'A'	1
Beijing CPS Tchdev 'A'	0
Beijing Enlight Media 'A'	0
Beijing Kingsoft Office Software 'A'	0
Beijing New Building Materials Public 'A'	1
Beijing Roborock Technology 'A'	0
Beijing Tiantan Biological Products 'A'	0
Beijing Tongrentang 'A'	0
Beijing Wantai Biological Pharmacy Enterprise 'A'	0
Beijing-Shanghai High Speed Railway 'A'	1
BOE Technology Group 'A'	0
BYD 'A'	1
Cambricon Technologies Corporation 'A'	0

Capital Securities 'A'	0
CGN Power 'A'	1
Changchun High New Technology 'A'	0
Chaozhou Three-Circle (Group) 'A'	0
China Citic Bank 'A'	0
China Coal Energy 'A'	1
China Communication Construction 'A'	1
China Construction Bank 'A'	0
China CSSC Holdings 'A'	1
China Eastern Airlines 'A'	0
China Energy Engineering 'A'	1
China Everbright Bank 'A'	0
China Galaxy Securities 'A'	0
China International Capital 'A'	0
China Jushi 'A'	1
China Life Insurance 'A'	0
China Merchants Bank 'A'	0
China Merchants Energy Shipping 'A'	1
China Merchants Expressway Network and Technology Holdings 'A'	1
China Merchants Securities 'A'	0
China Merchants Shekou Industrial Zone 'A'	0
China Minsheng Banking 'A'	0
China Mobile 'A'	0
China Molybdenum Luoyang 'A'	1
China National Chemical Engineering 'A'	1
China National NRR 'A'	1
China Northern Rare Earth (Group) Htec 'A'	1
China Oilfield Services 'A'	1
China Pacific Insurance (Group) 'A'	0
China Petroleum and Chemical 'A'	1
China Railway Construction 'A'	1
China Railway Group 'A'	1
China Railway Signal and Communication 'A'	1
China Resources Microelectronics 'A'	0
China Resources Sanjiu Medical and Pharmaceutical 'A'	0
China Satellite Communications 'A'	0
China Securities 'A'	0
China Shenhua Energy 'A'	1
China Shipbuilding Industry Group Power 'A'	1
China Southern Airlines 'A'	0
China State Construction Engineering 'A'	1
China Telecom 'A'	0
China Three Gorges Renewables (Group) 'A'	1

China Tourism Group Duty Free 'A'	0
China United Network Communications 'A'	0
China Vanke 'A'	0
China Yangtze Power 'A'	1
China Zheshang Bank 'A'	0
Chongqing Changan Automobile 'A'	1
Chongqing Rural Commercial Bank 'A'	0
Chongqing Zhifei Biological Products 'A'	0
Cinda Securities 'A'	0
Citic Pacific Special Steel Group 'A'	1
Citic Securities 'A'	0
CNOOC 'A'	1
CNPC Capital 'A'	0
Contemporary Amperex Technology 'A'	0
Cosco Shipping Energy Transportation 'A'	1
Cosco Shipping Holdings 'A'	1
CRRC 'A'	1
CSI Solar 'A'	1
Daqin Railway 'A'	1
Dawning Information Industry 'A'	0
Dongfang Electric 'A'	1
East Money Information 'A'	0
Eastroc Beverage (Group) 'A'	0
Empyrean Technology 'A'	0
ENN Natural Gas 'A'	1
Eoptolink Technology 'A'	0
EVE Energy 'A'	0
Everbright Securities 'A'	0
Focus Media Information Technology 'A'	0
Foshan Hai Tian FLFD 'A'	0
Founder Securities 'A'	0
Foxconn Industrial Internet 'A'	0
Fuyao Glass Industry Group 'A'	0
Ganfeng Lithium Group 'A'	1
Gigadevice Semiconductor 'A'	0
Goertek 'A'	0
Gold Power Development 'A'	1
Goneo Group 'A'	0
Gotion High-Technology 'A'	0
Great Wall Motor 'A'	1
Gree Electrical Appliances 'A'	0
Guangdong Haid Group 'A'	0
Guangzhou Automobile Group 'A'	1

Guangzhou Tinci Materials Technology 'A'	1
Guinness Flight Securities 'A'	0
Guolian Minsheng Securities 'A'	0
Guosen Securities 'A'	0
Guotai Haitong Securities 'A'	0
Haier Smart Home 'A'	0
Hainan Airport Infrastructure 'A'	0
Hangzhou HIK Vision Digital Technology 'A'	0
Hangzhou Silan Microelectronics 'A'	0
Hangzhou Tigermed Consulting 'A'	0
Henan Shuanghui Investment and Development 'A'	0
Hengli Petro 'A' 'A'	1
Hithink Royalflush Information Network 'A'	0
Hongta Securities 'A'	0
Hoshine Silicon Industry 'A'	1
Huadian New Energy Group 'A'	1
Huadian Power International 'A'	1
Huadong Medicine 'A'	0
Huali Industrial Group 'A'	0
Huaneng Lancang River Hydropower 'A'	1
Huaneng Power International 'A'	1
Huaqin Technology 'A'	0
Huatai Securities 'A'	0
Huaxia Bank 'A'	0
Huayu Automotive Systems 'A'	1
Huizhou Desay SV Automotive 'A'	1
Hundsun Technologies 'A'	0
Hygon Information Technology 'A'	0
Iflytek 'A'	0
Imeik Technology Development 'A'	0
Industrial and Commercial Bank of China 'A'	0
Industrial Bank 'A'	0
Industrial Securities 'A'	0
Inner Mongolia Baotou Steel Union 'A'	1
Inner Mongolia Yili Industrial Group 'A'	0
Inspur Electronic Information Industry 'A'	0
Isoftstone Information Technology (Group) 'A'	0
JA Solar Technology 'A'	1
Jcet Group 'A'	0
Jiangsu Eastern Shenghong 'A'	1
Jiangsu Expressway 'A'	1
Jiangsu Hengli Hydraulic 'A'	1
Jiangsu Hengrui Medicine 'A'	0

Jiangsu Kings Luck BRJST 'A'	0
Jiangsu Yanghe Brewery Joint Stock 'A'	0
Jiangsu Zhongtian Technologies 'A'	0
Jiangxi Copper 'A'	1
Jinko Solar 'A'	1
Jonhon Optronic Technology 'A'	0
Kuang-Chi Technologies 'A' D	1
Kunlun Technology 'A'	0
Kweichow Moutai 'A'	0
LB Group 'A'	1
Lens Technology 'A'	0
Lingyi Itech (Guangdong) 'A'	0
Longi Green Energy Technology 'A'	1
Loongson Technology 'A'	0
Luxshare Precision Industry 'A'	0
Luzhou LAO Jiao 'A'	0
Mango Excellent Media 'A'	0
Maxscend Microelectronics 'A'	0
Metallurgical Corporation of China 'A'	1
Midea Group 'A'	0
Montage Technology 'A'	0
Muyuan Foods 'A'	0
Nari Technology 'A'	0
National Silicon Industry Group 'A'	0
Naura Technology Group 'A'	0
New China Life Insurance 'A'	0
New Hope Liuhe 'A'	0
Ningbo Deye Technology 'A'	0
Ningbo Tuopu Group 'A'	1
Ningbo Zhoushan Port 'A'	1
Ningxia Baofeng Energy Group 'A'	1
Omnivision Integrated Circuits Group 'A'	0
Orient Securities 'A'	0
Petrochina 'A'	1
Pharmaron Beijing 'A'	0
Ping An Bank 'A'	0
Ping An Insurance (Group) Company of China 'A'	0
Poly Developments and Holdings Group 'A'	0
Postal Savings Bank of China 'A'	0
Power Construction Corporation of China 'A'	1
Qingdao Port International 'A'	1
Qinghai Salt Lake Industry 'A'	1
RG Intelligent Computing Technology Group 'A'	0

Rockchip Electronics 'A'	0
Rongsheng Petro Chemical 'A'	1
S F Holdings 'A'	1
Saic Motor 'A'	1
Sailun Group 'A'	1
Sany Heavy Industry 'A'	1
Satellite Chemical 'A'	1
Sdic Capital 'A'	0
Sdic Power Holdings 'A'	1
Semiconductor Manufacturing International Corporation 'A'	0
Seres Group 'A'	1
SG Micro 'A'	0
Shaanxi Coal Industry 'A'	1
Shandong Gold-Mining 'A'	1
Shandong Hualu- Hengsheng Chemical 'A'	1
Shandong Nanshan Aluminum 'A'	1
Shanghai Baosight Software 'A'	0
Shanghai Fosun Pharmaceutical (Group) 'A'	0
Shanghai International Airport 'A'	1
Shanghai International Port Group 'A'	1
Shanghai Pharmaceutical Holdings 'A'	0
Shanghai Pudong Development Bank 'A'	0
Shanghai Raas Blood Products 'A'	0
Shanghai Rural Commercial Bank 'A'	0
Shanghai United Imaging Healthcare 'A'	0
Shanjin International Gold 'A'	1
Shanxi Xinghuacun Fen Wine Factory 'A'	0
Shanxi Xishan C and Ely Power 'A'	1
Shengyi Technology 'A'	0
Shennan Circuits 'A'	0
Shenwan Hongyuan Group 'A'	0
Shenzhen Inovance Technology 'A'	1
Shenzhen Mindray Bmed Electronics 'A'	0
Shenzhen New Industries Biomedical Engineering 'A'	0
Shenzhen Transsion Holdings 'A'	0
Sichuan Biokin Pharmaceutical 'A'	0
Sichuan Chuantou Energy 'A'	1
Sichuan Kelun Pharmaceutical 'A'	0
Sichuan Road and Bridge 'A'	1
Sieyuan Electric 'A'	0
Spring Airlines 'A'	0
Sungrow Power Supply 'A'	1
Suzhou Dongshan Precision Manufacturing 'A'	1

Suzhou TFC Optical Communication 'A'	0
Tbea 'A'	0
TCL Technology Group 'A'	0
The Peop S Incm (Group) Ofch 'A'	0
Tianqi Lith Industries 'A'	1
Tongling Nonferrous Metals Group 'A'	1
Tongwei 'A'	1
Tsingtao Brewery 'A'	0
Unigroup Guoxin Microelectronics 'A'	0
Unisplendour 'A'	0
Victory Giant Technology Huizhou 'A'	0
Wanhua Chemical Group 'A'	1
Weichai Power 'A'	1
Wens Foodstuff Group 'A'	0
Wuliangye Yibin 'A'	0
WUS Printed Circuit (Kunshan) 'A'	0
Wuxi Apptec 'A'	0
XCMG Construction Machinery 'A'	1
Xinjiang Daqo New Energy 'A'	1
Yankuang Energy Group 'A'	1
Yealink Network Technology 'A'	0
Yihai Kerry Arawana Holdings 'A'	0
Yonyou Network Technology 'A'	0
YTO Express 'A'	1
Yunnan Aluminium 'A'	1
Yunnan Baiyao Group 'A'	0
Yutong Bus 'A'	1
Zangge Mining 'A'	1
Zhangzhou Pientzehuang Pharmaceuticals 'A'	0
Zhejiang China Commodities City Group 'A'	0
Zhejiang Chint Electrics 'A'	0
Zhejiang Dahua Technology 'A'	0
Zhejiang Huayou COB 'A'	1
Zhejiang Jingsheng MCL and ECL 'A'	0
Zhejiang Juhua 'A'	1
Zhejiang NHU 'A'	0
Zhejiang Sanhua Intelligent 'A'	0
Zhejiang Zheneng Electric Power 'A'	1
Zheshang Securities 'A'	0
Zhongji Innolight 'A'	0
Zhongjin Gold 'A'	1
Zhongtai Securities 'A'	0
Zhuzhou CRRC Times Electric 'A'	1

Zijin Mining Group 'A'	1
Zoomlion Heavy Industry Science and Technology 'A'	1
ZTE 'A'	0

Appendix 4. 5-day & 10-day event window – Results

EU Taxonomy (5-day window)

		Constant Return	Market Adjusted	CAPM
S.E.	Stdev	0,0091	0,0038	0,0037
	Stdev(10)	0,0288	0,0120	0,0118
	Stdev(21)	0,1320	0,0550	0,0543
Return (CAR)	Event	-0,62 %	-0,09 %	-0,05 %
	Anticipation	-1,22 %	-0,36 %	-0,28 %
	Adjustment	-0,57 %	-0,35 %	-0,33 %
	Total (EW)	-2,41 %	-0,81 %	-0,66 %
t-stat (5%)	Event	-0,69	-0,25	-0,13
t-stat (10%)	Anticipation	-0,42	-0,30	-0,24
	Adjustment	-0,20	-0,30	-0,28
	Total (EW)	-0,18	-0,15	-0,12

EU Taxonomy (10-day window)

		Constant Return	Market Adjusted	CAPM
S.E.	Stdev	0,0091	0,0037	0,0037
	Stdev(10)	0,0287	0,0118	0,0117
	Stdev(21)	0,1317	0,0543	0,0536
Return (CAR)	Event	-0,62 %	-0,09 %	-0,05 %
	Anticipation	-0,18 %	0,02 %	0,08 %
	Adjustment	-2,36 %	-0,39 %	-0,20 %
	Total (EW)	-3,16 %	-0,46 %	-0,17 %
t-stat (5%)	Event	-0,69	-0,25	-0,13
t-stat (10%)	Anticipation	-0,06	0,02	0,07
	Adjustment	-0,82	-0,33	-0,17
	Total (EW)	-0,24	-0,08	-0,03

EU Taxonomy Adoption (5-day window)

		Constant Return	Market Adjusted	CAPM
	Stdev	0,0086	0,0050	0,0049
S.E.	Stdev(10)	0,0273	0,0158	0,0155
	Stdev(21)	0,1249	0,0726	0,0708
	Event	0,74 %	0,22 %	0,29 %
Return (CAR)	**Anticipation**	-0,65 %	0,07 %	0,01 %
	Adjustment	0,09 %	0,48 %	0,46 %
	Total (EW)	0,18 %	0,77 %	0,77 %
t-stat (5%)	**Event**	0,86	0,43	0,60
t-stat (10%)	**Anticipation**	-0,24	0,04	0,01
	Adjustment	0,03	0,30	0,30
	Total (EW)	0,01	0,11	0,11

EU Taxonomy Adoption (10-day window)

		Constant Return	Market Adjusted	CAPM
	Stdev	0,0088	0,0050	0,0049
S.E.	Stdev(10)	0,0279	0,0158	0,0155
	Stdev(21)	0,1280	0,0726	0,0708
	Event	0,77 %	0,22 %	0,30 %
Return (CAR)	**Anticipation**	0,54 %	0,98 %	1,01 %
	Adjustment	-3,23 %	1,06 %	0,64 %
	Total (EW)	-1,92 %	2,26 %	1,95 %
t-stat (5%)	**Event**	0,88	0,43	0,60
t-stat (10%)	**Anticipation**	0,19	0,62	0,65
	Adjustment	-1,16	0,67	0,42
	Total (EW)	-0.15	0.31	0.27

CBAM (5-day window)

		Constant Return	Market Adjusted	CAPM
S.E.	Stdev	0,0086	0,0082	0,0086
	Stdev(10)	0,0272	0,0258	0,0272
	Stdev(21)	0,1245	0,1183	0,1245
Return (CAR)	Event	-0,08 %	-0,24 %	-0,24 %
	Anticipation	0,95 %	0,41 %	0,64 %
	Adjustment	-1,66 %	-1,57 %	-1,97 %
	Total (EW)	-0,79 %	-1,40 %	-1,56 %
t-stat (5%)	Event	-0,10	-0,29	-0,28
t-stat (10%)	Anticipation	0,35	0,16	0,24
	Adjustment	-0,61	-0,61	-0,72
	Total (EW)	-0,06	-0,12	-0,13

CBAM (10-day window)

		Constant Return	Market Adjusted	CAPM
S.E.	Stdev	0,0085	0,0051	0,0049
	Stdev(10)	0,0270	0,0160	0,0156
	Stdev(21)	0,1238	0,0732	0,0717
Return (CAR)	Event	-0,08 %	0,16 %	0,14 %
	Anticipation	1,37 %	0,99 %	1,11 %
	Adjustment	-1,73 %	0,39 %	0,21 %
	Total (EW)	-0,44 %	1,54 %	1,46 %
t-stat (5%)	Event	-0,09	0,31	0,29
t-stat (10%)	Anticipation	0,51	0,62	0,71
	Adjustment	-0,64	0,25	0,13
	Total (EW)	-0,04	0,21	0,20

CBAM Adoption (5-day window)

		Constant Return	Market Adjusted	CAPM
S.E.	Stdev	0,0108	0,0092	0,0108
	Stdev(10)	0,0341	0,0292	0,0341
	Stdev(21)	0,1564	0,1336	0,1564
Return (CAR)	Event	-0,33 %	-0,45 %	-0,40 %
	Anticipation	0,72 %	-0,11 %	0,58 %
	Adjustment	1,21 %	0,26 %	1,08 %
	Total (EW)	1,61 %	-0,30 %	1,26 %
t-stat (5%)	Event	-0,30	-0,49	-0,37
t-stat (10%)	Anticipation	0,21	-0,04	0,17
	Adjustment	0,36	0,09	0,32
	Total (EW)	0,10	-0,02	0,08

CBAM Adoption (10-day window)

		Constant Return	Market Adjusted	CAPM
S.E.	Stdev	0,0108	0,0052	0,0052
	Stdev(10)	0,0342	0,0165	0,0165
	Stdev(21)	0,1565	0,0758	0,0757
Return (CAR)	Event	-0,32 %	0,12 %	0,12 %
	Anticipation	0,38 %	-0,29 %	-0,38 %
	Adjustment	0,16 %	0,36 %	0,29 %
	Total (EW)	0,22 %	0,19 %	0,02 %
t-stat (5%)	Event	-0,29	0,23	0,22
t-stat (10%)	Anticipation	0,11	-0,18	-0,23
	Adjustment	0,05	0,22	0,17
	Total (EW)	0,01	0,03	0,00

Green Deal (5-day window)

		Constant Return	Market Adjusted	CAPM
	Stdev	0,0080	0,0037	0,0037
S.E.	Stdev(10)	0,0254	0,0117	0,0117
	Stdev(21)	0,1166	0,0537	0,0537
	Event	0,39 %	0,21 %	0,20 %
Return (CAR)	**Anticipation**	-0,74 %	-0,17 %	-0,17 %
	Adjustment	1,15 %	-0,20 %	-0,20 %
	Total (EW)	0,80 %	-0,17 %	-0,17 %
t-stat (5%)	**Event**	0,48	0,56	0,55
t-stat (10%)	**Anticipation**	-0,29	-0,15	-0,15
	Adjustment	0,45	-0,17	-0,17
	Total (EW)	0,07	-0,03	-0,03

Green Deal (10-day window)

		Constant Return	Market Adjusted	CAPM
	Stdev	0,0081	0,0037	0,0037
S.E.	Stdev(10)	0,0257	0,0118	0,0118
	Stdev(21)	0,1178	0,0542	0,0542
	Event	0,41 %	0,21 %	0,21 %
Return (CAR)	**Anticipation**	1,44 %	-0,22 %	-0,23 %
	Adjustment	2,01 %	0,06 %	0,05 %
	Total (EW)	3,87 %	0,04 %	0,03 %
t-stat (5%)	**Event**	0,51	0,55	0,55
t-stat (10%)	**Anticipation**	0,56	-0,19	-0,19
	Adjustment	0,78	0,05	0,04
	Total (EW)	0,33	0,01	0,01

CSRD (5-day window)

		Constant Return	Market Adjusted	CAPM
S.E.	Stdev	0,0094	0,0052	0,0051
	Stdev(10)	0,0298	0,0166	0,0160
	Stdev(21)	0,1367	0,0759	0,0735
Return (CAR)	Event	1,07 %	0,53 %	0,61 %
	Anticipation	-2,67 %	-0,48 %	-0,81 %
	Adjustment	0,59 %	0,27 %	0,31 %
	Total (EW)	-1,02 %	0,32 %	0,11 %
t-stat (5%)	Event	1,13	1,01	1,19
t-stat (10%)	Anticipation	-0,90	-0,29	-0,50
	Adjustment	0,20	0,16	0,20
	Total (EW)	-0,07	0,04	0,02

CSRD (10-day window)

		Constant Return	Market Adjusted	CAPM
S.E.	Stdev	0,0094	0,0052	0,0050
	Stdev(10)	0,0297	0,0165	0,0159
	Stdev(21)	0,1359	0,0754	0,0730
Return (CAR)	Event	1,08 %	0,53 %	0,61 %
	Anticipation	-1,16 %	-0,21 %	-0,37 %
	Adjustment	0,40 %	0,17 %	0,20 %
	Total (EW)	0,31 %	0,49 %	0,44 %
t-stat (5%)	Event	1,15	1,01	1,21
t-stat (10%)	Anticipation	-0,39	-0,13	-0,23
	Adjustment	0,13	0,11	0,12
	Total (EW)	0,02	0,06	0,06

CSDDD (5-day window)

		Constant Return	Market Adjusted	CAPM
S.E.	Stdev	0,0119	0,0053	0,0052
	Stdev(10)	0,0376	0,0167	0,0163
	Stdev(21)	0,1724	0,0766	0,0748
Return (CAR)	Event	-0,92 %	-0,67 %	-0,59 %
	Anticipation	-1,43 %	-0,25 %	0,00 %
	Adjustment	1,81 %	1,73 %	1,79 %
	Total (EW)	-0,53 %	0,81 %	1,20 %
t-stat (5%)	Event	-0,77	-1,27	-1,15
t-stat (10%)	Anticipation	-0,38	-0,15	0,00
	Adjustment	0,48	1,03	1,10
	Total (EW)	-0,03	0,11	0,16

CSDDD (10-day window)

		Constant Return	Market Adjusted	CAPM
S.E.	Stdev	0,0118	0,0054	0,0053
	Stdev(10)	0,0373	0,0169	0,0167
	Stdev(21)	0,1711	0,0776	0,0765
Return (CAR)	Event	-0,94 %	-0,67 %	-0,60 %
	Anticipation	-4,93 %	-2,27 %	-1,76 %
	Adjustment	0,23 %	1,74 %	2,09 %
	Total (EW)	-5,65 %	-1,19 %	-0,28 %
t-stat (5%)	Event	-0,80	-1,25	-1,14
t-stat (10%)	Anticipation	-1,32	-1,34	-1,06
	Adjustment	0,06	1,03	1,25
	Total (EW)	-0,33	-0,15	-0,04

CSDDD Adoption (5-day window)

		Constant Return	Market Adjusted	CAPM
S.E.	Stdev	0,0082	0,0050	0,0049
	Stdev(10)	0,0258	0,0157	0,0156
	Stdev(21)	0,1184	0,0722	0,0715
Return (CAR)	Event	-0,62 %	-0,30 %	-0,31 %
	Anticipation	0,14 %	0,65 %	0,62 %
	Adjustment	-0,33 %	0,21 %	0,18 %
	Total (EW)	-0,80 %	0,55 %	0,49 %
t-stat (5%)	Event	-0,76	-0,61	-0,63
t-stat (10%)	Anticipation	0,06	0,41	0,40
	Adjustment	-0,13	0,13	0,11
	Total (EW)	-0,07	0,08	0,07

CSDDD Adoption (10-day window)

		Constant Return	Market Adjusted	CAPM
S.E.	Stdev	0,0114	0,0053	0,0048
	Stdev(10)	0,0359	0,0168	0,0151
	Stdev(21)	0,1647	0,0769	0,0691
Return (CAR)	Event	-0,76 %	-0,33 %	-0,31 %
	Anticipation	0,59 %	1,55 %	1,49 %
	Adjustment	-0,55 %	0,47 %	0,42 %
	Total (EW)	-0,73 %	1,69 %	1,59 %
t-stat (5%)	Event	-0,67	-0,62	-0,65
t-stat (10%)	Anticipation	0,16	0,92	0,99
	Adjustment	-0,15	0,28	0,28
	Total (EW)	-0,04	0,22	0,23