Online-Appendix

„ESG Regulation Across the Globe:

Does ESG Regulation Pay Off?“

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Appendix

Appendix 1. Summary of regulations (source: own representation)

The table summarizes the regulations reviewed in Chapter 2. It provides information on the country or jurisdiction, the name of the regulation including a hyperlink to the original law (where available), the issuer of the regulation with its effective date in parentheses, the main content disclosure requirements, and the scope of application. It also indicates whether the law is considered a broad ESG disclosure regime, or a targeted regulation aimed at a specific group of companies (e.g. large emitters) or a limited reporting outcome (e.g. GHG emissions). The last column lists the studies analyzed in Chapter 3 of the paper that are based on the respective regulation. The regulations are listed in the order in which they appear in the text of the paper (sorted by year, first the broad regulations, then the targeted regulations per country).

Country	**Regulation (incl. link)**	**Issuer *(effective)***	**Key content disclosure requirements**	**Scope of application**	**Broad/ targeted**	**Studies**
EU	Non-Financial Disclosure Directive (NFRD, Directive 2014/95/EU)	European Parliament and Council *(2017)*	Recital 7: disclosure of non-financial information at least on the following matters: - Environmental matters (i.e., impact on environment and health and safety, energy use, GHG emissions, water use and air pollution) - Social and employee matters (e.g., gender equality, working conditions, dialogue with local communities, etc.) - Human rights protection - Anti-corruption and anti-bribery matters - Board diversity (for certain large companies) Recital 6: in relation to these matters, provide information on the company's development, performance, position, and impact	Large public interest entities with - > 500 employees - net turnover of > EUR 40 million - balance sheet total of > EUR 20 million	broad	Aureli, Del Baldo, et al. (2020) Arvidsson and Dumay (2022) Cicchiello et al. (2023) Cordazzo et al. (2020) Cuomo et al. (2022) Fiechter et al. (2022) Grewal et al. (2019) Mion & Adaui (2020) Mittelbach-H. et al. (2021) Ottenstein et al. (2022) Veltri et al. (2020)

Country	Regulation (incl. link)	Issuer *(effective)*	Key content disclosure requirements	Scope of application	Broad/ targeted	Studies
EU	Corporate Sustainability Reporting Directive (CSRD, Directive 2022/2464/EU)	European Parliament and Council *(2024)*	ESG Reporting according to the ESRS standards: - Environmental matters (climate, pollution, water and marine resources, biodiversity and ecosystems, resource use and circular economy) - Social matters (own workforce, workers in the value chain, affected communities, consumers and end users) - Governance (business conduct) Disclosure requirements apply to the following areas: - Governance - Strategy - Impact, risk, and opportunity management - Metrics and targets Additional industry-specific standards	- Large companies - Listed SMEs (except micro-enterprises) - Third-country companies with net turnover >EUR 150mn in the EU, whose subsidiaries fulfil size thresholds or whose branches have a turnover of > EUR 40mn	broad	
EU	EU Taxonomy (Regulation (EU) 202/852)	European Parliament and Council *(2020)*	- Classification system to establish a common understanding of economic activities that are environmentally sustainable - Requirement to disclose proportion of sustainable economic activities (through the *Disclosure Delegated Act*) Criteria: - Contributes to at least one of the environmental objectives - No harm of any other environmental objective - Complies with minimum safeguards of regulation - Complies with technical screening criteria Environmental objectives: - Climate change mitigation - Climate change adaptation - Protection of water and marine resources - Transition to a circular economy - Pollution prevention and control - Protection/ restoration of biodiversity and ecosystems	All companies subject to NFRD (and certain financial market participants)	broad	
Germany	Act on Corporate Due Diligence in Supply Chains (Lieferkettensorgfaltspflichtengesetz)	Bundestag *(2023)*	Disclosure of the fulfilment of due diligence obligations of the regulation (Paragraph 10(2)): - Human rights and environmental risks and violations (own operations, direct and indirect supplier's operations) - Measures implemented to fulfil its due diligence obligations - Assessment of the impact and effectiveness of the measures - Implications of the assessment for future measures	- Companies with >3,000 employees in Germany from 2023 - companies with >1,000 employees from 2024	targeted	

Country	Regulation (incl. link)	Issuer *(effective)*	Key content disclosure requirements	Scope of application	Broad/ targeted	Studies
France	Bilan Social	Government of France *(1977)*	Article L. 438-1: Disclosure of 134 social indicators (employment-related matters)	Companies with more than 300 employees	broad	
France	New Economic Regulations (NRE)	Government of France *(2001)*	Article 116 of NRE: Disclosure of social and environmental impact	All publicly listed French companies	broad	Chauvey et al. (2015)
France	Loi Grenelle I and Loi Grenelle II	Government of France *(2009/2010)*	Article 225 of Law n° 2010-788 Disclosure of over 40 ESG-related topics: - Social matters (incl. employment, health and safety, etc.) - Environmental matters (incl. Energy consumption, waste management, pollution management, etc.) Commitments to sustainable developments (human rights, social impacts, etc.)	All companies with more than 500 employees	broad	
France	French Corporate Duty Of Vigilance Law	Government of France *(2017)*	Disclosure of a vigilance plan, how the company conducts due diligence (of their direct and indirect operations) to protect: - human rights - health and safety of the society the environment	French (international) companies with more than 5,000 (10,000) employees in France	broad	
UK	Companies Act 2006 - Business Review	Parliament of the United Kingdom *(2006)*	Section 417: Business review disclosure on - Environmental matters - Employee matters - Social and community matters	UK Quoted Companies	broad	
UK	The Companies Act 2006 (Strategic Report and Directors' Report) Regulations 2013	Parliament of the United Kingdom *(2013)*	- Non-financial KPIs concerning environmental and employee matters (section 414C subsection 4(b)) - Principal risks and uncertainties, incl. ESG issues (section 414C subsection 2(b)) - Information on environmental matters, employee matters, social, community and human rights matters (section 414C subsection 7(b)) - Gender diversity (section 414C subsection 8(c)) - Scope 1 and 2 GHG emissions (part 7)	UK Quoted Companies	broad	Boamah (2022) Downar et al. (2021) Hummel and Rötzel (2019) Jouvenot and Krueger (2019) Krueger (2015)
UK	The Companies (Strategic Report) (Climate-related	Parliament of the United Kingdom *(2022)*	Replacement of the *Non-Financial Information Statement* with the *Non-Financial and Sustainability Information Statement*, alignment of disclosure with TCFD Recommendations	- Listed companies and UK-based AIM > 500 employees	broad	

Country	Regulation (incl. link)	Issuer *(effective)*	Key content disclosure requirements	Scope of application	Broad/ targeted	Studies
	Financial Disclosure) Regulations 2022			- LLPs and non-listed companies > 500 employees and turnover > GBP 500m		
UK	Modern Slavery Act 2015	Parliament of the United Kingdom *(2015)*	Section 54: Transparency in supply chains clause - Disclosure of an annual slavery and human trafficking statement, including information on measures taken to prevent such matters in the supply chain	Commercial companies operating in the UK with a turnover > GBP 36 million	targeted	Cousins et al. (2020)
UK	Gender Pay Gap Reporting	UK Government *(2017)*	Disclosure of the gender pay gap	Companies with more than 250 employees	targeted	
US (federal level)	Interpretive Guidance Regarding Disclosure Related to Climate Change	Securities and Exchange Commission (SEC) *(2010)*	Consideration of material climate change matters as part of annual statements	SEC-registered companies	broad	
US (federal level)	Enhancement and Standardization of Climate-Related Disclosures for Investors (Proposed rule)	SEC *(2022)*	Climate-related information, including: - Climate-related risks and (potential) impacts on the company's business, strategy, and outlook - Governance of climate-related risks and risk management processes - GHG emissions (incl. assurance for accelerated and large accelerated filers and with respect to certain emissions) - Certain climate-related financial statement metrics and related disclosures - Information about climate-related targets and goals, and transition plan	SEC-registered companies	broad	
US (federal level)	Dodd-Frank Wall Street Reform and Consumer Protection Act	US Congress, SEC *(2010)*	Section 1502: Conflict mineral disclosure Requirement to disclose the use of conflict minerals (tantalum, tin, gold, or tungsten) sourced from the Democratic Republic of the Congo or a neighboring country Section 1503: Mine-safety disclosure Requirement for mine owners to disclosure citations for violations	SEC-registered companies	targeted	Section 1502: Elayan et al. (2021) Swift et al. (2019) Section 1503:

Country	Regulation (incl. link)	Issuer *(effective)*	Key content disclosure requirements	Scope of application	Broad/ targeted	Studies
			of mine-safety regulations both regularly in financial reports and immediately in case of imminent danger odder (IDO) Section 1504: Disclosure of payment by resource extraction issuers Requirement to disclose payments made to US or foreign governments for the purpose of the commercial development of oil, natural gas or minerals by companies in the extractive industries			Christensen et al. (2017) Section 1504: Healy and Serafeim (2020)
US (federal level)	NASDAQ's Board Diversity Rule	SEC *(2021)*	- Requirement to have at least two diverse board members and otherwise disclose the reason why not - Requirement to disclose diversity statistics of board members	Nasdaq-listed companies	targeted	
US (federal level)	Rules on Cyber-security	SEC *(2023)*	- Requirement to report material cybersecurity risk within four business days - Annual reporting requirement of cybersecurity risk management, strategy, and governance	Public companies	targeted	
US (federal level)	Greenhouse Gas Reporting Program (GHGRP)	Environmental Protection Agency (EPA) *(2010)*	Annual reporting of GHG information	Large US direct emissions sources (>25.000 metric tons of carbon dioxide annually)	targeted	Bauckloh (2023) Tomar (2023)
US (federal level)	Toxics Release Inventory (TRI)	EPA *(1987)*	Annual reporting of toxic chemicals emissions (into air, water or land disposal)	Large US facilities involved in manufacturing, metal mining, electric power generation, and hazardous waste	targeted	Doshi et al. (2013)
US (state level)	California Transparency in Supply Chains Act of 2010 (CTSCA)	California Government *(2010)*	Disclosure of due diligence processes applied with respect to human rights abuses in the supply chains	Large manufacturers and retailers (> USD 100 m annual gross receipts) doing business in California	targeted	Birkey et al. (2018) She (2022)
US (state level)	The Climate Corporate Data Accountability Act (SB 253)	California Government *(2026)*	Annual disclosure of Scope 1, 2, and 3 GHG emissions	Public and private companies doing business in California > USD 1 billion revenues	targeted	
US (state level)	The Climate-Related	California Government *(2026)*	Annual disclosure of climate-related financial risk according to TCFD guidelines	Public and private companies doing business in California >	targeted	

Country	Regulation (incl. link)	Issuer *(effective)*	Key content disclosure requirements	Scope of application	Broad/ targeted	Studies
	Financial Risk Act (SB 261)			USD 500 million revenues		
India	Business Responsibility Report (BRR)	Securities and Exchange Board of India (SEBI) *(2012)*	Requirement to file a business responsibility report (BRR) including different ESG factors, (i.e., information on anti-corruption and anti-bribery, sustainable sourcing, employee wellbeing, human rights protection, resource consumption, etc.)	Top 100 listed companies by market capitalization (expanded to top 500 firms in 2015 and top 1,000 firms in 2017)	broad	
India	India Companies' Act 2013	Ministry of Corporate Affairs (MCA) *(2014)*	Section 135 (Corporate Social Responsibility Rules): - spending at least 2 % of average net profit (over three years) on ESG activities - disclosure of ESG activities in annual report (i.e., composition of ESG committee, information on ESG policy, activities, and spending) Section 134(3)(m): disclosure of conservation of energy	Companies meeting one of the criteria: Net worth > INR 5bn (USD 60mn), turnover > INR 10bn (USD 120mn), or profit > INR 50mn (USD 0,6mn)	broad	Bell (2021) Dharmapala and Khanna (2018) Manchiragu et al. (2017)
India	Business Responsibility & Sustainability Report (BRSR)	SEBI *(2022)*	Replacement of BRR with more comprehensive BRSR, including reporting in three sections: - General disclosures - Management and process disclosures - Principle-wise performance disclosures along the nine NGRBC principles (integrity, sustainable goods and services, employee well-being, stakeholder responsiveness, human rights, environmental protection, responsible and transparent public policy engagement, inclusive growth, responsible consumer engagement)	Top 1,000 listed entities by market capitalization	broad	
India	BRSR Core	SEBI *(2023)*	Mandatory assurance on BRSR Core disclosure elements (subset of BRSR), new disclosure requirements regarding the value chain for the top 250 listed companies on a comply-or-explain basis	Top 1,000 listed entities by market capitalization	broad	
China	Notice on the Preparation of 2008 Annual Reports of Listed Companies	Shenzhen Stock Exchange (SZSE) *(2008)*	Appendix 3 1. Overview: Brief description of the purpose and philosophy of the company in fulfilling its social responsibility 2. Explanation of the fulfilment of social responsibility, including information on: - Protection of the rights and interests of shareholders and creditors - Protection of the rights and interests of employees	All listed firms on the Shenzhen 100 Index	broad	Chen et al. (2018) Gramlich and Huang (2017) Ioannou and Serafeim (2017) Lu et al. (2021) Xu et al. (2021)

Country	Regulation (incl. link)	Issuer *(effective)*	Key content disclosure requirements	Scope of application	Broad/ targeted	Studies
			- Protection of the rights and interests of suppliers, customers, and consumers - Environmental protection and sustainable development - Public relations and social initiatives 3. Explanation of issues in fulfilling CSR and remedial plans - Explanation in case of non-compliance with regulation, disclosure of major environmental accidents, explanation of measures to resolve the problems - Disclosure of other major issues in fulfilling CSR and its impact on the company, explanation of specific plans and measures for improvement			
China	Notice of Doing a Better Job for Disclosing 2008 Annual Reports	Shanghai Stock Exchange (SSE) *(2008)*	Affected companies are required to publish an ESG report as an attachment to the annual report (Article 10), similar disclosure requirements as the SZSE regulation	- SSE-listed firms in the Corporate Governance Sector - Companies with overseas-listed shares - Financial firms	broad	Chen et al. (2018) Gramlich and Huang (2017) Ioannou and Serafeim (2017) Lu et al. (2021) Xu et al. (2021)
China	Notification on the Issuance of the Guideline on Fulfilling Social Responsibility by Central Enterprises	State-owned Assets Super-vision and Administration Commission (SASAC) *(2008)*	Article 18: Mandatory disclosure of ESG reports by central state-owned enterprises	Central state-owned enterprises	broad	
China	Environmental Protection Law of the People's Republic of China	Chinese Government *(2014)*	Article 55: Major emitters are required to disclose the following information: major pollutants, amount and concentration of emissions, means of emissions, excess emissions, construction and operation of pollution control facilities	Key pollutant discharging enterprises	targeted	
China	Guidelines No. 2 on Contents and Formats of Information	China Securities Regulatory	Disclosure of relevant environmental information	Listed companies identified as key-pollutant discharge companies	targeted	

Country	Regulation (incl. link)	Issuer *(effective)*	Key content disclosure requirements	Scope of application	Broad/ targeted	Studies
	Disclosure by Companies Offering Securities to the Public-Contents and Formats of Annual Reports	Commission (CSRC) *(Revised in 2021)*				
China	Administrative Measures for Legal Disclosure of Corporate Environmental Information	Ministry of Ecology and Environment (MEE) *(2021)*	Chapter 3, Article 12, disclosure in annual reports: 1. Overview on the company's corporate production and environmental protection 2. The environmental management, (i.e., information on administrative licenses for ecological environment, environmental protection tax, etc.) 3. The generation, treatment, and discharge of pollutants 4. Carbon emissions 5. Environmental emergencies, emergency plans and measures 6. Environmental violations 7. Any legally required information to be disclosed from the current year 8. Other environmental information prescribed by laws and regulations	Chapter 2: - Major pollutant discharge units - Companies that are required to conduct mandatory audits for cleaner production - Listed companies accused of environmental violations in the previous year	targeted	
Hong Kong	Environmental, Social, and Governance Reporting Guide (part of the HK Listing Rules, Appendix 27)	Hong Kong Stock Exchange (HKEX) *(2013)*	Part B - Mandatory provisions: - Governance Structure: board's oversight of ESG issues, board's ESG management approach and strategy, board's tracking of progress towards ESG goals and targets - Reporting Principles: Materiality, quantitative measures, consistency - Reporting boundaries: disclosure of the entities and operation included in ESG report Part C - Comply-or-explain provisions: - Environmental aspects: emissions, use of resources, environment and natural resources, climate change - Social aspects: employment, health and safety, development and training, labor standards, supply chain management, product responsibility, anti-corruption, community investment	All listed firms	broad	

Country	Regulation (incl. link)	Issuer *(effective)*	Key content disclosure requirements	Scope of application	Broad/ targeted	Studies
Japan	Japan's Corporate Governance Code	Tokyo Stock Exchange (TSE) *(2021)*	- Sustainability initiatives, investments in human capital, climate-related risks and opportunities in line with TCFD *(Principle 3.1.3)* - Senior management diversity, policies related to human resource development *(Principle 2.4.1)*	Companies listed on the Prime Market	broad	
Japan	Amendments on the Disclosure of Corporate Information	Financial Services Agency (FSA) *(2021)*	Disclosure of sustainability-related information: - Governance - Risk management - Strategy - Metrics and Targets (incl. Scope 1 and 2 emissions) Disclosure of diversity information	All listed companies in Japan	broad	
Japan	Act on the Rational Use of Energy	Government of Japan *(1979)*	Disclosure of energy consumption	High energy consuming factories	targeted	
Japan	Mandatory Greenhouse Gas Accounting and Reporting System	Government of Japan *(2006)*	Article 21-2 of the Act on Promotion of Global Warming Countermeasures: disclosure of GHG emissions	Major emitters (> 3.000 t annual CO2 emissions)	targeted	
Malaysia	Main Market Listing Requirements	Bursa Malaysia *(2007)*	Disclosure of ESG activities (no specific content requirement)	All publicly listed companies	broad	Ioannou and Serafeim (2017)
Malaysia	Sustainability Statement - Listing Requirements	Bursa Malaysia *(2015)*	Mandatory disclosure of a Sustainability Statement as part of the Listing Requirements: material risks and opportunities related to economic, environmental, and social matters	All publicly listed companies	broad	
Malaysia	Sustainability Statement - Listing Requirements *(update)*	Bursa Malaysia *(2023)*	- Disclosure of specific ESG matters, including impacts related to the following sustainability matters: anti-corruption, community/society, diversity, energy management, health and safety, labor practices and standards, supply chain management, data privacy and security, water and waste management, and emissions management (incl. Scope 1, 2, and 3 emissions) - Provision of historic sustainability data of the last three years - TCFD-aligned disclosures for Main Market listed companies - Statement of assurance	All publicly listed companies	broad	

Country	**Regulation (incl. link)**	**Issuer *(effective)***	**Key content disclosure requirements**	**Scope of application**	**Broad/ targeted**	**Studies**
Australia	Consultation paper: Climate-related financial disclosure	Australian Government *(tba)*	- Closely aligned with the ISSB framework - Climate risk governance - Impact of climate related risks and opportunities on business model, value chain, strategy, and financial performance - Climate-related risk management processes - ESG metrics and targets (incl. Scope 1-3 GHG emissions)	Public and private large companies and SMEs (in a staggered manner)	broad	
Australia	National Greenhouse and Energy Reporting Act 2007 (NGER)	Australian Government *(2007)*	- GHG emissions (Scope 1 and 2) - Energy production - Energy consumption	Largest carbon emitting entities: corporate Group (facility) threshold: >50 (25) kt scope 1 & 2 GHG emissions, >200 (100) TJ energy production, or >200 (100) TJ energy consumption	targeted	
Australia	Modern Slavery Act 2018	Australian Government *(2018)*	- Disclosure of risks of modern slavery in companies' operations and supply chains - Actions to address those risks	Australian companies or companies operating in Australia with > AUD 100 million annual consolidated revenues	targeted	
Brazil	Resolution No. 59	Brazilian Securities Commission (CVM) *(2023)*	ESG disclosure requirements including: - whether ESG information is included in annual reporting, and where - which methodology is applied - whether SDGs are considered - whether information is externally assured - whether TCFD (or another framework) has been applied - environmental and social risks and mitigation measures/ policies - GHG emission inventory (and scope, if applicable) - diversity information of employees	All listed companies	broad	
Brazil	Resolution No. 193	CVM *(2026)*	ESG disclosure in line with the IFRS Foundation's ISSB reporting standards, mandatory assurance	All listed companies	broad	
Brazil	ANEEL Requirements for Annual	Agencia Nacional de Energia	Requirement to disclose an annual sustainability report	Energy utility companies	targeted	

Country	**Regulation (incl. link)**	**Issuer *(effective)***	**Key content disclosure requirements**	**Scope of application**	**Broad/ targeted**	**Studies**
	Sustainability Report	Eletrica (ANEEL) *(2006)*				
Chile	General Rule No. 461	Financial Market Commission (CMF) *(2021)*	Amendment of General Rule No. 30, replacement of General Rule No. 385: - Paragraph 3.6: inclusion of sustainability and governance information in annual reports - Paragraph 8.2: industry specific ESG metrics aligned with SASB requirements	Listed companies and financial institutions	broad	
Argentina	Law 2594	Buenos Aires City Council *(2008)*	Disclosure of ESG impact (incl. of the supply chain) in line with GRI's reporting requirements	All companies in Buenos Aires with more than 300 employees	targeted	
Canada	National Instrument 51-102 - Continuous Disclosure Obligations	Canadian Securities Administrators (CSA) *(2004)*	Disclosure of material ESG-related risks as part of continuous reporting documents	Listed companies	broad	
Canada	Proposed National Instrument 51-107 Disclosure of Climate-related Matters	CSA *(tba)*	Disclosure of comprehensive ESG-related information in line with TCFD recommendations (proposal)	Listed companies	broad	
Canada	Greenhouse Gas Reporting Program (GHGRP)	Government of Canada *(2004)*	Section 46 of the Canadian Environmental Protection Act: Disclosure of annual GHG emissions	Facilities with > 10,000 tons GHG emissions annually	targeted	
South Africa	JSE Listing Requirement Paragraph 8.63; King Code of Governance Principles	Johannesburg Stock Exchange (JSE) *(2010)*	- Requirement to publish an integrated report (as recommended by King IV Code), which includes disclosure of material ESG-related information - Specific disclosure requirements for mineral companies: ○ environmental management and funding (paragraph 12.13(iii)(13)) ○ major environmental issues (paragraph 12.10(h)(viii))	JSE-listed companies	broad	Ioannou and Serafeim (2017) Barth et al. (2017)

Appendix 2. Summary literature review (source: own representation)

The table lists the literature reviewed in Chapter 3 of the paper. It provides a summary of each research question (with the respective variable of interest in italics where applicable), the research design used, the observed effect on the variable of interest, and the key findings. Studies are listed in the order in which they appear in the text of the paper.

Reference	Research question	Research design	Impact	Main findings
Panel A. ESG disclosure				
A.1 *Quantity of ESG disclosure*				
Fiechter et al. (2022)	Impact of NFRD on 1. ESG transparency - quantity *(number of reporting companies & global scope of report)* - quality *(reporting standard adoption & independent assurance)* 2. ESG activities *(overall, environmental, and social pillar scores)*	Country: EU Industry: All Mandate: NFRD Time period: 2011 - 2018 N: 4,608 EU and 4,608 US firm-year observations, 576 firms, respectively Method: Difference-in difference (DID) analysis with propensity score matched sample of US firms, yearly treatment effects	1. (+) 2. (+)	1. Improvement in ESG reporting score - Increase in the number of reporting companies and reporting scope - Increase in comparability and credibility of ESG reports (with stronger effect for companies with prior low reporting levels) 2. Significant average increase in ESG activities (due to stakeholder pressure and benchmarking effects) - effects materialize already after enactment of NFRD in 2014 (possibly due to internal learning, increased public awareness, anticipation of future stakeholder reactions) - impact only on social activities, not on environmental activities
Ottenstein et al. (2022)	Impact of the NFRD on 1. ESG reporting quantity *(number of firms and quantity per firm)* 2. ESG reporting quality *(voluntary assurance and reporting standards)*	Country: EU Industry: All Mandate: NFRD Time Period: 2012 - 2018 N: 905 treatment firms Method: DID regression analysis with propensity score matched samples	1. (+) 2. (+)	1. Increase in the number of firms reporting and in the reporting quantity per firm 2. Increase in the overall reporting quality (credibility: increase in voluntary assurance, comparability: no significant effect on adoption of ESG standards)
Cuomo et al. (2022)	Impact of the NFRD on 1. ESG transparency *(number of reporting companies)*	Country: EU Industry: All (except financial) Mandate: NFRD Time period: 2008 - 2018	1. (+) 2. (+)	1. Stronger positive effect on ESG transparency for smaller firms, firms with a high number of analysts following, and firms headquartered in countries with strong legal systems

Reference	Research question	Research design	Impact	Main findings
	2. Social and environmental performance *(scores)* 3. Equity risk and cost of equity	N: 5,732 (4,099) firm-year observations for transparency (performance) analysis Method: DID analysis (EU treatment group, US control group)	3. (+) / (0)	2. Stronger positive effect on ESG performance for smaller firms, and firms with higher investments in R&D. No significant impact of mandated ESG disclosure assurance on ESG performance. 3. Lower systematic risk and cost of equity, no effect on idiosyncratic risk
Mion and Adaui (2020)	Impact of the NFRD on 1. Reporting quantity *(number of ESG reports)* 2. Comparability of disclosures *(reporting standards)*	Country: Germany and Italy Industry: All Mandate: NFRD Time Period: 2016-2017 N: 70 listed companies Method: content analysis, self-constructed evaluation scale	1. (+) 2. (+)	1. Increase in the number of published reports 2. Considerable effect on reporting quality, increase in the adoption of reporting standards
Chauvey et al. (2015)	Impact of NRE on 1. Disclosure quantity *(space allocated ESG disclosure)* 2. Disclosure quality *(Breadth and informational quality)*	Country: France Industry: All Mandate: NRE Time period: 2004 - 2010 N: 81 public French firms Method: multiple regression model	1. (+) 2. (0)	1. Significant increase in the space allocated to ESG disclosure 2. No significant increase in disclosure quality (quality remains low)
Hummel and Rötzel (2019)	1. Impact of regulation on disclosure quantity *(KPIs and narrative disclosure)* 2. Whether the increase is moderated by firms' reporting incentives	Country: UK Industry: All Mandate: The UK Companies Act 2006 Regulations 2013 Time period: 2010 - 2015 N: 1,242 (1,175) firm-year observations for the treatment (control) group Method: textual analysis, DID approach	(+)	1. Significant increase for both types of disclosure 2. Smaller effect for firms with higher reporting incentives (i.e., higher capital market visibility, stronger corporate governance mechanisms and higher prior voluntary sustainability disclosure level)
Ioannou and Serafeim (2017)	The impact of mandatory ESG disclosure on 1. firm value *(Tobin's Q)* 2. ESG disclosure quantity *(disclosure score)*	Country: International (China, Denmark, Malaysia, and South Africa) Industry: All Mandate: Multiple Time period: 2005 - 2012 N: 144 Chinese, 29 Danish, 43	1. (+) 2. (+) 3. (+)	1. Increase in firm value 2. Increase in disclosure quantity 3. Increase in disclosure quality - higher likelihood to obtain assurance voluntarily for improved credibility

Reference	Research question	Research design	Impact	Main findings
	3. ESG disclosure quality *(assurance and reporting guidelines)*	Malaysian, 101 South African treatment firms (treatment group) Method: DID analysis with propensity-score matched sample		- higher likelihood to adopt reporting guidelines for improved comparability
Cordazzo et al. (2020)	1. Impact of ESG disclosure on market value of affected Italian companies *(share price)* 2. Impact on disclosure quantity *(several ESG-related metrics)*	Country: Italy Industry: All Mandate: NFRD Time period: 2016-2017 N: 231 listed Italian companies Method: multivariate analysis using Ohlson model	1. (0) 2. (0)	1. ESG information beyond the financial accounting information do not explain any incremental value-relevant information to investors 2. No significant increase in disclosure quantity
Bell (2021)	1. Influence of mandate on ESG disclosure quantity *(number of ESG-related words)* 2. Peer effects in ESG disclosure *(abnormal disclosure)*	Country: India Industry: All Mandate: Indian Companies Act 2013 Time period: 2013 - 2017 N: 907 firm-year observations (87 treatment group and 87 control group firms) Method: DID analysis, propensity score matching	1. (0) 2. (-)	1. No increase in the number of ESG-related words 2. Significant decrease in ESG disclosure for firms with pre-mandate low disclosure levels (i.e. mandate undermines prior voluntary disclosure)
***A.2** Quality of ESG disclosure*				
Fiechter et al. (2022)			(+)	*See A.1 Disclosure quantity*
Ottenstein et al. (2022)			(+)	*See A.1 Disclosure quantity*
Mion and Adaui (2020)			(+)	*See A.1 Disclosure quantity*
Ioannou and Serafeim (2017)			(+)	*See A.1 Disclosure quantity*
D. M. Christensen et al. (2022)	Impact of ESG disclosure requirements on reporting quality *(Bloomberg's ESG disclosure score)*	Country: International Industry: All Mandate: Multiple Time period: staggered N: 30.700 firm years, 5.637 firms Method: DID analysis	(+)	Mandatory ESG disclosure requirements lead to improvements in the quality of ESG disclosures

Reference	Research question	Research design	Impact	Main findings
Lock and Seele (2016)	Are ESG reports from countries with mandatory ESG disclosure regulations more credible than ESG reports from countries without mandates?	Country: Europe Industry: All Mandate: regulations in Spain, France, and the Netherlands prior to the NFRD Period: 2011 - 2014 N: 237 ESG reports Method: independent samples t-test, self-developed model for quality assessment, comparison of latest published reports	(0)	Companies in countries with mandatory ESG disclosure regimes do not have higher quality reports than those with voluntary disclosure
Chauvey et al. (2015)			(0)	See A.1 Disclosure quantity
Birkey et al. (2018)	Market reaction to events leading to the passage of the CTSCA *(CAR)*	Country: US (California) Industry: Retail Mandate: California Transparency in Supply Chains Act (CTSCA) of 2010 Time period: 2010 N: 105 retail companies Method: OLS regression	(-)	- significant negative impact on CAR - stronger effect for larger companies and companies with higher supply chain risk - general compliance with disclosure mandate but lack of substance of information provided
Panel B. Financial impact				
B.1. *Firm value*				
B.1.1 *Firm value - long term valuation effects*				
Ioannou and Serafeim (2017)			(+)	See A.1 Disclosure quantity
Krueger (2015)	Impact of GHG disclosure mandate on firm-value *(Tobin's Q)*	Country: UK Industry: All Mandate: The Companies Act 2006 (Strategic Report and Director's Report) Regulations 2013 Period: 2008-2014 N: 419 UK Quoted Companies listed on LSE's Main Market (treatment group) Method: DID analysis	(+)	- Significant increase in firm value for firms most affected by the mandate - Stronger positive effects for largest firms and firms in the oil and gas industry - Effects materialize before the mandate comes into force (in 2011)
Swift et al. (2019)	Impact of higher supply chain visibility on	Country: US Industry: Mainly manufacturing	1. (+)	Companies with higher supply chain visibility 1. have higher increases in firm profitability,

Reference	Research question	Research design	Impact	Main findings
	1. Firm profitability *(ROA)* 2. Sales 3. Market valuation *(Tobin's Q)*	Mandate: Section 1502 of Dodd-Frank Act (conflict material disclosure) Time period: 2010-2016 N: 1.180 SEC-registered companies Method: comparison of firms with high and low levels of supply chain visibility	2. (+) 3. (+)	2. experience higher sales growth, and 3. have a higher increase in market valuation as compared to companies with lower visibility These improvements are already observed in the years following the passage of the Act (i.e., before the disclosure regulation becomes effective)
Lu et al. (2021)	Effect of mandatory ESG disclosure regulation on 1. Profitability *(ROA, ROE)* 2. Firm value *(price-to-book ratio)*	Country: China Industry: All Mandate: SSE and SZSE stock exchange disclosure requirements 2008 Time period: 2006 - 2012 N: 236 treatment firms, 843 control firms (6982 firm-year observations) Method: DID analysis	1. (-) 2. (-)	1. Decline in profitability for affected SOE and NSOE firms following the regulation (in the period 2010-2012) 2. Decline in price-to-book ratios for affected SOE and NSOE firms following the regulation
Chen et al. (2018)	Effect of mandatory ESG disclosure regulation on 1. Firm profitability *(ROA, ROE)* 2. Environmental pollution *(Wastewater and SO2 emissions)* 3. Stock market reaction *(CAR)* 4. Firm value *(Tobin's Q)*	Country: China Industry: All Mandate: SSE and SZSE ESG disclosure requirements 2008 Time period: 2006 - 2011 N: 1.674 treatment firm-years, 5.278 benchmark firm-years Method: DID analysis with propensity score matched control group, event study design regarding stock market reaction	1. (-) 2. (+) 3. (-) 4. (-)	1. Decrease in profitability - decrease in ROA (ROE) by 26% (20%) (driven by SOEs) - decrease in sales revenue and CapEx, increase in operating cost and impairment charges 2. Stronger decrease in industrial wastewater and SO2 emission levels (driven by NSOEs) in cities with a higher proportion of affected companies 3. More negative stock market reaction upon announcement of the regulation 4. Decrease in firm value
Mittelbach-Hörmanseder et al. (2021)	Impact of enactment of NFRD on firm value of affected companies and the influence of the institutional environment (*share price*)	Country: EU Industry: All Mandate: NFRD Time period: 2008–2016 N: 3.961 firm-year observations (based on STOXX Europe 600 index) Method: nested Ohlson model	(-)	Negative association between companies' share prices and ESG disclosure following the announcement of NFRD (compared to previous positive or insignificant relationship) - CSR awareness and employee protection have a negative impact on the incremental value-relevance of ESG disclosure

Reference	Research question	Research design	Impact	Main findings
				- The degree of enforcement and strength of the legal environment have a positive impact on the incremental value relevance of ESG disclosure
***B.1.2** Firm value – event studies*				
Grewal et al. (2019)	1. Stock price reaction to events increasing the likelihood of mandated nonfinancial disclosure *(CAR)* 2. Association of stock price reaction with ESG performance ratings and ESG disclosure scores	Country: US, International Industry: All Mandate: NFRD Time period: 2011 - 2014 N: 2,053 (1,249) treatment and control group firms Method: Event study, cross-sectional analysis	(-)	1. Negative market reaction around events increasing the likelihood of NFRD passage 2. Negative market reaction is less pronounced for firms having higher ESG performance pre-directive, and for firms having higher ESG disclosure levels pre-directive
Chen et al. (2018)			(-)	*See B.1.1 Firm value - long term valuation*
Manchiragu and Rajgopal (2017)	1. Stock market reaction to events around passage of ESG disclosure and spending regulation *(CAR)* 2. Effect on firm value (long-term) *(Tobin's Q)*	Country: India Industry: All Mandate: Indian Companies Act 2013 Time period: 2009 - 2013 N: 2,120 firms Method: event study approach with a regression discontinuity design	(-)	1. 4% drop in the stock price around events related to the passage of the regulation. Less negative effect for companies that spend more on advertising. 2. Stronger decrease in Tobin's Q of affected companies in the years with increased likelihood of the passage of the regulation
Birkey et al. (2018)			(-)	*See A.2 Disclosure quality*
Healy and Serafeim (2020)	Market response to events associated with the adoption of mandatory disclosure of payments to foreign governments *(CAR)*	Country: US, International Industry: Oil and Gas Mandate: Section 1504 of the Dodd-Frank Act Time period: 2010 - 2017 N: 26 firms Method: event study approach	(-)	Negative effect on firms' stock price around events that increase the likelihood of the passage of Section 1504
Elayan et al. (2021)	1. Market reaction to regulatory events leading to the adoption of mandatory conflict	Country: US Industry: All Mandate: Section 1502 of the Dodd-Frank Act	(-)	1. Significant negative stock market reaction to the passage of the Act for users of conflict materials (more negative for firms with prior human rights issues, high dependence on conflict materials,

Reference	Research question	Research design	Impact	Main findings
	mineral disclosure *(CAAR)* 2. Market reaction to mandatory conflict mineral disclosures (first-time reporting)	Time period: 2008 - 2014 N: (1) 3.639 firms (regulatory events sample), (2) 1.206 firms (mandatory disclosures on Form SD) Method: Fama–French three factor model, OSL regression		high-tech firms, high financial reporting costs, low transparency; less negative for companies with good reputation and strong monitoring) 2. Negative market reaction to conflict mineral disclosure (limited to companies with prior human rights violations, companies sourcing from the DRC and neighboring countries, companies with ambiguous disclosure; less negative for firms with mitigation strategies)
Cousins et al. (2020)	Stock price reaction around events associated with the adoption of mandatory disclosure regarding modern slavery *(value-weighted return, CAR)*	Country: UK Industry: All Mandate: UK Modern Slavery Act 2015: Transparency in Supply Chains clause Time period: 2012 - 2015 N: 357 firms (205 firms for cross-sectional analysis) Method: Event study approach	(0)	- No evidence of abnormal stock returns - Significant cross-sectional differences in stock price reactions: ○ more negative effect for firms with high slavery risk ○ more positive effect for firms with track record of addressing slavery risk ○ no effects for prior ESG disclosure levels on stock price reactions
B.1.3 *Firm value – first-time reporting*				
Jouvenot and Krueger (2019)	Effect of GHG emissions disclosure regulation on 1. Environmental pollution *(GHG emissions)* 2. Market reaction *(CAR)*	Country: UK Industry: All Mandate: The Companies Act 2006 (Strategic Report and Directors' Report) Regulations 2013 Time period: 2009 - 2016 N: 163 UK treatment firms, 356 European control firms Method: (1) DID analysis, (2) event study design	1. (+) 2. (+) / (-)	1. Reduction in GHG emissions (due to a mix of institutional investor, general stakeholder, and competitive pressure) 2. Firms with low (high) emissions have positive (negative) abnormal returns
Elayan et al. (2021)			(-)	*See B.1.2 Firm value – event studies*
Cordazzo et al. (2020)			(0)	*See A.1 Quantity of ESG disclosure*

Reference	Research question	Research design	Impact	Main findings
Veltri et al. (2020)	Impact of ESG-related risk disclosure on market value of affected Italian companies *(share price)*	Country: Italy Industry: All Mandate: NFRD Time period: 2017 N: 51 listed Italian companies Method: Basic regression analysis using modified Ohlson model	(+)	Positive association between ESG-related risk information disclosure levels and companies' market value
B.2. *Stock liquidity and information asymmetry*				
Krueger et al. (2023)	Impact of ESG disclosure mandates on stock liquidity of affected companies worldwide *(bid-ask spread)*	Country: International (65 countries) Industry: All Mandate: multiple mandatory ESG disclosure regulations worldwide Time period: 2002 - 2020 N: 136.269 firm-year observations for 17,680 unique firms Method: staggered DID model	(+)	- Significant positive effect of ESG disclosure mandates on firm-level stock liquidity - Stronger effects if the disclosure requirements are implemented by government institutions, not on a comply-or-explain basis, and coupled with strong enforcement by informal institutions - Strongest positive effect on firms with weaker information environments prior to disclosure mandate (i.e. do not publish ESG information on a voluntary basis)
Barth et al. (2017)	Impact of integrated reporting disclosure mandate on *1.* Stock liquidity *(bid-ask spread)* 2. Cost of capital	Country: South Africa Industry: All Mandate: JSE Listing Requirements (King Code) Time period: 2011 - 2014 N: bid-ask spread analysis: 292 firm-year observations (79 firms); cost of capital analysis: 221 firm-year observations (65 firms) Method: Regression	1. (+) 2. (0)	Increase in integrated reporting quality following the introduction of the mandate lead to 1. Increases in stock liquidity and decreases in information asymmetry 2. No effect on the cost of capital
Ernstberger et al. (2021)	Impact of ESG disclosure regulation on information asymmetry *(bid-ask spread)*	Country: International (24 countries) Industry: All Mandate: multiple mandatory ESG disclosure regulations worldwide Time period: 2000-2012 N: 7.468 firm-year observations	(+)	Decrease in bid-ask spread of 18% compared to unaffected firms Decrease in information asymmetry is stronger - when implemented by governments (versus stock exchanges)

Reference	Research question	Research design	Impact	Main findings
		Method: DID analyses with propensity score matched sample		- when it requires standalone ESG reports (versus annual or integrated reports) - for firms in industries with a high proportion of affected companies Additional findings: - stronger reduction when firms use established reporting guidelines
B.3 *Cost of capital*				
Cuomo et al. (2022)			(+)	*See A.1 Quantity of ESG disclosure*
Xu et al. (2021)	Do firms subject to ESG disclosures regulations have a lower cost of debt than firms not subject to regulation?	Country: China Industry: All Mandate: SZSE and SSE ESG disclosure requirement 2008 Time period: 2005-2012 N: 644 firms (5.747 firm-years), 183 treatment firms (1.732 firm-years), 483 control firms (4.251 firm-years) Method: DID analyses with propensity score matched sample	(+)	- Affected companies have a lower cost of debt compared to unaffected companies - The reduction is more pronounced for firms with o longer ESG reports o higher ESG reporting quality
Barth et al. (2017)			(0)	*See B.2. Stock liquidity*
B.4 *Firm profitability*				
Chen et al. (2018)			(-)	*See B.1.1 Firm value - long term valuation*
Lu et al. (2021)			(-)	*See B.1.1 Firm value - long term valuation*
H. B. Christensen et al. (2017)	Effect of mandatory mine-safety information disclosure requirement on 1. mine safety 2. profitability *(labor productivity and cost)*	Country: US Industry: All Mandate: Section 1503 of the Dodd-Frank Act Time period: 2002 - 2013 N: 2.726 (23.533) treatment (control) Method: DID analysis	1. (+) 2. (-)	1. Increase in safety (as measured by a decrease in citations and worker injuries) 2. Decrease in labour productivity, leading to an increase in labor costs of approximately 0.9% of total revenue
Downar et al. (2021)	Impact of GHG disclosure regulation on 1. GHG emissions	Country: UK Industry: All Mandate: The Companies Act 2006	1. (+) 2. (0)	1. Reduction in GHG emissions by about 8% relative to control group

Reference	Research question	Research design	Impact	Main findings
	2. Financial operating performance *(gross margin)*	Regulations 2013 Time period: 2009–2018 N: installation (firm) -level sample: 7.267 (1.257) observations, 729 (127) unique installations (firms) Method: DID, control group of EU firms		2. No significant change in gross margins
Swift et al (2019)			(+)	*See B.1.1 Firm value - long term valuation*
Panel C. ESG-related company performance				
C.1. *Overall ESG performance*				
Fiechter et al. (2022)			(+)	*See A.1 Quantity of ESG disclosure*
Cuomo et al. (2022)			(+)	*See A.1 Quantity of ESG disclosure*
Cicchiello et al. (2023)	Effect of NFRD on ESG performance *(ESG scores)*	Country: EU Industry: All Mandate: NFRD Time period: 2015 - 2020 N: 866 firms (429 EU treatment, 437 US control) Method: DID analysis	(+)	- Increase in ESG scores following the coming into force of disclosure regulation relative to control firms - Higher scores for large firms and firms with high profitability, lower scores for firms with high leverage
Dharmapala and Khanna (2018)	Impact of ESG disclosure and spending requirement on ESG activities *(ESG spending)*	Country: India Industry: All Mandate: Section 135 of India's Companies Act of 2013 Time period: 2012–2015 N: 3.988 firms, 13.770 firm-years Method: DID approach	(+)	Significant increase in ESG activities of affected companies
Arvidsson and Dumay (2022)	Development of ESG reporting performance in Sweden	Country: Sweden Industry: All Mandate: NFRD Time period: 2009 - 2018 N: 27 firms Method: graphical inspection of ESG score development	(0)	ESG performance has not significantly improved following the NFRD (no before/after analysis, no control group)
C.2. *Environmental performance*				

Reference	Research question	Research design	Impact	Main findings
Chen et al. (2018)			(+)	*See B.1.1 Firm value - long term valuation*
Gramlich and Huang (2017)	Effect of mandatory ESG disclosure regulation on different types of pollution (incl. emissions into the air, water and land, consumption of natural resources incl. water)	Country: China Industry: All Mandate: SSE and SZSE ESG disclosure requirements 2008 Time period: 2005 - 2013 N: 751 firm-years, 215 firms (477 (274) firm-years, 131 (101) firms in the treatment (control) group) Method: DID analysis	(+)	Mandated firms reduce on average both their direct and indirect environmental impact
Doshi et al. (2013)	Impact of US EPA's TRI on environmental emissions of affected companies (243 chemicals)	Country: US Industry: mostly manufacturing, mining, electric utilities, hazardous waste treatment, and chemical distribution Mandate: expansion of EPA's TRI Time period: 1995 – 2000 N: 38.175 establishments (217.575 establishment-years) Method: interval regression	(+) / (-)	effectiveness of the disclosure mandate depends on several firm characteristics - stronger effects for establishments located close to their headquarters, corporate siblings, or siblings in the same industry - in sparse regions, large establishments improve more slowly than small establishments - stronger effects for private companies
Downar et al. (2021)			(+)	*See B.4 Firm profitability*
Jouvenot and Krueger (2019)			(+)	*See B.1.3 Firm value – first-time reporting*
Tomar (2023)	Impact of the US GHG emissions reporting program on GHG emissions of affected companies *(absolute GHG emissions and carbon intensity)*	Country: US Industry: Manufacturing Mandate: US GHGRP Time period: 2008 - 2013 N: 13.731 facility-years US treatment group, 1.540 facility-years Canadia control group Method: DID regression (OLS)	(+)	- 8% reduction in absolute GHG emissions - 7% reduction in carbon intensity - Mechanism: Benchmarking, not stakeholder pressure
Bauckloh et al. (2023)	Impact of the US GHG emissions reporting program on GHG emissions of affected companies *(absolute*	Country: US Industry: Manufacturing Mandate: US GHGRP Time period: 2007 - 2016	(+) / (-)	Affected companies have a - weaker reduction in absolute emissions

Reference	Research question	Research design	Impact	Main findings
	GHG emissions and carbon intensity)	N: 1.910 firm-year observations (263 firms) US treatment group, 6.170 firm-year observations (1.195 firms) US unregulated control group Method: DID analysis		- stronger improvement in carbon intensity
Matisoff (2013)	Impact of various state-level mandatory emissions reporting requirements on plant-level emissions *(CO2 emissions, electricity output, and carbon intensity)*	Country: US state-level (five states) Industry: power plants Mandate: various mandatory carbon reporting requirements Time period: 1994–2007 N: 1.873 plant year observations Method: DID, propensity matching	(0)	No significant decrease in carbon emissions and carbon intensity for companies affected by carbon reporting requirements as implemented by individual US states
***C.3.** Social performance*				
Jackson et al. (2020)	Influence of ESG disclosure mandates on the social components of firms' ESG activities *(CSR and CSiR index, average of seven social pillar sub-indices)*	Country: 24 OECD countries Industry: all Mandate: various Time period: 2002–2014 N: 19.709 firm-year observations Method: general linear squares (GLS) random effects models	(+) / (0)	- Increase in social activities (with largest impact on firms with previously low levels of ESG activities) - No evidence on a decrease in irresponsible actions (CSiR)
H. B. Christensen et al. (2017)			(+)	*See B.4 Firm profitability*
Chen et al. (2018)			(+)	*See B.1.1 Firm value - long term valuation*
She (2022)	Impact of mandatory disclosure of supply chain due diligence regarding human rights abuses *(average rating of supplier's human rights performance)*	Country: USA Industry: Manufacturing and Retail Period: 2005 - 2016 Mandate: California's Supply Chains Act of 2010 N: 530 (968) treatment (control) firms Method: DID analysis	(+)	- Increase in supply chain due diligence measured by improvement in human rights performance of suppliers - Stronger effects when companies face external pressures or have suppliers in countries with low human rights standards - Stronger effects when regulation leads to greater comparability of disclosures
***C.4.** Governance performance*				
Hummel and Rötzel (2019)			(-)	*See A.1 Quantity of ESG disclosure*

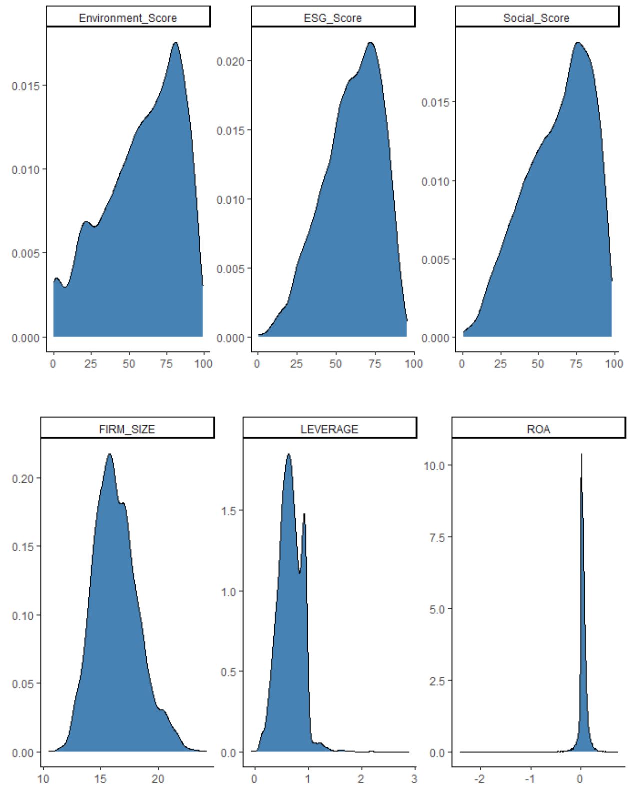
Reference	Research question	Research design	Impact	Main findings
Boamah (2022)	Effect of mandating GHG emissions disclosure on the number of directors on environmental-related board committees	Country: UK Industry: All Period: 2009 - 2016 Mandate: The Companies Act 2006 (Strategic Report and Directors' Report) Regulations 2013 N: 163 (1,075) unique firms (firm years) in the treated group, 317 (2,060) unique firms (firm years) in the control group from 15 European exchanges Method: DID regression	(+)	Increase in absolute (relative) number of directors on environmental-related board committees by 7.8% (2.6%) following the introduction of the disclosure mandate
Aureli, Del Baldo, et al. (2020)	Impact of the NFRD on company reporting strategy and governance practices	Country: Italy Industry: Wood and glass processing Mandate: NFRD Time period: N: 1 Method: paradigmatic case study	(+)	The introduction of the NFRD has led the company to set up an internal audit committee and exceed the mandate's requirements in terms of corporate governance practices

Appendix 3. Definition of variables (source: own representation)

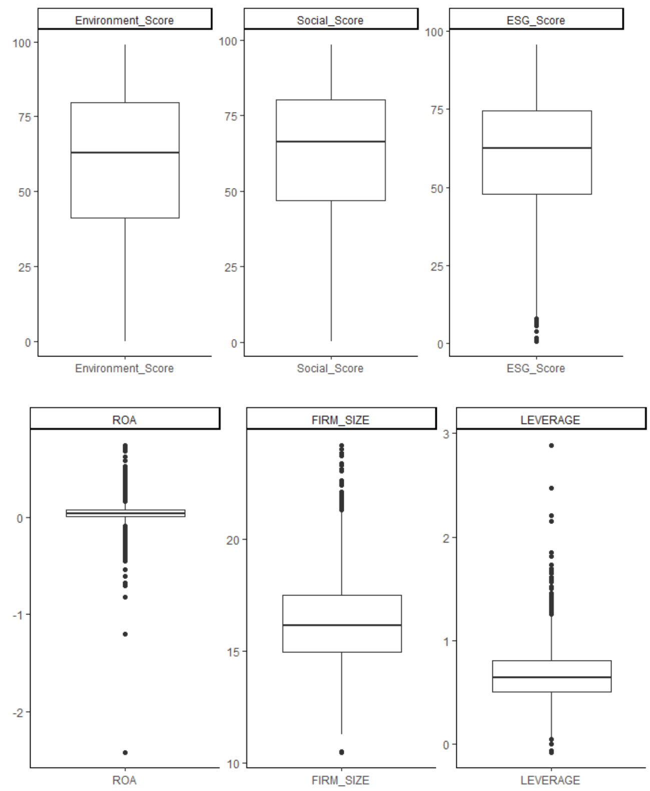
Definition of variables		
This table provides definitions of all variables used in the analyses. All data is retrieved from LSEG Workspace (formerly Refinitiv Workspace). Financial data is obtained from the LSEG Worldscope database, ESG data is obtained from LSEG ESG database (formerly ASSET4).		
Variable	**Description**	**Source**
Dependent variable		
ESG Score	Overall company score based on the self-reported information in the environmental, social and corporate governance pillars (*TRESGS*)	LSEG ESG
Environmental Pillar Score	Weighted average relative rating of a company based on the reported environmental information and the resulting three environmental category scores (*ENSCORE*)	LSEG ESG
Social Pillar Score	Weighted average relative rating of a company based on the reported social information and the resulting four social category scores (*SOSCORE*)	LSEG ESG
Control variables		
ROA	Net income (*WC01751*) deflated by total assets (*WC02999*)	Worldscope
Firm Size	Log of fiscal year's total assets (*WC02999*)	Worldscope
Leverage	Total liabilities (*WC03351*) to total assets (*WC02999*)	Worldscope
Country	The country in which the company is incorporated (*COINN*)	Datastream
Industry	Economic sector membership as defined by Refinitiv's industry classification system, consisting of 13 economic sectors (*TR1N*)	Datastream
Firm characteristics		
Total assets	Sum of total current assets, long term receivables, investment in unconsolidated subsidiaries, other investments, net property plant and equipment and other assets (*WC02999*)	Worldscope
Total liabilities	All short- and long-term obligations expected to be satisfied by the company (*WC03351*)	Worldscope
Net income	Net income the company uses to calculate its earnings per share, before extraordinary items (*WC01751*)	Worldscope
Number of shares	Total number of shares outstanding for the security expressed in thousands (*NOSH*)	Worldscope
Market price	Closing price of the company's stock at their fiscal year end (*WC05001)*	Worldscope
Common equity	Common shareholders' investment in a company (*WC03501*)	Worldscope
Employees	The number of both full and part time employees of the company (*WC07011*)	Worldscope

Appendix 4. Data visualization before data cleaning (source: own representation)

Panel A. Histograms before data cleaning

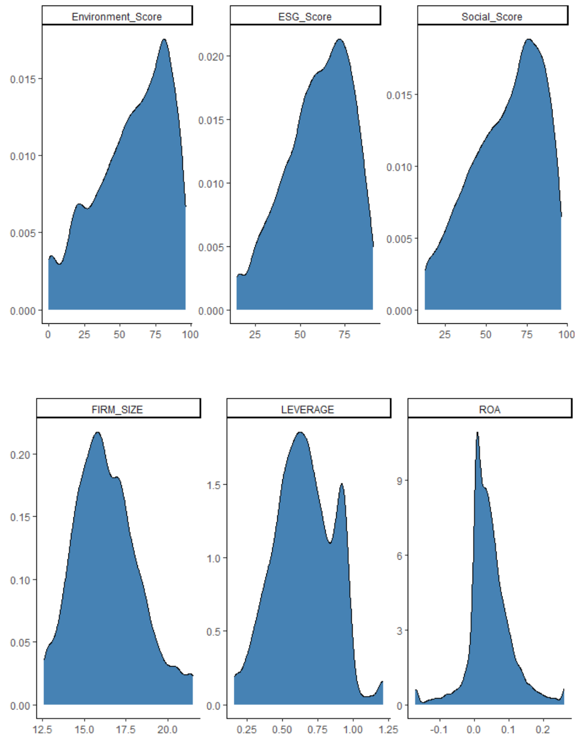


Panel B. Boxplot before data cleaning

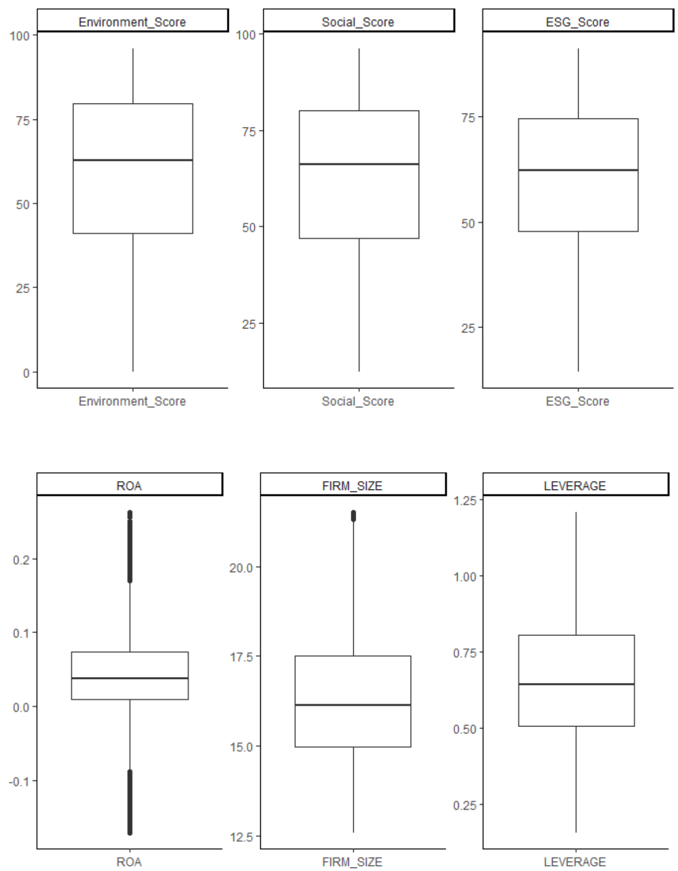


Appendix 5. Data visualization after data cleaning (source: own representation)

Panel A. Histograms after data cleaning



Panel B. Boxplot after data cleaning



Appendix 6. Parametric measures of location and dispersion (source: own representation)

This table presents the parametric measures of location and dispersion before and after data cleaning (i.e. after winsorization of large outliers and logarithmic transformation of skewed variables). It includes all variables used in the analysis, as well as additional firm characteristics. All variables are defined in Appendix 3.

Panel A: before cleaning	n	mean	sd	median	min	max	range	skew	kurtosis
ESG Score	7947	60.16	18.32	62.41	0.63	95.74	95.11	-0.49	-0.39
Env. Pillar Score	7947	58.62	25.20	62.87	0.00	99.06	99.06	-0.54	-0.65
Social Pillar Score	7947	62.66	21.55	66.12	0.26	98.47	98.21	-0.49	-0.62
ROA	8122	0.04	0.08	0.04	-2.42	0.75	3.16	-4.21	134.49
Firm Size	8122	16.34	1.94	16.14	10.48	24.21	13.73	0.47	0.20
Leverage	8122	0.65	0.22	0.65	-0.08	2.89	2.97	0.48	2.95
Total assets	8122	125,261,100	789,437,500	10,165,716	35,600	32,728,790,000	32,728,750,000	23	729
Total liabilities	8122	107,523,300	710,512,300	6,099,100	-17,202	29,406,480,000	29,406,490,000	23	708
Net income	8121	1,789,303	11,490,620	315,300	-101,985,000	455,592,000	557,577,000	25	778
Number of shares	8214	1,279,298	12,017,940	271,214	1,949	523,437,600	523,435,700	39	1,673
Market price	8079	102	678	25	0	23,450	23,450	18	415
Common equity	8122	16,850,370	89,243,180	3,107,961	-7,335,137	3,316,353,000	3,323,688,000	21	602
Employees	8101	39,701	71,027	14,295	0	675,805	675,805	4	24
Net sales	8121	22,196,150	74,610,360	5,759,749	-6,666,267	2,755,068,000	2,761,734,000	16	383

Panel B: after cleaning	n	mean	sd	median	min	max	range	skew	kurtosis
ESG Score	7947	60.19	18.17	62.41	14.44	91.31	76.87	-0.46	-0.51
Env. Pillar Score	7947	58.61	25.19	62.87	0.00	95.99	95.99	-0.54	-0.65
Social Pillar Score	7947	62.70	21.40	66.12	12.28	96.29	84.01	-0.46	-0.72
ROA	8122	0.05	0.06	0.04	-0.17	0.26	0.43	0.34	2.70
Firm Size	8122	16.34	1.91	16.14	12.58	21.52	8.93	0.44	-0.08
Leverage	8122	0.65	0.21	0.65	0.16	1.21	1.05	0.02	-0.35
Total assets	8122	16.34	1.91	16.14	12.58	21.52	8.93	0.44	-0.08
Total liabilities	8122	15.85	2.07	15.63	11.62	21.46	9.84	0.41	-0.01
Net income	8121	18.45	0.03	18.44	18.41	18.63	0.23	3.73	16.19
Number of shares	8214	12.66	1.33	12.51	9.95	16.58	6.63	0.52	0.06
Market price	8079	3.21	1.39	3.27	0.38	6.78	6.40	0.08	-0.46
Common equity	8122	16.44	0.71	16.16	15.71	19.11	3.41	1.72	2.68
Employees	8101	9.62	1.41	9.57	6.53	12.86	6.32	0.06	-0.52
Net sales	8121	16.61	0.82	16.34	15.74	19.28	3.54	1.26	1.05

Appendix 7. Non-param. measures of location and dispersion (source: own representation)

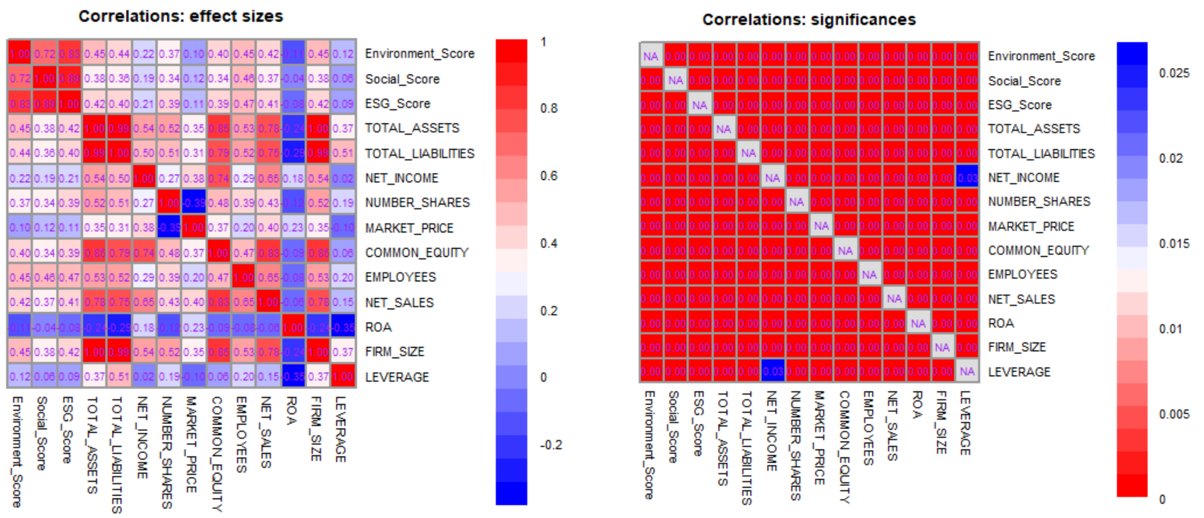
This table presents the non-parametric measures of location and dispersion before and after data cleaning (i.e. after winsorization of large outliers and logarithmic transformation of skewed variables). It includes all variables used in the analysis, as well as additional firm characteristics. All variables are defined in Appendix 3.

Panel A: before cleaning	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
ESG Score	0.63	47.91	62.41	60.16	74.53	95.74	273
Env. Pillar Score	0	41.24	62.87	58.62	79.72	99.06	273
Social Pillar Score	0.26	46.97	66.12	62.66	80.17	98.47	273
ROA	-2.42	0.01	0.04	0.04	0.07	0.75	98
Firm Size	10.48	14.96	16.13	16.34	17.50	24.21	98
Leverage	-0.08	0.51	0.64	0.65	0.81	2.89	98
Total assets	35,600	3,142,000	10,170,000	125,300,000	40,000,000	32,730,000,000	98
Total liabilities	-17,200	1,847,000	6,099,000	107,500,000	26,380,000	29,410,000,000	98
Net income	-101,985,000	78,200	315,300	1,789,303	1,198,000	455,592,000	99
Number of shares	1,949	123,926	271,214	1,279,298	725,429	523,437,600	6
Market price	0	8	25	102	64	23,450	141
Common equity	-7,335,137	1,053,873	3,107,960	16,850,375	10,193,577	3,316,353,000	98
Employees	0	5,498	14,295	39,701	42,115	675,805	119
Net sales	-6,666,267	1,964,600	5,759,749	22,196,152	17,770,000	2,755,068,000	99

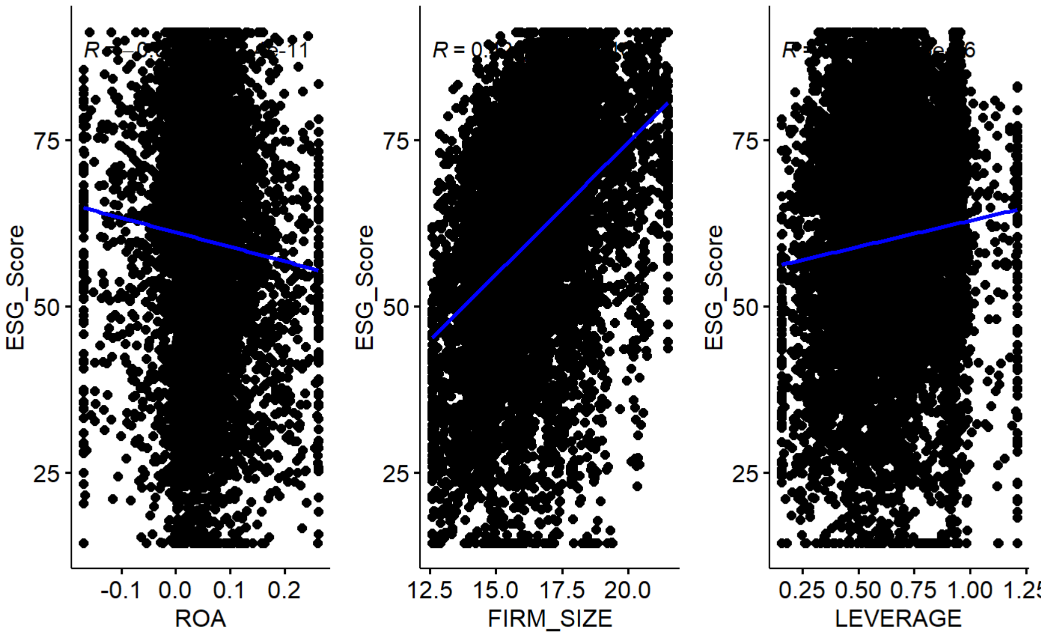
Panel B: after cleaning	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
ESG Score	14.44	47.91	62.41	60.19	74.53	91.31	273
Env. Pillar Score	0.00	41.24	62.87	58.61	79.72	95.99	273
Social Pillar Score	12.27	46.97	66.12	62.70	80.17	96.29	273
ROA	-0.17	0.01	0.04	0.04	0.07	0.26	98
Firm Size	12.58	14.96	16.13	16.34	17.50	21.51	98
Leverage	0.16	0.51	0.64	0.65	0.81	1.21	98
Total assets	12.58	14.96	16.13	16.34	17.50	21.51	98
Total liabilities	11.62	14.44	15.63	15.85	17.09	21.46	98
Net income	18.41	18.44	18.44	18.45	18.45	18.63	99
Number of shares	9.95	11.73	12.51	12.66	13.50	16.58	6
Market price	0.38	2.16	3.27	3.21	4.18	6.78	141
Common equity	15.70	15.94	16.16	16.44	16.68	19.11	98
Employees	6.53	8.61	9.57	9.62	10.65	12.86	119
Net sales	15.74	15.97	16.34	16.61	17.01	19.28	99

Appendix 8. Exploratory statistics (source: own representation)

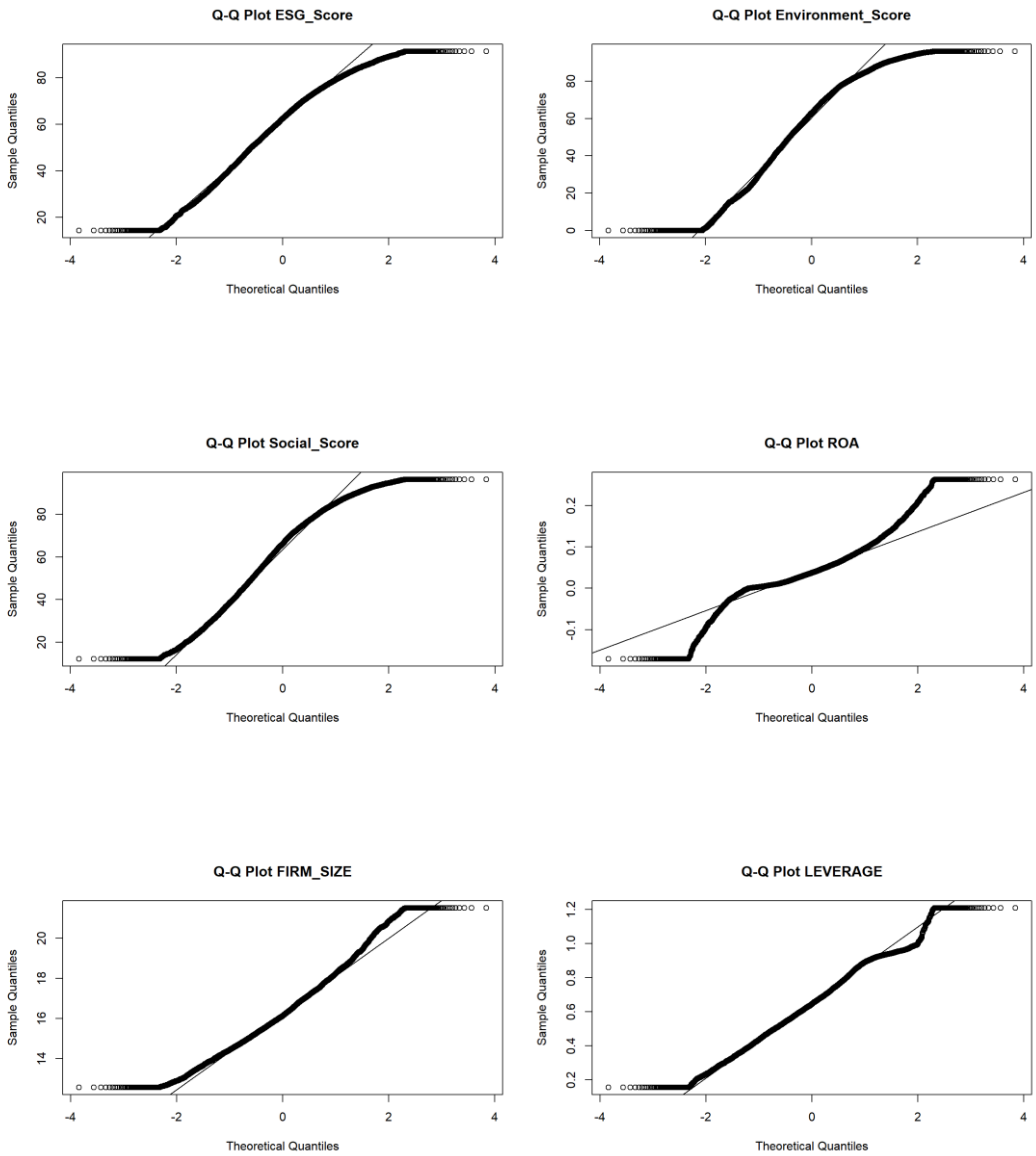
Panel A. Correlation heatmaps among firm-level variables and ESG scores



Panel B. Bivariate Scatterplots



Appendix 9. QQ-plots to visualize normal distribution (source: own representation)



Appendix 10. Results pooled OLS model (source: own representation)

Variable	(1) Regression coefficient	(2) t-statistics		(3) Robust t-statistics	
Post * Treatment	**2.36277**	**3.1881**	**	**2.6370**	**
Post	6.07636	9.3003	***	7.5346	***
Treatment	7.33027	12.3714	***	4.5808	***
ROA	11.77432	4.3173	***	2.1606	*
Leverage	1.76912	1.8902	.	0.6506	
Firm size	6.25073	54.6487	***	20.4622	***
Country (COINN):					
Austria	-5.41344	-4.2913	***	-2.1799	*
Belgium	-9.1987	-8.6631	***	-2.5136	*
Czech Republic	-36.2411	-14.8239	***	-14.1671	***
Denmark	-15.7218	-15.2691	***	-5.5619	***
Finland	5.00027	5.4467	***	2.5036	*
France	-0.54486	-0.8892		-0.3575	
Germany	-1.50626	-2.3531	*	-0.7836	
Greece	6.42736	4.2434	***	1.7646	.
Hungary	-30.62	-12.4694	***	-4.0212	***
Ireland	-11.8424	-11.2341	***	-3.8443	***
Italy	-1.50601	-1.6897	.	-0.5797	
Luxembourg	-8.39502	-4.0568	***	-1.1997	
Netherlands	-1.51905	-1.6833	.	-0.5004	
Poland	-17.7827	-16.0755	***	-5.1922	***
Portugal	4.29759	2.2951	*	1.4644	
Spain	6.15261	7.5526	***	3.1269	**
Sweden	-9.65926	-10.7987	***	-4.2943	***
Industry (TR1N):					
Basic Materials	5.80466	2.0092	*	1.7014	.
Consumer Cyclicals	1.8299	0.635		0.5521	
Consumer Non-cycl.	4.64326	1.5887		1.3123	
Energy	1.59229	0.5373		0.4145	
Financial	-14.0728	-4.8097	***	-3.8480	***
Healthcare	2.09503	0.7159		0.5791	
Industrials	0.36998	0.1285		0.1115	
Real Estate	9.97863	3.2749	**	2.3400	*
Technology	2.34538	0.8125		0.6846	
Utilities	-1.44588	-0.4877		-0.4015	
R^2	0.42582				
Adjusted R^2	0.42343				
n (N) observations	685 (7947)				
F-statistic (p-value)	177.832 on 33 and 7913 DF (< .001)				

This table reports results from estimating the DID analysis, applying a pooled OLS regression model with *ESG Score* as the outcome variable. Control variables are defined in Appendix 3. Column (1) presents the regression coefficients, column (2) presents the t-statistics and significance levels, column (3) presents significance using robust standard errors (Sandwich Estimator). The significance codes '***', '**', '*', and '.' indicate statistical significance at the .001, .01, .05, and .1 level, respectively.

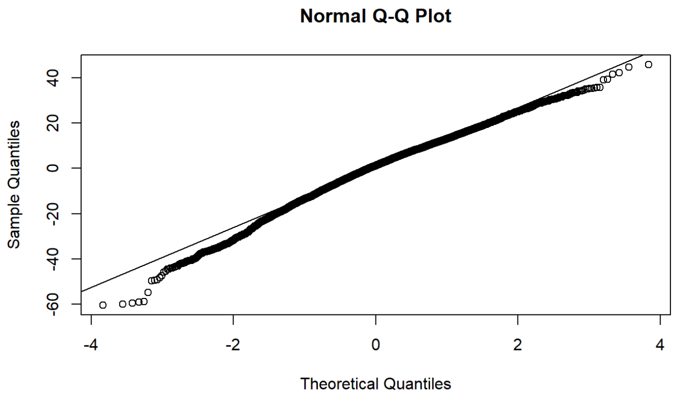
Appendix 11. Diagnostic of pooled OLS model (source: own representation)

Panel A. Test for normal distribution of the residuals

Anderson-Darling normality test

```
A = 22.676, p-value < 2.2e-16
```

QQ plot



Panel B. Test for serial correlation

Breusch-Godfrey/Wooldridge test for serial correlation in panel models

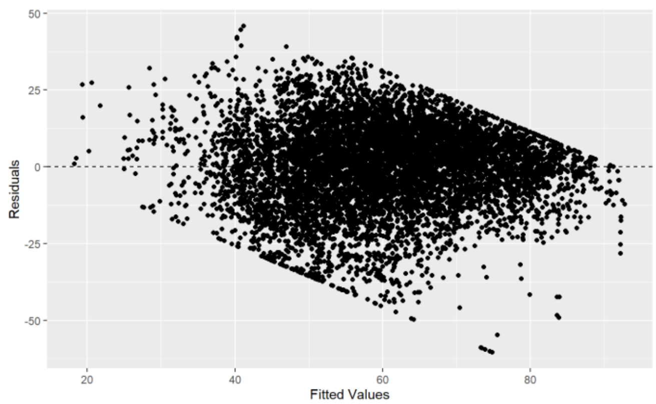
```
chisq = 5373.3, df = 8, p-value < 2.2e-16
alternative hypothesis: serial correlation in idiosyncratic errors
```

Panel C. Test for heteroskedasticity

Studentized Breusch-Pagan test

```
BP = 425.28, df = 33, p-value < 2.2e-16
```

Residuals plot



Appendix 12. Results fixed effects model (source: own representation)

Variable	(1) Regression coefficient	(2) t-statistics		(3) Robust t-statistics	
Post * Treatment	**2.26107**	**5.7034**	***	**2.6174**	**
Post	6.38335	17.6168	***	8.0925	***
ROA	-0.44080	-0.2173		-0.1531	
Leverage	1.50101	1.2941		0.6887	
Firm size	4.72848	16.0513	***	7.6539	***
R^2	0.33066				
Adjusted R^2	0.26711				
n (N) observations	685 (7947)				
F-statistic (*p*-value)	717.01 on 5 and 7257 DF (< .001)				

This table reports results from estimating the DID analysis, applying a fixed effects model (individual, within) with *ESG Score* as the outcome variable. All variables are defined in Appendix 3. Column (1) presents the regression coefficients, column (2) presents the t-statistics and significance levels, column (3) presents t-statistics and significance using robust standard errors (Sandwich Estimator). The significance codes '***', '**', '*', and '.' indicate statistical significance at the .001, .01, .05, and .1 level, respectively.

Appendix 13. Results pooled OLS for Environmental Score (source: own representation)

Variable	(1) Regression coefficient	(2) t-statistics		(3) Robust t-statistics	
Post * Treatment	**1.39561**	**1.3541**		**0.9854**	
Post	2.72821	3.0027	**	2.1007	*
Treatment	10.89184	13.2184	***	4.8099	***
ROA	9.23909	2.436	*	1.1481	
Leverage	1.95211	1.4998		0.5012	
Firm size	8.72852	54.8744	***	20.8531	***
Country (COINN):					
Austria	1.73301	0.9879		0.3924	
Belgium	-2.29892	-1.5569		-0.4619	
Czech Republic	-40.7632	-11.9897	***	-8.1797	***
Denmark	-16.5274	-11.5424	***	-3.9821	***
Finland	13.76971	10.7856	***	4.0818	***
France	5.26235	6.1754	***	2.5576	*
Germany	0.11626	0.1306		0.0447	
Greece	10.1005	4.7952	***	3.3363	***
Hungary	-36.166	-10.5905	***	-2.8843	**
Ireland	-14.5008	-9.8917	***	-3.3903	***
Italy	2.17752	1.7569	.	0.6539	
Luxembourg	-12.2582	-4.2596	***	-2.751	**
Netherlands	-0.35068	-0.2794		-0.0813	
Poland	-21.1679	-13.7602	***	-4.6075	***
Portugal	11.19685	4.2998	***	4.3403	***
Spain	11.57738	10.2195	***	4.8843	***
Sweden	-10.1386	-8.1505	***	-3.0859	**
Industry (TR1N):					
Basic Materials	17.01451	4.235	***	2.7391	**
Consumer Cyclicals	11.85994	2.9593	**	1.9157	.
Consumer Non-cycl.	16.15145	3.9739	***	2.5132	*
Energy	10.42686	2.5301	*	1.5992	
Financial	-9.42339	-2.3159	*	-1.4418	
Healthcare	5.89743	1.4491		0.9034	
Industrials	10.55812	2.6372	**	1.71	.
Real Estate	26.03508	6.1441	***	3.9249	***
Technology	6.97468	1.7374	.	1.103	
Utilities	7.80339	1.8926	.	1.1841	
R^2	0.42207				
Adjusted R^2	0.41966				
n (N) observations	685 (7947)				
F-statistic (*p*-value)	175.121 on 33 and 7913 DF (< .001)				

This table reports results from estimating the DID analysis, applying a pooled OLS regression model with *Environmental Score* as the outcome variable. Control variables are defined in Appendix 3. Column (1) presents the regression coefficients, column (2) presents the t-statistics and significance levels, column (3) presents significance using robust standard errors (Sandwich Estimator). The significance codes '***', '**', '*', and '.' indicate statistical significance at the .001, .01, .05, and .1 level, respectively.

Appendix 14. Results pooled OLS for the Social Score (source: own representation)

Variable	(1) Regression coefficient	(2) t-statistics		(3) Robust t-statistics	
Post * Treatment	**4.65128**	**5.1820**	***	**4.1415**	***
Post	5.94835	7.5174	***	6.0007	***
Treatment	5.50484	7.6712	***	2.8944	**
ROA	22.04217	6.6734	***	3.1547	**
Leverage	1.32538	1.1692		0.3962	
Firm size	6.55463	47.3167	***	18.3536	***
Country (COINN):					
Austria	-5.24504	-3.4331	***	-1.9766	*
Belgium	-9.15689	-7.1205	***	-1.8889	.
Czech Republic	-35.6191	-12.0298	***	-11.6636	***
Denmark	-14.1933	-11.3819	***	-4.3391	***
Finland	5.50706	4.9531	***	2.0564	*
France	2.98800	4.0262	***	1.5819	
Germany	1.42946	1.8438	.	0.6422	
Greece	7.26300	3.9593	***	1.5759	
Hungary	-29.37868	-9.8784	***	-3.3542	***
Ireland	-12.90993	-10.112	***	-3.7058	***
Italy	3.09837	2.8704	**	1.2052	
Luxembourg	-7.26344	-2.8982	**	-0.7593	
Netherlands	2.36756	2.1663	*	0.7166	
Poland	-19.8279	-14.8000	***	-4.7520	***
Portugal	10.76058	4.7449	***	2.3219	*
Spain	13.7599	13.9467	***	5.7397	***
Sweden	-7.34331	-6.7785	***	-2.7375	**
Industry (TR1N):					
Basic Materials	1.40454	0.4014		0.1468	
Consumer Cyclicals	0.03640	0.0104		0.0038	
Consumer Non-cycl.	1.40139	0.3959		0.1446	
Energy	-0.89517	-0.2494		-0.0911	
Financial	-18.4106	-5.1955	***	-1.8996	.
Healthcare	0.79908	0.2255		0.0819	
Industrials	-2.55652	-0.7332		-0.2670	
Real Estate	6.25782	1.6957	.	0.6172	
Technology	1.31941	0.3774		0.1372	
Utilities	-7.61962	-2.1220	*	-0.7860	
R^2	0.3931				
Adjusted R^2	0.39056				
n (N) observations	685 (7947)				
F-statistic (*p*-value)	155.312 on 33 and 7913 DF (< .001)				

This table reports results from estimating the DID analysis, applying a pooled OLS regression model with *Social Score* as the outcome variable. All variables are defined in Appendix 3. Column (1) presents the regression coefficients, column (2) presents the t-statistics and significance levels, column (3) presents significance using robust standard errors (Sandwich Estimator). The significance codes '***', '**', '*', and '.' indicate statistical significance at the .001, .01, .05, and .1 level, respectively.