Online-Appendix

„Mandatory ESG Disclosure and Firm Value – A Quantitative Analysis of the Effect of Directive 2014/95/EU on Firm Value"

Jan Oliver Horstmann

WHU – Otto Beisheim School of Management

Appendix

Appendix A: Definition of Variables

Dependent Variables

ESG	Refinitiv item"TR.TRESGScore". ESG score, scores from 0 to 100 – measures the company's ESG performance based on verifiable reported data in the public domain.
Q	Tobin's Q - Firm value measure. Caclulated as sum of total assets (TR.TotalAssetsReported) and market value of equity ("TR.TtlCmnSharesOut"*"TR.CLOSEPRICE") minus common book equity ("TR.CommShareholdersEqty") over the total assets (TR.TotalAssetsReported).
Env. Score	Refinitiv item "TR.EnvironmentPillarScore". Environmental score, scores from 0 to 100 – measures the company's Environmental performance based on verifiable reported data in the public domain.
Soc. Score	Refinitiv item "TR.SocialPillarScore". Social score, scores from 0 to 100 – measures the company's Social performance based on verifiable reported data in the public domain.
Gov. Score	Refinitiv item "TR.GovernancePillarScore". Governance score, scores from 0 to 100 – measures the company's Governance performance based on verifiable reported data in the public domain.

Independent Variables

Treatment	Treatment is a dummy vairable that equals 1 if a firm is in the treatment group (EU) and 0 if it is in the control group (U.S.).
Mandate	Mandate is a dummy vairable that equals 1 for time after the NFRD shock date in 2014 (2014-2019) and 0 if for the time before the shock date (2011-2013).
Treatment*Mandate	Interaction term of the two dummy variables Treatment and Mandate.
ln(SIZE)	Measure of firm size. Calculated as the natural logarithm of total assets ("TR.TotalAssetsReported").
LEV	Measure of firm leverage. Calculated as total liabilities ("TR.TotalLiabilities") over total assets ("TR.TotalAssetsReported").
Sector	Refinitiv item "TR.TRBCEconomicSector". Global, comprehensive, industry classification system owned and operated by Refinitiv.
Pre-directive reporting status	Dummy variable with Refinitiv item "CGVSDP026" as a proxy for whether a sample firm reports ESG information in either a standalone report or in a section in its annual report in year t or not.

Informational Variables

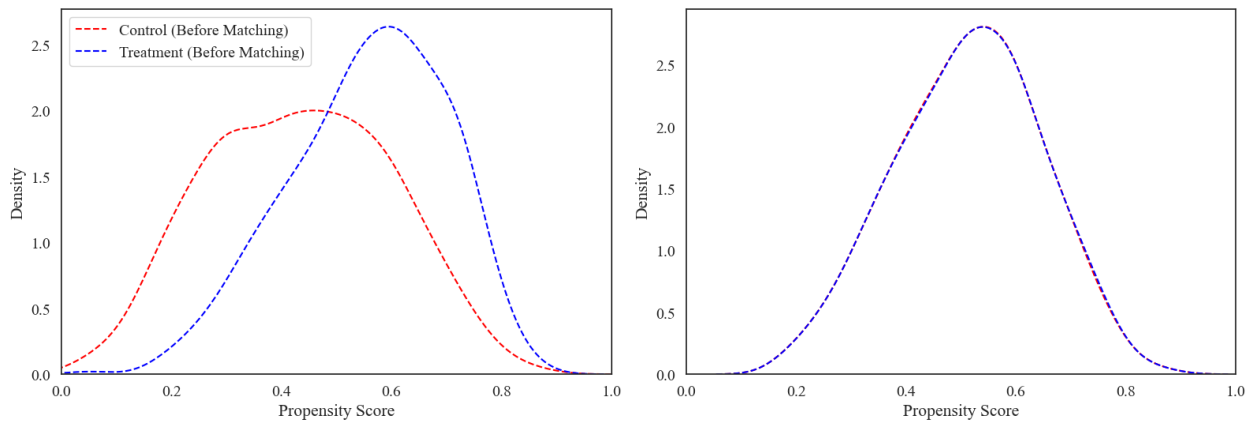|	
Revenue	Measure of a firm's revenue. Refinitiv item "TR.TotalRevenue".
Assets	Measure of a firm's total assets. Refinitiv item "TR.TotalAssetsReported".
ROA	Measure of firm profitability. Refinitiv item "TR.ROATotalAssetsPercent".

Appendix B: Plots

Figure 1: Distribution of Propensity Scores Before (Left) and After (Right) Matching

Comparison of the Average Environmental, Social, and Governance Scores

Social_Pillar_Score

Gov_Pillar_Score

Combined Score (Avg.) Without Governance Score
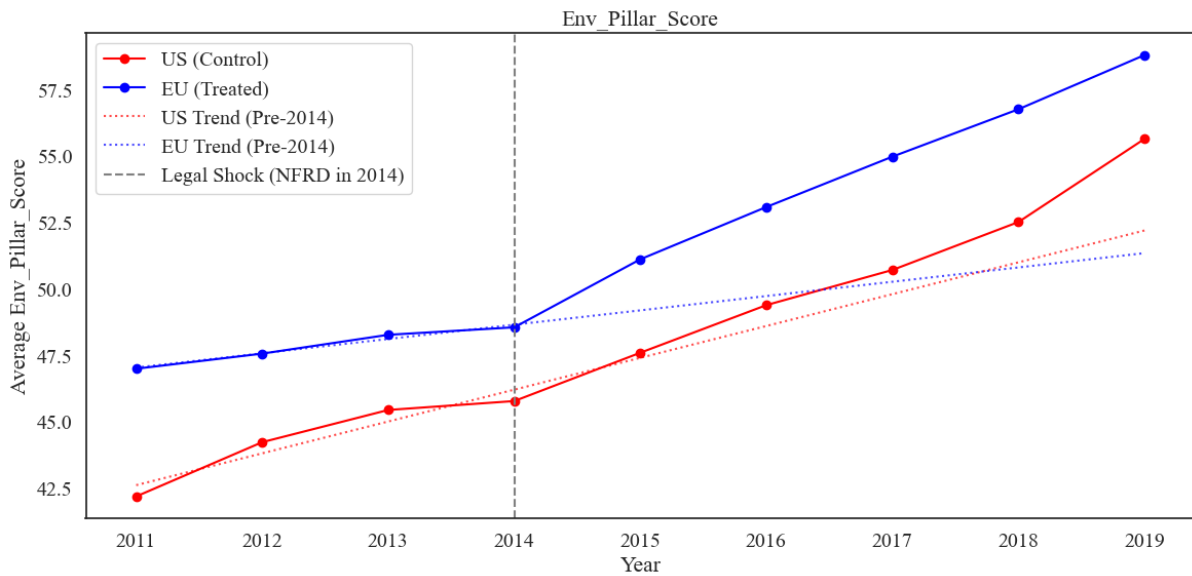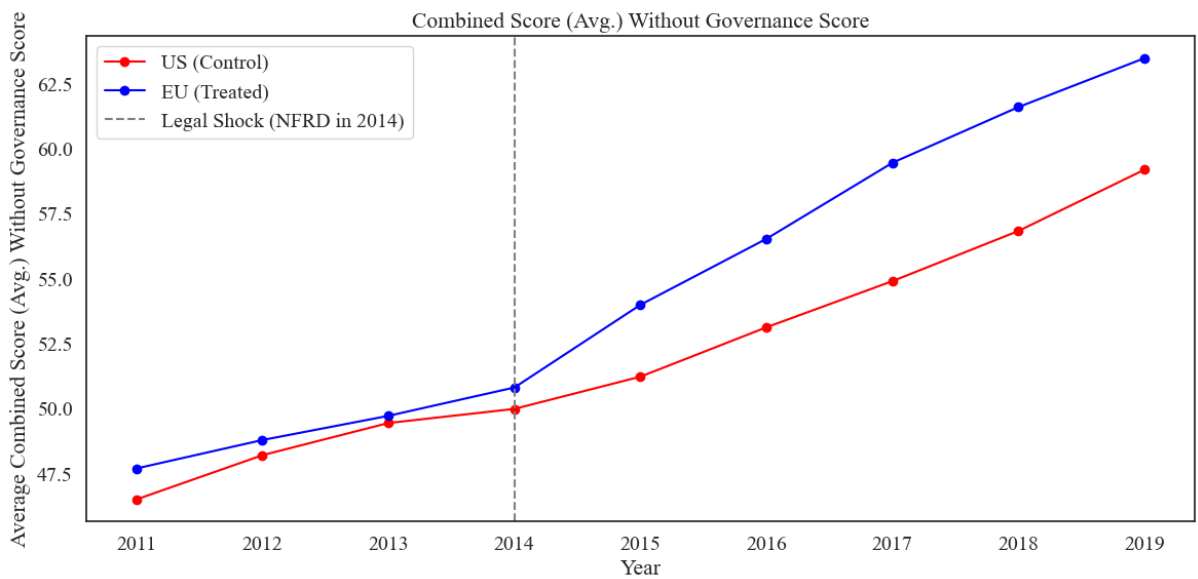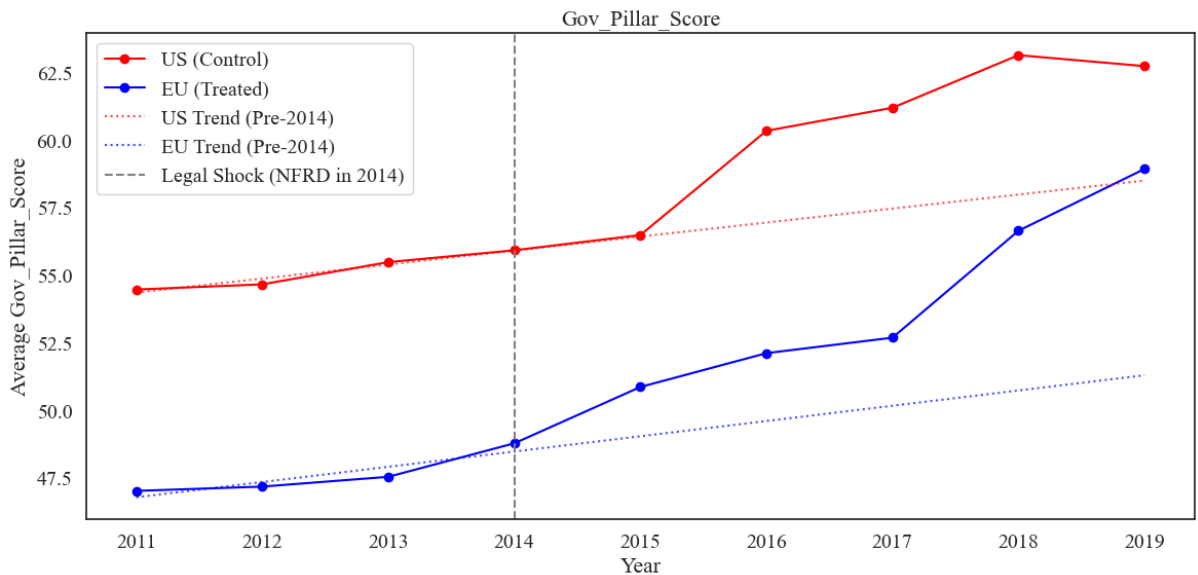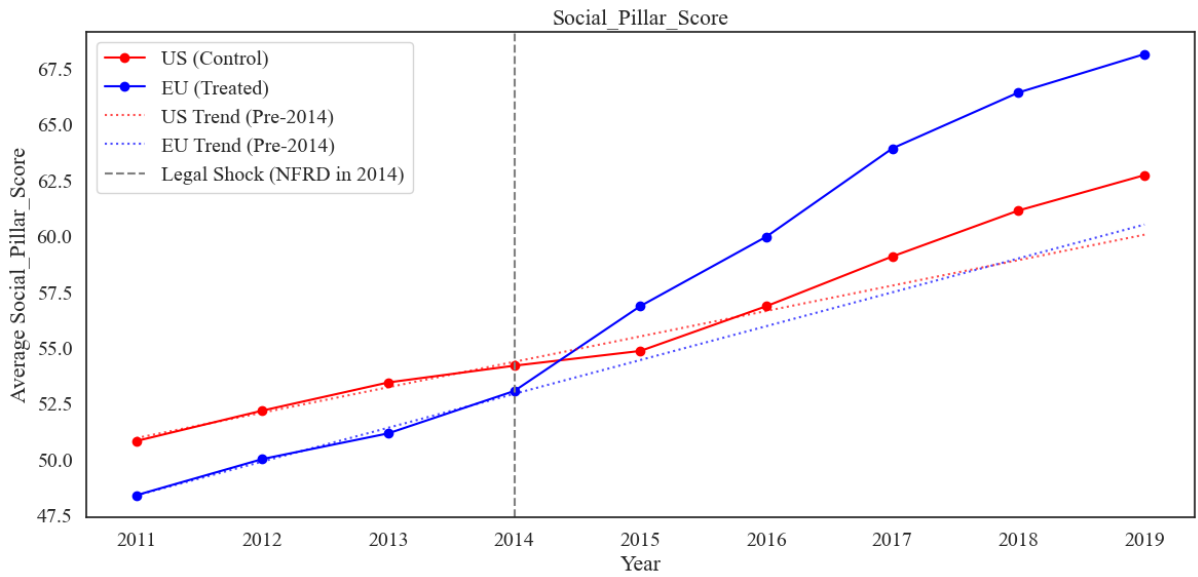
Appendix C: Timeline of Events Around the Non-Financial Reporting Directive 2014/95/EU

1.	April 16, 2013	The European Commission proposes an amendment to the existing Accounting legislation for the disclosure of non-financial and diversity information by large companies and groups (IP/13/330).
2.	February 26, 2013	The European Parliament and the Council reach an agreement on the Commission proposal to improve transparency of certain large companies on social, environmental and diversity matters by amending existing accounting legislation.
3.	April 15, 2014	The European Parliament adopts the NFRD.
	December 12, 2015	The Paris Agreement is adopted by 196 Parties at the UN Climate Change Conference (COP21) in Paris, France. It entered into force on November 4, 2016.
4.	January 1, 2017	The NFRD applies to all undertakings within the scope of Article 1 for the financial year starting on 1 January 2017 or during the calendar year 2017.
5.	June 7, 2019	The Capital Requirements Regulation II is published (CRR; Pillar 3 disclosure).
6.	December 9, 2019	The Sustainable Finance Disclosure Regulation is published (SFDR).
7.	June 22, 2020	The EU Taxonomy Regulation is published.
8.	December 16, 2022	The Corporate Sustainability Reporting Directive (CSRD) is published.

Based on Grewal et al. (2019), European Commission (2019b, 2019a, 2020, 2022), European Parliament (2022), and UNFCCC (n.d.).

Appendix D: Results of Robustness Test

Table 11

Robustness Test - Governance Score as Control Variable

	Env. Score		Soc. Score	
	First Stage (ESG)	Second Stage (Q)	First Stage (ESG)	Second Stage (Q)
Intercept	-2.224	16.152***	25.559	19.642***
	(24.474)	(1.885)	(21.285)	(1.961)
coefficient 1on β or ϑ	0.202	-1.144***	5.766***	-0.04***
	(0.919)	(0.321)	(0.869)	(0.011)
ln(SIZE)	1.593**	1.36***	1.23*	-0.413***
	(0.748)	(0.503)	(0.647)	(0.058)
LEV	-2.144	-1.59**	-2.127	0.777**
	(2.256)	(0.739)	(2.106)	(0.374)
Gov. Score	0.118***	0.133***	0.091***	0.002
	(0.017)	(0.038)	(0.016)	(0.001)
Firm fixed effects	Included	Included	Included	Included
Year fixed effects	Included	Included	Included	Included
Year-Sector fixed effects	Included	Included	Included	Included
Adjusted R^2	0.859	0.879	0.84	0.654
# of observations	6296	6296	6296	6296

The shown table depicts results of the robustness test utilizing the Governance score as a control variable. The model is estimated with Equation (2) and (3) of the IV2SLS model. Dependent variable of interest is either the Social score or the Environmental score in the first stage and Tobin's Q in the second stage (Either: the coeffcent from equation (2) for the first stage of the IV, β which is the coefficient on the interaction term of two dummy variables, Treatment (1 if in treatment group (EU), 0 if in control group (U.S.)) and Mandate (1 if after shock date in 2014 (2014-2019), 0 if before shock date (2011-2013). Or, it includes coefficient ϑ which is the coefficient on the predicted Env./Soc. score in the second stage). All retrieved via Refinitiv Eikon Data API. Control variables are: ln(SIZE), LEV, and the Governance score in both stages. ln(SIZE) is the natural logarithm of total assets. LEV is the total liabilities over total assets.

***, **, and * indicate statistical significance either at the 1%, 5%, or the 10% level (two-tailed), respectively. Following Flammer (2015) and Gibbons (2020), standard errors are included in parentheses. Standard errors clustered at the firm level are employed. All variables are defined in Appendix A.

Appendix E: Correlation Matrix

Table 12

Panel A: Pearson and Spearman Correlation Matrix - Heatmap

	ESG Score	Env. Score	Soc. Score	Gov. Score	ln(SIZE)	Tobin's Q	LEV
ESG Score							
Environmental Score							
Social Score							
Governance Score							
ln(SIZE)							
Tobin's Q							
LEV							

Panel B: Pearson and Spearman Correlation Matrix - Values with Significance Levels

	ESG Score	Env. Score	Soc. Score	Gov. Score	ln(SIZE)	Tobin's Q	LEV
ESG Score		0.849***	0.892***	0.597***	0.591***	-0.012	0.093***
Environmental Score	0.851***		0.721***	0.277***	0.579***	-0.066***	0.081***
Social Score	0.892***	0.721***		0.297***	0.528***	0.019	0.065***
Governance Score	0.578***	0.269***	0.287***		0.279***	0.002	0.051***
ln(SIZE)	0.597***	0.595***	0.527***	0.274***		-0.204***	0.192***
Tobin's Q	-0.007	-0.068***	0.029**	0.014	-0.187***		-0.021*
LEV	0.126***	0.119***	0.081***	0.064***	0.248***	-0.079***	

Pearson correlation coefficients are presented below the diagonal line. Spearman correlation respectively above the diagonal line. ***, **, and * indicate statistical significance either at the 1%, 5%, or the 10% level, respectively. All variables are defined in Appendix A.

Appendix F: Google Search Trend Comparison – "ESG" and "CSR" (Past 5 Years)

Figure 5 based on Google Trends (2023).