

Impact of Mandatory ESG disclosure on Greenwashing: Evidence from European Union's CSR Directive

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Executive Summary

I investigate the effects of widespread corporate social responsibility (“CSR”) reporting mandate on greenwashing activity. I find that in response to CSR reporting mandate, (i) affected firms increases their greenwashing activity and (ii) the effect is stronger for firms with poor CSR performance. Possible factors explaining such findings are: First, inadequate enforcement mechanism of the current directive allows overall greenwashing opportunity for the affected firms. Second, signaling and socio-political theory that incentivize firms to increase greenwashing activity, and causes stronger greenwashing effect for firms with poor CSR performance. These findings suggest the importance of enforcement mechanism in formulating future mandatory CSR reporting regulation.

Keywords: Corporate Social Responsibility (CSR); disclosure regulation; Directive 2014/95; European Union (EU); Greenwashing

The content of this thesis is the sole responsibility of the author and does not reflect the view of either the supervisor, second assessor, Erasmus School of Economics or Erasmus University.

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1. Introduction

This paper investigates the effects of widespread corporate social responsibility (“CSR”) reporting mandate on greenwashing activity. In the last decade, there has been growing use of non-financial factors (i.e. environmental, social and governance) in investors’ investment selection process, driven by social and environmental challenges in recent years. Yet, integrating non-financial information factors into asset selection process is difficult for investors due to the insufficient availability and quality of firm-level CSR disclosure (Illhan et. al., 2019). In response to this information gap, several countries have initiated mandatory CSR disclosure regulations to force firms adequately disclose CSR information. However, it is still unclear whether such regulations improve the CSR information environment.

Prior literatures have been able to empirically document increases in CSR information availability after CSR reporting mandate (Fletcher et. al., 2022; Ioannou and Serafeim, 2017; Krueger et. al., 2021). Yet, empirical studies on its effects on disclosure quality and comparability are still scarce. Existing challenges in terms of assurance and enforcement of CSR data disclosure persist post-mandatory reporting regulation due to; (i) unaudited data, (ii) no global governing body, (iii) behavioral issues at firm level, and (iv) no specific regulatory guidelines to ensure the accuracy of the reported CSR data (Yu et. al., 2020). Without a sufficient level of enforcement and assurance, affected firms may respond to the directive by merely augmenting or misleading their CSR disclosures; aimed at avoiding the CSR directive or increasing CSR reputation beyond its actual achievements (i.e. greenwash). Greenwashing behavior misleads investors’ perception of the company and ultimately impairs investors’ asset selection process. This paper is then aimed to empirically explore the effect of mandatory CSR disclosure regulation on firms’ greenwashing activity.

Specifically, this paper examines the impact of European Union’s Non-Financial Reporting Directive (NFRD¹ or CSR directive) introduced in 2014 on affected firms’ greenwashing behavior. I believe using EU CSR directive setting can provide the most generalizable and non-region biased result for our assessment, given that the directive is a supra-national disclosure regulation that affects firms in different industries and across EU countries. “Firms within the scope of the directive are diverse in terms of industry, business model, and location of operations, resulting in very different CSR reporting issues” (Fletcher et. al., 2022, p.1). This setting would allow the assessment of potential greenwashing implications in implementing global disclosure standards for sustainability reporting.

I focus my analysis on the two types of greenwashing activity that I am interested in, namely disclosure manipulation and investment strategy. Disclosure manipulation greenwashing is defined as the disclosure of large quantities of environmental data to obscure a firm’s actual CSR performance. On the other hand, I defined investment strategy greenwashing as a firm’s activity to undertake symbolic CSR projects that are not meaningful for its actual CSR performance. Following the study by Yu et. al. (2020), I create a peer-relative greenwashing score (“PRGS”) based on each respective definition of greenwashing activity, using Bloomberg ESG disclosure score (as a measure of CSR disclosure), Asset4 ESG score (as a measure of CSR performance) and SG&A expenses t-1 (as a measure of CSR investment).

¹ Directive 2014/95/EU, enacted October 22, 2014

When a firm has a better relative position than its peers in its CSR disclosure score than in its CSR performance score, or CSR investment, this firm's greenwashing score will be positive, implying that this firm is obscuring its poor CSR performance by simply revealing large quantities of CSR data or undertake symbolic CSR projects respectively.

Then, I empirically analyze whether the affected firms reduced or increased their greenwashing behavior after the introduction CSR directive, using PRGS as our proxy for the firm's greenwashing activity. The CSR directive was passed in 2014 and became effective in 2018; therefore, I use difference-in-difference ("DiD") design to estimate the average treatment effect for my sample period between 2011 to 2018, using 2014 as the starting point of the intervention year. I also investigate yearly treatment effect for eventful years in 2014 (CSR directive introduction), 2016 (reporting guidance release and integration in member states' national law) and 2018 (entry-into-force). To ensure the quality of the benchmark firm-year sample (non-treated sample), I use propensity score to match U.S. firms to the affected EU firms. The findings are consistent with my prediction that EU-affected firms increase its disclosure manipulation greenwashing, and CSR investment in symbolic projects in response to the CSR directive.

Furthermore, I conduct cross-sectional analysis based on the level of firm's CSR performance to assess the robustness of my hypotheses. I define poor CSR performers as companies that have below median CSR performance during the pre-directive period (i.e. 2011-2013). As these firms would face greater public attention and pressure due to the CSR directive introduction, I would expect these firms to have a greater incentive to perform greenwashing (i.e. higher increase in greenwashing activity) after the directive has been introduced. For this analysis, I create two sub-sample consisting of poor CSR performers and the remaining firms (mentioned as average firms in this paper) and separately run my DiD model for each respective sample. The results between these two sub-samples are then compared and assessed for any differences in the average treatment effect and yearly treatment effect. My analysis shows that increases in greenwashing activity are more substantial for poor CSR performers as compared to average firms, suggesting that the increase in EU-affected firms greenwashing activity is driven by the poor CSR performers. In addition, I find that average firms also increase their greenwashing activity in response to the CSR directive, which further suggests the inadequate level of enforcement during my sample period.

This study makes several contributions. First, I contribute to the literature on sustainability in capital markets, ESG data disclosure, and responsible investments. There are very few pieces of literature that assess greenwashing activity empirically, hence my study is one of the few studies that contribute to the literature on this matter. Second, this study extends the previous research by Fietcher et. al. (2022) that assess the real effect of EU CSR directive by utilizing different greenwashing proxy (i.e. peer-relative greenwashing score) as per the model developed by Yu et. al. (2020). Moreover, I also adjusted Yu et al. (2020) model to create a peer-relative greenwashing score for investment strategy greenwashing, which was not done in the original paper. Third, I extend the theory of greenwashing by introducing signaling and socio-political theory into the equation. From these theories, I derived possible explanations for the affected firms' response to the CSR directive in the context of greenwashing activity. Lastly, CSR disclosure regulation is currently one of the most debated policies in recent years, the findings are potentially relevant for policymakers and regulators who contemplate in

introducing a CSR report mandate. Particularly, this study informs the importance of enforcement and assurance in CSR reporting due to its multidimensional nature.

The rest of the paper is organized as follows. **Section 2** presents the background and prior literatures of mandatory CSR reporting regulation and greenwashing activity. **Section 3** discusses my hypothesis development process. **Section 4** outlines the sample, construction of the PRGS as a proxy for greenwashing activity and the research design. **Section 5** presents and analyzes the findings. **Section 6** discusses the findings and concludes.

2. Literature review

2.1 Mandatory CSR reporting

This paper defines the term “CSR”, “ESG” and “Sustainability” in a similar manner which indicates that their meaning is close and often used interchangeably. CSR can be defined as corporate activities and policies that assess, manage, and govern a firm’s responsibilities and their impacts on society and the environment (Christensen et. al., 2021). Based on such definition, CSR reporting is defined by this paper as the firm’s process of measuring, disclosing, and communicating its CSR activities to relevant stakeholders.

In the first part of this section, the paper provides background on mandatory CSR reporting regulation globally and its impact on firms based on the evidence from prior literatures. The second part of this section is focused on introducing the European Union’s CSR directive (NRFD), describing the regulation, its objectives, and potential issues.

2.1.1 Background of Mandatory CSR reporting

There are up to 29 countries that introduced mandates for firms to disclose ESG information by 2017 (Krueger et. al., 2021); where introduction rate has been increasing significantly from 2006 onwards, mainly in Asia & Europe; after the signatories to the UN Principles for Responsible Investment. This trend has mainly contributed by the growing social and environmental challenges in recent years, which have generated pressure on the firms from investors, shareholders, and other stakeholder groups to adopt approaches for risk management and sustainability. For example, study by Ioannou and Serafeim (2014) suggests that CSR information is being utilized by investors and financial intermediaries in the capital market as they have begun to integrate ESG consideration in their assessment and valuation model; Michelin & Rodrigue (2015) document increasing shareholder demands for CSR disclosures, ensuring for generalized accountability. This increased CSR reporting expectation has resulted in mandatory disclosure mandates in the form of sustainability reporting through regulations or public listing requirements in various countries.

Krueger et. al. (2021) study also documents the gap between CSR reporting mandates introduced in various countries. Some countries may not introduce environmental, social and governance disclosure requirements all at once. Out of 29 countries that they identified have implemented CSR reporting mandates, 15 countries introduced E, S, G disclosure requirements all at once. The remaining 14 countries introduced each of the dimension gradually. The regulation also varies significantly in terms of the disclosure format, required content within

the report, firms being targeted by the regulation and the relevant regulatory authority. For example, in Australia, CSR mandatory reporting is being charged to Financial Services Council and the Australian Council of Superannuation Investors. In South Africa, guidance notes to CSR reporting are established through collaboration between the Johannesburg Stock Exchange and the Institute of Directors in Southern Africa. In the European Union, some member countries issued reporting guidance based on the EU Modernization Directive (Directive 2003/51/EC). In other countries, CSR reporting is mandated without reporting or enforcement guidelines from their regulators (Krueger et. al., 2021).

Early research regarding this topic by Ioannou & Serafeim (2017) suggests that CSR reporting mandate does improve the availability of CSR information, promotes efforts from firms to improve comparability of the disclosed information, and boosts company valuation. In line with that result, Krueger et. al. (2021) also documents a greater likelihood of CSR report being disclosed by firms in various countries, in addition to real impacts such as improved analyst earnings forecasts accuracy, lower number of ESG incidents, as well as a lower likelihood of stock price crashes. Focusing on the European context, Fietcher et.al. (2022) provides evidence that mandatory CSR reporting triggers early compliance from the firms that are being affected; the real effects are more substantial for firms that are highly exposed by the directive (i.e. firms with low CSR reporting and activities) and the benefit is real as opposed to greenwashing.

Despite the positive study outcomes in the early study of mandatory CSR reporting, it is still difficult to conclude the net benefit of such regulation. The concern of information inaccuracy due to greenwashing, differences in enforcement level, and minimum assurance of CSR information could potentially affect the result of these studies (Christensen, Hail & Leuz, 2021). In addition, the fact that we are still in the early stages of introducing mandatory adoption of CSR reporting, it is also difficult to predict the responses from stakeholders in the long-term with the current evidence. Moreover, empirical evidence regarding the channel or mechanism on how mandatory CSR reporting influence a firm's responses (real effect) are still lacking, whether this is through shareholder pressure (Dhaliwal et. al., 2011), improved CSR monitoring & governance (Fietcher et. al., 2022); public attention (Huang and Watson, 2015); or benchmarking (Tomar, 2019).

2.1.2 European Union's CSR directive

European Parliament introduced NFRD on 15 April 2014 through Directive 2014/95. This regulation requires large public-interest companies, defined as listed companies with more than 500 employees and either total assets of more than EUR 20 million or revenue of EUR 40 million, to prepare CSR report starting on the fiscal year 2017. Hence, the first mandatory CSR reports were published in 2018 or 4 years after the directive introduction. The CSR directive was to be integrated to members state' national law on 6 December 2016.

As stated in the CSR directive, the regulation was introduced with the aim of increasing the relevance, consistency and comparability of CSR information disclosed within in EU area (Directive 2014/95, recital 21). EU Parliament believes that disclosure of CSR information is a crucial factor that drives firms to change towards a more sustainable global economy; combining long-term profitability with social justice and environmental protection (Directive

2014/95, recital 3). Due to the multi-dimensional nature of CSR information, policies and activities, it is then essential to ensure a sufficient level of comparability to fulfill the needs of stakeholders being impacted by business activities to achieve its intended goal (i.e. increase CSR activities).

Based on the CSR Directive guidelines introduced in June 2016, firms within the scope of the regulation are required to publish an annual CSR report, which reflects information regarding policies, main risks, outcomes related to environmental matters, social and employee factors, respect for human rights, anti-corruption issues and Board of directors diversity. The guideline further specifies that affected firms may follow its existing national reporting framework or international reporting framework, such as Global Reporting Initiatives (GRI), as well as instruct European Commission to develop implementation guidelines that facilitate relevant and comparable disclosure of CSR information, including general and sectoral key performance indicators.

Although the CSR directive has required member states to provide mechanisms that enforce compliance to the provisions, there is no detailed guideline for country-level enforcement institutions and their activities. Similarly, ESMA, the EU securities regulator, while being charged with harmonizing CSR reporting enforcement, has so far not published any official guidance nor any enforcement principles (Fletcher et. al., 2022). This raises the question of whether member states implement a similar level of enforcement given their country-level characteristics differences. Previous literatures suggest that enforcement is endogenous to a country's economic, legal, and cultural environments (De George et. al., 2016; Krueger et. al., 2021). Moreover, study by Anwar et. al. (2020), Shevchenko (2020), and Tran and Adomako (2021) also document a relationship between environmental regulation enforcement with firm's environmental performance.

2.2 Greenwashing

This section briefly discusses the various definition of greenwashing from previous literatures and its impact on the relevant stakeholders affected by such action.

Fletcher et. al. (2022) defines greenwashing in broad terms as a set of activities aimed at escalating a firm's CSR reputation beyond its actual CSR achievements. This can take various forms and activities, resulting in different proxies being used to measure greewashing in previous studies related to this topic.

Based on prior literatures, greenwashing generally can be classified into three different types according to its activities. The first type of greenwashing is disclosure manipulation, a strategy to overstate a firm's CSR performance in its disclosure aimed at misleading external stakeholders to appear 'greener' (Lyon and Montgomery, 2015; Shi et. al., 2020). Under this type, firms would manipulate their ESG performance by disclosing large quantities of environmental data to obscure their environmental performance or selectively reporting positive environmental information but hiding negative information (Yu et. al., 2020; Marquis et. al., 2016).

The second type of greenwashing is an investment strategy to undertake lower-cost and low-impact CSR projects that are not meaningful for firms' actual CSR performance (i.e. symbolic CSR projects). Li and Wu (2020) documents that public firms are more likely to

engage in CSR activities that have no real impact and symbolically engage in CSR activities due to higher level of pressure from shareholder and stakeholders. In this paper, Li & Wu (2020) find that public companies that have participated in United Nation Global Compact (UNGC) do not have lower number of ESG incidents in the post-period, despite their reputation as part of UNGC.

The third type is product greenwashing. Firms implementing product greenwashing focus on the most noticeable aspect from an external stakeholder perspective (i.e. product) and neglect the unobservable aspects. Wu et. al. (2020) document a good example of this type of greenwashing activity in the fast-fashion industry. Fast-fashion firms often label their products as 'green' products by using eco-friendly materials in their production of apparel; however, they do not focus on their hard-labor working conditions or environmental issues in their manufacturing process. A study by Kewalramani and Sobelsohn (2012) also documents a bottled-water company that claimed their product to be environmentally friendly, while in reality, they have significant environmental issues caused by its distribution and packaging processes.

As mentioned in Christensen et. al. (2021) study, one of the critical features of CSR reporting relative to financial reporting is the diversity of stakeholder groups that uses the CSR information for various purposes and objectives. Hence, greenwashing activity has the potential to negatively impact the decision-making process of a broader group of people.

From shareholder's perspective, greenwashing could result in mispriced firm's valuation. By providing inaccurate CSR information, greenwashers can overstate their valuation. Research by Hartzmark and Sussman (2019) suggests that investor does value sustainability, as they have empirically shown that the highest sustainability-rated portfolio investments received more than USD 24 billion greater fund flows as opposed to the lowest ones. In addition, Fisher-Vanden and Thorburn (2011) also suggests that CSR performance does have an impact on firms' share price.

From customer's perspective, greenwashing is a means of marketing and influencing customer purchasing decisions for the benefit of the firm's financial performance. Research by Testa et. al. (2015) documents a positive revenue impact of eco-label in products in Italian market; similarly, Delmas and Burbano (2011) suggest that firms can overstate product environmentally friendly image to improve their revenue; and Majid and Russel (2015) find that market value decline of second-hand 'green' cars is slower as opposed to its counterpart. The evidence above indicates that CSR engagements influence customers' perception of the company (or product) and improve customer loyalty, ultimately boosting future revenues.

From the perspective of society in general, CSR and sustainability are about externalities and the distribution of rights of assets across generations (Howarth and Norgaard, 1992). CSR reporting is one-way firms can convey their CSR activities to the public. Greenwashing is a crucial issue in the context of CSR reporting as it diminishes the real positive impact that prudent disclosure would bring to society in general. Amel-Zadeh and Serafeim (2018) suggest that CSR reporting would make acquiring and processing CSR information more efficient, encourage firms to change its profit-maximization behavior and reduce externalities in anticipation of stakeholder pressure. Chen et. al (2017) research support this argument as they document a reduction in overall industrial wastewater and SO₂ emissions in cities post CSR

reporting mandate. By overstating their CSR achievement (greenwash), firms would be able to avoid such external pressures through symbolic activities and reporting.

3. Hypothesis development

In this section, the paper aims to gain a better understanding of the mandatory CSR disclosure effectiveness in mitigating greenwashing practices. This paper will focus on the impact of CSR reporting mandate on two types of greenwashing discussed in Section 2, namely (i) greenwashing through disclosure manipulation and (ii) greenwashing through investment strategy. This paper will not assess product greenwashing, as product-related information is mainly confidential; hence it is challenging to acquire such information or generate an accurate proxy for this type of greenwashing.

3.1 Greenwashing through disclosure manipulation

Signaling theory in accounting research argues that information asymmetry in reporting system allows corporate managers to take decisions that affect disclosure of information presented to stakeholders. Under this theory, firms with a good CSR performance are more likely to disclose CSR information to differentiate themselves from its competitors. However, for greenwashing purposes, firms with poor CSR performance are also more likely to engage in CSR reporting to mislead stakeholders' perceptions about their actual CSR performance (Clarkson et. al, 2008).

Empirical results from prior literatures on mandatory CSR reporting regulation have shown evidence that mandating such regulation would increase firms' CSR disclosure and availability of CSR information (Krueger et. al., 2021; Ioannou and Serafeim, 2017). However, the same research by Krueger et al. (2021) also suggests that an increase in availability is not necessarily followed by an improvement in reporting quality. This finding is in line with socio-political theory; which argues that firms do have the incentive to engage in policy processes if they consider their social legitimacy is threatened (Patten, 2002); they will tend to publish additional disclosure to alter stakeholders' perceptions of their actual performance (Clarkson et. al., 2011). Christisen et. al. (2021) research also argues that enforcement of CSR mandatory reporting is very challenging due to the highly diverse CSR activities across industries and firms, which leads to issues such as verifiability of disclosed information and standardization of reporting for comparability, unfolding opportunity for greenwashing. Specifically for EU settings, Fietcher et. al. (2022) outlines that there is no official EU documentation that provides details of country-level enforcement institutions and their activities.

This paper considers the mandatory CSR reporting mandate as additional pressure from stakeholders (i.e. government) for firms to report their CSR activities. Based on the argument above, we assume that good CSR performer firms have voluntarily reported high-quality CSR information prior to the disclosure mandates, hence implying that additional disclosure requirements may not have significant effects on these firms. On the other hand, poor CSR performers would be incentivized to engage in greenwashing activities to fulfill this new demand for CSR information to respond to the additional social pressure (i.e. socio-political theory) supported by the current insufficient level of enforcement. Based on the argument above, I predict the net effect of the CSR reporting mandate would increase disclosure greenwashing activity.

Hypothesis 1: Greenwashing through disclosure manipulation increases after mandatory CSR reporting is introduced. (H1)

3.2 Greenwashing through investment strategy

Deriving from the same signaling theory and socio-political theory, greenwasher firms could also respond to the mandatory regulation by initiating symbolic CSR activities through investment in CSR projects that are low cost and with no meaningful impact on their CSR actual performance to appear “green”.

Previous literatures have shown that firms are often responding to new institutional demands by complying symbolically to appear in compliance (Bromley and Powell, 2012; Zajac and Westphal, 2004). Moreover, empirical result from Li and Wu (2020) documents evidence that supports this notion, as they found public listed companies failed to have lower ESG incidents after symbolically taking part in UNGC. This study also suggests that public companies are more likely to engage in symbolic CSR activities as they are more constrained by the fiduciary duty to maximize shareholders’ interests due to being tightly monitored by equity markets.

In line with the arguments above and the fact that mandatory CSR disclosure regulations are mainly targeted at public listed companies, we would expect that greenwashing through investment strategy would increase post its introduction.

Hypothesis 2: Greenwashing through investment strategy increases after mandatory CSR reporting is introduced. (H2)

4. Research Design

This section describes the empirical research framework to test our developed hypothesis based on different types of greenwashing that we have identified in prior literatures.

First, I create the peer-relative greenwashing score based on the study by Yu et. al. (2020) and applied this model to measure peer-relative score for (i) greenwashing through disclosure manipulation. To assess the peer-relative score for (ii) greenwashing through investment strategy, I adjusted Yu et. al. (2020) original model with a variable that captures a firm’s CSR investment. This will be further discussed in the section 4.2.1 and 4.2.2.

Then I use difference-in-differences design and estimate the treatment effects of the CSR directive on firm’s peer-relative greenwashing score (for both greenwashing through disclosure manipulation and investment strategy) for all period within our sample. In addition, we will also investigate the yearly treatment effect for eventful years (2014, 2016 and 2018), as well as perform cross-sectional analysis based on firm’s level of exposure to the CSR reporting mandate, please refer to section 4.3 for detailed explanation on this.

4.1 Sample and data

My sample period starts in 2011, three years prior CSR directive was introduced in European Union and ends in 2018, the year firms were required to publish CSR report (entry-into-force). Treated firms are defined as listed firms that satisfy the threshold as per described in the directive (refer to section 2.1.2). Given that the directive has a broad scope and applies

to all large-listed firms in the European Union, our setting falls short of the experimental ideal where the treatment is randomly assigned. Due to a lack of data availability for EU firms below the threshold assigned by the directive, U.S. firms are used for my benchmark group. The reason U.S. firms are ideal for the benchmark group is that the United States did not implement any CSR-related mandatory regulation during the sample period (Ioannou and Serafeim, 2017; Christensen et. al., 2021). Moreover, U.S. market provides the most comprehensive country-level coverage of Asset4 and Bloomberg ESG (i.e. database I use for CSR information), allowing the selection of matched control firms. Due to the high influence of financial and banking regulations may have on greenwashing behavior, financial firms are dropped from the sample. EU firms within the threshold of CSR directive are then matched with U.S. benchmark firms using propensity-score matching (“PSM”) based on their pre-directive levels of CSR performance, CSR disclosure, and other variables that are used in the empirical analyses.

As a proxy for a firm’s CSR disclosure, I utilize Bloomberg’s ESG disclosure score following prior studies (Yu et. al., 2018; Tamimi and Sebastianelli, 2017). Bloomberg ESG disclosure reflects the level of transparency and accountability of CSR disclosure of the firm as opposed to its CSR performance. All CSR information disclosed by a firm will be counted as a positive score under this score, regardless of whether the information being disclosed was negative or positive sentiment. Bloomberg ESG disclosure scores apply a multi-dimensional construct, based on about 120 quantitative and qualitative measures, to rate companies on their Environmental (E), Social (S), and Governance (G) policies and practices using publicly available data, annual and sustainability reports, direct communication, press releases, third-party research, and news items. The three ESG scores (each ranging from 0 indicating no disclosure to 100 demonstrating complete disclosure) are then combined into a single score (ranging from 0 to 100) using a proprietary method. ESG scores and ratings of companies are updated by Bloomberg annually (Bloomberg L.P).

To reflect the firm’s actual CSR performance, I select the score provided by Thomson Reuters Asset4. Prior studies adopt Asset4 as a measure to reflect CSR performance on the environmental, social and governance dimensions (Dai et. al., 2021; Fietcher et. al., 2022; Ioannou and Serafeim, 2012). Thomson Reuters supplies the Asset4 performance scores based on the relative performance of a company on the aspects of E, S, and G, compared with the Asset4 universe. The Asset4 ESG framework allows to rate and compare companies against approximately 700 individual data points, which are combined into over 250 key performance indicators (KPIs). These KPI scores are aggregated into a framework of 18 categories grouped within 4 pillars that are integrated into a single overall score. Indicators, categories, pillars and overall Score are calculated by equally weighting and z-scoring all underlying data points and comparing them against all companies in the Asset4 universe. The resulting percentage is therefore a relative measure of performance, z-scored and normalized to better distinguish values and position the score between 0 and 100 (Thomson Reuters).

I collected firm-level characteristics control variables from Bloomberg and Thomson Reuters database. The GDP per capita in U.S. dollar at PPP exchange rates is collected from the International Monetary Fund’s World Economic Outlook Database.

[Table 1]

Panel A of Table 1 outline the sample selection process, I start with matched sample between Asset4 and ESG Bloomberg for all EU and US firms for years 2011 to 2018. With Bloomberg Equity Screening Function (EQS), samples downloaded for Bloomberg ESG has been filtered for the CSR directive thresholds (i.e. Number of employee, Total Assets and Revenue). Then, I matched the filtered Bloomberg ESG samples to Asset4 which resulted in 41,760 observations. After eliminating for missing information and financial industry from the

sample, I obtained 4,688 observations. This consisted of 2,632 EU firm-year observations and matched 2,056 U.S. firm-year observations (Panel B of Table 1). Panel C and D outlines the distribution of sample across industries and countries.

4.2 Peer- relative greenwashing score

This section explains the model to estimate peer-relative greenwashing score variable (proxy for greenwashing activity), based on each respective definition greenwashing activity (i.e. Disclosure manipulation and investment strategy).

4.2.1 Peer- relative greenwashing score – Disclosure manipulation

Based on our previous literature review, I defined greenwashers as firms that manipulate disclosure to appear green by disclosing large quantity of CSR information to hide its actual poor CSR performance and mislead stakeholders by sheer volume of information (Yu et. al., 2020).

A company's peer-relative greenwashing score under this model (1) represents the difference between its normalized proxy for CSR disclosure and its normalized proxy for CSR performance score. We can identify three basic circumstances of a firm's ESG disclosure by using the peer-relative greenwashing score. Firms can either (a) disclose large quantities of CSR information such that it overstates its achievements in ESG issues, (b) disclose its ESG information fully, so the disclosed information is the same as the reflection of its actual performance in ESG issues, or (c) disclose less ESG information or remain silent, so it understates its achievements in ESG issues. A higher positive score would then imply a higher greenwashing level as explained by point (a).

[Table 2]

To arrive at our peer-relative greenwashing score, I convert Asset4 and Bloomberg ESG disclosure score into ratios by dividing by 100, so the maximum value for both indicators is one. Then we normalize both scores to the same scale by subtracting the mean and dividing by the standard deviation. Finally, we subtract the normalized CSR performance score from CSR disclosure score to see the value difference between these two variables. This results in Eq. (1) below.

$$PRGS (1) = \parallel CSR Disclosure score \parallel_{jt} - \parallel CSR Performance score \parallel_{jt} \quad (1)$$

<i>PRGS (1)</i>	:	Disclosure peer-relative greenwashing score for firm j in year t
$\parallel CSR Disclosure score \parallel_{jt}$:	Normalized Bloomberg ESG score for firm j in year t
$\parallel CSR Performance score \parallel_{jt}$:	Normalized Asset4 score for firm j in year t

4.2.2 Peer- relative greenwashing score – Investment Strategy

This type of greenwashing activity is defined as implementing less costly and impactful CSR projects to give symbolic compliance as opposed to actual commitment in incorporating CSR activities in firm's long-term strategy and operation.

A company's peer-relative greenwashing score under this adjusted model (2) represents the difference between its normalized proxy for CSR Disclosure and its normalized proxy for

CSR investment. We can identify three basic circumstances of a firm’s ESG disclosure by using the peer-relative greenwashing score. Firms can either (d) invest in a symbolic project that is not costly and does not have a meaningful impact to appear greener to outside stakeholders, (e) invest meaningful project that is fully reflected in its disclosure or (f) invest in a long-term project and meaningful project that is not reflected fully in its disclosure yet. A higher positive score would then imply a higher greenwashing level, as explained by point (d).

[Table 3]

Referring to previous literature by Fietcher et. al. (2022), I utilize selling, general and administration (“SG&A”) as a measure for a firm’s CSR-related investment. This is in line with previous research by Srivastava (2014) that suggests most CSR investment are mainly expensed. I then estimate a peer-relative greenwashing score for this type of greenwashing, by adjusting Yu et. al original model (1). This is done by replacing the original model denominator with firm’s normalized SG&A expenses which results in Eq. (2). The adjusted model (2) reflects the difference between actual CSR investment made by a certain firm to its disclosed CSR information. This paper also considers the time taken before projects realizes into a value for a firm, hence, we use firm’s $SG\&A_{t-1}$ to address this time gap between when the investment was made and its impact to firm’s CSR performance.

$$PRGS (2) = \parallel CSR Disclosure score \parallel_{jt} - \parallel SG\&A \parallel_{jt-1} \quad (2)$$

- $PRGS (2)$: Investment peer-relative greenwashing score for firm j in year t
- $\parallel CSR Disclosure score \parallel_{jt}$: Normalized Bloomberg ESG score for firm j in year t
- $\parallel SG\&A \parallel_{jt-1}$: Normalized log transformed SG&A expense for firm j in year t-1

I also run stricter greenwashing score replacing CSR Disclosure score with CSR Performance score in Eq (2). By doing so, I examine the difference between firm’s actual CSR performance score captured through assessment of its CSR disclosure (i.e. annual report, sustainability report, management presentation and etc.) as compared to firm’s actual CSR investment spent during the previous period. As Asset4 score is meant to capture firm’s actual performance, I believe this provides a stricter measure of greenwashing activity and measure external stakeholder ability to capture firm’s actual CSR activity through its disclosure (i.e. accurately measure a firm’s CSR performance regardless any greenwashing measures taken).

$$PRGS (3) = \parallel CSR Performance score \parallel_{jt} - \parallel SG\&A \parallel_{jt-1} \quad (3)$$

- $PRGS (3)$: Investment peer-relative greenwashing score for firm j in year t
- $\parallel CSR Performance score \parallel_{jt}$: Normalized Asset4 score for firm j in year t
- $\parallel SG\&A \parallel_{jt-1}$: Normalized log transformed SG&A expense for firm j in year t-1

The last PRGS model for investment strategy greenwashing that I run is a 2-step model. First, I estimate how meaningful the CSR investment made by a firm through a comparison between its SG&A expenses in the previous period (i.e. the proxy for CSR investment) with its Asset4 score, the proxy for a firm’s actual CSR performance. By reversing the role between the variables in Eq (3), we would get scoring that estimates the value that materializes to the firm’s actual CSR performance from its CSR investment made in the prior year. Higher values indicate more meaningful investment as per Eq (4).

$$\gamma_{jt} = \parallel SG\&A \parallel_{jt-1} - \parallel CSR Disclosure score \parallel_{jt} \quad (4)$$

γ_{jt} : CSR investment significance score for firm j in year t
 $\parallel CSR Performance score \parallel_{jt}$: Normalized Asset4 score for firm j in year t
 $\parallel SG\&A \parallel_{jt-1}$: Normalized log transformed SG&A expense for firm j in year t-1

Similar to Eq (2) and (3), the result (i.e. score) from Eq (4) is compared to firm's CSR disclosure score to understand the gap between CSR information disclosed by firms as compared to our proxy that measures materiality of CSR investment. This result into Eq (5) below.

$$PRGS (4) = \parallel CSR Disclosure score \parallel_{jt} - \parallel \gamma \parallel_{jt} \quad (5)$$

$PRGS (4)$: Investment peer-relative greenwashing score for firm j in year t
 $\parallel CSR Performance score \parallel_{jt}$: Normalized Asset4 score for firm j in year t
 $\parallel SG\&A \parallel_{jt-1}$: Normalized log transformed SG&A expense for firm j in year t-1

4.3 Model

In this section, I will outline the theoretical model that is used to assess the effect of CSR directive introduction on affected EU firms' greenwashing activity.

4.3.1 Difference-in-differences model

To assess the effect of mandatory CSR disclosure effect on the level of greenwashing, this paper employs difference-in-difference design and estimates the treatment effect of CSR directives on EU firms' level of greenwashing behavior. The sample consists of firm-year observations of EU and U.S. matched firms between 2011 (i.e. three years before directive introduction) to 2018 (year the mandate became effective for treated firms). Moreover, following the study by Fietcher et. al. (2022), I choose 2014 as the start of the treatment years to accommodate effects that materialize in the period before the reporting mandate became effective (2018) due to (i) internal learning, (ii) public attention and (iii) anticipation of stakeholder reactions, after the CSR directive was introduced in early 2014. Eq. (6) represents our model for testing the impact on greenwashing activity:

$$PRGS_{jt} = \beta_0 + \beta_1 EU_j + \beta_2 AFTER + \beta_3 EU_j * AFTER_t + \beta_4 CTRL + \beta_5 FE + \varepsilon \quad (6)$$

The dependent variable, $PRGS$, is the peer-relative greenwashing score that I estimated for different types of greenwashing (see section 4.2). The indicator EU is a dummy variable that equals to 1 for EU firms and 0 for the matched U.S. firms. $AFTER$ is a time dummy variable that indicates years after the introduction of CSR directive, equal to 1 for years $t \geq 2014$ (the year CSR directive was introduced). $AFTER * EU$ is our variable of interest representing the average treatment effect of CSR directive introduction. For both of my hypotheses, I would expect the coefficient of my variable of interest to be positive, indicating an increase in greenwashing activity for affected EU firms after CSR directive passage. $CTRL$ is a vector for control variables, this includes return on asset (ROA), dividend per share (DPS), total asset (TA), property, plant and equipment (PP&E) and market opportunity for growth (TQ) to control for profitability and size of the company (Delmas and Burbano, 2011); firm's level of liquidity

through leverage (LEV) and cash flow from operation (CFO), as well as analyst following (AF) to control for the analyst coverage that could affect the CSR performance and disclosure scores as per study by Fietcher et. al. (2022); and GDP per capita converted into US dollar to capture countries economic development, as this is one of the determinants of country's local CSR trend (Husted, 2005). The model also controls for time-invariant unobservable differences in firm characteristics and industry-year specific trends in CSR reporting by applying firm and industry-year fixed effects, respectively. Appendix A provides variable descriptions for all variables used.

In addition, we also run an additional test to assess the yearly treatment effect of the directive on affected firms' greenwashing behavior for the year where CSR Directive was introduced (2014), CSR reporting guidance release & integration of the directive to member states' national law (2016) and entry-into-force (2018).

$$PRGS_{jt} = \beta_0 + \beta_1 EU_j + \beta_2 YEAR + \beta_3 EU_j * YEAR_t + \beta_4 CTRL + \beta_5 FE + \varepsilon \quad (7)$$

For this analysis, I run a similar DiD model as outlined in Eq. (6); however, I replaced the *AFTER* variable with *YEAR*, which is a vector for eventful years within our sample period (i.e. 2014, 2016 and 2018). The variable of interest is *EU * YEAR* represents the yearly treatment effect CSR directive introduction on these eventful years. I also apply the same control variables and fixed effects to this model, resulting in Eq. (7). I would expect the same positive coefficient direction for my variable of interest as Eq. (6) for both of my hypotheses under this model.

4.3.2 Cross-sectional analysis

To further confirm the robustness of our hypothesis, I also investigate whether the treatment effect exhibits cross-sectional variation. More specifically, in my hypothesis development, I indicate that firms that are more exposed to the reporting mandate during the pre-directive period (i.e. with low CSR performance) would be more likely to perform greenwashing based on the signaling theory and would drive the increase level of greenwashing activity for EU affected firms in the post-directive period.

To empirically assess this, I create a dummy variable *LOW CSR* ("LC"), which equals to 1 if a certain firm's CSR performance score is lower than the median score of the sample during the pre-directive period and 0 otherwise. Based on the dummy variable, I create two sub-sample set consisting of (i) EU and U.S. matched firms that have low CSR performance during the pre-directive period and (ii) those that are not. I run the same DiD models to assess the average treatment effect and yearly treatment effect, namely Eq. (6) and Eq. (7), for each sub-sample separately and compare the result to assess the difference in effects between these two sub-samples.

Table 4 presents the summary statistics for both sub-samples I created by using the above-mentioned method.

[Table 4]

4.4 Peer-relative greenwashing score summary statistics and interpretation

Table 5 provides firm-year summary statistics of each respective peer-relative greenwashing score for the (i) full sample, (ii) low CSR performance firms and (iii) above average CSR performance firms.

[Table 5]

As shown in Table 5, the PRGS (1) – PRGS (4) value range are different between each of the scores (shown in the min and max value). Hence, to understand the significance of the result, I divide the resulting variable coefficient with the full sample min-max range of each respective PRGS. This will result in rescaled coefficient of estimate on a percentage basis (between 0% - 100%), relative to the range of min – max value for each respective PRGS.

$$\frac{b_x}{Max_x - Min_x}$$

b_x : Coefficient of estimate for PRGS x
 Min_x : Minimum value of PRGS x
 Max_x : Maximum value of PRGS x

5. Empirical result and analysis

The coefficient estimates are shown in Table 6. Column PRGS (1) – PRGS (4) represents the dependent variable peer-relative greenwashing score based on different definition and models outlined in section 4.2.1 and 4.2.2. Column (1) outline the result for average treatment effect for the full sample period (2011 – 2018), while column (2) shows the result for yearly treatment effect during eventful years (i.e. 2014, 2016 and 2018).

[Table 6]

To assess the impact of CSR directive introduction on firms' disclosure greenwashing activity (H1), I use the variable PRGS (1) as the dependent variable for Eq. (6) and Eq. (7). The test statistics reported in Table 6, show that EU affected firms have an increase in disclosure greenwashing activity from pre- to post-directive period. The result from Eq. (6) shows that the average treatment effect ($EU * AFTER$) is positive and significant result (0.093; p-value < 0.05), indicating that EU-affected firms increased their disclosure greenwashing behavior by circa 1.2% after the introduction of CSR directive. Next, I estimate Eq. (7) with the same dependent variable PRGS (1) to assess the yearly treatment effect on the eventful years. The results are highly positive and significant for $EU * 2016$ (0.216; p-value < 0.01) and $EU * 2018$ (0.306; p-value < 0.001), however not for $EU * 2014$. Collectively, H1 can be accepted as the results indicate an overall increase in EU-affected firms' greenwashing activity by disclosure manipulation after the CSR directive passage. Specifically, the increase in disclosure greenwashing activity started in 2016 and became stronger in 2018 (score increases by 2,9% and 4,2% for 2016 and 2018 respectively).

Then, I also test for the second hypothesis (H2). Specifically, I examine whether the CSR directive introduction also increases affected EU firms' investment in symbolic and non-meaningful CSR projects. For this analysis, I use PRGS (2), PRGS (3) and PRGS (4) as the dependent variable (i.e proxies for investment strategy greenwashing) and estimate the same Eq. (6) and Eq. (7). Average treatment effect ($EU * AFTER$) results from Eq. (6) for PRGS (2), PRGS (3) and PRGS (4) are all consistently positive and highly significant, with p-value < 0.001. On relative terms, the result suggests post CSR directive introduction, EU affected firms increases its investment in symbolic CSR projects by 3,1% (0.278); 1,8% (0.184) and 3,1%

(0.326) for PRGS (2), PRGS (3) and PRGS (4) respectively. The yearly treatment effect from estimating Eq. (7) also mainly shows consistent increasing positive and significant results between the three proxies throughout the eventful years, except for PRGS (3), which presents an insignificant result for $EU * 2016$. Overall, the outcome from both models is in-line with my second hypothesis; hence H2 can be accepted.

[Table 7]

Table 7 reports the result of the cross-sectional analysis, with variation based on the pre-directive period level of exposure to the CSR reporting mandate measured by the CSR performance score. Panel A shows the test result for the sub-sample consisting of firms with low CSR performance during the pre-directive period (LOW CSR = 1), while Panel B presents the test result for the remaining firms (LOW CSR = 0). Similarly, column (1) reports findings of the average treatment effect estimated by Eq. (6) and column (2) present the yearly treatment effect estimated by Eq. (7).

By comparing PRGS (1) DiD estimator $EU * AFTER$, I find that increase in disclosure greenwashing activity during the post-directive period is not driven by low CSR performance firms. However, if we compare specifically the yearly treatment effect in 2018 (entry-into-force), I noted that the coefficient for low CSR firms is 6.1% higher as compared to the average firms (0.323 vs 0.296), where both results are statistically significant. Moreover, the yearly treatment effect indicator for 2016 ($EU * 2016$) only shows a positive and significant result for poor CSR performers. For PRGS (2), PRGS (3) and PRGS (4), the result also suggests higher increases in symbolic CSR investment for low CSR firms. I find that for both column (1) and column (2), coefficients of poor CSR performers sub-sample are higher than average firms on results that are statistically significant. Notably, for PRGS (4), $EU * AFTER$ coefficient for low CSR firms is 1.1 times higher than average firms (0.440 as compared to 0.200), and the yearly treatment effect in 2018 is 1.2 times higher than the result of average firms (0.779 as compared to 0.369), where the result for both sub-samples are highly significant. Hence, these findings further support the passage that increases in EU-affected firms greenwashing activity during the post-directive period is mainly driven by firms with poor CSR performance. Although, it is not purely driven by poor CSR performers (as I hypothesized), as the evidence still documents increase in greenwashing activity for average firms.

6. Discussion and conclusions

In this study, I explore the impact of CSR reporting mandates on firms' greenwashing behavior. I use the EU CSR directive setting to perform DiD analysis and assess the causal effect between the introduction of CSR directive on the EU-affected firms' greenwashing activity through disclosure manipulation and investment strategy, measured using a peer-relative greenwashing score.

In the main analysis, I empirically show that affected firms increase their greenwashing activity through disclosure manipulation and symbolic CSR investment in response to the CSR directive. Notably, for the yearly treatment effect, I find positive and significant results for all the greenwashing indicators in 2018 (entry-into-force year), in line with the argument that without an adequate level of enforcement mechanism, forcing firms to report CSR information would lead to increase in CSR disclosure, but not necessarily in the actual CSR activity. As discussed in section 2.1.2, during our sample period, there is no EU official document that provides detailed guidance on country-level enforcement, including from ESMA and EU

securities regulator. Despite the uncertain enforcement guidance at country-level, the directive already requires affected firms to publish CSR reports with a specific level of standard in 2018, which create a disclosure greenwashing opportunity for these firms. My finding is in line with the study by Krueger et. al. (2021) that suggests average firms superficially comply with the disclosure requirement in response to CSR reporting regulation, as they documents increase likelihood to report CSR information, but not increases in the reporting quality itself.

Additionally, the result from cross-sectional analysis empirically shows that increases in greenwashing activity is driven by poor CSR performers during the post-directive period. Although I find no significant difference in poor CSR performers disclosure greenwashing activity during pre- and post-directive period, evidence from the yearly treatment effect during 2018 (entry-into-force) suggests that poor CSR performers increases in greenwashing activity is 6.1% higher for disclosure manipulation and up to 1.2 times greater for investment strategies compared to average firms. One possible explanation for this outcome is that poor CSR performers were already under stakeholders' pressure prior to the CSR directive passage; hence they already performed a high degree of disclosure greenwashing during the pre-directive period. The result for the yearly treatment effect, however, is in line with the study by Christensen et. al. (2017); as the public attention for CSR increased during the post-directive period, poor CSR performers receive more pressure and are monitored closely by external and internal stakeholders; hence, the evidence shows stronger increases in greenwashing activity on the year-on-year treatment effect for poor performers. This analysis also shows that average affected firms (Low CSR = 0) also increased their greenwashing activity post-directive period (particularly in 2018), indicating the insufficient level of enforcement. Alternatively, this finding could also be explained by signaling theory. Post CSR directive passage, poor CSR performers that were laggards in terms of CSR disclosure increased their disclosure by significantly more and reached levels of CSR disclosure that are similar to the leaders (good CSR performers) through disclosure greenwashing strategy. The leader would then respond by increasing their disclosure level even more to differentiate themselves from laggard firms, creating a domino effect that leads to the increased level of disclosure greenwashing for both poor CSR performers and average firms.

This study provides an early empirical assessment of CSR reporting mandate on firm's greenwashing behavior. The result confirms that early CSR mandatory reporting regulations are lacking in terms of guidance and enforcement mechanisms, thus, resulting in a rising level of greenwashing activity from the affected firms. Further, this study also empirically assesses the effect based on EU-affected firms' variation of CSR performance during the pre-directive period, and empirically presents that the increase is mainly driven by poor CSR performers. An important implication of the result is for countries that have already implemented CSR mandates or contemplating to implement such regulations in the future to consider the importance of enforcement mechanisms in their policy formulation process.

This paper also extends the theory of greenwashing; specifically, it extends the study by Yu et. al. (2020) and Fietcher et. al. (2022). First, I extend the peer-relative greenwashing score for investment strategy greenwashing in addition to the disclosure manipulation score developed by Yu et. al. (2020). Secondly, I apply these greenwashing proxies as the additional dependent variables to assess the real effect of EU CSR directive study done by Fietcher et. al.

(2022). This study also introduces the signaling theory and socio-political theory as possible explanations for firms' greenwashing behavior in response to the directive.

Our findings, however, are subject to limitations. First, our sample consisted of a small sample of large-cap listed firms due to the coverage limitation of Asset4 and Bloomberg ESG disclosure score. Our treatment sample only consists of 329 EU firms, which is a subsample of the approximately 6,000 EU firms within the scope of the CSR directive. Secondly, our proxy for greenwashing activity is not without flaws. It is possible that CSR investment might not be fully captured in SG&A expenses, as significant PP&E or R&D expenses might be capitalized and hence not captured by this proxy. In addition, our proxy for CSR disclosure (i.e. Bloomberg ESG disclosure score) increases regardless of the positive or negative sentiment of the CSR information. Hence, it is possible that the gap between CSR disclosure and CSR performance might not be caused by disclosure manipulation, but rather firms are reporting their negative information post-directive period, reducing their CSR performance score, while simultaneously increasing their disclosure score. Lastly, this paper presents early evidence of the CSR directive. The European Commission adopted a proposal for Corporate Sustainability Reporting Directives ("CSRD") on 21 April 2021. The new proposal radically improves the existing reporting requirements of the EU's Non-Financial Reporting Directive (NFRD), which includes stricter enforcement and assurance requirement of the disclosed informations. This provides future research avenue for greenwashing literature, more particularly to assess the effectiveness of the new CSRD in tackling greenwashing concerns that still exist in the current regulation setting.

7. References

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8. Appendices

Table 1 – Sample description

Panel A. Sample selection

<i>Selection criteria</i>	EU sample
Matched Asset4 & Bloomberg ESG data for US & EU firms	
<i>Bloomberg filtered for:</i> No of employee, Revenue and Total assets	41,760
<i>Period:</i> 2011 - 2018	
<i>Less observations of firms:</i>	
Asset4 & Bloomberg ESG firms coverage difference (2011 – 2018)	(36,936)
Financial firms	(136)
Final sample before matching:	4,688
Final sample after matching:	4,688

Panel B. Sample distribution per year

Desc.	2011	2012	2013	2014	2015	2016	2017	2018	Total
US firms	257	257	257	257	257	257	257	257	2,056
EU firms	329	329	329	329	329	329	329	329	2,632

Panel C. Sample distribution per industry

	EU firms		U.S. firms	
	Firm-years	Percent (%)	Firm-years	Percent (%)
Basic materials	245	9,4%	112	5,4%
Consumer discretionary	548	22,2%	496	24,1%
Consumer staples	264	10,0%	152	7,4%
Energy	184	7,0%	128	6,2%
Healthcare	144	5,5%	280	13,6%
Industrials	752	28,6%	448	21,8%
Real estate	16	0,6%	16	0,8%
Technology	120	4,6%	344	16,7%
Telecommunications	104	4,0%	48	2,3%
Utilities	216	8,2%	32	1,6%
Total	2,632	100,0%	2,056	100,0%

Panel D. Sample distribution per country

	EU firms		U.S. firms	
	Firm-years	Percent (%)	Firm-years	Percent (%)
Belgium	16	0,6%	-	-
France	416	15,8%	-	-
Germany	432	16,4%	-	-
Greece	40	1,5%	-	-
Ireland	40	1,5%	-	-
Italy	112	4,3%	-	-
Netherlands	136	5,2%	-	-
Poland	48	1,8%	-	-
Portugal	40	1,5%	-	-
Spain	144	5,5%	-	-
UK	1,208	45,9%	-	-
U.S.	-	-	2,056	100,0%
Total	2,632	100,0%	2,056	100,0%

Panel D. Summary statistics for EU and U.S. firms

	EU firms		U.S. firms		Full sample	
	Mean	StDev	Mean	StDev	Mean	StDev

Main variables:

CSR performance	0,54	0,17	0,49	0,02	0,52	0,17
CSR disclosure	0,44	0,12	0,41	0,02	0,43	0,12
SG&A _{t-1}	0,15	0,18	0,24	0,01	0,19	0,17

Control variables:

LN (TA)	22,66	1,61	22,95	1,02	22,79	1,48
LN (AF)	2,85	0,59	2,84	1,03	2,85	0,59
LEV	24,26	15,54	26,87	1,46	25,41	17,22
CFO	0,09	0,07	0,12	0,01	0,11	0,07
LN (FF)	4,25	0,44	4,53	0,20	4,37	0,38
ATO	0,96	0,63	0,99	0,05	0,97	0,66
DPS	0,84	1,03	0,98	0,08	0,90	1,27
PPE	0,59	0,43	0,52	0,03	0,53	0,40
ROA	5,64	6,93	7,64	0,47	6,52	7,12
LN (TQ)	(0,21)	0,89	0,30	0,04	0,01	0,88
LN (GDP)	0,72	0,63	2,76	0,12	1,62	1,12

We use propensity score matching (“PSM”) to obtain our final sample. The PSM sample is based on all EU and U.S. firms with employees > 499. We use all covariates (except for LN (GDP)), our measure of CSR performance and disclosure score, as well as industry membership (FF 12) as matching parameters.

***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively, using two-tailed tests.

Table 2
Disclosure manipulation score outcomes

Condition	Description
$\ \text{CSR Disclosure score} \ _{jt} > \ \text{CSR Performance score} \ _{jt}$	Disclosure manipulation
$\ \text{CSR Disclosure score} \ _{jt} = \ \text{CSR Performance score} \ _{jt}$	Disclosure fully reflects performance
$\ \text{CSR Disclosure score} \ _{jt} < \ \text{CSR Performance score} \ _{jt}$	Brown washing

Table 3
Investment strategy score outcomes

Condition	Description
$\ \text{CSR Disclosure score} \ _{jt} > \text{Log}(\ \text{SG\&A} \ _{jt-1})$	Investment in symbolic CSR project
$\ \text{CSR Disclosure score} \ _{jt} = \text{Log}(\ \text{SG\&A} \ _{jt-1})$	Investment in meaningful CSR projects
$\ \text{CSR Disclosure score} \ _{jt} < \text{Log}(\ \text{SG\&A} \ _{jt-1})$	Investment in long-term CSR projects

Table 4
Cross-sectional sample statistics

	LOW CSR = 1		LOW CSR = 0	
	EU	U.S.	EU	U.S.
Firm-years observation	1,144	1,256	1,488	800
<i>Main variables (avg):</i>				
CSR performance	0,43	0,40	0,63	0,62
CSR disclosure	0,38	0,37	0,48	0,47
SG&A _{t-1}	0,17	0,23	0,14	0,24
<i>Control variables (avg):</i>				
LN (TA)	22,04	22,82	23,14	23,15
LN (AF)	2,67	2,79	2,98	2,93
LEV	21,01	26,87	26,76	26,88
CFO	0,10	0,12	0,09	0,12
LN (FF)	4,26	4,51	4,24	4,55
ATO	0,99	1,01	0,93	0,96
DPS	0,70	0,87	0,94	1,14
PPE	0,56	0,46	0,61	0,46
ROA	6,21	7,68	5,21	7,59
LN (TQ)	(0,07)	0,31	(0,33)	0,24

Table 5
PRGS summary statistics

	N	Mean	StDev	Min	Max
<i>Full sample</i>					
PRGS (1)	4,688	1,06 E-15	0,97	(3,62)	3,87
PRGS (2)	4,688	1,17 E-15	1,48	(5,23)	3,74
PRGS (3)	4,688	3,87 E-16	1,48	(6,24)	3,54
PRGS (4)	4,688	1.69 E-15	1,68	(5,76)	4,86
<i>LOW CSR = 1</i>					
PRGS (1)	2,400	0,19	0,94	(3,02)	3,87
PRGS (2)	2,400	(0,53)	1,33	(5,23)	3,74
PRGS (3)	2,400	(0,72)	1,30	(6,24)	3,04
PRGS (4)	2,400	(0,93)	1,42	(5,76)	3,99
<i>LOW CSR = 0</i>					
PRGS (1)	2,288	(0,20)	0,97	(3,62)	3,83
PRGS (2)	2,288	0,56	1,42	(4,98)	3,74
PRGS (3)	2,288	0,76	1,27	(4,50)	3,54
PRGS (4)	2,288	0,97	1,36	(4,13)	4,86

Table 6
Effects of CSR Directive on firms' greenwashing behavior

This table report result from estimating difference-in differences model Eq. (6) and (7) with each respective peer-relative greenwashing score ("PRGS") as dependent variables. Column (1) outline the result average treatment effect using Eq. (6) DiD model. with variable of interest *EU * AFTER*. Column (2) shows the result for yearly treatment effect for 2014, 2016 and 2018 using Eq. (7) DiD model, with (i) *EU * 2014*; (ii) *EU * 2016* ; and (iii) *EU * 2018* as the variable of interests for each respective years. Control variables and fixed effects are applied for all tests.

DV	PRGS (1)		PRGS (2)		PRGS (3)		PRGS (4)	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
<i>EU * AFTER</i>	0.093*		0.278***		0.184***		0.326***	
	(2.56)		(9.29)		(5.77)		(9.20)	
<i>EU * 2014</i>		0.053		0.197***		0.143*		0.145*
		(0.78)		(3.53)		(2.14)		(2.01)
<i>EU * 2016</i>		0.216**		0.328***		0.112		0.357**
		(3.13)		(5.79)		(1.64)		(4.90)
<i>EU * 2018</i>		0.306***		0.554***		0.247***		0.571***
		(4.42)		(9.73)		(3.62)		(7.80)
AFTER	-0.088**		-0.155***		-0.067*		-0.162***	
	(-2.96)		(-6.35)		(-2.29)		(-5.16)	
YEAR 2014		-0.040		-0.125**		-0.084		-0.117*
		(-0.76)		(-2.87)		(-1.61)		(-2.09)
YEAR 2016		-0.169**		-0.155***		0.014		-0.145
		(-3.08)		(-3.44)		(0.25)		(-2.51)
YEAR 2018		-0.245***		-0.341***		-0.096		-0.310***
		(-4.26)		(-7.22)		(-1.69)		(-5.10)
LN (TA)	-0.037	0.006	0.338***	0.364***	0.374***	0.357***	0.347***	0.359***
	(-0.92)	(0.15)	(10.1)	(10.5)	(9.34)	(8.56)	(8.04)	(8.03)
LN (AF)	-0.041	-0.054	0.016	0.016	0.057	0.071	0.123**	0.138***
	(-1.06)	(-1.39)	(0.51)	(0.50)	(1.51)	(1.83)	(3.01)	(3.35)
LEV	-0.006***	-0.052***	-0.006***	-0.005***	0.001	-0.001	-0.008***	-0.007***
	(-4.96)	(-4.11)	(-5.92)	(-5.26)	(0.09)	(-0.21)	(-5.82)	(-5.24)
CFO	0.031	0.094	-0.290	-0.188	-0.322	-0.283	-0.938***	-0.826**
	(0.12)	(0.37)	(-1.40)	(-0.90)	(-1.29)	(-1.13)	(-3.53)	(-3.09)
LN (FF)	-0.421***	-0.398***	-0.041	-0.024	0.380***	0.374***	0.207**	0.218**
	(-6.34)	(-6.00)	(-0.74)	(-0.44)	(5.82)	(5.70)	(2.96)	(3.10)
ATO	-0.176**	-0.184**	0.508***	0.522***	0.686***	0.706***	0.698***	0.737***
	(-2.62)	(-2.69)	(9.19)	(9.27)	(10.33)	(10.44)	(9.80)	(10.19)
DPS	-0.003	-0.001	0.004	0.003	0.007	0.004	0.009	0.006
	(-0.36)	(-0.10)	(0.57)	(0.45)	(0.85)	(0.48)	(1.03)	(0.77)
PPE	0.230*	0.272*	-0.049	-0.032	-0.279*	-0.303**	0.080	0.741
	(2.06)	(2.43)	(-0.54)	(-0.34)	(2.55)	(-2.76)	(0.67)	(0.63)
LN (TQ)	-0.001	0.020	0.023	0.036	0.337	0.015	-0.021	-0.016
	(-0.39)	(0.75)	(1.14)	(1.62)	(1.35)	(0.59)	(-0.79)	(-0.55)
LN (GDP)	-0.835*	-1.245**	0.020	-0.456	0.855*	0.790	0.558	-0.113
	(-2.24)	(-2.93)	(0.07)	(-1.30)	(2.32)	(1.88)	(1.41)	(-0.25)
Firm-FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind*Year-FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.002	0.004	0.015	0.016	0.017	0.015	0.005	0.004
N	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688

Control variables includes LN(TA) (firm size), LN(AF) (analyst following), LEV (leverage), CFO (cash from operations), LN(FF) (free float), ATO (asset turnover), DPS (dividend per share), PPE (asset structure), LN(TQ) (growth opportunities), ROA (operating profitability), and LN (GDP) (economic development). All variables are defined in the appendix.

***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively, using two-tailed tests.

Table 7
Firm level variation in exposure to the CSR Directive

This table report result from estimating difference-in differences model Eq. (6) and (7) with each respective peer-relative greenwashing score (“PRGS”) as dependent variables. Panel A shows the result for sub-sample set consists of firms with below median CSR performance score during pre-directive period (i.e. LOW CSR = 1). Panel B outlines the result for sub-sample set consists of only firms with above median CSR performance score during pre-directive period (i.e. LOW CSR = 0). Column (1) outline the result average treatment effect using Eq. (6), with variable of interest *EU * AFTER*. Column (2) shows the result for yearly treatment effect for 2014, 2016 and 2018 using Eq. (7), with (i) *EU * 2014*; (ii) *EU * 2016* ; and (iii) *EU * 2018* as the variable of interests for each respective years. Control variables and fixed effects are applied for all tests.

Panel A. Low CSR = 1								
DV	PRGS (1)		PRGS (2)		PRGS (3)		PRGS (4)	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
<i>EU * AFTER</i>	0.022 (0.49)		0.328*** (8.01)		0.306*** (6.59)		0.440*** (8.33)	
<i>EU * 2014</i>		0.143 (1.69)		0.302*** (3.98)		0.158 (1.85)		0.236* (2.44)
<i>EU * 2016</i>		0.323*** (3.76)		0.434*** (5.48)		0.110 (1.27)		0.495*** (5.04)
<i>EU * 2018</i>		0.314*** (3.64)		0.689*** (8.94)		0.375*** (4.31)		0.779*** (7.92)
Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind*Year-FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.011	0.017	0.015	0.017	0.022	0.031	0.004	0.004
N	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400

Panel B. Low CSR = 0								
DV	PRGS (1)		PRGS (2)		PRGS (3)		PRGS (4)	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
<i>EU * AFTER</i>	0.174** (2.97)		0.220*** (5.12)		0.046 (0.83)		0.200*** (3.70)	
<i>EU * 2014</i>		-0.009 (-0.08)		0.112 (1.40)		0.121 (1.17)		0.069 (0.69)
<i>EU * 2016</i>		0.095 (0.87)		0.233** (2.87)		0.137 (1.31)		0.246* (2.41)
<i>EU * 2018</i>		0.296** (2.68)		0.418*** (5.12)		0.122 (1.16)		0.369*** (3.59)
Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind*Year-FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.004	0.017	0.033	0.040	0.031	0.039	0.038	0.043
N	2,288	2,288	2,288	2,288	2,288	2,288	2,288	2,288

Control variables includes LN(TA) (firm size), LN(AF) (analyst following), LEV (leverage), CFO (cash from operations), LN(FF) (free float), ATO (asset turnover), DPS (dividend per share), PPE (asset structure), LN(TQ) (growth opportunities), ROA (operating profitability), and LN (GDP) (economic development). All variables are defined in the appendix.

***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively, using two-tailed tests.

Appendix A
Definition of variables

Variable	Description	Data source
CSR performance score	CSR performance score based on Asset4	Asset4
CSR disclosure score	CSR disclosure score based on Bloomberg	Bloomberg
SG&A	Selling, general and administrative expenses scaled by revenue	Bloomberg
PRGS	Peer-relative greenwashing score based on type of greenwashing	Constructed based on Section 4.2
LN (TA)	Log of total assets in USD	Bloomberg
LN (AF)	Log of number analyst report published during the year	Bloomberg
ROA	Net income available to common shareholder to total assets	Bloomberg
CFO	Cash from operations to total assets	Bloomberg
LN (FF)	Log of percentage of shares in free float	Bloomberg
LEV	Debt/total asset ratio.	Bloomberg
ATO	Net sales divided by total assets	Bloomberg
DPS	Dividend per share	Bloomberg
PPE	Property, plant and equipment deflated by total assets	Bloomberg
LN (TQ)	Log of market capitalization scaled by total assets	Bloomberg
LN (GDP)	The value of GDP per capita converted to U.S. dollar at purchasing power parity (PPP) exchange rates	IMF