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COMPTABILITÉ ET CONTRÔLE

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THÈSE DE DOCTORAT

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pour l'obtention du grade de
Doctorat en Management

par Arianna PISCIELLA

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sans se prononcer sur les opinions exprimées dans cette thèse.

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Presentation of the articles

The aim of this dissertation is to investigate under which circumstances Environmental, Social, and Governance (ESG) corporate disclosures and European regulations on sustainability issues can help companies in being substantial actors in tackling Grand challenges. Prior research has referred to grand challenges as *wicked problems* (Bebbington and Unerman, 2018; Guthrie and Dumay, 2021) and *problems of the commons* (i.e., the population at large) (Hardin, 1968). These complex and multifocal problems extend beyond a single discipline and social, institutional, and organizational context (Campbel *et al*., 2019; Chakhovic and Virtanen, 2023; Kosmala and McKernan, 2011). According to Ferraro *et al*. (2015), grand challenges are typically complex problems that affect and are affected by multiple actors, multiple locations, and multiple time frames. They are also uncertain in nature, suggesting the difficulty of uniquely identifying their roots and causes or forecasting their future consequences (non-linearity and dynamicity characteristics). Finally, grand challenges are "incalculable"; they have multiple evaluation criteria and demand new issues every time they are addressed.

Grand challenges have been recently represented and addressed by the United Nations' Sustainable Development Goals (SDGs), an example of a globally accepted impact framework developed by the United Nations to guide countries and firms towards a more sustainable world by 2030. In September 2015, the UN Sustainable Development Summit adopted a new framework to guide development efforts between 2015 and 2030, entitled "Transforming our world: the 2030 Agenda for sustainable development" (UN, 2019). The SDGs cover issues such as natural disasters, climate change, gender equality, and social disruption, among others (Bebbington & Unerman, 2018) and given the ambitious and challenging nature of SDGs targets, it is evident that they cannot be met by governments alone, but require support from both public and private sector, civil society, and individual citizens (Ruhil, 2015).

Considering the complexity and dynamicity of current ESG issues and challenges, one of the objectives of this Thesis is to unpack and investigate each of the three sustainability dimensions, in three distinct but interconnected chapters. The *file rouge* connecting the three papers is indeed represented by the Sustainable Development Goals framework.

The first chapter focuses on the environmental (E) dimension, represented by SDG n. 12 about "Responsible consumption and production patterns", and investigates the role of SDGs sustainability reporting practices on firm environmental impacts. The second article is a systematic literature review concerned with the social (S) dimension expressed by SDG n. 3 about "Good health and wellbeing" and SDG n. 10 about "Reducing inequalities". The third and final article draws upon the key results of the second article and focuses on the governance dimension (G), specifically on SDG n. 5 about "Gender equality" in managerial roles and leadership roles.

The first and third articles both focus on the European institutional setting regarding sustainability reporting rules and adopt an empirical and quantitative approach, using a similar sample of firms (i.e., listed European firms belonging to the EU STOXX600 index) over the same time-period (2010-2020). The years under analysis are selected using 2015 as a reference year, corresponding to the official release of the SDGs to the large public, thus resulting in 5 years before and after the year 2015. These papers build upon two main theoretical frameworks emerged in the sustainability accounting literature over the past decades: Legitimacy theory, and specifically Impression management theory (Merkl-Davies et al. 2007), used to predict the role of sustainability reporting practices in shaping firms' behavior, and Institutional theory (Heras-Saizarbitoria *et al.*, 2022), developed to address the potential pressures derived from the external environment, such as regulatory bodies and industry peers.

The second chapter, focusing on the social dimension, is a qualitative paper providing a systematic literature review of the accounting literature. The review covers the past 23 years and concentrates on a corpus of articles published in 25 top-rated accounting journals. We considered the year 2000 as a starting point of the review, corresponding to the release of the United Nations

Global Compact Initiative that brought attention to the social and ESG dimensions for corporations. As it emerges from the study, we realized that the analysis of the social aspects in the accounting literature was strictly connected to the stakeholder group affected by the firm. The theoretical framework adopted in this study draws upon the core concepts of Stakeholder theory (Freeman *et al*., 2010), embracing the idea according to which businesses should create value for all their stakeholders, those who can affect or be affected by the realization of an organization's purpose (the wide definition) or those without whose support the organization would not exist (the narrow definition) (Dmytriyev *et al*., 2021).

Issues and context of the research

In recent years, organizations are increasingly expected to account for their ESG behavior, thus leading to an unprecedented increase in the number of corporate disclosures on these topics, especially among larger and listed firms (Bromley and Powell, 2012; George *et al.,* 2012; Jiang and Bansal, 2003). In an attempt to regulate the publication of non-financial related disclosures, on April 15, 2014, the European Parliament passed the non-financial reporting directive, EU Directive 2014/95. The Directive mandates that large "public interest entities, i.e. listed firms with more than 500 employees and with either more than EUR 20 million in total assets or EUR 40 million in sales, prepare annual non-financial (sustainability) reports starting with the fiscal year 2017 (Fiechter *et al.,* 2022). However, the complex, uncertain, and still highly subjective nature of sustainability reporting contents (Ferraro *et al.,* 2015), makes the conversion of corporate ESG disclosure into sustainable behavior an increasingly challenging task and a problem to be urgently solved (Brunsson *et al*., 2012). Recent critical studies raise doubts about the efficacy of corporate sustainability reporting in altering organizational behavior and highlight concerns about its opportunistic use as an impression management tool (Cho *et al* 2010; Melloni *et al* 2017; Merkl-Davies *et al*. 2007). The objective of this Thesis is to investigate under which circumstances

corporate non-financial disclosures and European regulations on sustainability matters can help companies in being substantial actors in tackling Grand challenges.

Conclusions and perspectives

Results from the first article show that SDG 12 disclosure is associated with positive environmental impact only under a voluntary sustainability reporting regime. With this study we aim at responding to the call for in-depth research on how organizations engage with SDGs in their reporting practices (Hörisch, 2021) and at enriching the current literature on the role of sustainability disclosure in addressing Grand challenges (Gray, 2010) by focusing on the environmental impacts of European listed firms. The second article is a systematic literature review about the social dimension in the accounting literature, covering 226 articles published in 25 top-rated accounting journals. The analysis identifies five categories of social performance topics (*Diversity & Inclusion*, *Human Capital*, *Corporate Social Responsibility*, *Social Capital*, and *Human Rights & Ethics*), and eight affected stakeholder groups (*Board of Directors & Top Managers*, *Community*, *Employees*, *Auditors*, *Investors*, *Suppliers*, *Regulators*, and *Customers*). The qualitative analysis makes several contributions to the rapidly evolving landscape of accounting literature and develops a first draft of a corporate social performance measurement and reporting framework, visualized as a multidimensional topic-stakeholder table. The third and final article draws upon some of the key results of the second article and focuses on the gender equality in leadership and managerial roles among European firms. By considering the synergic presence of the EU Directive 2014/95 and gender quota rules, the study explores the role of the European institutional setting on firm female representation, not only at the Board level, but also among executives, and middle managers. The empirical findings demonstrate that the presence of a mandatory gender quota law is positively associated with female presence among executive positions, and the introduction of the EU 2014/95 Directive contributes also to a higher women representation among managers. This paper contributes to the recently growing stream of research about gender diversity in leadership and managerial positions (Afeltra *et al.*,

2022) and the regulatory debate about mandatory sustainability reporting in Europe (Michelon *et al.* 2020).

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Article 1. The role of Sustainable Development Goals disclosure in tackling environmental grand challenges: Evidence from European firms.

Authors: Arianna Pisciella, Gaia Melloni

Abstract

In the United Nations 2030 Agenda for Sustainable Development, Sustainable Development Goal (SDG) 12 encourages multinational companies to report their sustainability efforts in tackling grand challenges at a systemic level. This study assesses the role of SDG 12 reporting in contributing to the achievement of global grand challenges by helping companies identify and account for their environmental impacts. This study assesses whether and how SDG 12 disclosure is linked to improved corporate environmental performance, as proxied by emissions, innovation, and resource use scores. Through manual content analysis of the sustainability reports of 336 companies from the EU STOXX 600 stock index over the period 2010–2020, we capture SDG disclosure through infographic, textual, and tabulated elements to offer nuanced insight into SDG disclosure quality. We also assess whether and how a mandatory sustainability reporting regime, identified by the presence of the European Directive 2014/95/EU, affects these results. The findings show that SDG 12 disclosure is associated with positive environmental impacts, especially under a voluntary sustainability reporting regime. Such results hold true when we consider both the presence and extent of SDGs disclosure and when we control for the presence of Global Reporting Initiative (GRI) reports. We use an instrumental variable approach with the 2015 introduction of the SDGs as an exogenous shock to demonstrate a positive association between environmental performance and the SDGs. In this respect, results do not lend support to prior studies on the use of SDGs disclosure as impression management strategy. This study investigates the role of a systemic impact framework, such as the SDGs, in shaping firm reporting strategies and accountability for environmental impacts produced across the value chain and measured by three different indicators. It focuses not only on narrative SDG disclosure but also on infographic and visual elements, as these are becoming relevant for sustainability reporting. The study sheds light on the consequences of SDG disclosure practices in a mandatory versus voluntary disclosure regime in Europe, providing insights for academics, standard-setters, and practitioners.

Keywords: SDG reporting, Environmental impacts, Grand challenges, Sustainability, ESG, Mandatory reporting

1. Introduction

Can disclosure of Sustainable Development Goals (SDGs) help companies in mitigating their environmental impacts at a systemic level? This study aims to answer this question by examining European listed companies across various industries over the 2010–2020 period. It assesses the role of the United Nations (UN) SDGs in influencing firms' environmental impacts at different levels of the value chain from the use of resources and innovative production processes to final carbon dioxide (CO2) emissions produced (Bebbington *et al*., 2020).

The UN adopted the SDGs, also known as the Global Goals, in 2015 as a universal call to action to end poverty, protect the planet, and ensure peace and prosperity for all by 2030 (UNDP, 2024). The 17 SDGs cover a broad range of pressing sustainability issues, including climate change, poverty, hunger, health, education, gender equality, and social justice (Ruhil, 2015) summarizing the most urgent global grand challenges for the world (Frey-Heger and Barret, 2021; Vollmer, 2021). Prior research has referred to grand challenges as wicked problems (Bebbington and Unerman, 2018; Guthrie and Dumay, 2021) and problems of the commons (i.e., the population at large) (Hardin, 1968). These complex and multifocal problems extend beyond a single discipline and social, institutional, and organizational context (Campbel *et al*., 2019; Chakhovic and Virtanen, 2023; Kosmala and McKernan, 2011). Similarly, an organization is a complex systemic entity, whose functioning depends on its parts and their interactions (Jackson, 2003). Given the complexity, uncertainty, and incalculability of sustainability grand challenges[1] the SDGs provide a systemic framework to address them, where actions in one area affect outcomes in others, necessitating a balance of social, economic, and environmental development (Dahlmann *et al*., 2019).

[1] According to Ferraro *et al*. (2015), grand challenges are typically complex problems that affect and are affected by multiple actors, multiple locations, and multiple time frames. They are also uncertain in nature, suggesting the difficulty of uniquely identifying their roots and causes or forecasting their future consequences (non-linearity and dynamicity characteristics). Finally, grand challenges are "incalculable"; they have multiple evaluation criteria and demand new issues every time they are addressed.

SDGs adoption should enable firms to monitor and consider firm impacts on the wider surrounding systems (Bebbington *et al.*, 2020). Specifically, SDG 12 pertains to "sustainable consumption and production patterns," with target SDG 12.6 explicitly encouraging companies, particularly large and transnational companies, to "adopt sustainable practices and integrate sustainability information into their reporting cycle" (UNDP, 2024). SDG 12 therefore explicitly calls for corporate actions toward SDG achievement, promoting corporate active engagement and sustainability reporting. Large and listed companies in Europe, especially after the introduction of the European Directive 2014/95/EU[2] on non-financial reporting which mandates the reporting of non-financial information from the fiscal year 2017 onward, have started addressing the SDGs in their sustainability reports (Guandalini *et al.*, 2019; Rosati and Faria, 2019; Williams *et al.*, 2019).

However, despite the growing importance of and interest in SDG reporting initiatives (Heras-Saizarbitoria *et al.*, 2022), their effectiveness in creating meaningful, positive impacts within broader social and environmental ecosystems remains limited (Bebbington *et al.*, 2020; Gray, 2006, 2010; Hsiao *et al.*, 2022). Sustainability disclosure practices can play a crucial role in defining and creating visibility for corporate involvement in solving grand challenges (e.g., in the form of specific SDG disclosure) (Caprani, 2016; Scheyvens *et al.*, 2016). At the same time, they may hinder positive advancements in addressing systemic grand challenges, as they tend to prioritize impression management and symbolic change over substantial, meaningful progress (Merkl-Davies and Brennan, 2011).

In this study, we assess whether and how corporate SDG acknowledgment in annual sustainability reports, and in particular SDG 12 disclosure, is linked to the actual environmental impacts of firms, proxied by three indicators taken from the Refinitiv Datastream database:

[2] The European Directive 2014/95/EU was released on October 22, 2014. Article 19a states as follows: "Large undertakings which are public-interest entities exceeding on their balance sheet dates the criterion of the average number of 500 employees during the financial year shall include in the management report a non-financial statement containing information to the extent necessary for an understanding of the undertaking's development, performance, position and impact of its activity, relating to, as a minimum, environmental, social and employee matters, respect for human rights, anti-corruption and bribery matters". Source: https://eur-lex.europa.eu/eli/dir/2014/95/oj

resource use score, environmental innovation score, and emissions score. We chose these impact metrics because they are in line with the aim and scope of SDG 12, which is to ensure sustainable consumption and production patterns, but also because they measure systemic environmental impact across three different production phases of the value chain: input (resource use), process (innovation), and output (emissions). We assess the robustness of our models by adopting an instrumental variable approach using the introduction of the SDGs in 2015 as an exogenous shock and show that environmental performance is positively associated with the introduction of the SDGs.

SDG 12 disclosure is comprehensively captured through infographic, textual, and tabulated elements contained in annual sustainability reports. In addition, the European setting allows distinguishing between a mandatory and voluntary sustainability reporting regime, identified by the issuance of Directive 2014/95/EU, and the subsequent mandatory issuance of sustainability reports by European public firms, which began on January 1, 2017. To distinguish between mandatory and voluntary sustainability reports, we rely on the official Directive 2014/95/EU guidelines and country-specific requirements. To this end, the sample comprises 336 firms belonging to the EU STOXX 600 stock index, spanning the period 2010–2020 (5 years before and 5 years after the SDGs were introduced in 2015), for 3,698 firm-year observations in total.

The findings indicate that SDG 12 disclosure is associated with positive environmental impacts across the value chain under a voluntary sustainability reporting regime countering the impression management hypothesis that firms use SDGs to mask poor environmental records. In this context, we contribute to calls for in-depth research on how organizations engage with SDGs and global grand challenges in their reporting practices (Bebbington and Unerman, 2018; Hörisch, 2021) and enrich the literature on the role of sustainability disclosure in mitigating systemic impacts (Gray, 2010) with a special focus on the environmental performance of European listed firms which operate under a combination of voluntary and mandatory disclosure regimes.

The remainder of this article proceeds as follows: Section 2 reviews the literature and develops the hypotheses. Section 3 describes the data and research method. Section 4 illustrates the main results and additional analysis, and Section 5 concludes.

2. Literature review and hypothesis development

2.1 The importance of firm contribution to SDGs in tackling systemic grand challenges

The private sector is one of the most important groups for the achievement of the SDGs, and literature largely agrees on the specific and crucial role of firms in this process (Caprani, 2016; Scheyvens *et al*., 2016). LeBlanc (2015) provides a first comparison of the SDGs with the former Millenium Development Goals (MDGs) adopted in 2002. Through a network analysis, LeBlanc shows that, compared with the MDGs, some thematic areas covered by the SDGs are well connected with one another. In addition, in contrast with the MDGs, which included only eight goals and were particularly focused on developing countries, the SDGs are universally applicable in both developing and developed countries (Hummel and Szekely, 2022). The SDGs therefore represent a more complex and integrated system of grand challenges than the MDGs, and as such, they embrace a wider range of interconnected challenges across the economic, social, and environmental dimensions of sustainable development (Ferraro *et al*., 2015).

Ruhil (2015) provides a detailed overview of the institutional stages that, from the 1948 UN Declaration of Human Rights, led to the SDG 2030 Agenda for Sustainable Development. The SDGs were first introduced during the UN Conference on Sustainable Development in Rio de Janeiro in 2012, and in September 2015, the UN Sustainable Development Summit adopted a new framework to guide development efforts between 2015 and 2030, titled “Transforming Our World: The 2030 Agenda for Sustainable Development” (UNDP, 2024). At the heart of this agenda is a list of 17 goals adopted by the UN as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all humankind would enjoy peace and prosperity. Table A1

and A2 in the Appendix provide respectively the list of all 17 goals and the SDG 12 detailed list of targets and indicators.

The SDGs cover a comprehensive set of grand global challenges that require the coordinated and collaborative efforts of multiple actors, including policymakers, corporations, non-governmental organizations, and consumers, to be plausibly addressed (George *et al*., 2016). Mio *et al*. (2020) confirm that all actors in society must address the SDGs and that both scholars and professionals must recognize the significant role of firms. Especially the COVID-19 global health crisis made evident that organizations still lack proper systematic disclosure and due-diligence processes to identify and account for their social and environmental impacts (Korca *et al*., 2021).

Considering the complexity and interconnectivity of current global grand challenges, recent accounting studies have emphasized the urgency to develop new accounting tools for companies to be accountable for their actions, decisions, and responsibilities in terms of current and systemic social and environmental challenges (Dinh *et al*., 2022; Busco *et al*., 2018). The SDG framework represents a novel approach to global governance, with goal-setting features as a key characteristic (Biermann *et al*., 2017). However, while the SDGs hold great potential, their success requires systemic synergies between governments and corporations, and these need to align strategic goals with current economic, social, and environmental global challenges (van der Waal *et al*., 2021). Van Zanten and Van Tulder (2018) conduct an exploratory survey to help explain business engagement with the SDGs. They stress that limited attention has been devoted to the role of multinational enterprises in the sustainable development and corporate social responsibility (CSR) discourse. In addition, most studies applying a CSR-related angle have evaluated outcomes on the performance of firms engaging in such behavior rather than the impacts on society and the planet (Kolk, 2016). Silva's (2021) recent empirical evidence shows that, in a sample of 100 Financial Times Stock Exchange reports on sustainability performance, two-thirds of companies address the SDGs and legitimize their contributions by mapping the SDGs to their existing activities or using them as inspiration for future activities. According to van der Waal *et al*. (2021),

multinational enterprises play an important role in pursuing SDG-relevant innovation activities, but they must also make trade-offs between different SDGs depending on their regional or industry-specific needs. However, corporations face challenges when integrating the SDGs into their core business strategies. A World Business Council for Sustainable Development (2018) study reports that 79% of the companies surveyed acknowledge SDGs in their disclosure strategy but only 6% align their strategy and targets with the specific target-indicator framework. In a similar vein, KPMG (2018) finds that the percentage of companies acknowledging the SDGs in their corporate reporting is significantly greater than the percentage of companies that actually incorporate them into their business actions. In summary, additional research is still required to understand the true role of companies as sustainable development agents (Mio *et al*., 2020).

2.2 The controversial role of SDG reporting

In the past decade, the practice of corporate sustainability disclosure has increased dramatically in line with stakeholder demand for information (Michelon *et al*., 2020). In this respect, SDG 12 is important because it is the only goal that explicitly acknowledges the role of corporate sustainability reporting in achieving the goal. For example, target SDG 12.6 calls on governments everywhere to "encourage companies, especially large and trans-national companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle" (UN, 2021), and indicator 12.6.1 keeps track of the "number of companies publishing sustainability reports."

The role of corporate sustainability reports therefore assumes particular importance in Europe, where in April 2014, the European Parliament passed the non-financial reporting directive, also called EU Directive 2014/95. The directive mandated that starting with fiscal year 2017, large "public interest entities"—that is, listed firms with more than 500 employees and with either more than €20 million in total assets or more than €40 million in sales—had to prepare annual non-financial (sustainability) reports (Fiechter *et al*., 2022). After the passage of the

directive in each EU member state, the number of published sustainability reports substantially increased because of this mandatory disclosure regime. The content (and, therefore, the quality) of such disclosures, however, remains highly voluntary and subjective in nature.

Bebbington and Unerman (2018) argue that firms could use sustainability reporting to camouflage business-as-usual practices by applying sustainability rhetoric. Indeed, prior research questions the efficacy of sustainability reporting in altering organizational behavior and highlights concerns about its opportunistic use as a symbolic disclosure (Cho *et al*., 2010; Melloni *et al*., 2017; Merkl-Davies and Brennan, 2007). Grounded in the sociological tradition, Merkl-Davies and Brennan's (2011) study delineates the concept of symbolic disclosure—that is, a kind of manipulation intended to influence stakeholders' perceptions of the congruence of organizational practices with social norms and rules, also known as "impression management". By contrast, a substantive disclosure means that the company truly intends to communicate to stakeholders the full economic, social, and environmental impacts of its activities (García-Meca and Martínez-Ferrero, 2021; Merkl-Davis and Brennan, 2011). Heras-Saizarbitoria *et al*. (2022) show that corporate involvement in the SDGs is largely symbolic and intentional in nature rather than substantive, whereas Van der Waal and Thijssens (2020) find that company involvement in sustainable practices is inspired by a mix of legitimacy and institutional motives.

Although literature highlights firms' largely superficial engagement in SDGs, which suggests a process of "SDG washing," Hummel and Szekely (2022) examine SDG disclosure in annual reports of a sample of European firms and show a substantial increase in reporting quality over time. Pizzi *et al*. (2020) introduce an "SDG Reporting Score" (SRS) that serves as a qualitative proxy for firm orientation toward the goals. The SRS is a compound index based on the SDG Compass guidelines. For each SDG, Pizzi *et al*. calculate the ratio of the number of SRS indicators reported by the firm to the number of SRS indicators required by the SDG Compass guidelines. They find a positive relationship between the SDG disclosure score and firm-level characteristics, such as the presence of independent directors on the board, expertise in non-

financial reporting, and report length. The study has some limitations, however, because it examines only Italian public interest entities, and the SDG score is strongly linked to Global Reporting Initiative (GRI) standards.

The challenge is distinguishing between reporting quantity and quality (Beattie *et al.*, 2004). The literature largely agrees that the use of a coding scale to qualify a firm's disclosure is an appropriate method (Cormier *et al.*, 2005; Jones, 2011). First, such a scale allows for the integration of different types of information into a single score that is comparable across firms in terms of relevance. Second, while disclosure studies rely on word counts to measure disclosure, a qualitative scale allows researchers to incorporate their judgements when rating the "value" of the disclosure made by a firm (Cormier *et al.*, 2005). A widely adopted method to proxy disclosure quality is manual or computer-assisted content (or thematic) analysis (Beattie *et al.*, 2004). Narrative disclosures are often accompanied by images, graphs, and tables; this is especially true for sustainability reports, the content of which remains voluntary and unregulated (Jones, 2011). Evidence suggests that companies widely use graphs especially to enhance the communicative effectiveness of their corporate social and environmental disclosures. Corporations invest heavily in the visual design of organizational communications, recognizing the distinctive role and benefits of visual imagery, as well as the rhetorical function of these documents (Greenwood *et al.*, 2019). This thus demands increased attention and research providing explicit guidance on how to analyze such visual elements of corporate disclosures. We draw from the body of literature in this area to try to capture the quality and content of SDG disclosure in annual sustainability reports, considering not only textual but also visual elements.

Despite the significant growth in the literature on corporate environmental disclosures (Bonetti *et al.*, 2023), little is known about the relationship between a firm's sustainability disclosure and its social and environmental impacts (Michelon *et al.*, 2020). Assessing the link between the adoption of firm-specific reporting practices and related sustainability performance can be difficult given potential contributing factors such as simultaneous institutional reforms and

changes to the reporting infrastructure (De George *et al*., 2016; Leuz and Wysocki, 2016). Christensen *et al*. (2017) investigate disclosure regulation effects on safety issues in the US mining industry, examining the consequences of mine-safety reporting on mine-safety violations and the number of injuries. Moreover, in terms of the "what gets measured gets done" attitude (Michelon *et al*., 2020), some studies find a positive relationship between disclosure and performance, showing, for example, the positive effect of Co2 reporting on carbon emissions performance (Burritt and Schaltegger, 2010; Qian and Schaltegger, 2017).

Another stream of literature investigates the effects of sustainability disclosure mandates. Mandatory environmental reporting is a way to increase the accountability of organizations, especially regarding environmental issues (Larrinaga *et al*., 2002). This is of relevance in Europe, where in 2014 the EU passed the non-financial reporting Directive 2014/95/EU mandating large and listed firms to prepare non-financial reports from fiscal year 2017 onward. Fiechter *et al*. (2022) examine an anticipatory real effect of the directive. They test whether firms within the scope of the directive anticipated the disclosure mandate, by increasing their CSR activities before the first mandatory disclosure. Their results reveal that, on average, treated firms increased their CSR activities after the 2014 passage of the directive, and this effect increased with lower pre-directive CSR disclosure levels. Other findings show that the increase in CSR activities is higher for firms with greater exposure to stakeholder reactions, stricter expected implementation of the directive, and a longer investment horizon. By contrast, Mittelbach *et al*. (2021), using data on firms listed in the EU STOXX 600 index during the period 2008–2016, show that the shift from voluntary to mandatory reporting, following the announcement of Directive 2014/95/EU, resulted in a negative association between share prices and CSR disclosure.

Despite the importance of these studies, the role of mandatory versus voluntary sustainability reporting in Europe and the rest of the world is not clear (Michelon *et al*., 2020). In addition, the literature so far has focused on mandatory reporting, with a preference for a US setting, specific industries, and individual company case studies (Christensen *et al*., 2021; Leuz

and Wysocki 2016). Thus, to close these gaps, the present study focuses on both voluntary and mandatory reporting practices in an international sample of European companies.

2.3 Hypothesis development

We highlight two main research gaps in the literature. The first is the lack of empirical evidence on the link between firm disclosure and acknowledgment of a systemic impact framework (e.g., the SDGs) and actual firm performance in terms of solving environmental and social grand challenges. Second, the ongoing debate on the role of mandatory or voluntary sustainability disclosure relative to a firm's impact on people and the planet is still far from resolved. Therefore, the research questions we aim to answer herein are:

What is the relationship between SDG 12 disclosure and firm environmental impacts?
and
Does a sustainability reporting regime affect this relationship?

We develop our hypotheses by building on the stream of legitimacy theory that supports the use of sustainability reporting as an impression management tool (Silva, 2021; Merkl-Davies and Brennan, 2007). According to the impression management framework, organizations engage in a conscious and opportunistic disclosure strategy by selecting the type of content and presentation methods that are mostly beneficial to them (Melloni *et al*., 2017), often to hide bad financial or non-financial performance (Cho *et al*., 2012). This is done to respond to institutional pressures and reinforce organizational reputation rather than to significantly improve internal sustainability practices and performance (Heras-Saizarbitoria *et al*., 2022).

Previous studies mostly rely on content analysis of sustainability and environmental disclosures. Jones (2011) shows that sustainability reports are highly voluntary and unregulated documents, as far as their content is concerned. The author considers in particular the use of graphs in sustainability reports of the top 100 UK companies in 2005 and demonstrates a clear evidence of impression management in graph usage. Especially companies operating in high environmental impact industries present relatively more good news compared to bad news in

graphs. Considering the recent high monetary investments that companies pursue in the visual design of such reports (Greenwood *et al*., 2019), we have reasons to believe that the presence of visual elements conveying positive messages is associated with negative behaviors. Building upon the empirical evidence on image enhancement and obfuscation strategies in sustainability reports (Cho *et al*., 2012), we argue that both the presence and the quantity of SDG 12 disclosure is negatively associated with firm environmental performance.

To capture the presence of SDG 12 disclosure, we rely on both visual and textual elements that are present in corporate annual sustainability reports. The three categories of firm SDG 12 disclosure identified are infographic, textual, and tabulated disclosure. Environmental performance is proxied by three scores taken from Refinitiv Datastream, capturing the efficient use of resources, environmental innovation, and CO2 emissions produced. In line with the above reasoning, we formulate the following hypotheses:

Hypothesis 1a*. The presence of SDG 12 disclosure is negatively associated with firm environmental impacts.*

Hypothesis 1b*. The extent of SDG 12 disclosure is negatively associated with firm environmental impacts.*

3. Research design and data

3.1 Sample description

The sample comprises the listed firms in the EU STOXX 600 index as of October 2021. With a fixed number of 600 entries, the EU STOXX 600 represents large, medium, and small capitalization companies across 17 countries of the European region: Austria, Belgium, Denmark, Finland, France, Germany, Great Britain, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, and Switzerland. This index is derived from the STOXX Europe Total Market Index and is a subset of the STOXX Global 1800 Index. To build our unique proprietary dataset of stand-alone sustainability reports, we manually collected sustainability reports written in English and issued between 2010 and 2020 from company websites. We chose

this 11-year period to have a balanced time window before and after the SDG introduction in 2015 (5 years before and 5 years after). After removal of missing archival data observations, our final sample contains 336 companies observed over the 11-year period, for 3,696 firm-year observations in total. Table 1 provides an overview of the sample selection process. Our final dataset corresponds to a balanced panel-data structure, with the panel variable equal to *FIRM_ID* and the time variable *YEAR*.

Table 1

3.2 Empirical models

To assess the relationship between firm environmental performance and SDG 12 disclosure, we test the following models:

Model 1: $Environmental\_impact_{t+1,i} =$
$\beta 0 + \beta 1(SDG12\_disc_{t,i}) + \beta 2(VOLU_{t,i}) + \beta 3(SDG12\_disc \times VOLU) + \beta jControls\, j + \varepsilon.$ *(1)*

Model 2: $Environmental\_impact_{t+1,I} =$
$\beta 0 + \beta 1(SDG12\_score_{t,i}) + \beta 2(VOLU_{t,i}) + \beta 3(SDG12\_score \times VOLU) + \beta jControls\, j + \varepsilon.$ *(2)*

In our empirical setting, it is not possible to adopt a proper *Difference-in-Difference* design, due to the endogenous applicability of the sustainability reporting regime. Indeed, the European Directive on non-financial reporting is only applied to firms complying with certain size and profitability thresholds, as further explained in section 3.3. For this reason, we cannot exogenously distinguish between treated and control firms in Europe and therefore have to rely on a traditional linear regression model. All dependent variables are in *leading form*; that is, we measure them at time $t + 1$ with respect to the explanatory variables. We also test both models using deltas of the dependent variables. Finally, we estimate all models using linear regression absorbing multiple levels of fixed effects (*reghdfe* Stata command) and robust standard errors clustered at the firm level.

3.3 Variables

3.3.1 Environmental impact

The dependent variable *Environmental_impact*$_{t+1,i}$ corresponds to firm-specific performance with respect to SDG 12 achievement. It is proxied by three indicators, provided by the Refinitiv Datastream database, that are closely connected with the focus of SDG 12 on sustainable consumption and production patterns. The first indicator, *Resource_use_score*, indicates a company's performance in reducing the use of materials, energy, or water and finding more eco-efficient solutions by improving supply chain management. The second indicator, *Environmental_innovation_score*, reflects a company's capacity to reduce the environmental costs and burdens for customers, thereby creating new market opportunities through new environmental technologies and processes or eco-designed products. Finally, the *Emissions_score*, measures a company's commitment to and effectiveness at reducing environmental emissions in production and operational processes. All three scores can take values ranging from 0 to 100, with 100 reflecting the best environmental performance and 0 a poor environmental performance across the value chain. We chose these indicators to have an external measure of performance, not subject to firm internal manipulation.

3.3.2 SDG disclosure

In a first step, we define the key variables of interest by drawing on the empirical approach of Daske *et al.* (2013). From a methodological standpoint, the first binary variable built is *SDG_all_disc*, which captures the presence of a generic SDG disclosure in corporate sustainability reports. This dummy variable distinguishes between firms that mention the SDG framework at least once in their report and those that do not. As previously explained, we rely on both visual and textual elements to search for the presence of SDG disclosure. For visual elements, we consider SDG icons provided by the official UN communication materials website, displayed in Table A1 of the Appendix.

For textual elements, we check for the presence of a set of selected keywords in the reports, such as "sustainable development goals," "SDGs," and similar terms. Table 2 provides the full list of keywords used for textual analysis. Finally, *SDG_all_disc* takes the value 1 if at least one of the SDG-selected keywords or SDG icons is present in the report and 0 otherwise. We manually check to ensure that negative claims such as "we do *not* acknowledge the SDGs" do not appear in our sample.

Table 2

As a second step, we build the binary variable *SDG12_disc* to capture the specific SDG 12 disclosures in the sustainability reports. We deliberately use a broad classification when coding this binary variable. Given the voluntary nature of SDG disclosure, firms do not yet have a standardized SDG disclosure strategy. However, in a manual content analysis of sustainability reports, we observe that firms tend to adopt three main disclosure strategies that we categorize as infographic disclosure, textual disclosure, and tabulated disclosure.

By infographic disclosure, we mean disclosure that exploits the SDG 12-specific icons provided by the official UN communication materials. These well-recognized icons display the official SDG 12 logo. We operationalize infographic disclosure with the binary variable *SDG12_icon*, which takes the value 1 if the SDG 12 icon is present at least once in the report and 0 otherwise.

By textual disclosure, we mean the disclosure of SDG 12-specific keywords. In contrast with Hummel and Szekely (2022), we define SDG 12-specific keywords in a stringent manner; that is, we aim to capture specific textual references to SDG 12 with keywords that are directly linked to that goal. Therefore, we do not include keywords such as "recycle" or "food waste" as Hummel and Szekely do; instead, we retain terms such as "goal 12" and "SDG number 12." In this way, we build the binary variable *SDG12_text*, which takes the value 1 if at least one of the

SDG 12-related keywords is present in the report and 0 otherwise. Table 2 provides the complete list of the SDG 12 selected keywords.

Finally, tabulated disclosure captures the disclosure (either infographic or textual) of SDG 12 in a table. The distinguishing trait of this kind of disclosure is that the SDG 12 icons or keywords do not appear in any given (random) place in the report but instead appear in a well-delimited space (a "table") that usually relates the SDGs to other firm dimensions. In general, a table contains two (or more) dimensions. We code tabulated disclosure with the dummy variable *SDG12_table*, which takes the value 1 if SDG 12 is mentioned at least once in a table with an icon, text, or numbers and 0 if SDG 12 is never mentioned in a table. In summary, our second main variable of interest *SDG12_disc* takes the value 1 if the firm discloses activities related to SDG 12 using at least one of the three disclosure strategies outlined (*SDG12_icon*, *SDG12_text*, or *SDG12_table*) and takes the value 0 otherwise. Table 3 shows the coding scheme of the SDG 12 disclosure types, providing examples taken from some sustainability reports analyzed, for each of the disclosure strategies identified: infographic disclosure, textual disclosure, and tabulated disclosure.

Table 3

Our third independent variable captures the extent of SDG 12 disclosure. That is, *SDG12_score* is a numerical score equal to the sum of *SDG12_icon*, *SDG12_text*, and *SDG12_table* and can take values 0, 1, 2, or 3. For example, a high SDG 12 disclosure (*SDG12_score* = 3) occurs when all three disclosure strategies appear in the report. This means that the company acknowledges SDG 12 in a comprehensive and extensive way. Medium SDG 12 disclosure (*SDG12_score* = 2) occurs when only two disclosure strategies appear, and low SDG 12 disclosure (*SDG12_score* = 1) occurs when only one disclosure strategy appears. Finally,

when SDG 12 disclosure does not appear at all, *SDG12_score* takes the value 0. This content analysis method complies with Beattie et al.'s (2004) description.

Our disclosure score takes both forms suggested by these authors: a nominal score to indicate the presence or absence of the item and an ordinal-level score to capture the degree of specificity of the item. For valid inferences to be drawn, the classification procedure must be reliable (i.e., different people code the text in the same way) and valid (i.e., the variables generated from the classification procedure should represent what the researcher intended). To check both requirements, we had two research assistants, in addition to ourselves, manually coding the disclosures and any disagreements or doubts were resolved during a plenary meeting.

3.3.3 Mandatory versus voluntary sustainability reporting

The European setting allows us to distinguish between firms that are mandated to publish annual sustainability reports and firms that voluntary choose to disclose such a report. To distinguish between mandatory and voluntary sustainability reporters, we rely on Directive 2014/95/EU guidelines and country-specific requirements. We build the dummy variable *VOLU* for each firm-year observation in the sample, taking into consideration both EU-level compliance requirements and country-specific requirements displayed in Table A3 in the Appendix.

According to the European guidelines, firms must produce a non-financial (sustainability) report if they have both an average number of employees exceeding 500 during the financial year and either a balance sheet of total assets exceeding €20 million or a net turnover exceeding €40 million. For most European countries, the variable *VOLU* takes the value 0 if, for each year after 2017 (included), the firm has more than 500 employees and more than €20 million in total assets. Exceptions are Switzerland, which never adopted the Directive over the 2010-2020 period because not legally subject to it; Luxembourg, Sweden, and Denmark, which require at least 250 employees to fall under the scope of the directive; and Great Britain, Poland, and Belgium, which set more stringent thresholds on total assets.

We distinguish between mandatory and voluntary disclosures using only total employees and total assets for two reasons: (1) the net turnover definition is not clearly provided by Directive 2014/95/EU and (2) it can be more easily manipulated (Uwer and Schramm, 2018). Furthermore, not all countries set specific requirements on net turnover. Ultimately, the binary indicator *VOLU* takes the value 1 if the company does not need to comply with the European Directive 2014/95/EU in that year and 0 otherwise.

In summary, from 2010 until 2020 we can highlight three main relevant years. Regarding the EU Directive, the release in 2014 and the entry into force in 2017 allowing to distinguish between the voluntary sustainability reporting period (from 2010 until 2016) and the mandatory sustainability reporting period (from 2017 until 2020). Regarding the release of the UN SDGs framework, the year 2015 divides the sample into the pre-SDG period (absence of SDGs disclosure) and post-SDG period (presence of SDGs disclosure). Figure 1 provides a visual representation of the timeline considered in the analysis.

Figure 1

3.3.4 Control variables

For our span of control variables, we include one more SDG related indicator (*SDG_all_disc*) to capture the disclosure of the SDG framework in general terms. Following Moussa *et al*. (2022), we control for the adoption of GRI standards (*GRI_guidelines*), which is a dummy variable that equals 1 if the firm declares to comply with GRI and zero otherwise. Following Melloni *et al*. (2020), we control for the presence of CSR committees (*CSR_committee*), as a potential determinant for early SDG adoption, and *CSR_audit*, to check whether the sustainability report has been audited by a third independent party. Following Hahn and Kühnen (2013) and Dienes *et al*. (2016), we include financial leverage (*LEV*), as the ratio of

total liabilities to total assets, to control for financial stability, and market capitalization (*MARKET_CAP*) to proxy firm size. In line with Rosati and Faria (2019), we also include country- and industry-level controls. Our country-level controls are the annual level of CO2 emissions from fossil fuels, per capita. Our industry-level control is given by the economic sector number (*ECON_SEC_NUM*), which equals 1 for our reference category (financial). Table A4 in the Appendix lists all variable definitions and computations.

4. Results

4.1 Descriptive statistics

Table 4 shows the sample composition, distinguishing by country and economic sector. Panel A shows the seventeen countries in the sample and their frequency distribution. Great Britain and Germany are the two most represented countries, covering respectively 803 firm-year observations (21.73%) and 561 firm-year observations (15.18%), while Luxembourg, Poland, and Portugal are the least represented with 22 firm-year observations each (0.6%). Panel B reveals the sample composition by economic sector. When summing all firm-year observations, we find that the financial sector is the most represented in the sample with 682 firm-year observations (18.45%), while the Energy sector is the least frequent with 132 firm-year observations (3.57%).

Given that Great Britain is the most frequent country and financial the most frequent economic sector, we adopt them as reference categories in our models.

Table 4

Table 5 provides the overview of the frequency distribution of the SDG-related disclosure variables, according to the economic sector (Panel A) and sustainability reporting regime (Panel B). Panel A shows that the three economic sectors in which the SDG framework is mostly mentioned in annual sustainability reports are the financial (186 reports), consumer cyclical (158

reports), and industrial (135 reports) sectors. The real estate sector has the lowest number of reports mentioning the SDGs (40 reports). In terms of specific SDG 12 disclosure, the consumer cyclical (114 reports) and financial (110 reports) sectors display the highest number of reports. A focus on the type of SDG 12 disclosure reveals that disclosure in the industrial sector is the most extensive with 48 reports having a SDG 12 disclosure score of 3. The financial and consumer cyclical sectors follow with 39 and 38 reports, with the highest SDG 12 disclosure score respectively. Panel B displays the type of SDG disclosure according to the sustainability reporting regime, either voluntary or mandatory. Among the total number of sustainability reports that display SDGs, 593 are published under a voluntary regime (58%) and 422 (42%) are issued under a mandatory regime. We observe a similar distribution for the specific SDG 12 disclosure. Regarding the SDG 12 disclosure score, we see that most reports issued under a voluntary regime do not display any type of SDG 12 disclosure (2806 reports accounting for almost 94% of total observations in that category). Reports with disclosure scores equal to 1, 2 or 3 are fairly balanced between mandatory and voluntary reporting regime.

Table 5

Table 6 provides the descriptive statistics of our variables. We do not observe abnormal values for skewness or kurtosis, except for market cap. Thus, we take the natural logarithm of the market capitalization, in accordance with Hahn and Kühnen (2013) and Dienes *et al*. (2016).

Table 6

4.2 Pairwise correlations

Table 7 shows pairwise correlations of the continuous variables. We find a positive and significant correlation between our dependent variables (*Resource use score*, *Environmental*

innovation score, Emissions score) and SDG disclosure score (*SDG12_score*). These relationships suggest that a higher extent of SDG disclosure is correlated with better environmental performance.

Table 7

4.3 Multivariate analysis

Table 8 displays the results of the main regression models. Given the correlation results, we check all variance inflation factor values and find that they are lower than 10. Thus, we confirm that multicollinearity is not an issue in our study. We estimate models using linear regressions absorbing multiple levels of fixed effects—that is, firm fixed effects alone and then the absorbed country, industry, and year fixed effects. As mentioned previously, the dependent variables are in leading form (i.e., measured at time $t + 1$ with respect to the explanatory variables).

Table 8

Model 1 displayed in panel A of Table 8 focuses on the presence of SDG 12 disclosure and its impact on environmental performance indicators. Each column of the table considers a specific model with different environmental performance measures and fixed effects included. We find a negative and significant coefficient between the presence of SDG 12 disclosure and environmental performance measured by the environmental innovation score (-10.823). However, when the sustainability report is issued under a voluntary reporting regime (Volu = 1) and contains SDG 12 disclosure (interaction term *SDG12_disc * Volu* = 1), the relationship between SDG 12 disclosure and environmental performance is positive and significant, not only for the environmental innovation score (12.602) but also for the emissions score (12.951 with firm fixed effects only, and 9.078 with multiple fixed effects). The presence of SDG 12 disclosure is not

significantly related to the resource use score. The adoption of GRI guidelines and the size of the firm measured as market capitalization, are positively related to environmental performance across all model specifications.

Panel B of table 8 shows Model 2, focusing on the extent of SDG 12 disclosure and its link with environmental performance indicators. We measure the extent of SDG 12 disclosure using the SDG 12 disclosure score, which can take a minimum value of 1 if the firm uses only one of the three possible disclosure strategies (infographic, textual, or tabulated) and a maximum value of 3 if the firm acknowledges SDG 12 extensively throughout the report with all three disclosure types. We find a positive and significant coefficient between an SDG 12 disclosure score equal to 1 and the environmental innovation score (13.342); that is, firms that disclose activities related to SDG 12, using at least one of the three strategies, have better environmental performance in terms process innovation. Concerning the highest SDG 12 disclosure score, we observe a negative coefficient for the environmental innovation score (–17.122); however, if the same level of disclosure occurs in a voluntary reporting setting, the coefficient becomes significantly positive (21.711). The environmental innovation score is positively related to the highest level of SDG 12 disclosure (score equal to 3), only when the sustainability report is issued voluntarily by the firm.

In summary, the results show that specific types of SDG 12 disclosure lead to better environmental performance if firms are under a voluntary sustainability reporting regime. By contrast, SDG disclosure does not affect environmental performance if firms are under a mandatory sustainability reporting regime. Furthermore, we demonstrate that a higher SDG 12 disclosure score, combining visual/infographic and textual elements, has a positive effect on the firm environmental innovation score. In this respect, our results reject impression management hypotheses of firms using SDG disclosure to hide bad environmental performance.

4.4 Additional analysis

4.4.1 Endogeneity concerns

Firms' choice to disclose activities related to SDGs is not exogenous, as it can be associated with firm-level characteristics that influence the environmental performance, giving rise to omitted variable bias. Thus, we further test our models by adopting an instrumental variable approach using the introduction of the SDGs in 2015 as an exogenous shock instead of firm-specific SDG disclosure choices. The dummy variable *SDG_post* equals 1 if the year is greater than or equal to 2015, the year in which the SDG framework was officially published.

Table 9 - Panel A, shows the results of the regression model. Environmental performance, measured by all three indicators, is always significantly positively associated with the introduction of the SDGs. We observe the same result for the presence of the GRI guidelines, which has a positive and significant impact on environmental performance. These results suggest that the SDG introduction had a positive influence on environmental performance. However, coefficients also suggest that to become more effective, SDG disclosure possibly needs to be combined with a set of reporting standards such as the GRI.

Table 9 – Panel A

4.4.2 Cross-sectional analysis by economic sector

Building upon previous literature on SDGs disclosure practices across different economic sectors (Avrampou *et al.*, 2019), we re-run the instrumental variable approach highlighting the single coefficients for each industry sector represented in the sample. The industry classification is taken from The Refinitiv Business Classification codes (TRBC). Table 9, Panel B shows the results of the regression model. We can see that two sectors perform particularly bad over all environmental impact measures. These are the "Consumer Non-Cyclicals" and "Energy" sectors,

displaying negative and significant coefficients in all three columns. The "Consumer Non-Cyclicals" category includes sectors like Food & Beverages or Personal & Household Products & Services, i.e., sectors that do not consistently vary over time according to seasonality trends. The "Energy" sector includes companies operating with coal, oil & gas, uranium, and renewable energy. Not surprisingly the Energy sector shows the highest and negative coefficients (-13.341, -27.479, and -14.404), resulting in the worst environmental performance compared to the other sectors. The only two sectors that display a positive and significant coefficient are the "Consumer cyclicals" (4.785 for the resource use score) and "Utilities" (11.126 for the environmental innovation score). Firms operating in the "Consumer cyclicals", produce automobiles & auto parts, textiles & apparel, or deliver services such as homebuilding & construction services, hotels & entertainment services, among others. The "Utilities" sector includes electric utilities, natural gas utilities, water & related utilities, and independent power producers. The "Financials" sector is not displayed in the table because is used as reference category for the other sectors, due to its highest frequency in the sample and to the established primacy in terms of sustainability reporting experience (Berg, *et al.* 2022).

These results are in line with previous studies showing similarities and differences across industry groups, especially in terms of environmental impacts which are strictly connected to the core business activities of the firm (Rosati and Faria, 2019; Ruhil, 2015) and to the "learning experience" that each firm has acquired in that sector, by being in the business from more or less time compared to the others (Avrampou *et al.*, 2019).

Table 9 – Panel B

4.4.3 Alternative environmental performance variables

We test the results using a series of different environmental performance indicators, i.e., the actual CO2 emissions at the firm level, distinguishing between scope 1, scope 2, and scope 3

emissions. According to the GHG Protocol scope 1 emissions are direct emissions from owned or controlled sources. Scope 2 emissions are indirect emissions from the generation of purchased energy, while scope 3 emissions are all indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions.

From Table 9, panel C we see that the only significant coefficient is displayed for the scope 1 emissions in a voluntary reporting regime (-0.202). However, the relatively small sample size compared to the main models and the lack of significance for the other variables, lead us to arise some concerns about the reliability of such type of data and the need to further investigate how environmental scores are linked to the actual footprint caused by the firm (Berg *et al.,* 2022).

Table 9 – Panel C

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5. Conclusions

Despite the growing importance and interest on SDG reporting (UNDP, 2015), we still know little about SDG disclosure and its relationship with sustainable performance at firm and country level (Bebbington and Unerman, 2018). In this study we aim to respond to the call for in-depth research on how organizations engage with SDGs in their reporting practices (Bebbington and Unerman 2018; Hörisch, 2021) and to enrich the current literature on the role of sustainability disclosure in addressing systemic grand challenges (Gray, 2010; Christensen *et al*., 2019; Michelon *et al*., 2020).

We investigated the SDG reporting practices of European public listed firms and estimated the link between SDG reporting strategies and firm environmental impact, proxied by three specific SDG 12 related indicators: resource use score, environmental innovation score, and emissions score, in an attempt to measure systemic environmental consequences across the three

different production phases: input (resource use); process (innovation); and output (emissions). Through the manual content analysis of sustainability reports, we differentiated between three comprehensive types of SDG 12 disclosure strategies: infographic, textual, and tabulated disclosure.

We demonstrated that corporate SDG disclosure is associated with positive environmental impacts, especially under a voluntary sustainability reporting regime. These results are in line with Moussa et al. (2002), suggesting that SDG disclosure is not a mere "rainbow-washing" strategy, but on the contrary, can signal a substantive positive corporate behavior. Our results can be also explained by Kays' (2022) reasoning according to which firms strategically offset expected reputational costs by voluntarily issuing supplemental information. Thus, when mandatory disclosures are incomplete, firms will voluntarily issue additional information to remain in control of their disclosure environments. This can also be true in our setting, where the content of mandatory sustainability disclosure is unregulated and not comparable across companies (Jones, 2011). We also support the Beretta and Bozzolan (2008) assumption that high-quality information should usefully support external users in the judgment of past and future performance, by showing that a higher extent of SDG disclosure has a positive association with environmental performance. In accordance with Biermann *et al*. (2017) and Cai *et al*. (2016), we show that the collective success of SDG disclosure depends on several systemic institutional factors, such as the absence of the requirement to disclose sustainability information at a country level, the adoption of other reporting standards like the GRI, and the market development and size of the firm, proxied by the market capitalization in our setting.

We recognize some limitations in our study. A first concern regards the empirical design of the statistical analysis, as due to the endogenous applicability of the EU Directive, we could not implement a proper Dif-in-Dif design and had to rely on linear regressions with multiple fixed effects and an instrumental variable approach that considers the release of the SDGs in 2025 as a possible exogenous shock equally affecting all firms in the sample.

Second, from the comparison of the models using the three Refinitiv environmental scores (resource use, environmental innovation, and emissions score) versus the actual level of firm emissions (scope 1, scope2, and scope 3), we do not find consistent and significant evidence. This aspect should raise some attention and concerns on the data availability and reliability of such measures. Unfortunately, the numer of firms that reliably compute and report about emissions across the value chain is limited (cf. smaller sample size) making it still very difficult to empirically assess if firms are truly reducing their environmental footprint or are just reporting about initiatives to tackle scope 1 emissions, exploiting some kind of greenwashing practices.

A final point, somehow related to the lack of data and information on firm systemic impacts across the value chain, is the so-called "indirect rebound effect" (Reimers *et al*., 2021). Indirect rebound effects arise on the consumer level when potential CO2 emission savings from the production phases of the product or the usage of more efficient technologies, are partially or fully offset by the consumers' adverse behavioral usage of that product. A limitation of the present study and of the accounting literature at large, is the lack of focus on the consumers behavior and practices, primarly due to lack of data but also to a biased attention on other stakeholder groups. We encourage future research to consider the above concerns and explore innovative and non-traditional ways to find possible solutions.

Tables

Table 1. Sample selection process

Total STOXX Europe 600 firms	600
Total firms with missing archival data over the period 2010-2020	-264
Total firms retained in final sample	336
Total years in final sample	11
Total firm-year observations in final sample	**3,696**

Table 2. List of general SDGs and specific SDG n. 12 keywords

Generic SDG textual disclosure	sdg sustainable development goal sustainability development goal
Specific SDG 12 textual disclosure	goal 12, goal n. 12, goal no 12, goal 12 sdg 12, sdg n. 12, sdg no 12, sdg12, sdg number 12, sdg no.12 sustainable development goal number 12 responsible consumption and production responsible production and consumption sustainable consumption and production sustainable production and consumption

Notes: For each keyword, word modifications are included (i.e., plural forms or capital letters). The variable *SDG_all_disc* equals 1 if at least one of the generic SDG keywords is mentioned in the report and 0 otherwise. The variable *SDG12_text* equals 1 if at least one of the specific SDG 12 keywords is mentioned in the report and 0 otherwise.

Table 3. SDG 12 disclosure coding scheme and examples

Example 1. Infographic disclosure (variable *SDG12_icon* = 1)	Example 2. Textual disclosure (variable *SDG12_text* = 1)	Example 3. Tabulated disclosure (variable *SDG12_table* = 1)
 UNIPER Sustainability report 2018 page 7	*Terna makes reference to Goals 8 ("Decent work and economic growth"), 12 ("Responsible consumption and production"), 15 ("Life on land"), 16 ("Peace, justice and strong institutions") and 17 ("Partnership for the Goals").* TERNA Sustainability report 2019 page 40	 **Sustainability program** / **Related SDGs** **Customer-focused solutions:** We continuously push the limits of technology and innovation to offer the best solutions to our customers. — 3, 4, 9 **Access to hearing care:** We provide access to hearing care and improve the quality of life for millions of people with hearing loss. — 3, 4 **Investment in people:** We support the development of our employees and offer a flexible and inclusive work environment. — 5, 8 **Safeguarding the environment:** We ensure eco-efficient practices across all our business activities. — 6, 7, 9, 12, 13 **Governance, risk, and compliance management:** We adhere to good corporate governance and strictly ethical business practices — 8, 16 SONOVA Sustainability report 2018 page 200
 SKANSKA Sustainability report 2019 page 56	*"These four impact drivers will contribute particularly to three UN SDGs: 'Climate action' (SDG 13), 'Responsible consumption and production' (SDG 12), and 'Decent work and economic growth' (SDG 8)."* SIMCORP Sustainability report 2020 page 4	 OMV Sustainability report 2019 page 108

Notes: The variable *SDG12_disc* takes the value 1 if the firm discloses activities related to SDG 12 using at least one of the three disclosure strategies outlined (*SDG12_icon*, *SDG12_text*, or *SDG12_table*) and takes the value 0 otherwise.

Table 4. Sample composition

Panel A. Firm-year observations by country

Sample composition by country

Country	Freq.	Percent	Cum.
Great Britain (GB)	803	21.73	21.73
Germany (DE)	561	15.18	36.91
Switzerland (CH)	363	9.82	46.73
Sweden (SE)	352	9.52	56.25
France (FR)	319	8.63	64.88
Italy (IT)	264	7.14	72.02
Denmark (DK)	198	5.36	77.38
Spain (ES)	176	4.76	82.14
Finland (FI)	143	3.87	86.01
Belgium (BE)	132	3.57	89.58
Netherlands (NL)	132	3.57	93.15
Norway (NO)	88	2.38	95.53
Ireland (IE)	55	1.49	97.02
Austria (AT)	44	1.19	98.21
Luxembourg (LU)	22	0.6	98.81
Poland (PL)	22	0.6	99.41
Portugal (PT)	22	0.6	100.01
Total	3696	100	

Panel B. Firm-year observations by economic sector

Sample composition by economic sector

Economic sector	Freq.	Percent	Cum.
Financials	682	18.45	18.45
Consumer Cyclicals	539	14.58	33.03
Industrials	517	13.99	47.02
Basic Materials	407	11.01	58.03
Technology	341	9.23	67.26
Consumer Non-Cyclicals	319	8.63	75.89
Healthcare	297	8.04	83.93
Real Estate	231	6.25	90.18
Utilities	231	6.25	96.43
Energy	132	3.57	100
Total	3696	100	

Table 5. Frequency distribution of SDGs disclosure

Panel A. SDGs disclosure by economic sector

Economic sector	Number of reports with SDGs disclosure	Number of reports with SDG 12 disclosure	Number of reports for each SDG 12 disclosure score			
			0 (missing)	1 (symbolic)	2 (hybrid)	3 (substantive)
Basic Materials	121	90	317	24	35	31
Consumer Cyclicals	158	114	425	33	43	38
Consumer Non-Cyclicals	85	58	261	14	15	29
Energy	54	37	95	9	19	9
Financials	186	110	572	36	35	39
Healthcare	65	46	251	6	24	16
Industrials	135	95	422	18	29	48
Real Estate	40	28	203	10	10	8
Technology	92	67	274	18	15	34
Utilities	79	59	172	12	23	24
Total	1015	704	2992	180	248	276

Panel B. SDGs disclosure by sustainability reporting regime

Sustainability reporting regime	Number of reports with SDGs disclosure	Number of reports with SDG 12 disclosure	Number of reports for each SDG 12 disclosure score			
			0 (missing)	1 (symbolic)	2 (hybrid)	3 (substantive)
Voluntary	593	403	2806	111	141	125
Mandatory	422	301	186	69	107	151
Total	1015	704	2992	180	248	276

Notes: SDG 12 disclosure occurs if the firm indicates its activities related to SDG 12 using at least one of three disclosure strategies (infographic, textual, or tabulated). The SDG 12 score is a numerical score that takes values 0, 1, 2 or 3. High SDG 12 disclosure (SDG12_score = 3) occurs when all three disclosure strategies appear in the report. Medium SDG 12 disclosure (SDG12_score = 2) occurs when only two disclosure strategies appear. Low SDG 12 disclosure (SDG12_score = 1) occurs when only one disclosure strategy appears.

Table 6. Descriptive statistics

	Mean	SD	p25	Median	p75	Min	Max	Skew	Kurtosis	N
emissions score	61.596	33.29	40.41	73.465	88.82	0	99.91	-0.792	2.263	3662
env innovation score	41.357	35.423	0	38.02	75.47	0	99.88	0.151	1.514	3663
resource use score	62.859	34.249	42.31	75.1	91.67	0	99.86	-0.807	2.246	3663
sdg12 disc	0.19	0.393	0	0	0	0	1	1.576	3.485	3696
sdg12 icon	0.17	0.376	0	0	0	0	1	1.758	4.09	3696
sdg12 text	0.116	0.32	0	0	0	0	1	2.401	6.766	3696
sdg12 table	0.121	0.326	0	0	0	0	1	2.321	6.388	3696
sdg12 score simple	0.407	0.908	0	0	0	0	3	2.046	5.656	3696
sdg all disc	0.275	0.446	0	0	1	0	1	1.01	2.02	3696
sdg post	0.545	0.498	0	1	1	0	1	-0.182	1.033	3697
volu	0.868	0.338	1	1	1	0	1	-2.177	5.741	3696
gri guidelines	0.648	0.478	0	1	1	0	1	-0.62	1.384	1727
csr committee	0.744	0.436	0	1	1	0	1	-1.118	2.25	3164
csr audit	0.645	0.478	0	1	1	0	1	-0.608	1.37	2936
leverage	0.621	0.214	0.48	0.616	0.758	0.021	1.537	0.018	2.796	3552
market cap ln	16.308	1.43	15.296	16.19	17.334	10.567	20.506	0.076	2.884	3408
co2 emissions country	6.863	2.098	5.203	6.147	8.518	3.732	22.066	1.196	7.026	3696

Notes: The table shows descriptive statistics for all variables considered in the analysis: mean values, standard deviation (SD), 25% percentile (p25), median values, 75% percentile (p75), minimum values, maximum values, skewness values (Skew), kurtosis values, and total number of firm-year observations (N).

Table 7. Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) emissions score	1						
(2) env innovation score	0.558*	1					
(3) resource use score	0.861*	0.582*	1				
(4) sdg12 score	0.229*	0.173*	0.247*	1			
(5) leverage	0.175*	0.172*	0.180*	0.005	1		
(6) market_cap_ln	0.411*	0.303*	0.440*	0.194*	0.137*	1	
(7) co2 emissions country	-0.179*	-0.088*	-0.165*	-0.186*	-0.016	-0.222*	1

Notes: Coefficients significance is marked according to p-values as follows: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 8. Multivariate regression models output

Panel A. Presence of SDG 12 disclosure: Model 1

Variable	Resource use score		Environmental innovation score		Emissions score	
SDG 12 disc	-4.512	-0.715	-10.823*	5.778	-3.880	1.303
	(-1.11)	(-0.14)	(-1.93)	(0.93)	(-0.98)	(0.33)
Volu	-2.185	3.634	-7.604	6.523	-5.968*	-1.924
	(-0.53)	(0.77)	(-1.58)	(0.88)	(-1.78)	(-0.54)
SDG 12 disc * Volu	4.469	4.363	12.602***	-3.563	12.951***	9.078*
	(-0.91)	(-0.74)	(2.02)	(-0.45)	(2.66)	(1.86)
SDG all disc	4.663	0.136	1.337	0.372	-0.850	-4.287
	(1.44)	(0.04)	(0.36)	(0.07)	(-0.27)	(-1.42)
GRI guidelines	20.126***	19.627***	7.548*	-0.627	13.522***	15.533***
	(4.27)	(5.60)	(1.81)	(-0.12)	(3.43)	(4.90)
CSR committee	1.884	18.578***	3.952	12.083**	7.529	20.123***
	(0.44)	(4.26)	(0.84)	(2.11)	(1.57)	(5.05)
CSR audit	4.691	10.148***	2.583	10.678*	2.551	3.436
	(1.45)	(3.24)	(0.62)	(1.85)	(0.73)	(1.04)
Leverage	-11.604	14.649*	-21.125	-3.044	-20.829	-3.560
	(-0.73)	(1.73)	(-1.44)	(-0.18)	(-1.61)	(-0.52)
Market cap	11.166***	3.18**	4.34*	5.568***	13.25***	4.764***
	(4.01)	(2.14)	(1.87)	(2.62)	(5.15)	(3.81)
CO2 emissions country	6.06***	-4.491*	2.489	-4.386	6.679***	-3.335
	(3.40)	(-1.76)	(1.35)	(-0.98)	(3.75)	(-1.44)
Constant	-165.236***	-0.864	-33.539	-38.663	-193.411***	-12.727
	(-3.02)	(-0.03)	(-0.73)	(-0.98)	(-3.95)	(-0.54)
Firm f.e.	YES	NO	YES	NO	YES	NO
Country f.e.	NO	YES	NO	YES	NO	YES
Industry f.e.	NO	YES	NO	YES	NO	YES
Year f.e.	NO	YES	NO	YES	NO	YES
N. obs.	1123	1124	1123	1124	1123	1124
Adj. R sq.	0.571	0.498	0.633	0.317	0.565	0.507

Notes: Absorbed multilevel fixed effects models with robust standard errors clustered at firm level. T-stats are displayed in parentheses. “f.e.” stands for “fixed effects”.
Coefficients significance is marked according to p-values as follows: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Panel B. Extent of SDG 12 disclosure: Model 2

Variable	Resource use score		Environmental innovation score		Emissions score	
SDG12 disc score (1)	5.307	6.529	-1.959	13.342*	3.612	3.717
	(1.07)	(1.09)	(-0.35)	(1.72)	(0.68)	(0.72)
SDG12 disc score (2)	-11.410	-1.809	-12.728	0.787	-12.485	0.090
	(-1.23)	(-0.18)	(-1.22)	(0.08)	(-1.32)	(0.01)
SDG12 disc score (3)	-8.827*	-5.194	-17.122**	2.719	-5.409	0.241
	(-1.71)	(-0.86)	(-2.29)	(0.35)	(-1.04)	(0.05)
Volu	-2.296	3.537	-7.971	6.318	-5.925*	-1.871
	(-0.54)	(0.75)	(-1.63)	(0.85)	(-1.73)	(-0.52)
SDG 12 disc score * Volu (1 1)	2.837	0.232	4.683	-11.941	12.127*	13.009*
	(0.46)	(0.03)	(0.71)	(-1.05)	(1.89)	(1.90)
SDG 12 disc score * Volu (2 1)	8.598	5.693	10.064	-1.074	20.664*	8.694
	(0.76)	(0.51)	(0.86)	(-0.09)	(1.80)	(0.93)
SDG 12 disc score * Volu (3 1)	6.295	6.925	21.711**	1.717	11.437*	7.727
	(-0.94)	(0.98)	(2.45)	(0.18)	(1.70)	(1.17)
SDG all disc	4.442	0.041	1.111	0.318	-1.027	-4.342
	(1.36)	(0.01)	(-0.29)	(0.06)	(-0.32)	(-1.44)
GRI guidelines	19.636***	19.581***	7.34*	-0.644	13.123***	15.542***
	(4.21)	(5.57)	(1.78)	(-0.12)	(3.36)	(4.88)
CSR committee	1.577	18.778***	3.955	12.163**	7.205	20.127***
	(0.37)	(4.32)	(0.83)	(2.11)	(1.52)	(5.03)
CSR audit	4.964	10.144***	2.513	10.542*	2.883	3.455
	(1.57)	(3.24)	(0.61)	(1.82)	(0.83)	(1.04)
Leverage	-9.933	14.714*	-20.425	-3.014	-19.415	-3.715
	(-0.65)	(1.74)	(-1.41)	(-0.18)	(-1.52)	(-0.55)
Market cap	11.133***	3.218**	4.394*	5.646***	13.209***	4.755***
	(4.08)	(2.15)	(1.92)	(2.63)	(5.15)	(3.79)
CO2 emissions country	5.810***	-4.541*	2.435	-4.334	6.429***	-3.299
	(3.23)	(-1.77)	(1.34)	(-1.14)	(3.56)	(-1.41)
Constant	-163.440***	-1.197	-33.886	-40.073	-191.583***	-12.770
	(-3.05)	(-0.05)	(-0.75)	(-1.01)	(-3.93)	(-0.54)
Firm f.e.	YES	NO	YES	NO	YES	NO
Country f.e.	NO	YES	NO	YES	NO	YES
Industry f.e.	NO	YES	NO	YES	NO	YES
Year f.e.	NO	YES	NO	YES	NO	YES
N. obs.	1727	1727	1727	1727	1727	1727
Adj. R sq.	0.575	0.499	0.635	0.317	0.568	0.507

Notes: Absorbed multilevel fixed effects models with robust standard errors clustered at firm level. T-stats are displayed in parentheses. "f.e." stands for "fixed effects".
Coefficients significance is marked according to p-values as follows: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 9. Instrumental variable regression model output

Panel A. Post-SDG introduction period

Variable	Resource use score	Environmental innovation score	Emissions score
SDG post	7.520***	6.231**	6.952***
	(4.65)	(2.43)	(4.05)
Volu	0.447	-0.601	0.377
	(0.12)	(-0.16)	(0.11)
SDG all disc	1.995	-0.646	1.314
	(0.82)	(-0.21)	(0.53)
GRI guidelines	19.751***	7.430*	13.072***
	(4.38)	(1.82)	(3.40)
CSR committee	3.186	5.102	8.774*
	(0.77)	(1.16)	(1.82)
CSR audit	3.949	1.839	2.315
	(1.23)	(0.44)	(0.65)
Leverage	-10.648	-19.285	-18.813
	(-0.67)	(-1.30)	(-1.48)
Market cap	9.158***	3.037	11.753***
	(3.19)	(1.39)	(4.66)
CO2 emissions country	8.203***	4.235**	8.569***
	(4.67)	(2.11)	(4.62)
Constant	-153.707***	-35.146	-192.784***
	(-2.82)	(-0.81)	(-4.09)
Firm f.e.	YES	YES	YES
Country f.e.	NO	NO	NO
Industry f.e.	NO	NO	NO
Year f.e.	NO	NO	NO
N. obs.	1727	1727	1727
Adj. R sq.	0.577	0.634	0.567

Notes: Firm fixed effects models with robust standard errors clustered at firm level. T-stats are displayed in parentheses. “f.e.” stands for “fixed effects”.
Coefficients significance is marked according to p-values as follows: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Panel B. Cross-sectional analysis at economic sector level

Variable	Resource use score	Environmental innovation score	Emissions score
SDG post	2.765*	1.019	2.689*
	(1.76)	(0.45)	(1.67)
Volu	2.902	5.710	-1.103
	(0.97)	(1.56)	(-0.39)
SDG all disc	-2.834	1.422	-5.025**
	(-1.20)	(0.48)	(-2.16)
GRI guidelines	17.837***	10.392***	11.152***
	(8.39)	(3.62)	(5.53)
CSR committee	19.789***	5.598*	21.787***
	(7.80)	(1.89)	(8.19)
CSR audit	11.372***	8.993***	9.047***
	(5.78)	(3.17)	(4.82)
Leverage	14.042***	14.129**	-0.049
	(2.75)	(2.41)	(-0.01)
Market cap	2.903***	3.644***	3.625***
	(4.41)	(4.09)	(5.71)
CO2 emissions country	0.566	0.577	0.194
	(1.37)	(1.09)	(0.48)
Economic sector			
Basic Materials	-0.924	-24.567***	-4.370
Consumer Cyclicals	4.785*	-15.04***	0.440
Consumer Non-Cyclicals	-8.616**	-25.970***	-11.981***
Energy	-13.341***	-27.479***	-14.404***
Healthcare	-3.951	-22.417***	-7.313**
Industrials	-0.881	-10.272***	-8.281***
Real Estate	0.597	-13.931***	-8.350**
Technology	-0.269	-22.933***	-6.521*
Utilities	-5.434	11.126**	-0.156
Constant	-29.183**	-38.71***	-18.057*
	(-2.53)	(-2.61)	(-1.69)
N. obs.	1727	1727	1727
Adj. R sq.	0.406	0.220	0.376

Notes: Firm fixed effects models with robust standard errors clustered at firm level. T-stats are displayed in parentheses. “f.e.” stands for “fixed effects”.
Coefficients significance is marked according to p-values as follows: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.
Economic sector classification following the Refinitiv Business Classification (TRBC).

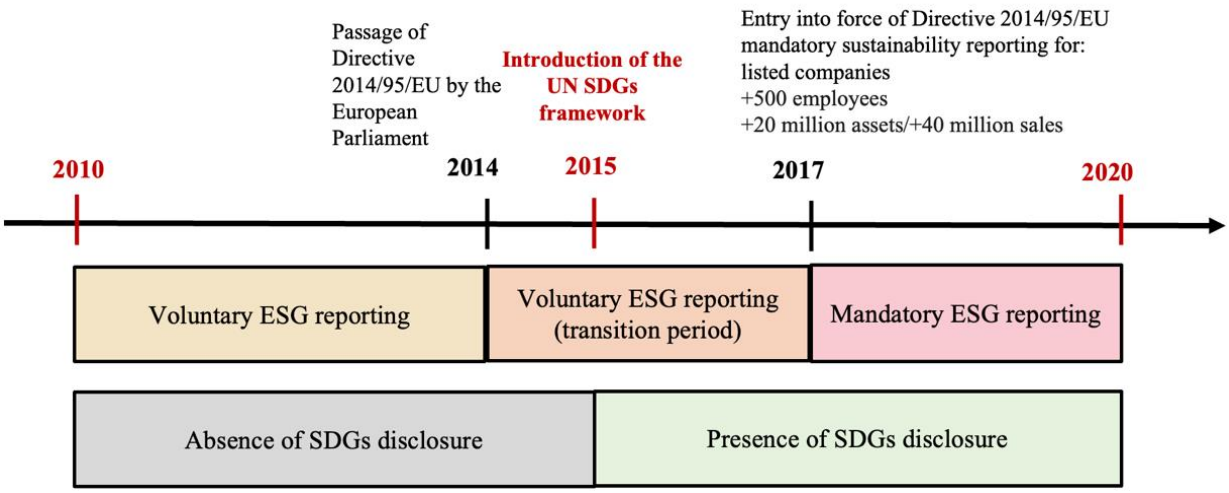
Panel C. Actual CO2 emissions levels as alternative dependent variables

Variable	Scope 1 CO2 emissions	Scope 2 CO2 emissions	Scope 3 CO2 emissions
SDG post	0.097	-0.160	0.265
	(1.57)	(-1.26)	(1.58)
Volu	-0.202**	-0.004	0.069
	(-2.18)	(-0.02)	(0.23)
SDG all disc	-0.007	0.020	0.339
	(-0.10)	(0.22)	(1.45)
GRI guidelines	-0.005	-0.004	0.357
	(-0.06)	(-0.02)	(1.10)
CSR committee	0.065	0.094	-0.330
	(0.60)	(0.48)	(-0.72)
CSR audit	0.191*	0.126	0.877**
	(1.87)	(1.15)	(2.13)
Leverage	0.846	1.331***	1.859
	(1.50)	(2.63)	(1.54)
Market cap	0.099	0.048	0.364**
	(0.94)	(0.46)	(2.29)
CO2 emissions country	0.162***	0.157**	-0.209
	(4.02)	(2.19)	(-1.49)
Constant	8.107***	8.657***	5.151*
	(4.18)	(5.19)	(1.79)
Firm f.e.	YES	YES	YES
Country f.e.	NO	NO	NO
Industry f.e.	NO	NO	NO
Year f.e.	NO	NO	NO
N. obs.	889	889	745
Adj. R sq.	0.978	0.941	0.864

Notes: Firm fixed effects models with robust standard errors clustered at firm level. T-stats are displayed in parentheses. “f.e.” stands for “fixed effects”.
Coefficients significance is marked according to p-values as follows: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Figures

Figure 1. Timeline of main events considered



APPENDIX

Table A1. The 17 UN Sustainable Development Goals and associated official icons

SDG 1. No poverty	End poverty in all its forms everywhere
SDG 2. Zero hunger	End hunger, achieve food security and improved nutrition and promote sustainable agriculture
SDG 3. Good health and well-being	Ensure healthy lives and promote well-being for all at all ages
SDG 4. Quality education	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
SDG 5. Gender equality	Achieve gender equality and empower all women and girls
SDG 6. Clean water and sanitation	Ensure availability and sustainable management of water and sanitation for all
SDG 7. Affordable and clean energy	Ensure access to affordable, reliable, sustainable and modern energy for all
SDG 8. Decent work and economic growth	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
SDG 9. Industry, innovation and infrastructure	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
SDG 10. Reduced inequalities	Reduce inequality within and among countries
SDG 11. Sustainable cities and communities	Make cities and human settlements inclusive, safe, resilient and sustainable
SDG 12. Responsible consumption and production	Ensure sustainable consumption and production patterns
SDG 13. Climate action	Take urgent action to combat climate change and its impacts
SDG 14. Life below water	Conserve and sustainably use the oceans, seas and marine resources for sustainable development
SDG 15. Life on land	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
SDG 16. Peace, justice and strong institutions	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
SDG 17. Partnerships for the goals	Strengthen the means of implementation and revitalize the global partnership for sustainable development

Notes: Source https://sdgs.un.org/goals

Table A2. Global indicator framework for the SDG 12 and related targets

A/RES/71/313
E/CN.3/2018/2
E/CN.3/2019/2
E/CN.3/2020/2
E/CN.3/2021/2

Global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development

Sustainable Development Goal indicators should be disaggregated, where relevant, by income, sex, age, race, ethnicity, migratory status, disability and geographic location, or other characteristics, in accordance with the Fundamental Principles of Official Statistics.[1]

Goals and targets (from the 2030 Agenda for Sustainable Development)	*Indicators*
Goal 12. Ensure sustainable consumption and production patterns	
12.1 Implement the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries	12.1.1 Number of countries developing, adopting or implementing policy instruments aimed at supporting the shift to sustainable consumption and production
12.2 By 2030, achieve the sustainable management and efficient use of natural resources	12.2.1 Material footprint, material footprint per capita, and material footprint per GDP
	12.2.2 Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP
12.3 By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses	12.3.1 (*a*) Food loss index and (*b*) food waste index
12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment	12.4.1 Number of parties to international multilateral environmental agreements on hazardous waste, and other chemicals that meet their commitments and obligations in transmitting information as required by each relevant agreement
	12.4.2 (*a*) Hazardous waste generated per capita; and (*b*) proportion of hazardous waste treated, by type of treatment
12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse	12.5.1 National recycling rate, tons of material recycled
12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle	12.6.1 Number of companies publishing sustainability reports
12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities	12.7.1 Degree of sustainable public procurement policies and action plan implementation
12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature	12.8.1 Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in (*a*) national education policies; (*b*) curricula; (*c*) teacher education; and (*d*) student assessment
12.a Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production	12.a.1 Installed renewable energy-generating capacity in developing countries (in watts per capita)
12.b Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products	12.b.1 Implementation of standard accounting tools to monitor the economic and environmental aspects of tourism sustainability
12.c Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities	12.c.1 Amount of fossil-fuel subsidies (production and consumption) per unit of GDP

Notes: Source https://unstats.un.org/sdgs/indicators/indicators-list/

Table A3. Directive 2014/95/EU: Country-specific requirements

Country	Requirements	National law
Austria	Employees: over 500 Balance sheet total: over EUR 20 million Listed companies	Sustainability and Diversity Improvement Act 257/ME https://www.parlament.gv.at/PAKT/VHG/XXV/ME/ME_00257/fname_568007.pdf
Belgium	Employees: over 500 Balance sheet total: over EUR 17 million Listed companies	Amendment to Companies Code 2564/ (2016/2017) http://www.ejustice.just.fgov.be/eli/loi/2017/09/03/2017020487/moniteur
Denmark	Employees: over 250 employees Balance sheet total over DRK 156 million Listed companies and State-limited liability companies	Act amending the Danish Financial Statements Act L 117 https://www.ft.dk/RIpdf/samling/20141/lovforslag/L117/20141_L117_som_fremsat.pdf
Finland	Employees: over 500 Balance sheet total over EUR 20 million Listed companies	Amendment 1376/2016 and Amendment 1441/2016 to the Accounting Act https://www.eduskunta.fi/FI/vaski/eduskunnanvastaus/Documents/EV_256+2016.pdf
France	Over 500 employees Balance sheet total over EUR 20 million Listed companies	Amendments to the Law on Accounting PZE No. 51 https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000042339777/
Germany	Over 500 employees Balance sheet total over EUR 20 million Listed companies	CSR Directive Implementation Act https://www.bgbl.de/xaver/bgbl/start.xav?startbk=Bundesanzeiger_BGBl&start=//*%5b@attr_id=%27bgbl117s0802.pdf%27%5d#__bgbl__%2F%2F*%5B%40attr_id%3D%27bgbl117s0802.pdf%27%5D__1638381183701
Great Britain	Employees: over 500 Listed companies	The Companies, Partnerships and Groups (Accounts and Non-financial Reporting) Regulation No. 1245 https://www.legislation.gov.uk/uksi/2016/1245/pdfs/uksi_20161245_en.pdf
Ireland	Over 500 employees Balance sheet total over EUR 20 million Listed companies	European Union Regulations 2017 https://enterprise.gov.ie/en/Legislation/Legislation-Files/SI-No-360-of-2017.pdf
Italy	Over 500 employees Balance sheet total over EUR 20 million Listed companies	Legislative Decree 30 December 2016, n. 254 https://www.gazzettaufficiale.it/atto/serie_generale/caricaDettaglioAtto/originario?atto.dataPubblicazioneGazzetta=2017-01-
Luxembourg	Employees: over 250 Balance sheet total: over EUR 20 millions Listed companies	Law of 23 July 2016 on the Publication of Non-financial Information and Information on Diversity A156 https://legilux.public.lu/eli/etat/leg/loi/2016/07/23/n19/jo
Netherlands	Employees: over 500 Balance sheet total: over EUR 20 million Listed companies	Decree Disclosure of Non-financial Information PbEU, 2014, L330 and Decree Disclosure Diversity Policy PbEU, 2014, L330 https://www.rijksoverheid.nl/binaries/rijksoverheid/documenten/besluiten/2017/03/23/staatsblad-100-2017-besluit-bekendmaking-niet-financiele-informatie/stb2017-100.pdf
Norway	Employees: over 500 Balance sheet total: over EUR 20 million Listed companies	Amendment to the Accounting Act Company Scope (Based on draft law – Norway has not official transposed the Directive 2014/95/EU) https://www.sands.no/media/258396/eu-reform-of-corporate-social-responsibility.pdf
Poland	Employees: over 500 Balance sheet total: over PLN 85 million Listed companies	Act of 15 December 2016, Amending the Accounting Act 61 https://www.gov.pl/web/finanse
Portugal	Employees: over 500 Listed companies	Law No. 148/2015 https://dre.pt/dre/LinkAntigo?search=107773645
Spain	Employees: over 500 Balance sheet total: over EUR 20 million Listed companies	Anteprojecto de Ley sobre información no financiera y diversidad (Based on draft law – Spain has not official transposed the Directive 2014/95/EU) https://www.icac.gob.es/documentos/contabilidad/APL%20Informaci%c3%b3n%20no%20financiera.pdf
Sweden	Employees: over 250 Balance sheet total: over SEK 175 million All types of companies	Corporate Reporting on Sustainability and Diversity Policy CU2 https://data.riksdagen.se/fil/E967F0FC-7DE9-46A1-BCC8-41B7F9CF984D
Switzerland	Not applicable	

Notes: Adapted from
https://www.accountancyeurope.eu/wp-content/uploads/1711-NFRpublication-GRI-CSR-Europe.pdf

Table A4. Variables definitions

Variable name	Definition	Source
co2_emissions_country_capita	Annual tons of country carbon dioxide (CO_2) emissions from fossil fuels and industry, per capita.	Our world in data
country_num	Unique progressive number for each country in the list. It takes values from 1 to 17. Reference country is GB = 1.	Autonomously coded
csr audit	Dummy variable equal to 1 if the firm sustainability reported is audited by a third independent party; 0 otherwise.	Refinitiv
csr committee	Dummy variable equal to 1 if the firm has a CSR committee in ist governance structure; 0 otherwise.	Refinitiv
economic sector	Unique progressive number for each economic sector in the list. It takes values from 1 to 10. Reference category is Financials = 1.	Autonomously coded
Emissions_score	Emission category score measures a company's commitment and effectiveness towards reducing environmental emission in the production and operational processes.	Refinitiv
Environmental_innovation_score	Environmental innovation category score reflects a company's capacity to reduce the environmental costs and burdens for its customers, and thereby creating new market opportunities through new environmental technologies and processes or eco-designed products.	Refinitiv
gri guidelines	Dummy variable equal to 1 if the report is issued in compliance with the Global Reporting Initiative guidelines; 0 otherwise.	Refinitiv
lev	The ratio of total liabilities to total assets.	Autonomously coded
market_cap_ln	Natural logarithm of MARKET_CAP, market price times total shares outstanding, at year-end, in euros.	Autonomously coded
Resource_use_score	Resource use category score reflects a company's performance and capacity to reduce the use of materials, energy or water, and to find more eco-efficient solutions by improving supply chain management.	Refinitiv
sdg_all_disc	Dummy variable equal to 1 if SDGs keywords are mentioned at least once in the report; 0 otherwise.	Autonomously coded from corporate reports
sdg12_disc	Dummy variable equal to 1 if at least one of SDG12_icon, SDG12_text or SDG12_table is equal to one; 0 otherwise.	Autonomously coded from corporate reports
sdg12_icon	Dummy variable equal to 1 if the SDG12 icon is present at least once in the report, 0 otherwise.	Autonomously coded from corporate reports
sdg12_score	Numerical score that is equal to the sum of SDG12_icon, SDG12_text and SDG12_table. It can take values 0,1,2,3.	Autonomously coded
sdg12_table	Dummy variable equal to 1 if the SDG 12 icon or keywords are present at least once in a table. A table is defined as a graphical scheme having at least two dimensions.	Autonomously coded from corporate reports
sdg12_text	Dummy variable equal to 1 if SDG 12 keywords are mentioned at least once in the report; 0 otherwise.	Autonomously coded from corporate reports
volu	Dummy variable equal to 1 if the report is issued under (voluntary disclosure); 0 if is issued in compliance with the EU Directive (mandatory disclosure). See appendix for country specific criteria.	Autonomously coded
year	Year to which the sustainability report refers to. It takes values from 2015 until 2020 included.	Company websites

Table A5. Additional examples of SDG n. 12 disclosure types

Examples of infographic disclosure

UNIPER, 2017, page 7

Examples of textual disclosure

"Sika is making a contribution to the UN 2030 Agenda for Sustainable Development, focusing on eight of the 17 goals. Sika's contribution to both the construction and the vehicle industry highly influence these goals: 3 (good health and well-being), 4 (quality education and lifelong learning), 6 (clean water and sanitation), 8 (decent work and economic growth), 9 (industry, innovation and infrastructure), 11 (sustainable cities and communities), **12 (responsible consumption and production**), 13 (climate action)."

SIKA, 2019, page 51

"These four impact drivers will contribute particularly to three UN SDGs: 'Climate action' (SDG 13), 'Responsible consumption and production' (SDG 12), and 'Decent work and economic growth' (SDG 8)."

SIMCORP, 2020, page 4

Examples of tabulated disclosure

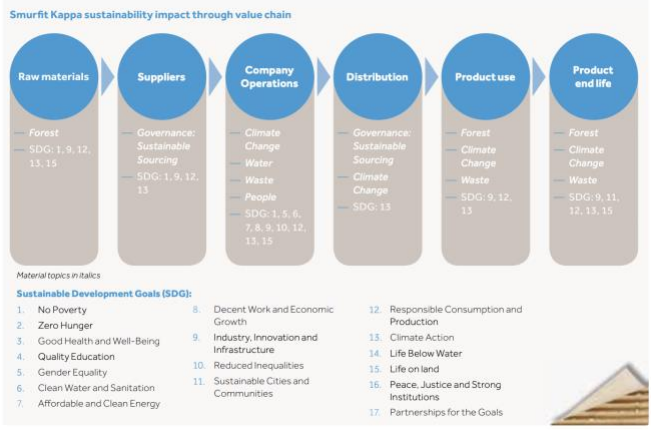
Important sustainability aspects	Assignment to the material aspects dealt within the non-financial statement (HGB)	Assigned to the section "Simply sustainable" Documents audited separately	SDG
Economic stability and reliable partners		1. Long-term, stable growth. RATIONAL as a dependable partner.	8
Appliance efficiency	Customer matters	2. Our number one. The customer. Appliances that offer efficiency in diverse ways: energy	7
Working safely with the appliances			3
Healthy nutrition	Social matters	3. Food made easy. Gentle cooking for a healthy diet.	3
Durability and recyclability	Environmental matters	4. Less is more. Durability and recyclability.	12
Reduced volumes of waste and wastewater	Environmental matters	5. Kind to the environment. Resource-efficient production and logistics. Drinking water consumption and volume of waste	6
Corporate culture; working independently and with personal responsibility	Employee matters	6. Our engine that drives sustainability. Our employees. Entrepreneur in the company Employees' health and safety	8
Employees: occupational health and safety	Employee matters		
Worldwide compliance with all legal requirements	Human rights, anti-corruption	7. A matter of course. Ethics and legal compliance.	16

RATIONAL, 2019, page 15

Examples of infographic and textual disclosure

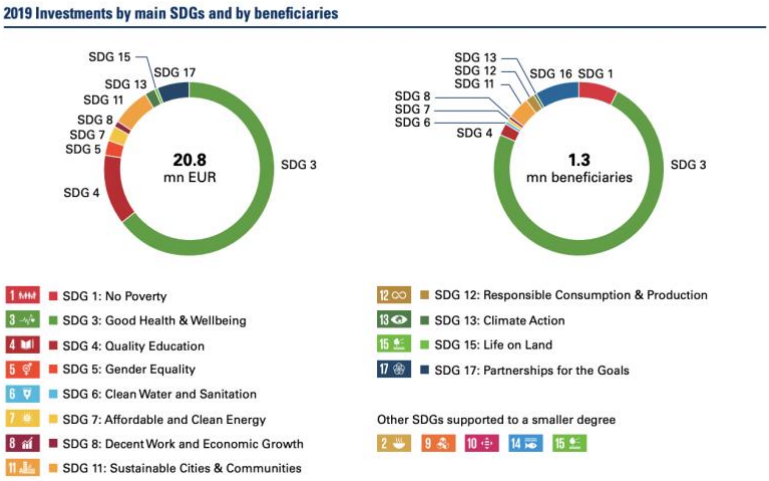
SKANSKA, 2019, page 56

Examples of tabulated and textual disclosure



KAPPA, 2016, page 33

Examples of infographic, textual and tabulated disclosure



OMV, 2019, page 108

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17 - PARTNERSHIP TOWARDS THE GOALS

Action taken by Poste Italiane:

- Participation with national and international Institutions to guarantee services for citizens;
- Constant dialogue and relations with Consumers' Associations;
- Active participation in a series of international activities in the context of environmental responsibility.

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C&T

13 - THE FIGHT AGAINST CLIMATE CHANGE

Actions taken by Poste Italiane:

- Energy saving in property assets through more responsible management and an environmental strategy that favours the use of renewable energies and intelligent technologies;
- Corporate mobility programme to contribute to the reduction of CO_2 air emissions, favouring solutions of sustainable mobility in urban areas;
- Alliance to national and international initiatives aiming at reducing climate-changing emissions.

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12 - RESPONSIBLE CONSUMPTION AND PRODUCTION

Actions taken by Poste Italiane:

- Implementation of digitalisation processes regarding offered goods/services and dematerialisation of paper documents with a consistent reduction in the use of paper;
- Responsible waste management through actions of prevention and reduction and promotion of awareness among personnel.

POSTE ITALIANE, 2017, page 10

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Article 2. Unpacking the "S" of ESG: A systematic review of social performance measures in the accounting literature.

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Abstract

Notwithstanding the importance of measuring corporate social performance (i.e., the "S" of "ESG"), there is limited evidence on how to capture it in a credible and impactful way. The purpose of this paper is twofold: To provide a systematic review of the measures of the "S" dimension of ESG performance in the accounting literature, and to suggest a possible framework to identify, measure, and report on social performance, conceived as the impact of firms on stakeholders. The systematic review covers the past 23 years and concentrates on a corpus of 226 articles published in 25 top-rated accounting journals. The analysis identifies five categories of social performance topics (*Diversity & Inclusion*, *Human Capital*, *Corporate Social Responsibility*, *Social Capital*, and *Human Rights & Ethics*), eight affected stakeholder groups (*Board of Directors & Top Managers*, *Community*, *Employees*, *Auditors*, *Investors*, *Suppliers*, *Regulators*, and *Customers*) and the related relevant KPIs presented in a topic-stakeholder table. In this respect, our analysis provides a measurement framework that can be used by academics and practitioners interested in measuring social performance.

Keywords: social impact, people, measurement, framework

1. Introduction

Firms' activities have major consequences on the sustainable development of individuals and societies (Bebbington and Unerman, 2020) and are increasingly held responsible for inequalities and harm to both people (Christ *et al.*, 2020) and planet (Arjaliès and Gibassier, 2023). In September 2015, the UN Sustainable Development Summit adopted a new framework to guide development efforts in solving Grand challenges. The 17 SDGs cover a broad range of pressing developmental issues, with a special focus on social and humanitarian challenges like poverty (SDG 1), hunger (SDG 2), quality of education (SDG 4), gender equality (SDG 5), decent work and economic growth (SDG 8), reducing inequalities (SDG 10), peace and justice (SDG 16). Moreover, the UN framework explicitly calls for corporate actions and involvement towards SDGs achievement, not only asking for corporate active involvement but also encouraging corporate disclosure via sustainability reporting practices (SDG 12).

The urgency to develop sustainability accounting tools to measure corporate social performance has been discussed for over a decade (Bebbington and Larrinaga, 2014) and has now become a priority considering grand challenges like recent polycrises (Yu, 2021), and socialwashing scandals (Kjaer and Kirchmaier, 2023). For example, the recent Covid crisis has radically changed many aspects of our lives shedding light on social issues that are important to individuals and societies (Leoni, 2021). Indeed, the scope of 'social' issues has progressively widened over the past two decades, which reflects the constantly evolving business landscape where firms, markets, and countries are increasingly interconnected and interdependent (Neilan *et al*., 2020). The so called "Great Resignation", a term coined in May 2021, describes the record number of people leaving their jobs since the beginning of the pandemic, and recent studies demonstrate that this trend is not expected to end soon (Fuller and Kerr, 2022). As a result, talent shortages and an evolving workplace have made human capital management a top priority for firms (Ellerbeck, 2022). The objective of this literature review is to unpack the black box of the

"S" or "social" dimension of what we commonly refer to as "Environmental, Social, and Governance" (ESG) aspects and to design a possible framework to identify and measure specific aspects of firm Corporate Social Performance (CSP). We assess the state of the art regarding social issues and measurement practices in the accounting literature over the two last decades, and based on the findings we propose a framework to report and measure social impact of firms on a variety of stakeholder groups.

We analyzed 226 papers published in 25 top-rated accounting journals over the period 2000-2023. We categorized papers into five categories of CSP (*Diversity & Inclusion, Human Capital, Corporate Social Responsibility, Social Capital*, and *Human Rights & Ethics*), that were subsequently unpacked into eleven more specific sub-categories. Drawing upon Stakeholder Theory (Freeman et al., 2010) we then identified the main stakeholder group being analyzed in each paper, resulting into eight stakeholder groups (*Board of Directors & Top Managers, Community, Employees, Auditors, Investors, Suppliers, Regulators,* and *Customers*), distinguishing between internal and external stakeholders to the firm. Our analysis makes several contributions to the rapidly evolving landscape of accounting literature and develops a first draft of a corporate social performance measurement and reporting framework, considering the specific social categories and the stakeholders affected.

The remainder of the paper is structured as follows: Section 2 describes the methodology used and provides an overview of the final corpus of selected articles; Section 3 presents the categories of Corporate Social Performance while Section 4 focuses on the stakeholder groups represented in the literature. Section 5 highlights the main indicators of CSP, section 6 presents the suggested matrix framework divided by stakeholder groups and categories of social performance. Concluding remarks and avenues for future research are presented in Section 7.

2. Methodology of the systematic review

In this section, we describe the procedure used to select articles for the literature review (section 2.1) and we provide an overview of the final corpus of selected articles (section 2.2).

2.1. Selection of articles for the literature review

We searched for scientific papers published in the top-ranked academic journals (rated as 4*, 4, or 3 according to the CABS 2021 Ranking) belonging to the accounting discipline. A total of 25 accounting journals were included in the analysis. The search criteria were based on a list of keywords to be present in either the title or the abstract of the article. The keywords were divided into two dimensions: The "social" dimension and the "measurement" dimension. The keywords included in the "social" dimension were: "social", "human", "people", "diversity", "wellbeing", "inclusion", "gender", "equality", "CSR", and "ESG". The keywords for the "measurement" dimension were: "measure", "metric", "assessment", "performance", "impact", "value", and "rating". We excluded from the initial results editorials, book reviews, and scientific articles focusing only on the environmental dimension. We covered the last 23 years starting from the year 2000 up to October 2023. The year 2000 corresponds to the start of the United Nations (UN) Global Compact initiative launched by the former UN Secretary-General Kofi Annan. The Global Compact was initiated to bring business and the United Nations together to give a human face to the global market, by upholding universal principles in the areas of human rights, labor, and anti-corruption (UN Global Compact 20th Anniversary). Table 1, Panel A shows the list of the 25 journals with the corresponding number of selected papers.

Table 1

From the initial accounting papers retrieved with the keywords search in each journal website, a manual check of the abstracts was performed to retain only the papers focusing on some aspects of corporate social performance. Three papers were excluded because focusing on the disclosure of financial information on social media platforms. A total of 226 papers were retained for further analysis. We can see that the first ten most prolific journals summed together account for 162 papers, corresponding to 72% of the total. These are *Accounting, Organizations & Society* (22 papers, 9.7%); *Review of Accounting Studies* (22 papers, 9.7%); *European Accounting Review* (18 papers, 8%); *Critical Perspectives on Accounting* (17 papers, 7.5%); *Journal of Business Finance and Accounting* (16 papers, 7.1%); *Accounting, Auditing and* Accountability *Journal* (15 papers, 6.6%), *Accounting Forum* (15 papers, 6.6%), *Contemporary Accounting Research* (14 papers, 6.2%), *The Accounting Review* (13 papers, 5.8%), and *Accounting Horizons* (10 papers, 4.4%).

Looking at the time period of published papers, the first journal *Accounting, Organizations & Society* by number of papers, has published 22 papers over 16 years (2008-2023), while the second journal *Review of Accounting Studies* has reached the same number of papers during the last five years (2019-2023). Only the journals *European Accounting Review* and *Critical Perspectives on Accounting* cover the full period under analysis with their publications (2000-2023). Three journals started publishing papers on social-related topics only recently, i.e., in the year 2023: *Accounting Horizons*, *Journal of the American Taxation Association*, and *Behavioral Research in Accounting*.

2.2. Overview of selected articles

Table 1, Panel B and Figure 1, Panel A show the evolution over time of the selected articles. We can see that during the initial period 2000-2007, the number of published papers was very low and always below 5 in every year.

Figure 1

We observe a first general increase during the period 2008-2014, with an average of 6 papers published each year. The very first remarkable peak is in 2016 (14 papers). This increase in publications on social topics can be explained by two important events. The first relevant event was the launch of the United Nations (UN) Sustainable Development Goals (SDGs) in 2015, which represent the most recent attempt to integrate sustainable development ambitions into a single policy framework. In September 2015, the UN Sustainable Development Summit adopted a new framework to guide development efforts between 2015 and 2030, entitled "Transforming our world: the 2030 Agenda for sustainable development" (UNDP, 2015). In addition, the SDG 12 explicitly calls for corporate actions and involvement towards SDGs achievement, not only asking for corporate active involvement but also encouraging corporate disclosure via sustainability reporting practices, as demonstrated in target 12.6 which encourages "companies, especially large and trans-national companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle" and by the indicator 12.6.1 that keeps track of the "number of companies publishing sustainability reports" (SDG 12).

Secondly, the release of the European Directive on Non-financial Reporting (EU Directive 2014/95/EU) in 2014. The Directive mandates that large "public interest entities", i.e. listed firms with more than 500 employees and with either more than EUR 20 million in total assets or more than EUR 40 million in sales, prepare annual non-financial (sustainability or CSR) reports starting with fiscal year 2017 (Fiechter et al., 2022). After the passage of the Directive in each EU Member state, the number of published CSR reports substantially increased because of the mandatory disclosure regime. After the peak of 2016, we observe a slight decrease in publications in the year 2017 (8 papers), and 2019 (8 papers) but with an increase in 2018 (18 papers). The increase of publications in the year 2018 might be still attributable to the two mentioned events in the years

2014-2015, considering the time needed to publish an academic paper (more than 2 years oftentimes), and especially to the fact that the EU Directive became effective only after in the year 2017. From 2020 onwards we observe a constant increase until the maximum number of publications in 2023 (41 papers). Figure 1, Panel B shows the evolution over time of the publications of the five most prolific journals. In line with the average total trend, we observe two remarkable peaks: the first one occurred in 2011 by the journal *Critical Perspectives on Accounting* with 7 publications, and the second one in 2022 by the journal *Review of Accounting Studies* with 13 published papers. We can therefore conclude that the social aspects of a firm performance are a quite recent topic of interest in the accounting literature.

Finally, we distinguished the selected papers by the methodology adopted for data analysis: quantitative and qualitative analysis. From Table 2, Panel A we see that most papers performed quantitative analysis (145 papers, 64% of total sample) relying on different data sources: archival data (126 papers), experiments (14 papers), and surveys (5 papers). The other 81 papers (36%) applied qualitative approaches: case studies (48 papers), literature reviews (19 papers), and theoretical contributions (14 papers). Table 2, Panel B shows the relative frequencies of each adopted method on the total sample. The majority of papers (56%) used archival data sources, 21% of the papers performed qualitative case studies, while literature reviews, experiments, theoretical pieces, and surveys cover the remaining 23% of the papers. Table 2, Panel C shows the frequency distribution of papers by methodology adopted over time. Out of the six methodologies, archival data studies (in blue) reach the highest frequency in every year, except for the years 2010, 2016, and 2019. In 2010 the case studies papers (3) are higher compared to the 2 papers using archival data, while in 2016 and 2019 case studies reach the same number of papers as archival data ones.

Table 2

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3. Categories of corporate social performance

The objective of this section is to unpack the different aspects of CSP investigated in the accounting literature. As a first step, based on a detailed reading of the abstracts, we identified five macro-categories of corporate social performance: *Diversity & Inclusion*, *Corporate Social Responsibility, Human Capital*, *Human Rights & Ethics,* and *Social Capital*.

As a second step, we identified eleven sub-categories by looking more closely at the variables considered by each study, presented either in the Introduction or in the Methodology section of the paper. Table 3 provides an overview of all categories identified.

Table 3

By looking at the time-period of published papers for each topic (Table 3, Panel A) we notice that *Corporate Social Responsibility* covers the entire period considered (2000-2023), while the papers on *Ethics* are the most recently published only after the year 2014. Table 3, Panel B shows the frequency distribution of the five categories over time. We can see that before the year 2015, there were only two categories with a high number of publications: *Diversity & Inclusion* in 2008 (4 papers), and *Human rights & Ethics* in 2011 (6 papers). After 2015 we observe a general increase in all categories, with the maximum number of publications in 2023 for the *Diversity & Inclusion* category. The following sections focus in detail on each of the sub-categories of CSP.

3.1 Diversity & Inclusion

"*Diversity is the presence of a wide range of human qualities and attributes within an individual, group or organization*" (Ghio et al. 2023, p.2)

"*We tend to think about diversity in terms of things like racial diversity and gender diversity and ethnic diversity. Those things are all important. But it's also important to have diversity in how people think*" (Nobel Prize Richard Thaler, McKinsey 2022, p.2)

The most investigated category of social performance is *Diversity & Inclusion*, with a total of 70 papers accounting for 31% of the total sample. In this macro-category fall papers that address issues like *Gender diversity*, *Demographic and cultural diversity*, and *Ethnic and religious diversity*. The 41 papers on *Gender diversity* represent 18% of the total sample and focus mainly on female representation in the firm, gender equality issues, gendered characteristics, and Lesbian, Gay, Bisexual, Transgender, and Queer, among others (LGBTQ+). The *Demographic and cultural diversity* studies consider the age or the country of origin of the various stakeholders affected by the firm behavior. *Ethnic and religious diversity* is about the presence and consideration of ethnic and racial minorities or discriminated groups such as African Americans and Afro-Caribbean or more generally referred to as Black, Indigenous, and People of Color (BIPOC), religious social norms and practices.

Table 4, Panel A shows the three sub-categories of *Diversity & Inclusion*: *Gender diversity* (41 papers, 59% of the 70 papers in the category), *Demographic and cultural diversity* (17 papers, 24%), and *Ethnic and religious diversity* (12 papers, 17%).

Table 4 Panel A

3.1.1 Gender diversity

Most papers on *Gender diversity* adopt quantitative methods and archival data sources (25 papers). Both the geographical regions and industry sectors being investigated cover international

and diversified settings. The first paper about *Gender diversity* was published in 2002 by Bernardi et al., (2002) in the *Accounting, Auditing & Accountability Journal,* examining the differences in the visual representation of the Boards of Directors (BoD) members in the annual reports of 472 corporations from the Fortune 500 index. The findings show that the proportion of female directors was 11% for firms that did not include pictures of their boards and 14.5% for firms that included pictures of their boards in their annual reports. This indicated that firms with a higher percentage of women on their boards wanted to signal this choice to stockholders, investors, and other constituents by including pictures of their boards in their annual reports.

Academic research on *Gender diversity* increased over time, reaching the maximum number of publications in 2022 and 2023, with 8 papers in each year. A lot of attention has been devoted to gender diversity among the Board of Directors (19 papers), top managers (8 papers), and Audit committees (3 papers). Some papers investigate the impact of Board gender diversity on market outcomes, like Harakeh et al. (2023) who study the association between board gender diversity and stock price crashes. Similarly, Gul et al. (2011) analyze the US mining industry and find that stock prices of firms with more women on the Board reflect more firm-specific information. Other studies focus instead on the relationship between Board gender diversity and disclosure strategies. Liao et al. (2015) demonstrate that there is a positive association between female directors on the Board and the propensity to disclose GHG information according to the Carbon Disclosure Project (CDP) guidelines. Ben-Amar et al. (2023), using a sample of 3,085 U.S. firm-year observations from 2007 to 2016, check if gender-diverse Boards influence the linguistic features of corporate financial reporting and find that the higher presence of women in the Board and Audit committee increases the readability of textual disclosures and is associated with a less optimistic and ambiguous tone in annual reports. Although most papers focus on the binary definition of gender (male and female), the study by Peytcheva (2023) examines how the use of pronouns (masculine

vs. gender-inclusive) in professional guidance affects the equity and inclusion assessments of the historically marginalized gender and sexual orientation groups (LGBTQ+ people).

3.1.2 Demographic and cultural diversity

Inside the *Demographic and cultural diversity* sub-category fall different personal characteristics like age and generational cohort (Koh et al., 2022), national cultural traits (Lau & Buckland, 2000), country of origin (Merkley et al., 2020), or cognitive elements (Kang et al., 2022). Most studies focus on international settings (7 papers), European samples (3 papers), or United States (3 papers). The first study was published in the journal *Accounting and Business Research* by Lau & Buckland (2000). The authors investigate the relationship between Norwegian cultural traits and managers' budgetary participation in Norway. The authors claim and find that with a moderate individualism culture, Norwegian managers' budgetary participation is expected to be high. After the year 2000, no papers addressed the *Demographic and cultural diversity* topic until 2016. The study by Plöckinger et al. (2016) is a literature review about the influence of the demographic characteristics of firm executives on corporate financial reporting decisions. They summarize the empirical research focusing on executives' psychological attributes and character traits and find that Upper Echelons Theory is one of the most adopted theoretical frameworks in this field. They also call for additional future research on managerial characteristics and reporting choices. A more recent study by Hrazdil et al. (2020) suggests a new approach to measure executive personality traits, thanks to the use of machine learning and artificial intelligence techniques. They classify CEOs' and CFOs' answers to analysts' questions during conference calls and propose the "Big Five personality traits" to estimate individual risk-tolerance: openness, conscientiousness, extraversion, agreeableness and neuroticism. The authors in this way demonstrate that risk-tolerance is an innate personality trait that changes with manager individual characteristics, as opposed to firm characteristics and firm financial performance.

3.1.3 Ethnic and religious diversity

The *Ethnic and religious diversity* category is less explored in the literature, with only 12 papers among the total sample. The most investigated samples consider the United States (5 papers) and differentiated industry sectors (6 papers). Particular attention is given to the audit profession, with 5 papers focusing on the auditing industry. The two most prolific journals are *Journal of Business Finance and Accounting* (3 papers) and *Accounting Horizons* (3 papers published in 2023). Three studies focus on Black minorities (Glover et al., 2000; Raddatz et al., 2023; Dey et al., 2023). The study by Raddatz et al. (2023) considers more specifically the Black, Indigenous, and People of Color (BIPOC) minorities in the auditor profession. The authors claim that gaining knowledge of the experiences and challenges faced by BIPOC auditors is essential for identifying and addressing the barriers to inclusion. Consequently, the authors suggest that future research should explore the factors causing discrimination and look for potential interventions and solutions to foster diversity and inclusion in the workplace. Among the three papers on religious diversity, Sian et al. (2020) investigate an uncommon setting like Saudi Arabia. Thanks to interviews conducted in the Big 4 audit firms based in Saudi Arabia, the paper shows how the patriarchal societal norms and practices, that are rooted in a particular interpretation of Islam and often supported by local legislation, are applied also in the audit profession and negatively impact the daily lives of Saudi women.

3.2 Corporate Social Responsibility

> *"We use the terms "CSR" and, interchangeably, "sustainability" activities and policies to denote corporate actions that assess, manage, and govern a firm's responsibilities for and impacts on society and the environment. CSR often has the goal of improving social welfare or making business activities more sustainable*." (Christensen et al., 2021, p.1179).

The second macro-category by frequency of papers is *Corporate Social Responsibility*, with 67 papers (30% of the total). This category includes papers that do not focus on specific aspects of social performance, but instead consider environmental, social, and governance aspects

together as a single concept. Table 4, Panel B shows the two sub-categories of *CSR activities* (35 papers, 52%) and *CSR disclosure* (32 papers, 48%).

Table 4 Panel B

Studies about *CSR activities* focus on aggregate measures of non-financial impact captured by ESG ratings or other publicly available sources (18 papers) or consider various CSR initiatives implemented by the firm (17 papers). The studies about *CSR disclosure* analyze firm reporting strategies regarding sustainability issues.

3.2.1 CSR activities

The papers in the *CSR activities* category are mostly quantitative (27 papers) relying on archival data (23 papers). The most investigated samples are international settings (16 papers) and United States (15 papers). One study by Rajgopal & Tantri (2022) considers India's Government implementation of a mandate requiring firms to spend at least 2% of their profits on CSR initiatives. The results show that firms that voluntarily engaged in CSR before the mandate reduced their CSR spending afterward, suggesting that regulatory interventions in CSR can also have negative outcomes like a reduction in voluntary CSR engagement. The first published paper in our considered period, is by Surroca & Tribó (2008) in the *Journal of Business Finance and Accounting*. They exploit an international database provided by the Sustainable Investment Research International company, called SiRi PRO database, specialized in socially responsible investment analysis. The three most recent articles are published in 2023 and analyze the relationship between corporate social responsibility and corporate tax aggressiveness (Marques et al., 2023), the link between ESG performance and internal control environment (Moffitt et al.,

2023), and the consequences of engaging in immaterial or material types of CSR activities (Hoang & Phang 2023).

3.2.2 CSR disclosure

The studies on *CSR disclosure* are more balanced in terms of methodology: 17 quantitative papers and 15 qualitative. The majority use archival data sources (15), but case studies (9) and literature reviews (5) are also frequent. European and international setting are the most investigated, while in terms of most prolific journals three stand out: *Accounting Forum* (8 papers), *European Accounting Review* (7), and *Accounting, Organizations and Society* (6). Twelve studies perform some type of content analysis on sustainability or annual reports, assessing the comprehensiveness of CSR reporting (Bouten et al., 2011), or the alignment with some specific reporting guidelines like the Global Reporting Initiative (GRI) standards (Ryou et al., 2021). Another relevant stream of literature focuses on CSR reporting norms and requirements like CSR assurance (Simpson et al. 2021), the role of CSR committees on sustainability disclosure (Elbardan et al., 2023), or the determinants and magnitude of the CSR reporting restatements phenomenon (Pinnuck et al., 2020).

3.3 Human Capital

> Human capital refers to "*Individuals' knowledge, education, skills, training, and experience that allows for productive labor*" (Beck et al., 2018, p. 395).

> "*The stock of attributes that an organization's employees provide to in exchange for wages and salaries, and several constituents such as training and skills, experience and expertise, commitment, ingenuity, and teamworking capacity*" (Roslender et al., 2012, p. 269)

The *Human capital* category is the third by the number of papers (49 papers, 22%) and Table 4, Panel C shows the three sub-categories: *Individual characteristics* (29 papers, 59%), *Wages and benefits* (17 papers, 35%), and *Health and safety* (3 papers, 6%).

Table 4 Panel C

3.3.1 Individual characteristics

The most frequent sub-category of *Human Capital* focuses on employees' individual characteristics. Most papers are quantitative (19), exploiting archival data (15) or experiments (3). The studies are well balanced in terms of geographical coverage and industry sectors, being international and diversified samples preferred compared to more specific settings. In terms of topics there are two prevalent streams: studies about employees' performance, tasks engagement and satisfaction (21 papers), and studies about employees' soft skills and expertise (8 papers). Some examples of employees' performance and engagement topics are employees' tenure (Mali & Lim 2023), CEO's tenure and turnover (Li & Wahid 2018), how audit firms make human resource allocation decisions (Wu et al., 2023), the different mix of work assigned to staff, seniors, managers, and partners (Cameran et al., 2018), and workload imbalance, proxied by busy-season audits, impair audit quality, and how auditors adjust staff assignments for busy-season audits (Heo et al., 2021), employees' engagement, satisfaction and effort (Hales et al., 2018; Huang et al., 2020; Presslee et al., 2023). Among these studies, there are two empirical papers by Hales et al. (2018) and Huang et al. (2020) that both use Glassdoor.com as a source of data to analyze employees' opinions on the firm outlook and behavior. As Huang et al. (2020) explain, Glassdoor.com is a popular job site, launched in 2008, where both current and former employees post reviews about their employers, sharing sensitive information on areas such as compensation and benefits and job interviews. Several features of Glassdoor suggest that reviews accurately represent employees' views. First, the reviews are anonymous, allowing employees to express their views without fear of employer retaliation. Second, under Glassdoor's policy, employees gain access to the most valuable information about employers only if they themselves provide

reviews. Third, Glassdoor works to identify and remove employee reviews that appear to have been incentivized or coerced by employers. Among the studies on employees' soft skills, we can cite Wu et al. (2023) who investigate if audit firms' human resource allocation decisions are linked with the risk profile of the client firm being audited and find that clients with higher risks (i.e. tax, legal, and asset valuation risks) are more likely to be audited by partners with the corresponding domain-specific expertise.

3.3.2 Wages and benefits

The second sub-category focuses on *Wages and benefits*, with a total of 17 papers, of which 16 adopt quantitative methods while 1 is a theoretical piece. Most studies analyze compensation contracts characteristics, like top managers' bonus compensation contracts (Widener, 2006), or pension benefit plans (Hwang & Hong, 2023; Anantharaman et al., 2022). Five papers focus on the wage gaps between male and female employees, in the auditing profession (Dong, 2022; Hardies et al., 2020), in no-profit organizations (Finley et al., 2022) and other sectors (Austin et al., 2021; Carter et al., 2017). The first paper was published in 2003 by Abdel-khalik in *European Accounting Review*. The empirical analysis uses both data on executives' compensation and personal attributes, like job experience and risk aversion, to show that investors do recognize human capital even though accounting does not. This study is one of the first to show that relative incentive compensation is a good proxy for human capital. Widener (2006) supports and takes a similar direction in criticizing traditional financial measures for lacking relevance. Firms need to complement traditional financial information with non-financial measures, like firms' reliance on human capital and firm's pay structure.

3.3.3 Health and safety

All papers about *Health and safety* focus on the conditions for a safe working environment and the role that non-financial disclosure can play on workers' safety outcomes. Several authors suggested including workforce health in the Human Capital definition and consider workforce

health and employees' well-being as prerequisites for any organization (Bessieux-Ollier et al., 2023; McCracken et al., 2018). Among the quantitative studies, Laux (2014) considers the industrial disaster occurred in Glasgow, Scotland, which killed nine people and injured more than thirty others, while Christensen et al. (2017) compare US mines owned by SEC-registered issuers mandated to publish safety records in their financial reports, with mines that are not subject to such disclosure requirement. The authors document that including safety records in financial reports decreases mining-related citations and injuries while reducing labor productivity.

3.4 Human Rights & Ethics

> *"The idea of human rights is as simple as it is powerful: that people have a right to be treated with dignity. Human rights are inherent in all human beings, whatever their nationality, place of residence, sex, national or ethnic origin, colour, religion, language or any other status. Every individual is entitled to enjoy human rights without discrimination. These rights are all interrelated, interdependent and indivisible"* (UN Global Compact, 2024, p.1)

Twenty-six papers are included in *Human rights & Ethics* category (12% on total papers), concerning the respect of globally recognized human rights (17 papers) and ethical behaviors (9 papers). Table 4, Panel D shows the details of the papers that fall within these sub-categories.

Table 4 Panel D

3.4.1 Human rights

Under the pure *Human rights* sub-category fall studies that explicitly address global humanitarian issues, often in non-western settings. Majority of papers in this sub-category are qualitative (11) and use mainly case studies (6), theoretical approaches (4) and literature reviews (1). It is worth

noting that there are some studies focusing on non-typical geographical settings like Bangladesh (Islam et al., 2021), Cameroon (Sikka, 2011), Niger (Thomson & Yonekura, 2019), and Tanzania (Lauwo & Otusanya, 2014). Lauwo & Otusanya (2014) draw attention on human rights dilemmas arising from foreign direct investment initiatives of transnational corporations within the mining sector of the Tanzanian context. The study finally considers the possibility of corporate governance reforms informed by accounting to promote the realization of human rights.

3.4.2 Ethics

The papers focusing on *Ethics* mostly consider the ethical ideology broadly defined (Boyce, 2014; Johansson & Liljegren, 2021), ethical ideology of accountants (Caglio & Cameran, 2017), and CEOs (Arivdsson & Sabelfeld, 2023; Everaert et al., 2019). Using Upper Echelons Theory (UET), Everaert et al. (2019) assess CEOs' ethical ideology along the idealism and relativism dimensions and their perceptions on the importance of sustainability and find that CEOs' ethical ideology influences the degree to which they take distance from the shareholder-oriented logic and get closer to the stakeholder-oriented logic. The other three studies investigate different forms of ethical behaviors. O'Sullivan & O'Dyer (2015) provide a longitudinal case study examining why and how commercial banks chose to integrate sustainability issues into their project finance operations between 2003 and 2008. Preuss & Max (2023) analyze the coherency between S&P500 firms' sociopolitical claims and political donations. Findings show that, on average, firms tend to donate to lower-rated politicians (i.e., those with lower environmental and human rights ratings), however, firms making more sociopolitical claims donate relatively more to higher-rated politicians.

3.5 Social capital

> "*Social capital relates to existing and emerging social infrastructures that facilitate individual and collective actions of many kinds*" (Foley & Edwards, 1999, p.154)

"*We consider social capital as a property of an organization, where individual and collective actions provide actual or potential benefits for organizations*" (Chenhall et al., 2010, p. 740)

The papers on *Social Capital* (14 papers, 6%) consider the possible interactions and connections that can arise among the various stakeholder groups affected by the firm. Table 4, Panel E shows the details of the 14 papers that fall within the *Interpersonal connections* (8 papers) and *Community networks* (6 papers) sub-categories.

Table 4 Panel E

3.5.1 Interpersonal connections

The first study on *Interpersonal connections* was published by Chenhall et al., (2010) in *Accounting, Organizations and Society* and defines Social Capital as a comprehensive framework to examine the nature of social connections that predispose individuals towards mutually beneficial collective action. Using a case study of a non-government organization (NGO), the authors study the interplay between management control systems and the development of social connections in and between organizations. Drawing upon the research paradigm known as social network analysis (SNA), Bianchi et al. (2022) study whether interactions between individuals, teams, and organizations result in network structures and patterns that can explain important outcomes like firm performance, management reporting behaviors, investor beliefs, and audit outcomes. A recent empirical study by Chen (2023) examines the effect of social ties between the CEO, CFO and independent board members on related party transactions and shows firms can benefit from a socially connected board's advice because the CEO/CFO-board social ties are positively associated with abnormal RPTs. The results of this study, however, indicate that regulatory frameworks should be revised to account for the influence of social ties to protect minority shareholders' interests and more research should be conducted on these dynamics.

3.5.2 Community networks

Among the six studies on community social capital, five exploit the United States as sample under analysis. One possible reason for this preference is the exploitation of the Northeast Regional Center for Rural Development (NRCRD) at Penn State which serves the 12-state region from Maine to West Virginia and the District of Columbia. It was established by the Rural Development Act of 1972 and is currently maintained by the nation's four Regional Rural Development Centers that work in partnership with the Land-Grant University system to address the crucial needs of rural communities. According to Bhandari & Bhuyan (2023) and based on social norms and structural theories, social capital can be captured by the strength of social norms and the density of social networks in a particular region. Similarly, Chung et al. (2022) examines whether the social capital surrounding the firm's corporate headquarters mitigates managerial self-dealing in the form of opportunistic insider trading and find strong evidence that the level of social capital in the region surrounding the firm's headquarters is negatively and significantly associated with insider trading profitability.

4. Stakeholders across categories of Corporate Social Performance

As Ormazábal (2018) pointed out, a firm is accountable towards its stakeholders who represent the categories of people affected by the firm actions. Drawing upon the core concepts of Stakeholder theory (Freeman et al., 2010), we embrace their principal idea according to which businesses should create value for all their stakeholders, those who can affect or be affected by the realization of an organization's purpose (the wide definition) or those without whose support the organization would not exist (the narrow definition) (Dmytriyev et al., 2021). The composition of stakeholders may differ depending on a company's industry and business model, but the most typical representation of stakeholders includes customers, employees, financiers

(e.g., shareholders, bondholders, and banks), suppliers, and communities. For this reason, we realized that the analysis of the social performance indicators (outlined in section 5) was strictly connected to the stakeholder group affected by that measure and had to be anticipated by the categorization of each paper into the main stakeholder considered by the authors. After a second check of all selected papers, we identified eight groups of key stakeholders, as displayed in Table 5, in order of frequency: *Board of Directors & Top Managers, Community, Employees, Investors, Suppliers, Regulators, Auditors,* and *Customers*.

Table 5

The table shows the total number of papers falling into each of the five identified categories of social performance and the distribution across the eight identified stakeholder groups. We use dark blue to highlight stakeholder groups with more than 30% of the papers, medium blue for percentages between 10% and 30%, and light blue for percentages that are below 10%. We can see that *Board of Directors & Top managers*, *Community*, and *Employees* are the three stakeholder groups that display the highest frequencies across the different categories. *Board of Directors & Top managers* is common to almost all the categories, with a peak in the Diversity & Inclusion (42 papers) and Human Capital (18 papers). *Community* is particularly important for papers addressing Human Rights & Ethics (16 papers), and Social capital (6 papers). Not surprisingly, *Employees* are the most represented stakeholder group of the Human Capital category (30 papers). *Customers* are the least considered stakeholder group, with only 4 papers falling in the Corporate Social Responsibility category.

5. Indicators of Corporate Social Performance across categories and stakeholders

Table 6 shows the frequency of quantitative indicators for each category of corporate social performance and affected stakeholder group. The identification of the indicators was based on the information provided in the Abstracts, or in the Introduction and Methodology sections of the papers when it was not possible to retrieve the information only from the Abstracts. By "quantitative indicators" we mean discrete and measurable elements that can monitored and communicated as objectively and rigorously as possible. In Table 6 we also display how many indicators are "monetary" in nature, meaning that they are assessed via a currency value.

Table 6

Board of Directors & Top managers is the first stakeholder group by frequency of quantitative indicators. We see that most quantitative indicators lie in the Diversity & Inclusion, Human Capital and Social Capital categories. In the Diversity & Inclusion papers one common indicator is the % of women members on the Board of Directors or the presence of a female Chief Executive Officer (CEO) or Chief Finance Officer (CFO). For example, one study by Francis et al. (2012) examines whether banks consider the gender of CFOs when pricing bank loans. This article finds that firms with a female CFO on average enjoy about 11% lower bank loan prices than firms with a male CFO. Results show that banks tend to recognize the role of female CFOs in providing more reliable accounting information ex-ante and reducing default risk ex-post, thus granting firms with female CFOs lower loan prices and more favorable contract terms. Other examples of monetary and non-monetary indicators include the CEOs turnover (Laux, 2014) which falls withing the Human Capital and Non-monetary category of KPIs, the ratio of the CEO's and median employee's pay (LaViers et al., 2022) is instead an example of monetary KPI.

The second stakeholder group that presents a high number of quantitative indicators is *Employees*, especially in the Human Capital category that also display the highest number of

monetary KPIs compared to all other categories and stakeholders. Some examples are the dispersion in employees' wage growth value vs. stocks growth value (Hansson, 2004), below-market wages (Chen et al. 2020) or the number of work-related injuries (Christensen et al. 2017).

The third stakeholder group that presents 26 papers using quantitative indicators is *Community*. The fourth stakeholder group that presents 15 papers using quantitative indicators are *Investors*, in the Corporate Social Responsibility category. A widely used measure of social performance by investors comes from the KLD Social Ratings Database (also known from the MSCI ESG KLD Ratings), adopted by 9 papers. The KLD Social Rating covers approximately 80 indicators in seven areas: (i) community, (ii) corporate governance, (iii) diversity, (iv) employee relations, (v) environment, (vi) human rights, and (vii) product quality and safety (Banker et al., 2020). Each area is associated with different Strengths and Concerns, where a binary measure indicates the presence or absence of a Strength or Concern. The authors highlight several advantages of the KLD rating over other CSR performance measures, including its comprehensiveness (i.e., with large databases that address cross-sections of industries to maximize variances for all variables) and objectivity (i.e., with evaluations performed by external observers to reduce the potential self-serving biases in CSR reporting) (Banker et al., 2020).

6. Corporate Social Performance measurement and reporting framework: "the KPIs matrix"

After conducting the literature review and analyzing the indicators used by the different studies to address corporate social performance, we realized that the indicators used so far in the literature are not categorized according to their nature and purpose. Our proposed framework to measure and report firms' social impact distinguishes between the nature of the KPI, the category of social performance being measured, and the stakeholder group that is affected by the KPIs. The framework is displayed in Figure 2.

Figure 2

It is a multi-dimensional table where social performance is the first dimension divided into four main categories: *Diversity & Inclusion, Human Capital, Social Capital, and Human rights & Ethics*. We believe that the *Corporate Social Responsibility* category that was previously identified in the literature review, should be disaggregated, and re-positioned into one of the four identified categories of social performance. If the aim is to measure credibly and reliably the impact that firms have on specific categories of stakeholders, we need to be precise and decompose the broad concept of CSR into its peculiar aspects, which we believe are *Diversity & Inclusion, Human Capital, Social Capital, and Human rights & Ethics.*

The horizontal dimension identifies the stakeholder group monitored by the company and affected by its behaviors. The firm should distinguish between *internal* stakeholders (such as employees) and *external* stakeholders, like customers or suppliers. Among the external stakeholders there can be also regulators, investors, auditors, and the community at large; firms should be able to identify the "material" stakeholder groups, according to the well-established "materiality" determination process in the sustainability accounting field (cf. Integrated Reporting framework, GRI materiality matrix). Our suggested framework can indeed be considered as an extension of the materiality matrix, in which the firm not only determines the material sustainability topics according to the stakeholder groups affected, but also monitors and measure specific key performance indicators for each stakeholder group and social aspect under assessment.

Inside the corpus of the table, there is the possibility to monitor and distinguish KPIs not only according to their monetary or non-monetary nature, but also with respect to the absolute or relative level of measurement. *Absolute* KPIs should be the ones that are comparable across

countries and industries and that should be monitored and reported by all firms, irrespective of the business sector and country in which they operate. *Relative* KPIs instead depend on firm characteristics like size, industry, and business. These KPIs, if monetary, can be scaled by total assets or total revenues to be easily integrated in the balance sheet or income statement of the firm. If instead are non-monetary indicators, they should be scaled by the total number of people affected and belonging to the stakeholder group being considered. We acknowledge that our proposed framework is a prototype that should be tested and implemented by actual firms over time, to assess its applicability and replicability in the real world.

7. Conclusions

The objective of this review is twofold: To analyze the accounting literature about corporate social performance to unpack the meaning of "social" performance, and to propose a measurement and reporting framework that can be implemented by companies to monitor and report their social impact on people. We analyzed 226 papers published in 25 top-rated accounting journals over the period 2000-2023. We categorized papers into five categories of social performance (*Diversity & Inclusion*, *Human Capital*, *Corporate Social Responsibility*, *Social Capital*, and *Human Rights & Ethics*), that were subsequently unpacked into twelve more specific sub-dimensions. For each paper, we then identified the main stakeholder group being analyzed, resulting in eight stakeholder groups (*Board of Directors & Top Managers*, *Community*, *Employees*, *Auditors*, *Investors*, *Suppliers*, *Regulators*, and *Customers*). Our review makes several contributions to the rapidly evolving landscape of accounting literature. First, we identify and provide definitions of the specific categories building the broad concept of "corporate social performance", second we highlight research gaps and opportunities both in terms of social topics and stakeholders' representation in the literature, and finally we propose a measurement and reporting framework to guide companies in their social performance assessment process.

We noticed that 67 papers (30% of the total) still refer to the generic term "Corporate social responsibility", instead of focusing on more precise aspects of the social dimension. Considering the wide variety of topics (cf. the twelve sub-categories identified in this review) that fall within the general term of "social" performance, we encourage future scholars to move away from the aggregate terminology of "CSR" or "ESG" to address the more specific elements of the social dimension, exploring the trade-offs, contrasts, and commonalities across the different categories. This would allow to have a deeper understanding on firm's impact on different topics and would be more meaningful than an aggregated score.

From the stakeholder's perspective, we noticed that *Board of Directors & Top Managers* are highly investigated, and we think that future literature should focus on other categories. For example, *Customers* is emerged as the least investigated stakeholder group, with only 4 papers in the sample. Although the attention on some categories of stakeholders might be biased and dependent on the scope of the journals considered in the analysis (i.e, accounting journals), we think that more attention should be devoted to all stakeholders, especially customers, who are directly affected by the firm products and services. Customers can be crucial to the firm economic survival and sustainable development over time, by affecting the firm profitability and reputation thanks to changes in purchasing behavior and power. We therefore encourage future accounting research to embrace interdisciplinary perspective, building on marketing and strategy fields of research in terms of resources, theories, and competencies. Another important aspect that emerges from the stakeholders' perspective is the lack of attention on the, so-called, "marginalized stakeholders" or "invisible stakeholders". Marginalized stakeholders are those who predominantly come from vulnerable social identities or belong to lower social classes. They are often subject to racial discrimination, generate very low incomes relative to their locations, or are stigmatized for their sexual orientation, physical disabilities, and mental health problems (Chowdhury, 2022). A major challenge for researchers is the lack of data availability on such

marginalized categories, making them even more invisible from an academic perspective. We hope that future research starts recognizing and giving identity to the "invisible" ones, making them visible at least through case studies and qualitative studies.

From a measurement perspective, we highlighted some of the most used indicators to measure corporate social performance, distinguishing them by topic and by stakeholder focus. We acknowledge that this is not an exhaustive list of indicators, and we encourage future research to analyze in more detail such measures, possibly highlighting the Key Performance Indicators (KPIs) and their specific characteristics, i.e., monetary nature vs. non-monetary, quantitative vs. qualitative, output vs. input measures, positive vs. negative impact metrics, short vs. long term time horizon. Indeed, the recently approved Corporate Sustainability Reporting Directive (CSRD, 2021), includes the development of standardized sustainability reporting standards. Among the twelve topics in which the reporting standards are classified, four topics are devoted to the "social" dimension and the affected stakeholders: S1 "Own workforce", S2 "Workers in the value chain", S3 "Affected communities", and S4 "Consumers and end-users". The indicators for each category are then classified according to their type (narrative, semi-narrative, decimal, integer, etc.). We encourage future research to focus on the different types of indicators and their unique characteristics, for example, the directive does not refer to the measurement phases captured by the indicators: *Input, process, and output.* The need to distinguish between inputs, processes, and outputs is supported by the International Integrated Reporting <IR> Framework, in which organizations are encouraged to articulate their business model by reference to inputs, business activities, and outcomes. Some examples of *input* KPIs for the Human Capital category are the total number of current and new employees or the amount of pension benefits granted to each employee. The *process* KPIs are indicators that allow the transformation of inputs into measurable outputs. Regarding Human Capital, some examples of process KPIs are recruitment costs or training and development spending. These represent the actions taken by the firm that could then

bring to a higher or lower level of employees' satisfaction, labor productivity or mental and physical well-being, i.e. the *output* KPIs.

We can think of our suggested topic/stakeholder table as a very first draft version of a corporate social performance measurement framework, that can be further developed and tested by future research. We approach corporate social responsibility more holistically, helping firms to consider a broader spectrum of social topics and affected stakeholders. Each association between social performance category and stakeholder group can therefore be further explored with specific KPIs. Our analysis is not free from limitations. We focus on 25 accounting journals, but our results can be challenged and tested by considering also other academic disciplines like Management, Finance or Economics, fostering a more interdisciplinary approach. Our suggested framework to measure corporate social performance, ultimately ends up considering measurable indicators. However, we are aware that many KPIs cannot be considered in isolation and might not be informative without proper contextualization and qualitative information. We encourage not only academics, but also practitioners and regulators to consider our suggested framework as a first basis for future developments towards an effective way to monitor and measure corporate social performance in a reliable and objective way.

Tables

Table 1

Panel A - List of journals and number of papers per accounting journal

N.	Journal Name	CABS 2021 Ranking	N. papers analyzed	% on total	Time period of published papers
1	Accounting, Organizations & Society	4*	22	9,7%	2008-2023
2	Review of Accounting Studies	4	22	9,7%	2019-2023
3	European Accounting Review	3	18	8,0%	2000-2023
4	Critical Perspectives on Accounting	3	17	7,5%	2000-2023
5	Journal of Business Finance and Accounting	3	16	7,1%	2004-2023
6	Accounting, Auditing and Accountability Journal	3	15	6,6%	2002-2023
7	Accounting Forum	3	15	6,6%	2007-2023
8	Contemporary Accounting Research	4	14	6,2%	2014-2023
9	The Accounting Review	4*	13	5,8%	2013-2022
10	Accounting Horizons	3	10	4,4%	2023
11	Journal of Accounting, Auditing and Finance	3	9	4,0%	2012-2023
12	Journal of Accounting Research	4*	8	3,5%	2015-2023
13	Journal of International Accounting, Auditing and Taxation	3	8	3,5%	2005-2023
14	Management Accounting Research	3	7	3,1%	2006-2023
15	British Accounting Review	3	6	2,7%	2015-2023
16	Abacus	3	5	2,2%	2008-2022
17	Journal of Accounting & Economics	4*	5	2,2%	2011-2022
18	Foundations and Trends in Accounting	3	4	1,8%	2014-2020
19	Journal of Accounting Literature	3	3	1,3%	2015-2019
20	Accounting and Business Research	3	3	1,3%	2000-2015
21	Journal of Accounting and Public Policy	3	2	0,9%	2022-2023
22	International Journal of Accounting	3	1	0,4%	2018
23	Journal of the American Taxation Association	3	1	0,4%	2023
24	Behavioral Research in Accounting	3	1	0,4%	2023
25	Financial Accountability and Management	3	1	0,4%	2020
	Total		**226**	**100%**	

We searched for scientific papers published in top-ranked academic journals (rated as 4*, 4 or 3 according to the CABS 2021 Ranking) belonging to the accounting discipline. We covered the last 23 years starting from the year 2000 up to October 2023. A total of 25 accounting journals and 226 papers were included in the analysis. Journals are ordered by total number of papers included in the analysis. The journals "Auditing" and "British Tax Review" were ranked 3 but did not retrieve any results, therefore are not tabulated.

Panel B - Evolution of the selected papers over time (2000-2023)

Year	Total number of papers	% on total
2000	4	1,8%
2001	0	0,0%
2002	1	0,4%
2003	1	0,4%
2004	1	0,4%
2005	1	0,4%
2006	1	0,4%
2007	1	0,4%
2008	7	3,1%
2009	1	0,4%
2010	6	2,7%
2011	11	4,9%
2012	4	1,8%
2013	3	1,3%
2014	9	4,0%
2015	5	2,2%
2016	14	6,2%
2017	8	3,5%
2018	18	8,0%
2019	8	3,5%
2020	24	10,6%
2021	24	10,6%
2022	33	14,6%
2023	41	18,1%
Total	**226**	**100,0%**

The table shows the total number of retrieved papers published in each year under analysis, from the year 2000 until the year 2023 included.

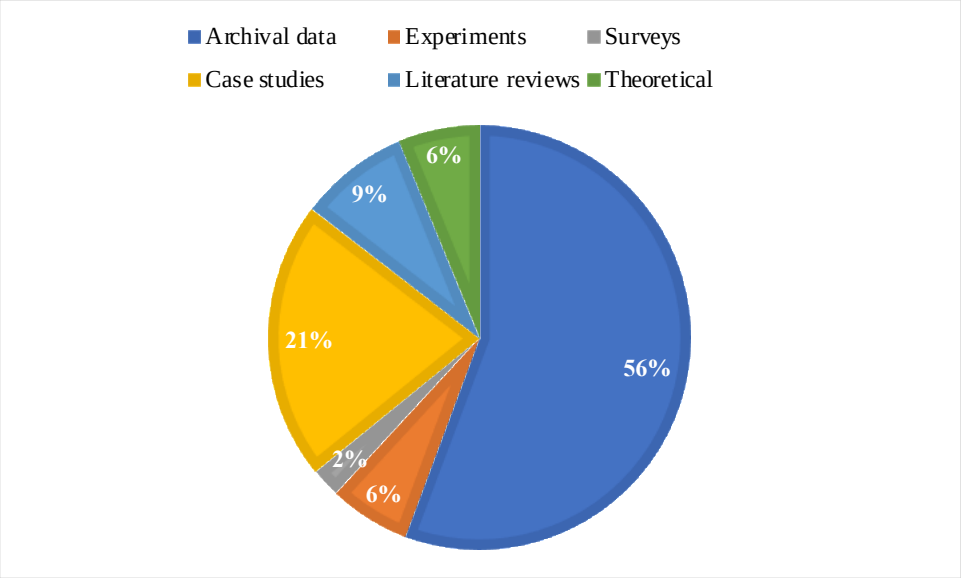
Table 2

Panel A - Methodology overview of selected papers

Quantitative analysis		Qualitative analysis	
Archival data	126	Case studies	48
Experiments	14	Literature reviews	19
Surveys	5	Theoretical	14
Total papers	**145**		**81**
% on the 226 total papers	**64%**		**36%**

Panel A shows the total number of retrieved papers for each type of research method identified. Out of the total 226 papers, 64% adopted quantitative methods while 36% adopted qualitative methods.

Panel B – Frequency distribution of methodologies adopted



Panel B shows the relative frequency distribution of the retrieved papers in terms of specific methodologies adopted. Out of the total 226 papers, 56% (126 papers) adopted archival data.

Panel C – Frequency distribution of methodologies adopted over time

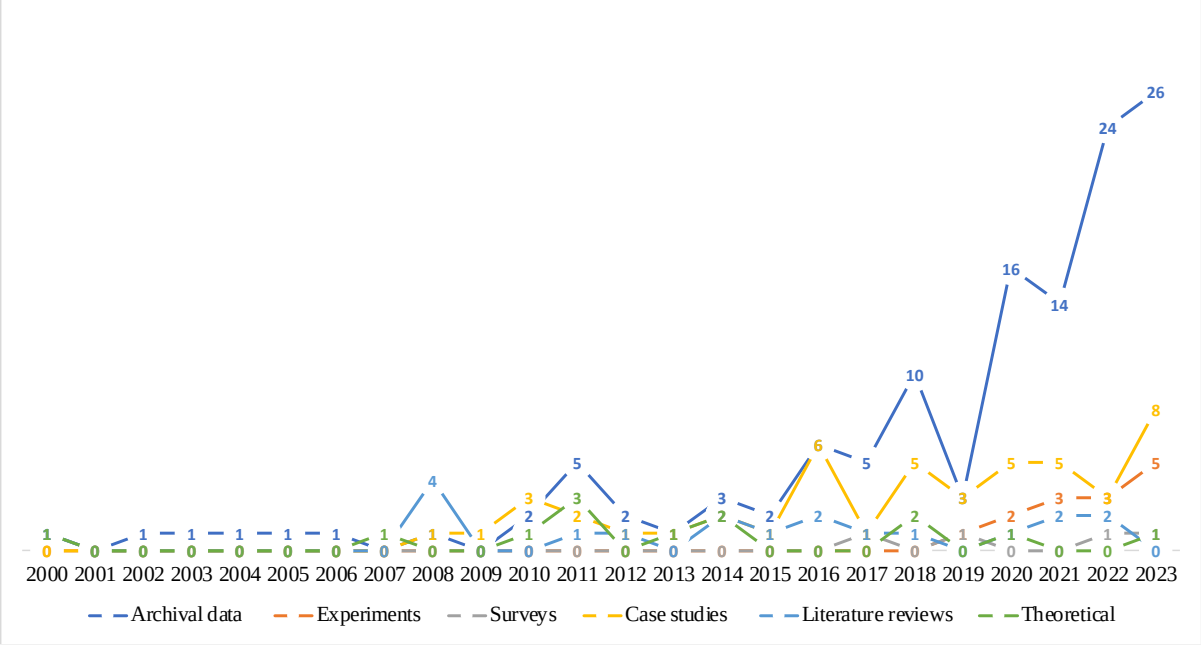


Table 3. Categories of Corporate Social Performance

Panel A – Overview and frequency distribution of the five categories

Categories of Corporate Social Performance	**N. of papers**	**% on total papers**	**Sub-categories**	**N. of papers**	**% on total papers**	**N. of journals**	**Time-period of published papers**
1. DIVERSITY & INCLUSION	70	*31%*	Gender diversity	41	*18%*	14	2002-2023
			Demographic and cultural diversity	17	*8%*	12	2000-2023
			Ethnic and religious diversity	12	*5%*	8	2000-2023
2. CORPORATE SOCIAL RESPONSIBILITY (CSR)	67	*30%*	CSR activities	35	*15%*	17	2000-2023
			CSR disclosure	32	*14%*	11	2000-2023
3. HUMAN CAPITAL	49	*22%*	Individual characteristics	29	*13%*	14	2011-2023
			Wages and benefits	17	*8%*	10	2003-2023
			Health and safety	3	*1%*	2	2011-2023
4. HUMAN RIGHTS & ETHICS	26	*12%*	Human rights	17	*8%*	4	2010-2022
			Ethics	9	*4%*	6	2014-2023
5. SOCIAL CAPITAL	14	*6%*	Social connections	14	*6%*	10	2010-2023
Total papers	**226**	***100%***		**226**	***100%***		

The table shows the total number of retrieved papers in each category and sub-category of corporate social performance, the total number of journals, and the time period in which the papers are published.

Panel B – Frequency distribution of the five categories over time

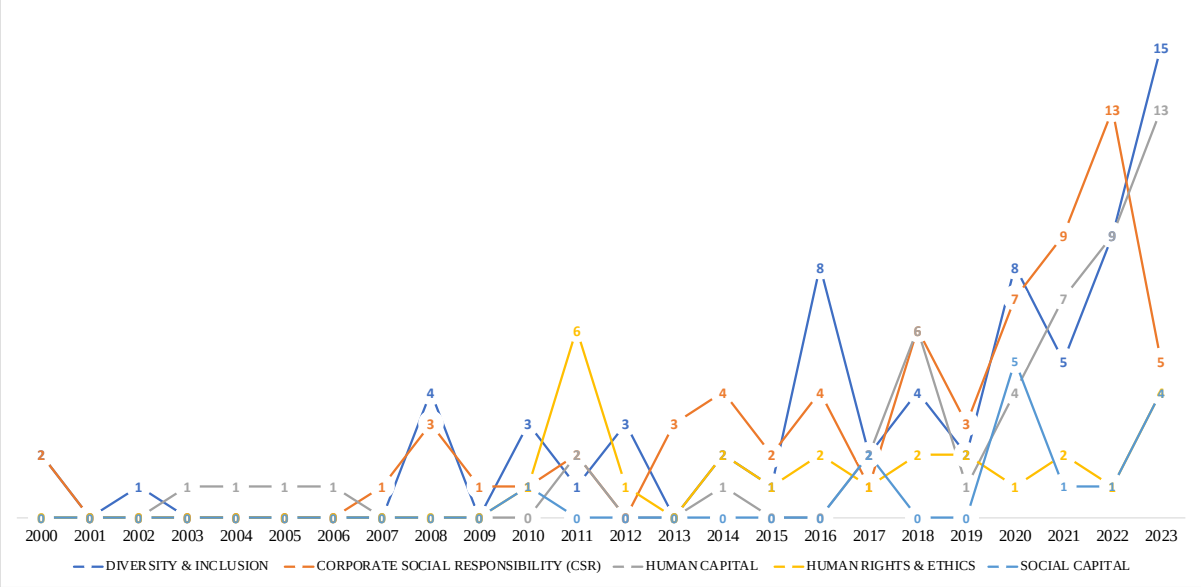


Table 4. Sub-categories of Corporate Social Performance

Panel A - Diversity & Inclusion

Sub-categories of DIVERSITY & INCLUSION category	N. of papers	% on category papers	Analysis	Methods	Geographical regions	Industry sectors	Most prolific journals	Relevant aspects
Gender diversity	41	*59%*	quantitative (26) qualitative (15)	archival data (25), case studies (9), literature reviews (6), experiments (1)	United States (17), International samples (9), European region (11), Canada (2), Africa (1), Australia (1), Iran (1), Japan (1)	Various sectors (32), Audit (7), Banking (1), Mining (1), State owned firms (1)	Accounting, Auditing & Accountability Journal (6) Accounting, Organizations and Society (6)	Female presence on the Board of Directors (19), Top managers (8), and Audit committes (3)
Demographic and cultural diversity	17	*24%*	quantitative (11) qualitative (6)	archival data (10), case studies (3), literature reviews (2), experiments (1), theoretical (1)	International samples (7), European region (3), United States (3), China (2), Korea (1), Malasia (1)	Various sectors (14), Audit (2), Consultancy (1)	Critical Perspectives on Accounting (2) Journal of Business Finance and Accounting (2) Journal of Accounting Literature (2) The Accounting Review (2)	Personality traits (5), Age (4), Cultural and geographical differences (3)
Ethnic and religious diversity	12	*17%*	quantitative (8) qualitative (4)	archival data (6), case studies (4), theoretical (2)	United States (5), International samples (3), Canada (1), UK (1), Saudi Arabia (1), South Africa (1)	Various sectors (6), Audit (5), Banking and retail (1)	Accounting Horizons (3) Journal of Business Finance and Accounting (3)	Ethnic minorities (6), Black, African American, or People of Color (3), Religious aspects (3)
Totals	**70**	**100%**						

The table shows for each sub-category of the broader Diversity & Inclusion category, the total number of retrieved papers, the frequency distribution on the total papers of the Diversity & Inclusion category, the type of analysis and method adopted, the geographical regions being investigated, the industry sector under analysis, the journals with the highest number of published papers, and some relevant aspects in terms of topic covered.

Panel B - Corporate Social Responsibility

Sub-categories of CORPORATE SOCIAL RESPONSIBILITY (CSR) category	N. of papers	% on category papers	Analysis	Methods	Geographical regions	Industry sectors	Most prolific journals	Relevant aspects
CSR activities	35	*52%*	quantitative (27) qualitative (9)	archival data (23), case studies (4), experiments (4), theoretical (3), literature reviews (2)	International samples (16), United States (15), European region (4), India (1)	Various sectors (30), Audit (2), Banking (2), Academia (2)	Review of Accounting Studies (7), The Accounting Review (6), Journal of Business Finance and Accounting (4)	CSR ratings (18), CSR initiatives and investments (17)
CSR disclosure	32	*48%*	quantitative (17) qualitative (15)	archival data (15), case studies (9), literature reviews (5), experiments (2), theoretical (1)	European region (11), International samples (9), United States (5), Other regions (7)	Various sectors (23), Audit (4), Banking (2), Oil and gas (2), Hospitality (1)	Accounting Forum (8), European Accounting Review (7), Accounting, Organizations and Society (6)	Content analysis (12), Level of disclosure (8), CSR reporting norms (6)
Totals	**67**	**100%**						

The table shows for each sub-category of the broader Corporate Social Responsibility category, the total number of retrieved papers, the frequency distribution on the total papers of the Corporate Social Responsibility category, the type of analysis and method adopted, the geographical regions being investigated, the industry sector under analysis, the journals with the highest number of published papers, and some relevant aspects in terms of topic covered.

Panel C - Human Capital

Sub-categories of HUMAN CAPITAL category	N. of papers	% on category papers	Analysis	Methods	Geographical regions	Industry sectors	Most prolific journals	Relevant aspects
Individual characteristics	29	*59%*	quantitative (19), qualitative (10)	archival data (15), case studies (9), experiments (3), literature reviews (2)	International samples (12), European region (7), United States (3), China (2), Korea (2), Others (3)	Various sectors (17), Audit (6), Academia (2), Retail (2)	Management Accounting Research (4), Review of Accounting Studies (4), Journal of International Accounting Auditing and Taxation (3)	Employees' performance and engagement (21), Employees' soft skills (8)
Wages and benefits	17	*35%*	quantitative (16), qualitative (1)	archival data (13), experiments (3), theoretical (1)	International samples (8), United States (5), European region (4)	Various sectors (13), Audit (2), No-profit (2)	Review of Accounting Studies (3)	Compensation contracts structure and evolution (12), Wage gaps based on gender (5)
Health and safety	3	*6%*	quantitative (1), qualitative (2)	case studies (2), archival data (1)	United States (2), UK (1)	Agriculture (1), Plastic materials (1), Mining (1)	Critical Perspectives on Accounting (2), Journal of Accounting and Economics (1)	Conditions for a safe working environment (1), Role of disclosure on safety conditions (2)
Totals	**49**	**100%**						

The table shows for each sub-category of the broader Human Capital category, the total number of retrieved papers, the frequency distribution on the total papers of the Human Capital category, the type of analysis and method adopted, the geographical regions being investigated, the industry sector under analysis, the journals with the highest number of published papers, and some relevant aspects in terms of topic covered.

Panel D – Human Rights & Ethics

Sub-categories of HUMAN RIGHTS & ETHICS category	N. of papers	% on category papers	Analysis	Methods	Geographical regions	Industry sectors	Most prolific journals	Relevant aspects
Human rights	17	*65%*	quantitative (6), qualitative (11)	archival data (6), case studies (6), theretical (4), literature reviews (1)	International samples (8), UK (4), United States (1), Bangladesh (1), Cameroon (1), Niger (1), Tanzania (1)	Various sectors (8), NGO (4), Mining (2), Audit (1), Clothing and retail (1), Oil (1)	Critical Perspectives on Accounting (9), Accounting, Auditing & Accountability Journal (3), Accounting Forum (3)	Human rights frameworks and principles (9), Disclosure and accountability for human rights (8)
Ethics	9	*35%*	quantitative (5), qualitative (4)	case studies (5), archival data (3), theoretical (1)	International samples (4), Sweden (3), United States (1), Belgium (1)	Various sectors (5), Banking (1), Municipalities (1), Retail (1), Telecommunications (1)	Accounting, Auditing & Accountability Journal (2), Accounting, Organizations and Society (2)	Ethical ideology (6), Ethical behaviours (3)
Totals	**26**	**100%**						

The table shows for each sub-category of the broader Human Rights & Ethics category, the total number of retrieved papers, the frequency distribution on the total papers of the Human Rights & Ethics category, the type of analysis and method adopted, the geographical regions being investigated, the industry sector under analysis, the journals with the highest number of published papers, and some relevant aspects in terms of topic covered.

Panel E – Social Capital

Sub-categories of SOCIAL CAPITAL	N. of papers	% on category papers	Analysis	Methods	Geographical regions	Industry sectors	Most prolific journals	Relevant aspects
Interpersonal connections	8	57%	quantitative (5), qualitative (3)	archival data (5), case studies (2), literature reviews (1)	United States (2), China (2), International samples (1), Australia (1), Canada (1), Italy (1)	Various sectors (4), Audit (3), NGOs (1)	Contemporary Accounting Research (3)	Effects of interpersonal connections (6), Drivers of interpersonal connections (2)
Community networks	6	43%	quantitative (4), qualitative (2)	archival data (4), case studies (1), theoretical (1)	United States (5), International samples (1)	Various sectors (6)	Journal of Accounting, Auditing and Finance (2)	Community networks and firm financial choices (3), Community networks and firm strategic non-financial choices (3)
Totals	**14**	**100%**						

The table shows for each sub-category of the broader Social Capital category, the total number of retrieved papers, the frequency distribution on the total papers of the Social Capital category, the type of analysis and method adopted, the geographical regions being investigated, the industry sector under analysis, the journals with the highest number of published papers, and some relevant aspects in terms of topic covered.

Table 5. Affected Stakeholders by Categories of Corporate Social Performance

Categories of Corporate Social Performance	N. of papers	BOARD & TOP MANAGERS	COMMUNITY	EMPLOYEES	INVESTORS	SUPPLIERS	REGULATORS	AUDITORS	CUSTOMERS
1. DIVERSITY & INCLUSION	70 *100%*	**42** ***60%***	5 *7%*	18 *26%*	2 *3%*	0 *0%*	1 *1%*	2 *3%*	0 *0%*
2. CORPORATE SOCIAL RESPONSIBILITY (CSR)	67 *100%*	18 *27%*	16 *24%*	5 *7%*	16 *24%*	2 *3%*	4 *6%*	2 *3%*	4 *6%*
3. HUMAN CAPITAL	49 *100%*	**18** ***37%***	1 *2%*	**30** ***61%***	0 *0%*	0 *0%*	0 *0%*	0 *0%*	0 *0%*
4. HUMAN RIGHTS & ETHICS	26 *100%*	4 *15%*	**16** ***62%***	3 *12%*	0 *0%*	3 *12%*	0 *0%*	0 *0%*	0 *0%*
5. SOCIAL CAPITAL	14 *100%*	3 *21%*	**6** ***43%***	2 *14%*	2 *14%*	1 *7%*	0 *0%*	0 *0%*	0 *0%*

The table shows the total number of papers falling into each of the five identified categories of social performance and the distribution across the eight identified stakeholder groups. We use dark blue to highlight stakeholder groups with more than 30% of the papers, medium blue for frequency percentages between 10% and 30% and light blue for percentages that are below10%.

Table 6. Indicators of Corporate Social Performance

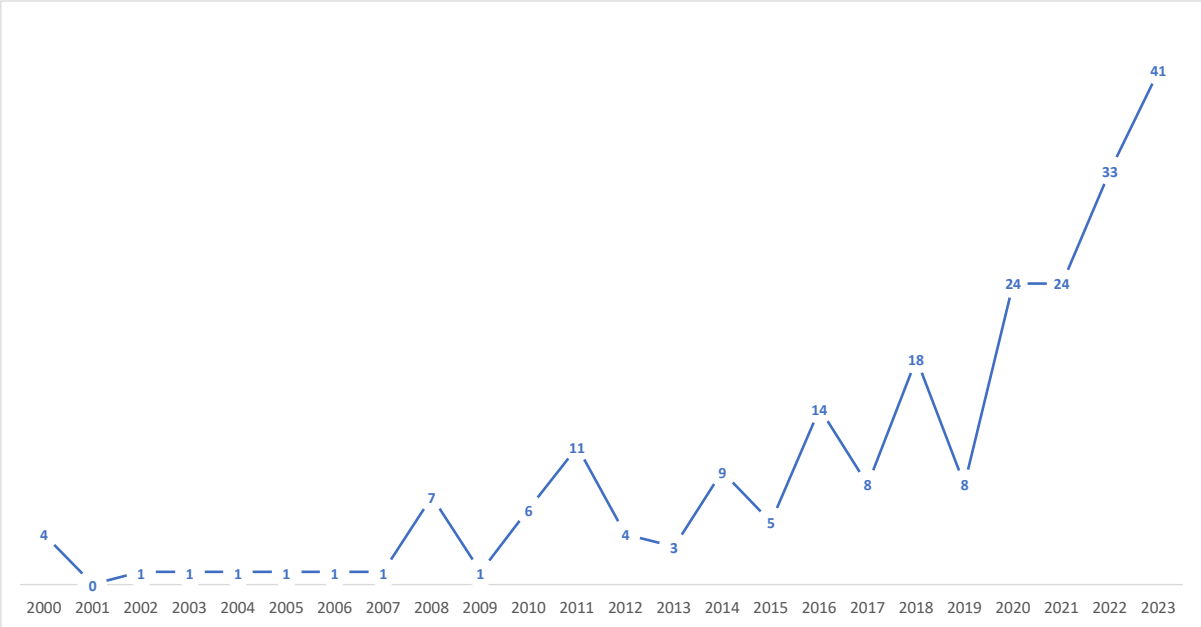
Categories of Corporate Social Performance	Total papers using quantitative KPIs	BOARD & TOP MANAGERS	COMMUNITY	EMPLOYEES	INVESTORS	SUPPLIERS	REGULATORS	AUDITORS	CUSTOMERS
1. DIVERSITY & INCLUSION	**51**	**36**	1	9	2	0	1	2	0
	73% of total 70 papers	***71% of the 51 papers***	*2% of the 51 papers*	*18% of the 51 papers*	*4% of the 51 papers*	*0% of the 51 papers*	*2% of the 51 papers*	*4% of the 51 papers*	*0% of the 51 papers*
	of which monetary KPIs								
	0	0	0	0	0	0	0	0	0
	0% of the 70 papers	*0% of the 51 papers*	*0% of the 51 papers*	*0% of the 51 papers*	*0% of the 51 papers*	*0% of the 51 papers*	*0% of the 51 papers*	*0% of the 51 papers*	*0% of the 51 papers*
2. CORPORATE SOCIAL RESPONSIBILITY (CSR)	**46**	10	6	4	**15**	1	4	2	4
	69% of total 67 papers	*22% of the 46 papers*	*13% of the 46 papers*	*9% of the 46 papers*	***33% of the 46 papers***	*2% of the 46 papers*	*9% of the 46 papers*	*4% of the 46 papers*	*9% of the 46 papers*
	of which monetary KPIs								
	7	4	0	0	2	0	1	0	0
	10% of the 67 papers	*9% of the 46 papers*	*0% of the 46 papers*	*0% of the 46 papers*	*4% of the 46 papers*	*0% of the 46 papers*	*2% of the 46 papers*	*0% of the 46 papers*	*0% of the 46 papers*
3. HUMAN CAPITAL	**44**	**18**	0	**26**	0	0	0	0	0
	90% of total 49 papers	***41% of the 44 papers***	*0% of the 44 papers*	***59% of the 44 papers***	*0% of the 44 papers*	*0% of the 44 papers*	*0% of the 44 papers*	*0% of the 44 papers*	*0% of the 44 papers*
	of which monetary KPIs								
	17	7	0	10	0	0	0	0	0
	35% of the 49 papers	*16% of the 44 papers*	*0% of the 44 papers*	*23% of the 44 papers*	*0% of the 44 papers*	*0% of the 44 papers*	*0% of the 44 papers*	*0% of the 44 papers*	*0% of the 44 papers*
4. HUMAN RIGHTS & ETHICS	**14**	0	**10**	3	0	1	0	0	0
	54% of total 26 papers	*0% of the 14 papers*	***71% of the 14 papers***	*21% of the 14 papers*	*0% of the 14 papers*	*7% of the 14 papers*	*0% of the 14 papers*	*0% of the 14 papers*	*0% of the 14 papers*
	of which monetary KPIs								
	5	0	3	1	0	1	0	0	0
	19% of the 26 papers	*0% of the 14 papers*	*21% of the 14 papers*	*7% of the 14 papers*	*0% of the 14 papers*	*7% of the 14 papers*	*0% of the 14 papers*	*0% of the 14 papers*	*0% of the 14 papers*
5. SOCIAL CAPITAL	**13**	**3**	**6**	1	2	1	1	2	0
	93% of total 14 papers	***23% of the 13 papers***	***46% of the 13 papers***	*8% of the 13 papers*	*15% of the 13 papers*	*8% of the 13 papers*	*2% of the 51 papers*	*4% of the 51 papers*	*0%%*
	of which monetary KPIs								
	0	0	0	0	0	0	0	0	0
	0% of the 14 papers	*0% of the 14 papers*	*0% of the 14 papers*	*0% of the 14 papers*	*0% of the 14 papers*	*0% of the 14 papers*	*0% of the 14 papers*	*0% of the 14 papers*	*0% of the 14 papers*

The selection of the indicators was based on the information provided in the Abstracts, or in the Introduction and Methodology sections of the papers when it was not possible to retrieve the information only from the Abstracts. By “indicators” we mean quantifiable elements that can be measured or monitored as objectively and rigorously as possible. If the paper did not mention any indicator, we display (no indicators) in the below tables, and if there were no papers on that specific topic and stakeholder group we display (no papers) in the tables.

Figures

Figure 1. Evolution of the selected papers over time (2000-2023)

Panel A - Evolution of publications over time, aggregate



Panel B - Evolution of publications over time, by the most 10 prolific journals

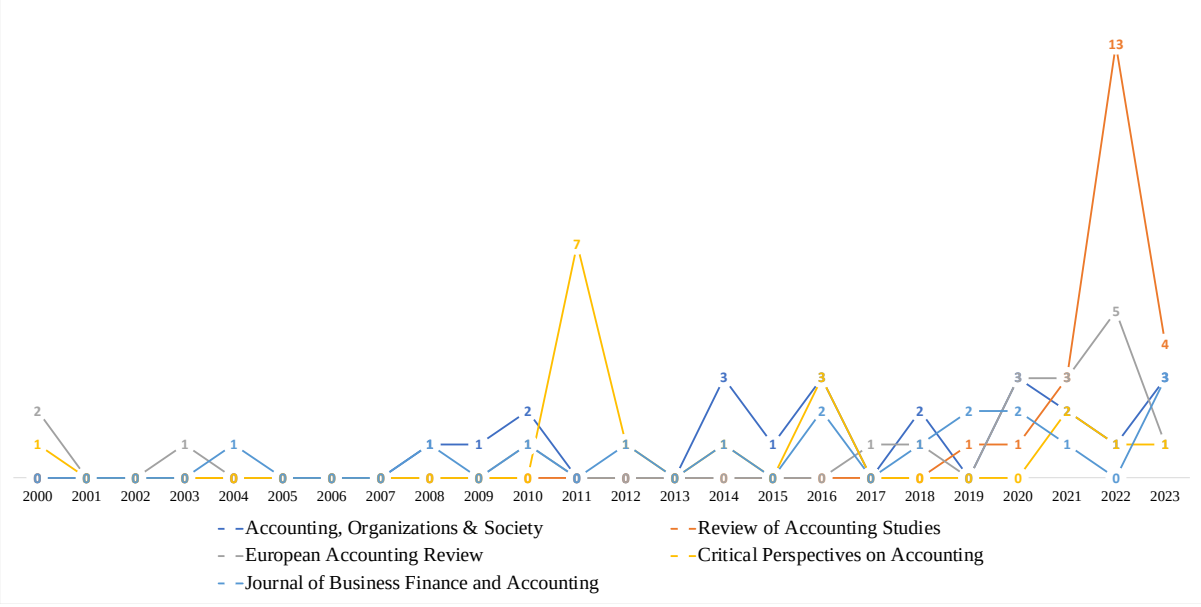


Figure 2. Corporate Social Performance measurement and reporting framework

	INTERNAL STAKEHOLDERS						EXTERNAL STAKEHOLDERS						
	BOARD & TOP MANAGERS			EMPLOYEES			CUSTOMERS			SUPPLIERS			…
DIVERSITY & INCLUSION	KPIs nature:	MONETARY	NON-MONETARY	KPIs nature:	MONETARY	NON-MONETARY	KPIs nature:	MONETARY	NON-MONETARY	KPIs nature:	MONETARY	NON-MONETARY	
	ABSOLUTE			ABSOLUTE			ABSOLUTE			ABSOLUTE			
	/ TOTAL ASSETS			/ TOTAL ASSETS			/ TOTAL ASSETS			/ TOTAL ASSETS			
	/TOTAL REVENUES			/TOTAL REVENUES			/TOTAL REVENUES			/TOTAL REVENUES			
	/TOTAL PEOPLE			/TOTAL PEOPLE			/TOTAL PEOPLE			/TOTAL PEOPLE			
HUMAN CAPITAL	KPIs nature:	MONETARY	NON-MONETARY	KPIs nature:	MONETARY	NON-MONETARY	KPIs nature:	MONETARY	NON-MONETARY	KPIs nature:	MONETARY	NON-MONETARY	
	ABSOLUTE			ABSOLUTE			ABSOLUTE			ABSOLUTE			
	/ TOTAL ASSETS			/ TOTAL ASSETS			/ TOTAL ASSETS			/ TOTAL ASSETS			
	/TOTAL REVENUES			/TOTAL REVENUES			/TOTAL REVENUES			/TOTAL REVENUES			
	/TOTAL PEOPLE			/TOTAL PEOPLE			/TOTAL PEOPLE			/TOTAL PEOPLE			
HUMAN RIGHTS & ETHICS	KPIs nature:	MONETARY	NON-MONETARY	KPIs nature:	MONETARY	NON-MONETARY	KPIs nature:	MONETARY	NON-MONETARY	KPIs nature:	MONETARY	NON-MONETARY	
	ABSOLUTE			ABSOLUTE			ABSOLUTE			ABSOLUTE			
	/ TOTAL ASSETS			/ TOTAL ASSETS			/ TOTAL ASSETS			/ TOTAL ASSETS			
	/TOTAL REVENUES			/TOTAL REVENUES			/TOTAL REVENUES			/TOTAL REVENUES			
	/TOTAL PEOPLE			/TOTAL PEOPLE			/TOTAL PEOPLE			/TOTAL PEOPLE			
SOCIAL CAPITAL	KPIs nature:	MONETARY	NON-MONETARY	KPIs nature:	MONETARY	NON-MONETARY	KPIs nature:	MONETARY	NON-MONETARY	KPIs nature:	MONETARY	NON-MONETARY	
	ABSOLUTE			ABSOLUTE			ABSOLUTE			ABSOLUTE			
	/ TOTAL ASSETS			/ TOTAL ASSETS			/ TOTAL ASSETS			/ TOTAL ASSETS			
	/TOTAL REVENUES			/TOTAL REVENUES			/TOTAL REVENUES			/TOTAL REVENUES			
	/TOTAL PEOPLE			/TOTAL PEOPLE			/TOTAL PEOPLE			/TOTAL PEOPLE			

Social performance is declined into four main categories: Diversity & Inclusion, Human Capital, Social Capital and Human rights & Ethics, while the impact on people is assessed over eight stakeholder groups: Top managers, Community, Employees, Auditors, Investors, Suppliers, Regulators, and Customers, distinguishing between internal and external stakeholders to the firm. Each cell should be ideally filled with measurable key performance indicators.

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Article 3. Board gender quota rules and EU Non-financial reporting Directive: Evidence on female representation in European firms.

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Abstract

Female representation and gender equality in leadership roles is a pressing policy challenge. This paper investigates the role that Board gender quota rules and the EU Directive on mandatory sustainability disclosure in Europe, can have on female representation among different hierarchical levels such as directors on the Board, executives, and managers. A sample of 547 firms belonging to the EUSTOXX 600 index, results in a panel dataset covering the period 2010-2020. Results show that firms complying with the Directive disclosure requirement have a significantly higher female representation in managerial, executive, and director positions, compared with firms that need to comply with only Board quota rules, simply displaying more female directors on the Board but not on lower levels. The study contributes to the growing stream of research about gender diversity among listed firms, by showing that Board gender quota laws combined with mandatory CSR disclosure can improve corporate behavior regarding women's representation not only at the Board level, but also among executives and managerial positions.

Keywords: Board diversity; EU Directive 2014/95/EU; Women presence; Sustainable Development Goal n.5; Gender diversity

1. Introduction

Promoting women's participation and gender equality in leadership roles is a pressing policy challenge for all countries. However, across many G20 and OECD countries, women make up only about one-third of total managers (OECD, 2020). The urgent need for a more equitable gender representation in managerial positions is well highlighted by the UN Sustainable Development Goal (SDG) number 5, which aims at achieving gender equality and empowering all women and girls, not only among governments and public institutions but also among big corporations. "*Providing women and girls with equal access to education, health care, decent work, and representation in political and economic decision-making processes will fuel sustainable economies and benefit societies and humanity at large*" (SDG Tracker, Goal n. 5 on gender equality). To respond to the SDGs' call for action, governments have started to introduce regulations and incentives to increase female representation, especially among large and listed companies.

One example of such regulations is the introduction of mandatory gender quota rules at the Board of Directors (BoD) level for listed firms (Kirsch, 2021), which define a minimum percentage of women members to sit on the Board. As a consequence, gender diversity has recently emerged as a new and relevant research stream in the accounting literature (Afeltra *et al.*, 2022), focusing primarily on female representation on the Board (Bernardi *et al.*, 2002), and on female top-leadership positions as Chief Executive Officers (CEO) or Chief Financial Officers (CFO) (Francis *et al*., 2012)). Only a few studies so far have investigated female presence at lower hierarchical levels, for example during the recruiting process (Fanning *et al*., 2021) or in single-country settings (Ciappei *et al*., 2023).

Another important regulatory requirement addressing the issue of gender inequality among big corporations is the introduction of non-financial disclosure mandates around the world and, in Europe, with the passage of the EU Directive 2014/95/EU (from now on EU Directive) that

mandates the disclosure of sustainability-related information for large, and listed firms (Michelon *et al.*, 2022). The EU Directive explicitly sets the obligation to disclose diversity policies as regards social and employee-related matters, and the information provided must state the actions taken to ensure gender equality (cf. Article 1 (2) EU Directive 2014/95/EU, page L 330/5). Most academic literature focused on the possible consequences of such regulations on firm financial performance (Reguera-Alvarado *et al.*, 2017), on firm sustainability performance proxied by Environmental, Social, and Governance (ESG) scores (Fiechter *et al.*, 2022) and on female representation at the Board level (de Cabo *et al.*, 2019).

As it emerges from the above-cited studies, academic attention so far has been devoted to the presence of women at the top management levels, i.e. CEOs or Board level positions and no study has investigated the potential role that such regulatory requirements can play on female representation at lower hierarchical job levels of the firm, for instance among middle managers. The description of SDG n. 5 is, however, concerned also with female representation among lower-levels positions. As Target 5.5 points out, SDG n. 5 is concerned to ensure women's full participation in leadership positions at all levels. Indeed, indicator 5.5.2 measures the «proportion of women in managerial positions». I believe it is important to look "below the surface", that is below the usually monitored top positions as directors or CEOs and CFOs, to check if firms are just "ticking the box" to comply with regulatory requirements on female representation or if they foster internal female growth in the firm, starting from lower roles among total employees. The aim of this paper is therefore to examine the role of Board gender quota rules and the EU Directive on firm female representation not only among top positions but also among lower-level positions.

The present study uses a sub-sample of firms belonging to the EU STOXX 600 stock index, resulting in a panel dataset covering the period 2010-2020. Exploiting official country regulations among European member states, the study identifies firm-year observations that must comply with a minimum gender quota law at the Board level and firm-year observations under the EU Directive mandate. Female representation is proxied by three indicators retrieved from the

Refinitiv-Datastream database (previously called Asset4): The percentage of women on the Board, the percentage of women in executive positions, and the percentage of women in managerial positions.

In line with Social-Networks theory (Burke *et al.,* 2010) and Institutional theory (Leong and Hazelton, 2019), results show that firms that need to comply with the EU Directive disclosure requirement have a significantly higher female representation in managerial, executive, and directors positions, compared with firms that need to comply with only Board quota rules, displaying only a higher % of female directors on the Board but not on lower job levels in the firm. This paper contributes to the recently growing stream of research about gender diversity in leadership and managerial positions (Afeltra *et al*., 2022) and the regulatory debate about mandatory sustainability reporting in Europe (Michelon *et al.,*2020) in different ways. First, it exploits the unique and heterogeneous European institutional setting to analyze the simultaneous presence of two different types of regulations, as well as their separate implementation, across a sample of firms from different countries and sectors. Secondly, empirical results suggest that Board quota rules, if implemented alone, may lead firms to worry about the stringent compliance to the requirement but do not foster female participation across lower levels in the firm. This might lead to a superficial "thick the box" approach, possibly making firms hire external female directors without encouraging the internal growth of female managers. Finally, the study highlights the positive role played by the EU Directive on Non-financial Reporting concerning female representation among the different job positions considered in the analysis. Mandating firms to disclose about gender diversity practices and actions taken in this respect, make them increase the number of female members not only among top positions but also among total managers and directors.

The remainder of this paper is structured as follows: Section 2 reviews the literature and develops hypotheses, Section 3 describes the empirical models and variables, Section 4 illustrates the sample selection and descriptive statistics, Section 5 presents and discusses the results of the

analysis, and Section 6 concludes the paper. The Appendix provides additional information about Board quota rules in Europe, the EU Directive 2014/95/EU specific country requirements, and variables definitions.

2. Literature review and hypothesis development

2.1 Board gender quota rules in Europe

The Board of Directors is the main corporate governance body that is concerned with how power and control are distributed among various actors in the firm (Kirsch, 2021). As Matsa and Miller (2011) highlight, although women make up 47 percent of the overall labor force, they account for only 6 percent of corporate CEOs and top executives. Women are also far less likely than men to become Chief Executive Officers (CEOs) or to sit on Boards of Directors (BoD). The urgent need to act in this respect is well represented by the Sustainable Development Goal number 5, on "Gender equality". As the United Nations highlight: "Gender equality is not only a fundamental human right, but a necessary foundation for a peaceful, prosperous, and sustainable world. Providing women and girls with equal access to education, health care, decent work, and representation in political and economic decision-making processes will fuel sustainable economies and benefit societies and humanity at large." (SDG Tracker, Goal n. 5). Among the targets and indicators of Goal n. 5, there is indicator 5.5.2 that explicitly urges businesses to monitor and increase the proportion of women in managerial positions.

To respond to the SDGs' call for action, governments have started to introduce minimum gender quota requirements, especially for large and listed companies. Gender quotas define a minimum percentage or number of positions to be filled by, or allocated to, women and men, generally at the Board level (Kirsch, 2021). There can be two types of gender quota rules: "hard" quotas and "soft" quotas. A "hard" quota refers to a binding legal instrument that often leads to serious consequences in case of non-compliance, i.e., de-listing, financial sanctions, or even the dissolution of the company. In contrast, a "soft" quota is not legally binding, meaning that a firm

that lacks a gender-balanced board can continue to operate, and only faces recommendations and warnings, or needs to report on the causes of non-compliance (Walby, 2004). Norway was the first country in Europe to introduce a minimum "hard" gender quota law on the Board of listed companies. The law was passed in December 2003, and required 40% representation of each gender on the Board of public limited liability companies. The law became compulsory in January 2008, and firms that did not comply were to be dissolved (Bertrand *et al.*, 2019). Inspired by the Norwegian example, but adopting a substantially different approach, Spain adopted a soft quota to encourage large firms to appoint at least 40% of both genders on the boards. The Spanish Act only provides recommendations for firms to follow its guidelines, thus adopting a "soft" quota approach (Reguera-Alvarado *et al*., 2017).

de Cabo *et al*. (2019) explore the effectiveness of the Spanish Gender Equality Act and find that less than nine percent of targeted firms fully comply with the quota. In particular, firms that depend on public contracts are significantly more likely to increase female representation, although quota-compliant firms do not actually benefit from the Act's potential incentive. The results highlight the Spanish government's lack of commitment to the quota, and that the quota's normative obligations did not trigger the adoption of gender-balanced boards. The Netherlands is another country that since 2013 introduced a minimum of 30% soft quota rule on both the executive and the supervisory boards of Dutch companies (Luckerath, 2015). From 2007 onwards, other countries started to adopt some kind of hard or soft quota at the Board level.

However, even with strong actions and mandatory gender quotas, corporations are still lagging behind the public sector in terms of equal representation of men and women in managerial positions (MSCI, 2019). Women are underrepresented on the boards of directors of many companies around the world (de Cabo *et al.,* 2019). For this reason, the academic literature is increasingly focusing on gender representation in the corporate world. Solal and Snellman (2019) examine investor responses to board diversity and highlight a previously unexplored mechanism. Drawing on signaling theory, they propose that an increase in board diversity leads investors to

update their beliefs about firm preferences. Specifically, a gender-diverse board is interpreted as revealing a preference for diversity and a weaker commitment to shareholder value. Consequently, firms with more female directors will be penalized. This argument is tested using 14 years of panel data on U.S. public firms. Findings show that firms that increase board diversity suffer a decrease in market value and this effect is amplified for firms that have received higher ratings for their diversity practices. However, despite the large body of literature examining the relationship between women on boards and firm financial performance, the evidence is still mixed (Afeltra *et al*., 2022). Post and Byron (2014), for example, in their meta-analysis of 140 studies, find that female board representation is positively related to accounting returns and that this relationship is more positive in countries with stronger shareholder protection. The relationship is positive in countries with greater gender parity, and negative in countries with low gender parity.

As Ashurst (2021) states, the country's gender parity level is often proxied by the presence of mandatory thresholds of gender quotas. Ahern and Dittmar (2012) exploit this institutional trait in Norway where in 2003, the Board quota law required that at least 40% of Norwegian firms' directors to be women. The authors used the pre-quota cross-sectional variation in female board representation to instrument exogenous changes to corporate boards following the quota. They find that the constraint imposed by the quota caused a significant drop in the stock price at the announcement of the law and a large decline in Tobin's Q over the following years, consistent with the idea that firms choose boards to maximize value. Rebérioux and Roudaut (2016) examine whether women's situation within French boards has improved following the adoption of the board-level gender quota in 2011. The sample includes the listed companies belonging to the SBF120 index over the 2006-2014 period. They show that the quota succeeded in opening the doors of boardrooms to new female directors (not present on the director labor market before the regulation). They show that women experience an inner glass ceiling, with "positional" gender segregation within French boards. Overall, the quota has rather amplified this segregation process, with an increase in the average within-firm gender fees gap.

Matsa and Miller (2011), examine the role of women social connections in corporate America. Using a merged panel of directors and executives for large US corporations between 1997 and 2009, they find a positive association between the female share in the Board and among top executives. The relationship's timing suggests that causality runs from boards to managers and not the reverse. These findings are in line with Social-networks theoretical framework, a branch of the social sciences aimed at investigating social and human interactions (Burke *et al*., 2010). Social life is developed mainly through interpersonal relationships and the patterns formed by these relationships. The pattern of women helping women at the highest levels of firm leadership found by Matsa and Miller (2011) reinforces the social-network interactions that are present among women. Drawing on Social-Networks theory, it is plausible to expect that firms that must comply with Board gender quota rules will have more female directors, who will tend to hire women executives, managers or even employees (Ciappei *et al*., 2023). Following this reasoning the first Hypothesis is stated as follows:

Hypothesis 1. *Female representation is higher for firms subject to hard gender quota laws at the Board level, compared to firms not subject to hard Board gender quota laws.*

The aim of the first hypothesis is to see if the presence of Board gender quota rules, incentivize companies to increase female members also at lower levels in the firm. If this is the case, it would be possible to conclude that Board rules contribute to the internal growth of women (from managers to ultimately Board directors) instead of the external acquisition of female directors only to comply with the mandate.

2.2 The European Non-Financial Reporting Directive (EU Directive 2014/95/EU)

Sustainability reporting assumes particular importance in Europe, where in April 2014, the European Parliament passed the Non-Financial Reporting Directive (Directive 2014/95/EU). The

Directive mandates that large “public interest entities”, i.e. listed firms with more than 500 employees and with either more than EUR 20 million in total assets or more than EUR 40 million in turnover, prepare annual non-financial (sustainability) reports starting with fiscal year 2017 (Fiechter *et al.*, 2022). After the passage of the Directive in each EU Member state, the number of published Corporate Social Responsibility (CSR) reports substantially increased because of this mandatory disclosure regime. In addition, the Directive mandates large companies to disclose their diversity policies in relation to their administrative, management and supervisory bodies (Kirsch, 2021) and the recently approved Corporate Sustainability Reporting Directive (CSRD, 2021), specifies that the diversity policies must include a reference to gender.

Such regulatory requirements suggest that there should be a link between CSR disclosure and actual corporate practices. However, there is a big and unsolved debate in the sustainability accounting literature about the role of sustainability reporting in altering organizational behavior. Many authors are concerned about its opportunistic use as an impression management tool (Cho *et al.*, 2010; Merkl-Davies and Brennan, 2007). Evidence on the 2,000 largest stock market-listed businesses worldwide (Johnsson *et al.*, 2020) shows that CSR disclosure is largely symbolic and intentional in nature, rather than substantive. Some scholars (Melloni *et al.*, 2017) found evidence of impression management strategies in various integrated reports, one possible type of sustainability-related disclosure.

On the other hand, a recently emerging stream of literature has been providing evidence of positive real effects of CSR reporting. Leuz and Wysocki (2016) define “real effects” as "situations in which the disclosing manager or reporting entity changes its behavior in the real economy (e.g., investment, use of resources, consumption)" (p. 545). The preferred settings for these studies include the introduction of some type of disclosure regulatory requirements. For example, Christensen *et al.* (2017) look at disclosure regulation effects on safety issues in the US mining industry. They look at the real effects that mine-safety reporting has on mine-safety violations and number of injuries and find that including safety records in financial reports

decreases mining-related citations and injuries and reduces labor productivity. Baboukardos (2017) provides evidence on the potential benefits of mandatory environmental reporting for listed firms' market valuation. The study exploits the UK regulation that requires all listed firms to report their annual greenhouse gas (GHG) emissions in annual reports and shows that the magnitude of the negative association between GHG emissions and the market value of listed firms decreased after the introduction of the reporting regulation.

The EU Directive on mandatory non-financial reporting has been grasping the attention of many scholars. Fiechter *et al.* (2022) examine an anticipatory real effect of the Directive. They test whether firms within the scope of the directive anticipate the disclosure mandate, by increasing the CSR activities before the first mandatory disclosures. Results document that treated firms on average increase their CSR activities after the 2014 passage of the directive, and that this effect increases with lower pre-directive CSR disclosure levels. On the other hand, Mittelbach-Hörmanseder *et al.*, (2021), by using data of firms listed in the EU STOXX 600 index for the period 2008–2016, show that the shift from voluntary to mandatory reporting, following the announcement of Directive 2014/95/EU hurts share prices.

As it emerges from cited studies, the real effects dimension is still in its infancy and faces many challenges, and the existing literature focusing on mandatory sustainability reporting, with a preference for the US setting, specific industries, and individual companies' case studies (Michelon *et al.*, 2020). No present study has yet focused on the gender diversity aspect promoted by the Directive in Europe, which states that regarding to social and employee-related matters, the sustainability disclosure should contain "the information about the actions taken to ensure gender equality" and "the diversity policies in relation to the administrative, management and supervisory bodies with regard to aspects such as, for instance, age, gender or educational and professional backgrounds, the objectives of that diversity policy, how it has been implemented and the results in the reporting period. If no such policy is applied, the statement shall contain an explanation as to why this is the case". (cf., Article 1 (2) EU Directive, page L 330/5).

The second aim of the paper is to investigate the role of the EU Directive on female representation across the firm. Leong and Hazelton (2019) use Institutional theory to show that sustainability accounts can drive change by providing information that changes the institutional mix of pressures on organizations. More specifically, mandatory CSR disclosure is most likely to drive change when indicators are appropriate for information intermediaries or other intended users and the information is comparable to external benchmarks and/or other corporations. Given that the percentage of women in the firm is an indicator that satisfies the above conditions, there are reasons to believe that the disclosure of gender diversity in the firm can be seen as a first step toward the process of organizational change (Hess, 2018), especially if the disclosure is mandated by regulatory interventions. This rationale is also in line with the "what gets measured gets done" belief that has been recently supported by academic literature on the role of sustainability reporting (Michelon *et al*., 2020). The second hypothesis is formulated as follows:

Hypothesis 2*. Female representation is higher for firms subject to the EU Directive on Non-financial Reporting, compared to firms not subject to the EU Directive.*

2.3 Contemporary presence of the two regulations

The Board gender quota rule is a very specific mandate on firm behavior, requiring firms to have a minimum percentage of women on the Board of Directors. It can be reasonably assumed that firms can comply with this requirement in two main ways: The easiest solution is to hire women directors outside the company, while the second option is to promote to director positions female managers who are already employed by the company, and I expect that this second option would require a greater women presence in managerial roles. As reported by Ciappei *et al*. (2023), women's empowerment grows as their relative numbers increase. Matsa and Miller (2013) discovered that the presence of women directors serves as a proxy for predicting the probability

of women to be appointed as CEOs and executives, and it influences executives' involvement in the decision-making process. Notably, women occupying key leadership positions exhibit a greater propensity for cordiality and collaboration, particularly within a predominantly female-dominated work environment.

On the other hand, the EU Directive is a more comprehensive mandate on firms' transparency and disclosure practices on gender equality, requiring firms to prepare a non-financial statement that, pertaining to gender inequality, it is expected to include comprehensive details regarding the measures and actions implemented to decrease such inequalities in the firm. The required disclosed information should focus on diversity policies applicable to administrative, management, and supervisory bodies, taking into consideration factors such as age, gender, educational background, and professional experience (Article 1 (2) EU Directive, page L 330/5). In instances where no such diversity policy is in place, the statement must include a clear and coherent explanation elucidating the rationale behind this absence. This "comply or explain" reporting approach should ensure a more transparent picture of an organization's commitment to gender equality and diversity, fostering accountability and good behavior, ultimately resulting in equal presence and treatment of men and women in the workplace and among managerial positions.

The third hypothesis wants to test if the simultaneous presence of these two different types of regulations with different scopes (Board gender quota rules and the EU Directive on sustainability disclosure), has a synergic effect on the ultimate objective of balanced gender representation in the firm. The expectation is that firms that need to comply with both rules at the same time, receiving more external regulatory inputs, will give more attention to gender equality and increase female representation among the different job positions (directors, executives, managers), compared to firms that comply with only one of the two requirements or none of them. The third hypothesis tests therefore for the simultaneous presence of the two different types of regulations:

Hypothesis 3*. Female representation is higher for firms subject to both hard gender quota laws at the Board level and the EU Directive on Non-financial Reporting.*

3. Empirical models and variables

To verify the three hypotheses on the relationship between firm female representation and the two legal requirements on gender quota rules and non-financial reporting, the following regression models are tested:

Model 1. $Female\ representation = \beta 0 + \beta 1(Board\ gender\ quota) + \beta jControls\ j + \varepsilon.\ (1)$

Model 2. $Female\ representation = \beta 0 + \beta 1(EU\ Directive) + \beta jControls\ j + \varepsilon.\ (2)$

Model 3. $Female\ representation = \beta 0 + \beta 1(Board\ gender\ quota) + \beta 2(EU\ Directive) + \beta 3(Board\ gender\ quota*EU\ Directive) + \beta jControls\ j + \varepsilon.\ (3)$

Model 1 is associated with Hypothesis 1 (Hp. 1), focusing on the role of gender quota rules at the Board level. The coefficient $\beta 1$ is expected to be positive. Model 2 is linked with the second Hypothesis (Hp.2) testing for the positive relationship between the presence of the EU Directive and female representation, while Model 3 tests hypothesis 3 (Hp. 3), looking at the simultaneous presence of the two legal requirements and expecting a positive and incremental coefficient for the interaction term. All models are estimated using linear regression absorbing multiple levels of fixed effects and robust standard errors clustered at the firm level.

3.1 Dependent variables

Female representation across the different firm levels is proxied using four indicators, retrieved from the Refinitiv-Datastream database (previously called ASSET4). The first indicator

corresponds to the highest hierarchical level, that is the percentage of female members who sit on the Board of Directors *(% Women on the Board*). The second indicator is the percentage of female executive managers (% *Women executives),* while the third indicator is the percentage of female managers among total managers of the firm *(% Women managers)*. A "manager" is a person who is responsible for the activities of a group of employees in an organization or some specific projects. If there is a breakdown by category in percentage such as top, senior, middle, and junior management, then the percentage of middle-woman managers is considered for the "managers" category (source: Refinitiv-Datastream). An "executive manager" or "executive" is part of the "top" or "senior" managers, and therefore corresponds to a higher hierarchical and responsibility level. Finally, Board members or "directors", are executive managers who are nominated to be part of the Board of Directors. Not all executive managers are also members of the Board. From a review of the literature on gender diversity topics in the accounting field (Ranasinghe *et al*., 2022), I noticed that relative measures of female presence were preferred compared to absolute numbers of female members in the firm to ensure comparability to external benchmarks and/or other corporations and this is why I use female presence in percentage terms in the analysis.

3.2 Independent variables

The first main independent variable *Board gender quota* captures the presence of mandatory "hard" Board gender quota laws that require the firm to introduce a minimum percentage of female members on the Board of Directors. It is a dummy variable that depending on the year under analysis, takes the value 1 if the firm is mandated to comply only with the law and 0 otherwise. The information about gender quotas is retrieved from official country laws, regulatory documents, and previous studies (De Cabo *et al.,* 2019; Fauver *et al.,* 2022). Table A2 in the Appendix shows the introduction of hard quota rules across the 17 European countries in the sample. Eight Member States have introduced gender quotas, Norway being the first mover with a mandatory minimum 40% percent quota to be effective in 2008. In the following years, other

European countries followed the Norwegian example: Belgium (2011), Italy (2012), Denmark (2013), France (2014), Germany (2016), Austria (2018), and Portugal (2018). All these eight countries require a minimum percentage that goes from 20% to 40%. In Belgium, France, and Italy, non-compliant firms can be fined, dissolved, or banned from paying directors. In Portugal and Austria, non-compliance may lead to fines or the nullification of the Directors' appointment. The remaining nine countries (Finland, Great Britain, Ireland, Luxembourg, Netherlands, Poland, Spain, Switzerland, and Sweden) did not adopt any type of minimum "hard" Board gender quota so far. The "soft" quota recommendations introduced in Spain and the Netherlands are not considered as "hard" mandatory quota.

The second independent variable is *EU Directive*. It is a dummy variable that distinguishes firms that need to comply with Directive 2014/95/EU from firms that do not. The directive must be implemented by all European member states starting from the fiscal year 2017 (1st January 2017), therefore the dummy variable can take value 1 only for the years 2017-2018-2019-2020. In addition, according to the European guidelines, firms must disclose sustainability-related information only if they satisfy specific size and profitability thresholds: they should have more than 500 employees and either total assets exceeding EUR 20 million or a net turnover exceeding EUR 40 million. However, these threshold criteria can vary from country to country, as each member state has the freedom to apply selection criteria for compliant firms. For example, Luxembourg, Sweden, and Denmark require firms to have only 250 employees to fall under the scope of the Directive, and Great Britain, Poland, and Belgium set more stringent thresholds on total assets. See Table A3 in the Appendix for the detailed threshold criteria for each European country in the sample. The dummy variable *EU Directive* is therefore manually constructed, considering the year under analysis (2017 or following years) and the country-specific thresholds applied to compliant firms.

3.3 Control variables

In line with previous studies (Hahn and Kühnen, 2013; Rosati and Faria, 2019) we include firm-level control variables, for both non-financial performance and financial performance. The *Governance score* is the performance score provided by Refinitiv, rating a company based on the reported governance information on public available sources. The score can take values from zero (minimum performance) to 100 (maximum performance). Similarly, the *Social score*, is the score provided by Refinitiv to rate a company on the four sub-categories scores, related to Community, Human rights, Product responsibility, and Workforce. Firm financial performance is captured by return on assets (*ROA*), return on equity (*ROE*), and financial leverage (*Leverage*). *ROA* is calculated by Refinitiv as net income divided by end of year's total assets, while *ROE* is calculated as net income divided by end of year's common equity. *Leverage* is calculated as total liabilities over total assets of the current year and is used to control for financial stability. Country and industry controls are included in all models. Table A1 in the Appendix provides the full list of variables definitions.

4. Sample and descriptive statistics

Firms are sampled from the Europe STOXX 600 index as of October 2021. With a fixed number of 600 components, the STOXX Europe 600 Index represents large, medium, and small capitalization companies across 17 countries of the European geographical region: Austria, Belgium, Denmark, Finland, France, Germany, Great Britain, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, and Switzerland. The period under analysis goes from 2010 until 2020, spanning five years before and five years after the year 2015. We consider the year 2015 as a "turning point" because it corresponds to the official release of the Sustainable Development Goals Agenda and the EU Directive on Non-financial Reporting (published in October 2014). From the total population of 6600 observations, it was necessary to exclude 1602 observations due to missing ESG (1271 obs.) and accounting (331 obs.) variables.

Table 1, Panel A provides the overview of the sample selection process, resulting in an unbalanced panel dataset of 547 unique firms and a total of 4998 firm-year observations.

Table 1

Table 1, Panel B shows the sample composition by country and the type of regulation adopted. Great Britain (GB) and France (FR) are the two most represented countries, respectively covering 27% and 13% of the total observations. Overall, the sample distribution by country mirrors the country distribution of the STOXX600 index population. We can see that the observations in the sample can be divided into four categories: 771 firm-year observations that comply with only "hard" Board quota rules (15% of the sample), 696 firm-year observations that need to comply with only The EU Directive (14% of the sample), 595 firm-year observations that need to comply with both regulations in the same year (12% of the sample), and 2936 firm-year observations that are not subject to any of the two regulatory interventions considered in the analysis (59% of the sample). Therefore, the total number of observations that comply with at least one of the two regulations considered is 2062 (771+696+595), corresponding to 41% of the sample. Table 1, Panel C shows the sample composition by economic sector. The economic sector categories are taken from The Refinitiv Business Classification Codes (TRBC). The Industrial sector is the most frequent in the sample, covering 17% of the total observations, while the Energy sector is the least frequent covering 3% of the sample.

Table 2, Panel A displays the summary statistics of all variables used in the study. After performing the Normality checks on skewness and kurtosis values, the 1% winsorization technique is applied to *ROA*, *ROE*, and *Leverage*. The average percentage of women on the Board is almost 26%, while the maximum percentage is 75%. The average presence of women in executive positions (13%) is lower than women's presence as managers (23%), which reaches a

maximum value of 100% for one observation in the year 2019 for the British chemical company Victrex. On average, firms in the sample perform well concerning the Governance, Social, and CSR scores, all with average values higher than 58 (58.54, 64.91, and 58.50 respectively). Financial performance variables show an average ROA of 4%, ROE of 15%, and Leverage of 0.50.

Table 2

In Table 2, Panel B we can see mean and median values of all variables of interest, distinguishing between the four different sub-samples according to the type of regulation present: only the Board quota rule, only the EU Directive, both regulations, or none of the two. On average, firms that need to comply with both regulations display the highest percentage of women on the Board (35.92%), while firms that need to comply only with the EU Directive reach the highest presence of women among executives (17.43%) and managers (27.90%). In line with our hypotheses, firms that are not subject to any of the two regulations show the lowest levels of female representation across the three different hierarchical levels (20%, 11% and 20%). Firms that need to comply only with the EU Directive have on average higher Governance scores (65.51), while firms that comply with both regulations reach the highest Social and CSR scores, 75.44 and 66.99 respectively.

Table 2, Panel C shows the correlation coefficients of all variables included in the analysis. The significance level of the correlation coefficients is always lower than 10% but higher than 5%, meaning that the variables are not highly correlated. The % of women managers is positively correlated with the percentage of women executives (0.385*) and women on the Board (0.285*). The Social score is positively correlated with all other variables, while the Governance and CSR scores do not correlate with the presence of Board quota rules. On average, the financial performance variables are negatively correlated with the presence of the regulations and are not

significantly correlated with the percentage of women across the different positions. One exception is ROE that is positively correlated with the presence of women executives in the firm (0.064*).

Figure 1, Panel A compares the average female percentage in Board positions of the first available year (2010) with the last available year in the sample (2020). Countries are divided between member states with mandatory Board quotas and without mandatory quotas. On average, the 2010 female representation on Boards is much lower compared to 2020, except for Norway that shows the highest percentage in 2010 (39.6%), that is almost in line with the 2020 average level. France is the country that reaches the highest average percentage of women in the Boards in 2020 (45.3%), while Luxembourg displays the lowest average percentage in 2020 (21.8%).

Figure 1

By focusing on female representation over time, Figure 1, Panel B shows the average percentage of women managers, executives, and directors over the time period considered, from 2010 to 2020. The average presence of women on the Board of Directors shows a constant increase over time and, after the year 2013, the % of women directors is always higher than the other two hierarchical levels. Female representation among executives and managers follows a similar increasing trend, especially after the year 2014. However, the average female presence among executives is lagging behind the other two categories, ranging from a minimum of 10% in 2010 to a maximum of 18% in 2020.

5. Results

5.1 Main analysis

Tables 3, 4, and 5 display the results of the multivariate regression models. For every model, the VIF values are checked to exclude any multicollinearity issues among the variables; all VIF values are smaller than 10 thus excluding any multicollinearity concerns. All models use absorbed multilevel fixed effects to account for country, and industry fixed effects. All models have robust standard errors clustered at the firm level.

Table 3

Table 3 tests Hypothesis 1 about the relationship between the unique presence of Board hard quota rules and female representation across the different hierarchical levels (Model 1). Results show that the presence of the hard quota at Board level is significantly and positively associated with the percentage of women on the Board (13.552), women executives (2.409), and women managers (1.353). The Governance score coefficient is always positive and significant, meaning that firms with higher governance score have higher female representation not only on the Board, but also among executives and managers. The same is true for the CSR strategy score and the Social score, except for women executives for which the social score is not significant. Female representation does not depend on the Return on Assets (non-significant coefficients), while it seems to be positively related to the Return on Equity, regarding the female presence on the Board (3.661) and among managers (4.416). Female representation across the three different levels is also negatively dependent on Leverage, meaning that firms with higher presence of women across the three different hierarchical levels have on average lower indebtedness. *Hypothesis 1* is therefore accepted: The presence of Board gender quota rules is positively related to female representation across all three different levels.

Table 4 verifies the second hypothesis, expecting a positive relationship between the presence of the EU Directive and female representation across the different job levels (Model 2). Results show that the presence of the EU Directive is significantly positively associated with the

percentage of women directors (8.641), executives (3.118), and managers (4.196). This empirical evidence shows the power that the EU Directive has on female representation among compliant firms, that is stronger compared to the Board quota rules, if we look at the coefficients of women executives and managers.

Table 4

We can say that Hypothesis 2 is strongly accepted, being female representation among directors, executives, and managers significantly higher for firms complying with the EU Directive on Non-financial reporting compared to firms that don't need to comply with it. The third Hypothesis (Model 3) is verified in Table 5. Results show that the presence of the Board quota rule alone, does not imply a higher percentage of women among executive or managerial positions, but only on the Board of Directors (12.107). Instead, firms that need to comply with the EU Directive display a higher female presence not only on the Board (8.317) but also across the two lower hierarchical levels, executives (2.961) and managers (5.703). In addition, the combined presence of both mandatory Board gender quota rules and compliance with the EU Directive shows a significant incremental result on the percentage of women on the Board (+15.33% that is obtained summing the three coefficients of 12.107 + 8.317 – 5.094) and on women managers (+2.55% obtained as 0.385 + 5.703 – 3.538). The interaction coefficient for women executives is not significant. This result leads to a strong acceptance of Hypothesis 3.

Table 5

The provided empirical evidence suggests that complying with both regulatory requirements is fostering higher female representation, not only among top hierarchical levels like Board of directors, but also among middle-level managerial roles. In addition, by comparing the results of Model 1 and Model 2, we see that the effectiveness of the EU Directive is stronger compared to Board quota rules if we look at female presence among executives, and managers. These results confirm the initial concern about Board gender quota rules, which tend to foster a "thick the box" behavior by companies, that only worry about complying with the rule, thus not

focusing the attention on the broader gender equality issue, i.e. the female representation at lower levels of the firm. On the contrary, the EU Directive on Non-financial Reporting is much broader in scope and mandates companies to disclose gender-related information, without giving stringent requirements on how many female members there should be in each different job position. Probably due to this lower level of requirements, the Directive seems to be more effective and the "*what gets measured, gets managed*" belief seems to hold true in practice. By monitoring and disclosing gender-related information, firms tend to also increase female representation among lower hierarchical levels.

5.2 Additional analysis

5.2.1 Robustness tests

The first robustness test is performed to see whether results are weaker or stronger by including also the "soft" Board gender quota rules. Soft board gender quota rules are not legally binding, meaning that a firm that lacks a gender-balanced board can continue to operate, and only faces recommendations and warnings, or needs to report on the causes of non-compliance (Walby, 2004). This is the case for Spain and the Netherlands which in 2007 and 2013 respectively introduced soft quota rules at the board level (Reguera-Alvarado *et al*., 2017; Luckerath, 2015). The sample contains 176 observations complying with the Spanish soft quota rule and 132 observations falling under the Dutch recommendation, for a total of 308 observations with soft quota rules. The new dummy variable *Hard & soft quota* is therefore equal to 1 if the firm needs to comply irrespectively with a hard or a soft quota rule, 0 if it does not have to comply with any type of Board quota recommendation or rule.

The results displayed in Table 6 are consistent with Model 3 (Table 5). However, we notice a significant relationship between the presence of hard & soft quota rule and the percentage of women executives' coefficient. The coefficient is indeed positive and significant (1.247),

compared to the non-significant coefficient found in Model 3. We can conclude that the presence of soft quota rules leads to positive results regarding the women presence on executive positions.

Table 6

The second robustness test is performed to check if results of Model 3 (Table 5) hold true even if we use a balanced panel data sample. The balanced sample contains only observations from firms that have populated variables for all years considered (2010 until 2020), therefore resulting in a slightly smaller sample of 4201 observations, 797 observations less compared to the full sample of 4998 firm-year obs. Table 7 shows that results do not different from the full sample model of Table 5. In addition, the adjusted R-squared are higher for the balanced sample (45%, 26%, and 31%) compared to the full sample models (42%, 23%, and 28%), confirming the reliability of the results.

Table 7

5.2.2 Endogeneity concerns

The independent variable that distinguishes firms' complying with the EU Directive from firms that are not subject to the regulation is not exogenous, because it depends on some size thresholds (number of employees and total assets) and profitability characteristics of the firm (turnover). To attenuate endogeneity concerns, we adopt an instrumental variable (IV) approach on the balanced panel data sample, using the publication of the EU Directive of 22 October 2014 as an exogenous shock. The dummy variable *Post EU Directive* is created, taking value 1 if the year under analysis is greater or equal 2015, for all observations irrespective of the implementation dates and criteria set by the Directive or by the single European country. This is

done to test if the pure publication of the EU Directive already raises some type of gender equality awareness, leading to greater female representation in the firm. As demonstrated by Fiechter *et al. (*2022), the number of published sustainability reports substantially increased already after the passage of the Directive, and firms within the scope of the directive anticipated the disclosure mandate, by increasing their CSR activities before the first mandatory disclosures took place in 2017. Table 8 shows the output of the regression.

Table 8

Results are consistent with Table 5 and in line with the expectation deriving from Fiechter *et al.* (2022) results. Female representation across all the different levels is significantly higher for the years after 2015, corresponding to the post EU Directive period for all firms in the sample. We can therefore conclude that the effectiveness of the EU Directive on non-financial reporting on female representation is present, irrespective of the specific implementation dates and criteria set by each country, thus mitigating any endogeneity problems regarding the applicability of the Directive.

6. Conclusions

Despite the growing importance and interest on female representation in leadership role, women remain outnumbered at the role that Board gender quota rules and mandatory sustainability disclosure in Europe (EU Directive 2014/95/EU), can have on female representation among three different job positions such as directors, executives, and managers. Drawing upon Social-Networks theory (Burke *et al.,* 2010) and Institutional theory (Leong and Hazelton, 2019), the study hypothesizes that female representation is higher for firms that need to comply with Board rules (Hp. 1, Model 1), for firms that need to comply with the EU Directive (Hp. 2, Model

2) and especially for firms that need to comply with both regulations at the same time (Hp. 3, Model 3).

The first hypothesis is partially accepted because firms that comply with Board quota rules, have higher number of females on the Board but not among lower levels. The second and third hypotheses are strongly accepted as the compliance with the EU Directive, as well as the simultaneous presence of the two regulations, is positively associated with greater female directors, executives and managers. In addition, robustness analyses demonstrate that irrespective of firm characteristics and thresholds requirements, the passage of the EU Directive is associated with higher female presence.

Firms that need to comply with only Board quota rules might favor a that a "thick the box" behavior, by increasing the number of female directors to comply with the rule and not worrying about female representation among the total firm. On the contrary, the EU Directive on Non-financial Reporting is broader in scope and mandates companies to publish gender-related information, without giving specific requirements on actions or initiatives to be implemented inside the firm. However, despite this different regulatory nature, the EU Directive seems to be more effective and the "what gets measured, gets managed" belief seems to hold true in practice, highlighting the positive role of non-financial and sustainability disclosure. By monitoring and disclosing gender related information, firms' awareness on gender equality might increase and expand to the different job levels.

This paper adds to the expanding body of research addressing gender diversity within leadership and managerial roles (Afeltra *et al.*, 2022), and it contributes to the ongoing regulatory discourse on mandatory sustainability reporting in Europe (Michelon *et al.*, 2020), by exploiting the distinctive and diverse European institutional landscape to examine the concurrent influence of two distinct regulatory frameworks.

The study is not free from limitations. One concern regards the time frame under analysis. Given that the introduction of both the mandatory gender quota and the EU Directive have been

issued only in recent years, we might be able to see long-term results only by observing firm behavior a few years from now. A second issue is the focus on "hard" quota laws at the country level. The study does not capture voluntary initiatives aimed at improving female representation among firms in countries where hard quotas are absent. A relevant example are the efforts made in UK by Lord Davies, the former trade minister, when in 2011 he launched an independent review into women on boards and set a target of 25% women in the 100 largest companies listed on the London Stock Exchange (FTSE) by 2015. The present empirical analysis does not consider such un-regulated initiatives that, however, could play an important role. One last consideration is about the lack of empirical evidence about the specific roles that women managers play in the firm, in order to control for potential differences between more powerful and less powerful positions. One could argue that Human Resources (HR) or Marketing managers have less power compared to Finance managers. Unfortunately, the Refinitiv database used in this study does not provide such information. This drawback could be overcome by enhancing firm disclosure about women positions in the firm, their roles and responsibilities.

The above limits represent however opportunities for future research and developments on these topics. The content elements of gender diversity disclosure regarding female representation across all levels of the firm, deserve future greater attention to draw solid conclusions and provide additional insights about the role, nature, and quality of sustainability reporting in the social dimension. Future studies should expand further the analysis provided in this study, by possibly enlarging the sample size and the time frame and by considering not only mandatory requirements affecting female representation in the firm but also internal firm practices and external voluntary and spontaneous social movements. Results are relevant not only to academics, but also to practitioners and standard setters in Europe. Indeed, the recently approved Corporate Sustainability Reporting Directive (CSRD, 2021), specifies that the disclosure of diversity policies must include a specific reference to gender, suggesting that diversity issues and female representation is deemed as a crucial indicator to be monitored and measured over time.

Tables

Table 1. Sample composition

Panel A. Sample selection process

Total STOXX Europe 600 companies	600
Number of years under analysis (2010-2020)	11
Total firm-year observations	6600
Firm-year observations with missing values for ESG variables	-1271
Firm-year observations with missing values for accounting variables	-331
Total retained firm-year observations	**4998**

Panel B. Sample composition by country and type of regulation

Country	N. obs. subject only to "hard" Board gender quota rules	N. obs. subject only to Directive 2014/95/EU	N. obs. subject to both regulations	N. obs. not subject to any of the two regulations	Total observations per country	Percentage on total observations
Austria (AT)	0	6	18	31	55	1%
Belgium (BE)	80	0	48	12	140	3%
Denmark (DK)	96	0	45	42	183	4%
Finland (FI)	0	16	0	127	143	3%
France (FR)	263	0	167	221	651	13%
Germany (DE)	84	0	219	250	553	11%
Great Britain (GB)	0	456	0	894	1350	27%
Ireland (IE)	0	16	0	79	95	2%
Italy (IT)	157	0	54	34	245	5%
Luxembourg (LU)	0	8	0	38	46	1%
Netherlands (NL)	0	49	0	173	222	4%
Norway (NO)	91	0	35	0	126	3%
Poland (PL)	0	12	0	35	47	1%
Portugal (PT)	0	3	9	21	33	1%
Spain (ES)	0	50	0	192	242	5%
Sweden (SE)	0	80	0	334	414	8%
Switzerland (CH)	0	0	0	453	453	9%
Total observations	**771**	**696**	**595**	**2936**	**4998**	**100%**
% on total observations	***15%***	***14%***	***12%***	***59%***	***100%***	***100%***

Panel C. Sample composition by economic sector

Economic sector (Refinitiv)	Total observations	Percentage on total observations
Basic Materials	539	11%
Consumer Cyclicals	706	14%
Consumer Non-Cyclicals	468	9%
Energy	172	3%
Financials	821	16%
Healthcare	384	8%
Industrials	835	17%
Real Estate	266	5%
Technology	527	11%
Utilities	280	6%
Total observations	**4998**	**100%**

Table 2. Summary statistics

Panel A. Summary statistics of all variables in the models – full sample

Variables	N	Mean	SD	Min	p25	Median	p75	Max
Board gender quota	4998	0.27	0.45	0.00	0.00	0.00	1.00	1.00
EU directive	4998	0.26	0.44	0.00	0.00	0.00	1.00	1.00
Both regulations	4998	0.12	0.32	0.00	0.00	0.00	0.00	1.00
% women on the Board	4998	25.77	13.52	0.00	16.67	25.00	35.71	75.00
% women executives	4998	13.06	12.34	0.00	0.00	11.76	20.00	75.00
% women managers	4998	23.36	14.84	0.00	14.00	22.22	33.00	100.00
Governance score	4998	58.54	21.97	2.78	42.58	61.48	76.50	98.56
Social score	4998	64.91	21.82	1.16	50.96	69.51	82.58	98.47
CSR strategy score	4998	58.50	29.19	0.00	36.05	66.44	82.14	99.92
ROA (winsorized at 1%)	4998	0.04	0.06	-0.08	0.00	0.03	0.07	0.29
ROE (winsorized at 1%)	4998	0.15	0.18	-0.39	0.07	0.13	0.20	1.13
Leverage (winsorized at 1%)	4998	0.50	0.32	0.00	0.26	0.56	0.73	0.98

Panel B. Summary statistics of all variables in the models – Four possible sub-samples

Sub-samples	***Firms subject to Board quota only***			***Firms subject to Directive only***			***Firms subject to both regulations***			***Firms not subject to any regulation***		
Variables	N	Mean	Median	N	Mean	Median	N	Mean	Median	N	Mean	Median
Board gender quota	771	1.00	1.00	696	0.00	0.00	595	1.00	1.00	2936	0.00	0.00
EU directive	771	0.00	0.00	696	1.00	1.00	595	1.00	1.00	2936	0.00	0.00
Both regulations	771	0.00	0.00	696	0.00	0.00	595	1.00	1.00	2936	0.00	0.00
% women on the Board	771	32.09	33.33	696	30.98	30.00	595	35.92	36.36	2936	20.82	20.00
% women executives	771	12.37	11.11	696	17.43	15.38	595	14.89	14.29	2936	11.83	11.11
% women managers	771	24.45	22.39	696	27.90	27.00	595	27.43	27.00	2936	21.18	20.00
Governance score	771	54.58	56.94	696	65.51	68.53	595	64.65	67.62	2936	56.70	59.27
Social score	771	66.73	70.51	696	68.06	72.03	595	75.44	79.45	2936	61.55	65.65
CSR strategy score	771	53.89	56.98	696	66.74	73.75	595	66.99	73.67	2936	56.04	62.97
ROA (winsorized at 1%)	771	0.05	0.03	696	0.03	0.01	595	0.03	0.01	2936	0.05	0.04
ROE (winsorized at 1%)	771	0.13	0.11	696	0.15	0.13	595	0.12	0.11	2936	0.16	0.14
Leverage (winsorized at 1%)	771	0.55	0.59	696	0.43	0.51	595	0.51	0.61	2936	0.50	0.55

Panel C. Pairwise correlation coefficients

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Board gender quota	1.000											
(2) EU directive	0.248*	1.000										
(3) Both regulations	0.599*	0.623*	1.000									
(4) % women on the Board	0.362*	0.327*	0.276*	1.000								
(5) % women executives	0.020	0.153*	0.055*	0.330*	1.000							
(6) % women managers	0.099*	0.172*	0.101*	0.285*	0.385*	1.000						
(7) Governance score	0.012	0.177*	0.102*	0.227*	0.198*	0.181*	1.000					
(8) Social score	0.158*	0.177*	0.178*	0.278*	0.141*	0.300*	0.379*	1.000				
(9) CSR strategy score	0.023	0.169*	0.107*	0.201*	0.166*	0.245*	0.487*	0.616*	1.000			
(10) ROA (winsorized at 1%)	-0.060*	-0.146*	-0.119*	-0.027	0.013	0.018	-0.119*	-0.081*	-0.094*	1.000		
(11) ROE (winsorized at 1%)	-0.083*	-0.049*	-0.068*	-0.004	0.064*	0.016	-0.074*	-0.075*	-0.091*	0.568*	1.000	
(12) Leverage (winsorized at 1%)	0.063*	-0.054*	0.014	0.031	-0.048*	0.037*	0.170*	0.161*	0.206*	0.044*	0.023	1.000

**** p<0.01, ** p<0.05, * p<0.1*

Table 3. Model 1 - Relationship between Board quotas and female representation (Hp1)

Variable	% women on the Board	% women executives	% women managers
Board quota	13.552***	2.409***	1.353*
	(19.44)	(3.70)	(1.74)
Governance score	0.103***	0.098***	0.056***
	(6.55)	(5.65)	(2.69)
Social score	0.093***	0.028	0.132***
	(4.95)	(1.47)	(5.44)
CSR strategy score	0.023*	0.029*	0.070***
	(1.70)	(1.95)	(3.92)
ROA	-1.098	-3.032	6.528
	(-0.17)	(-0.29)	(0.63)
ROE	3.661**	6.757	4.416*
	(2.09)	(1.64)	(1.81)
Leverage	-2.326**	-2.488*	-2.929*
	(-2.00)	(-1.84)	(-1.95)
Constant	9.349***	3.434***	7.541***
	(6.51)	(2.62)	(4.86)
Country fixed efffects	YES	YES	YES
Industry fixed effects	YES	YES	YES
N. obs.	4998	4998	4998
Adj. R sq.	0.382	0.222	0.264

*** p<0.01, ** p<0.05, * p<0.1

Absorbed multilevel fixed effects model with robust standard errors clustered at firm level. T-stats are displayed in parentheses.

Table 4. Model 2 - Relationship between EU Directive and female representation (Hp2)

Variable	% women on the Board	% women executives	% women managers
EU Directive	8.641***	3.118***	4.196***
	(17.06)	(5.51)	(7.03)
Governance score	0.090***	0.093***	0.049**
	(5.61)	(5.31)	(2.32)
Social score	0.096***	0.025	0.123***
	(5.13)	(1.28)	(5.11)
CSR strategy score	0.013	0.026*	0.067***
	(0.98)	(1.75)	(3.73)
ROA	8.078	-0.016	10.364
	(1.28)	(0.00)	(1.00)
ROE	3.218*	6.560	4.122*
	(1.72)	(1.57)	(1.66)
Leverage	-1.140	-1.999	-2.224
	(-0.94)	(-1.47)	(-1.47)
Constant	10.972***	3.659***	7.569***
	(7.4)	(2.77)	(4.89)
Country fixed efffects	YES	YES	YES
Industry fixed effects	YES	YES	YES
N. obs.	4998	4998	4998
Adj. R sq.	0.376	0.231	0.277

*** p<0.01, ** p<0.05, * p<0.1

Absorbed multilevel fixed effects model with robust standard errors clustered at firm level. T-stats are displayed in parentheses.

Table 5. Model 3 - Relationship between both regulations and female representation (Hp3)

Variable	% women on the Board	% women executives	% women managers
Board quota	12.107***	1.038	0.385
	(-14.70)	(1.43)	(0.41)
EU Directive	8.317***	2.961***	5.703***
	(13.33)	(3.76)	(6.99)
Board quota*EU Directive	-5.094***	-0.149	-3.538***
	(-4.89)	(-0.13)	(-2.87)
Governance score	0.093***	0.093***	0.049**
	(5.89)	(5.32)	(2.33)
Social score	0.079***	0.023	0.122***
	(4.26)	(1.20)	(5.04)
CSR strategy score	0.019	0.027*	0.068***
	(1.49)	(1.78)	(3.81)
ROA	4.286	-0.337	10.199
	(0.68)	(-0.03)	(0.99)
ROE	3.503*	6.570	4.31*
	(1.93)	(1.57)	(1.73)
Leverage	-1.273	-2.012	-2.209
	(-1.08)	(-1.48)	(-1.47)
Constant	9.177***	3.513***	7.419***
	(6.50)	(2.68)	(4.85)
Country fixed efffects	YES	YES	YES
Industry fixed effects	YES	YES	YES
N. obs.	4998	4998	4998
Adj. R sq.	0.421	0.231	0.279

*** p<0.01, ** p<0.05, * p<0.1

Absorbed multilevel fixed effects model with robust standard errors clustered at firm level. T-stats are displayed in parentheses.

Table 6. Relationship between all rules (hard & soft quotas, and EU directive) and female representation

Variable	% women on the Board	% women executives	% women managers
Hard & soft quota	11.726***	1.247*	0.093
	(15.26)	(1.81)	(0.11)
EU directive	9.011***	2.783***	5.962***
	(13.70)	(3.28)	(6.73)
Hard & soft quota*EU directive	-5.645***	0.099	-3.345***
	(-5.57)	(0.09)	(-2.76)
Governance score	0.092***	0.093***	0.048**
	(5.88)	(5.32)	(2.31)
Social score	0.077***	0.023	0.123***
	(4.23)	(1.17)	(5.03)
CSR strategy score	0.021	0.027*	0.068***
	(1.60)	(1.77)	(3.82)
ROA	4.166	-0.413	10.246
	(0.66)	(-0.04)	(1.00)
ROE	3.575*	6.556	4.326*
	(1.96)	(1.57)	(1.74)
Leverage	-1.278	-2.005	-2.265
	(-1.09)	(-1.47)	(-1.51)
Constant	8.325***	3.389***	7.494***
	(5.94)	(2.59)	(4.91)
Country fixed efffects	YES	YES	YES
Industry fixed effects	YES	YES	YES
N. obs.	4998	4998	4998
Adj. R sq.	0.424	0.231	0.279

*** p<0.01, ** p<0.05, * p<0.1

Absorbed multilevel fixed effects model with robust standard errors clustered at firm level. T-stats are displayed in parentheses.

Table 7. Robustness test on Model 3 - Relationship between both regulations and female representation (Hp3) with balanced panel data sample

Variable	% women on the Board	% women executives	% women managers
Board quota	12.015***	1.634**	0.539
	(15.02)	(2.38)	(0.65)
EU Directive	9.196***	2.408***	6.074***
	(15.21)	(2.98)	(7.01)
Board quota*EU Directive	-5.383***	0.441	-4.644***
	(-5.02)	-0.39	(-3.72)
Governance score	0.109***	0.101***	0.037
	(6.53)	(5.25)	(1.56)
Social score	0.085***	0.029	0.131***
	(4.25)	(1.37)	(4.80)
CSR strategy score	0.009	0.033*	0.085***
	(0.59)	(1.94)	(4.41)
ROA	8.335	2.826	9.505
	(1.22)	(0.24)	(0.80)
ROE	3.910**	7.591	6.034**
	(2.00)	(1.57)	(2.19)
Leverage	-1.426	-3.814**	-2.618
	(-1.04)	(-2.46)	(-1.54)
Constant	7.844***	2.773*	6.212***
	(4.68)	(1.81)	(3.37)
Country fixed efffects	YES	YES	YES
Industry fixed effects	YES	YES	YES
N. obs.	4201	4201	4201
Adj. R sq.	0.448	0.261	0.311

*** p<0.01, ** p<0.05, * p<0.1

Absorbed multilevel fixed effects model with robust standard errors clustered at firm level. T-stats are displayed in parentheses.

Table 8. Robustness test on Model 3 - Relationship between both regulations and female representation (Hp3) with balanced panel data sample and exogenous EU Directive

Variable	% women on the Board	% women executives	% women managers
Board quota	8.258***	0.528	0.333
	(8.92)	(0.77)	(0.43)
Post EU Directive	9.949***	2.315***	3.808***
	(21.55)	(3.79)	(5.86)
Board quota*Post EU Directive	-2.101**	0.942	-2.367**
	(-2.00)	-1.11	(-2.32)
Governance score	0.103***	0.101***	0.037
	(6.38)	(5.27)	(1.57)
Social score	0.058***	0.022	0.128***
	(2.93)	(1.00)	(4.55)
CSR strategy score	0.011	0.035**	0.086***
	(0.75)	(2.08)	(4.46)
ROA	2.524	0.877	6.738
	(0.39)	(0.07)	(0.56)
ROE	4.389**	7.717	5.950**
	(2.54)	(1.62)	(2.19)
Leverage	-1.231	-3.823**	-2.736
	(-0.94)	(-2.46)	(-1.59)
Constant	7.570***	2.667*	5.957***
	(4.58)	(1.74)	(3.22)
Country fixed efffects	YES	YES	YES
Industry fixed effects	YES	YES	YES
N. obs.	4201	4201	4201
Adj. R sq.	0.497	0.262	0.306

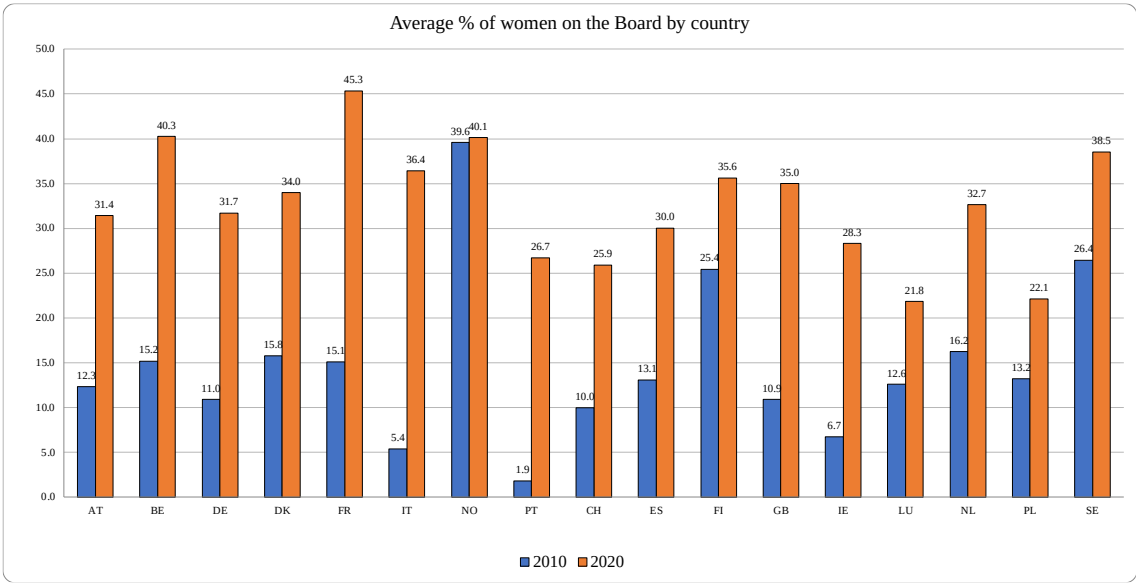
*** p<0.01, ** p<0.05, * p<0.1

Absorbed multilevel fixed effects model with robust standard errors clustered at firm level. T-stats are displayed in parentheses.

Figures

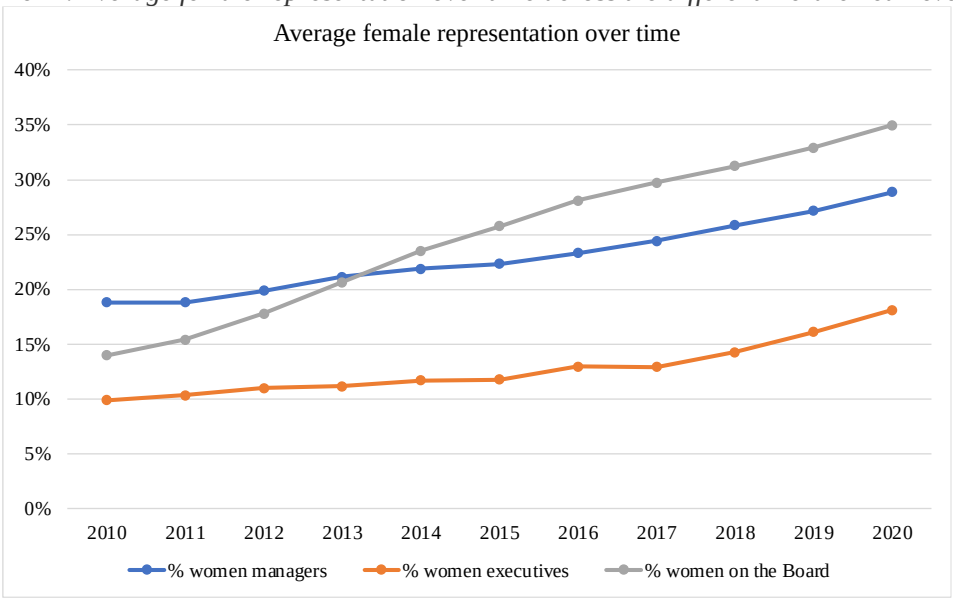
Figure 1

Panel A. Average percentages of women on Board of Directors at country level (2010 vs.2020)



(The 2010 average values for Portugal and Luxemburg are missing because without any observations in the sample)

Panel B. Average female representation over time across the different hierarchical levels



Appendix

Table A1. Variables definitions

Dependent variables		
% Women on the Board	Percentage of female directors among total directors on the Board.	Source: Refinitiv-Datastream
% Women executives	Percentage of female executive managers among total executive managers in the firm.	Source: Refinitiv-Datastream
% Women managers	Percentage of women managers among total managers of the company. If there is a breakdown by category in percentage such as top, senior, middle, junior management, then the percentage of middle woman managers is considered.	Source: Refinitiv-Datastream
% Women employees	Percentage of women employees among total number of employees in the firm.	Source: Refinitiv-Datastream
Independent variables		
Board gender quota	Dummy variable equal to 1 if the firm is mandated to comply only with the "hard" quota law, 0 otherwise.	Source: Codification from official country sources and previous studies
EU Directive	Dummy variable equal to 1 if the firm is mandated to comply only with Directive 2014/95/EU, 0 otherwise.	Source: Codification from official country sources and previous studies
Control variables		
Governance score	Governance Pillar Score is the weighted average relative rating of a company based on the reported governance information and the resulting three governance category scores related to CSR strategy, Management and Shareholders.	Source: Refinitiv-Datastream
Social score	Social Pillar Score is the weighted average relative rating of a company based on the reported social information and the resulting four social category scores, related to Community, Human rights, Product responsibility and Workforce.	Source: Refinitiv-Datastream
CSR strategy score		
ROA	Return on assets calculated as net income over end-of-year total assets and winsorized at 1% level.	Source: Refinitiv-Datastream
ROE	Return on equity calculated as net income over end-of-year common equity and winsorized at 1% level	Source: Refinitiv-Datastream
Leverage	Ratio of total liabilities to total assets, winsorized at 1% level.	Source: Refinitiv-Datastream
Economic sector	Economic sector name associated with economic sector code, according to The Refinitiv Business Classification (TRBC).	Source: Refinitiv-Datastream
Country	Company ISO country code.	Source: Refinitiv-Datastream

Table A2. Board hard gender quota rules in Europe (as of 2020)

Country	Board "hard" gender quota	Minimum quota required (%)	Effective year	Compliant firms	National law
Austria	yes	30	2018	Listed firms and companies with more than 1,000 employees	Act on Equality between Women and Men in Supervisory Boards (GFMA act): https://www.bundeskanzleramt.gv.at/en/agenda/women-and-equality/gender_equality_in_the_labour_market/women-in-leadership-positions.html#:~:text=The%20law%20was%20adopted%20in,with%20more%20than%201%2C000%20employees
Belgium	yes	33	2011	All listed and state-owned companies	National Law of 28 July 2011: https://blogs.eui.eu/genderquotas/wp-content/uploads/sites/24/2015/04/Executive-summary-Belgium-Meier2.pdf
Germany	yes	30	2016	All listed companies	March 6, 2015 Bundestag Law: https://www.loc.gov/item/global-legal-monitor/2021-09-12/germany-second-law-establishing-gender-quotas-to-increase-number-of-women-in-company-leadership-positions-enters-into-force/
Denmark	yes	40	2013	All listed companies with more than 50 employees	Danish Companies Act, the Danish Financial Statements Act and the Danish Act on Gender Equality: https://xbma.org/danish-update-new-rules-on-gender-quotas-in-boards-of-directors/
France	yes	20	2014	All listed companies with more than 500 employees	Law on 13 January 2011: https://www.eurofound.europa.eu/publications/article/2011/french-law-to-increase-number-of-women-directors
Italy	yes	30	2012	All listed companies	Golfo Mosca Law: https://link.springer.com/chapter/10.1007/978-3-319-56142-4_6
Norway	yes	40	2008	All listed companies	The law was ratified by the Parliament in 2003 and implemented in 2006 with a two-year grace period: https://link.springer.com/chapter/10.1007/978-3-319-56142-4_2
Portugal	yes	33	2018	All listed companies	2017 law: https://www.mdpi.com/2076-0760/11/10/449#:~:text=In%202017%2C%20Portugal%20became%20one%20of%20the%20latest,the%20under-represented%20sex%2C%20in%202018%20and%202020%2C%20respectively%29.
Finland	no				
Great Britain	no				
Ireland	no				
Luxembourg	no				
Netherlands	no				
Poland	no				
Spain	no				
Switzerland	no				
Sweden	no				

Table A3. EU Directive 2014/95/EU: Country specific requirements

Adapted from: https://www.accountancyeurope.eu/wp-content/uploads/1711-NFRpublication-GRI-CSR-Europe.pdf

Country	Thresholds for compliant firms	National law
Austria	Public Interest Entities with: -Employees over 500; -Net turnover over EUR 40 million or Balance sheet total over EUR 20 million.	Sustainability and Diversity Improvement Act 257/ME: https://www.parlament.gv.at/PAKT/VHG/XXV/ME/ME_00257/fname_568007.pdf
Belgium	Public Interest Entities with: -Employees over 500; -Net turnover over EUR 34 million or Balance sheet total over EUR 17 million.	Amendment to Companies Code 2564/ (2016/2017): https://www.lachambre.be/FLWB/PDF/54/2564/54K2564004.pdf
Denmark	Listed companies and State-limited liability companies with: -Employees over 250; -Net turnover over DKR 156 million or Balance sheet total over DKR 156 million.	Act amending the Danish Financial Statements Act L 117: https://www.ft.dk/RIpdf/samling/20141/lovforslag/L117/20141_L117_som_fremsat.pdf
Finland	Public Interest Entities with: -Employees over 500; -Net turnover over EUR 40 million or Balance sheet total over EUR 20 million.	Amendment 1376/2016 and Amendment 1441/2016 to the Accounting Act: https://www.eduskunta.fi/FI/vaski/eduskunnanvastaus/Documents/EV_256+2016.pdf
France	Public Interest Entities with: -Employees over 500; -Net turnover over EUR 40 million or Balance sheet total over EUR 20 million.	Amendments to the Law on Accounting PZE No. 51: https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000042339777/
Germany	Public Interest Entities with: -Employees over 500; -Net turnover over EUR 40 million or Balance sheet total over EUR 20 million.	CSR Directive Implementation Act: https://www.bgbl.de/xaver/bgbl/start.xav?startbk=Bundesanzeiger_BGBl&start=//*%5b@attr_id='bgbl117s0802.pdf'%5d
Great Britain	Public Interest Entities with: -Employees over 500.	The Companies, Partnerships and Groups (Accounts and Non-financial Reporting) Regulation No. 1245: https://www.legislation.gov.uk/uksi/2016/1245/pdfs/uksi_20161245_en.pdf
Ireland	Public Interest Entities with: -Employees over 500; -Net turnover over EUR 40 million or Balance sheet total over EUR 20 million.	European Union Regulations 2017: https://enterprise.gov.ie/en/Legislation/Legislation-Files/SI-No-360-of-2017.pdf
Italy	Public Interest Entities with: -Employees over 500; -Net turnover over EUR 40 million or Balance sheet total over EUR 20 million.	Legislative Decree 30 December 2016, n. 254: http://www.gazzettaufficiale.it/atto/serie_generale/caricaDettaglioAtto/originario?atto.dataPubblicazioneGazzetta=2017-01-10&atto.codiceRedazionale=17G00002&elenco30giorni=true
Luxembourg	Public Interest Entities with: -Employees over 250; -Net turnover over EUR 40 million or Balance sheet total over EUR 20 million.	Law of 23 July 2016 on the Publication of Non-financial Information and Information on Diversity A156: https://legilux.public.lu/eli/etat/leg/loi/2016/07/23/n19/jo
Netherlands	Public Interest Entities with: -Employees over 500; -Net turnover over EUR 40 million or Balance sheet total over EUR 20 million.	Decree Disclosure of Non-financial Information PbEU, 2014, L330 and Decree Disclosure Diversity Policy PbEU, 2014, L330: https://www.rijksoverheid.nl/binaries/rijksoverheid/documenten/besluiten/2017/03/23/staatsblad-100-2017-besluit-bekendmaking-niet-financiele-informatie/stb2017-100.pdf

Norway	Public Interest Entities with: -Employees over 500; -Net turnover over EUR 40 million or Balance sheet total over EUR 20 million.	Amendment to the Accounting Act Company Scope: https://www.sands.no/media/258396/eu-reform-of-corporate-social-responsibility.pdf
Poland	Public Interest Entities with: -Employees over 500; -Net turnover over PLN 170 million or Balance sheet total over PLN 85 million.	Act of 15 December 2016, Amending the Accounting Act 61: https://www.gov.pl/web/finanse
Portugal	Public Interest Entities and Public undertakings with: -Employees over 500; -Net turnover over EUR 50 million or Balance sheet total over EUR 300 million.	Law No. 148/2015: https://dre.pt/dre/LinkAntigo?search=107773645
Spain	Public Interest Entities and Public undertakings with: -Employees over 500; -Net turnover over EUR 40 million or Balance sheet total over EUR 20 million.	Anteprojecto de Ley sobre información no financiera y diversidad: https://www.icac.gob.es/documentos/contabilidad/APL%20Informaci%c3%b3n%20no%20financiera.pdf
Sweden	All types of companies with: -Employees over 250; -Net turnover over SEK 350 million or Balance sheet total over SEK 175 million.	Corporate Reporting on Sustainability and Diversity Policy CU2: https://data.riksdagen.se/fil/E967F0FC-7DE9-46A1-BCC8-41B7F9CF984D
Switzerland	Not implemented.	

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