

Do firms practise what they preach? Corporate performance- communication decoupling on environmental SDGs and the impact of sustainability-oriented governance mechanisms

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Abstract

Purpose – The study aims to investigate the decoupling between corporate performance and communication in relation to environmental sustainable development goals (SDGs) and the role of sustainability-oriented corporate governance (CG) in promoting their alignment and enhancing corporate contribution.

Design/methodology/approach – The authors focus on an international sample of listed companies over the period 2015–2022. The authors map firms' SDG performance-communication behaviours and conduct logistic regressions to examine what CG mechanisms are associated with an alignment between performance and communication.

Findings – The results highlight a widespread decoupling between SDG performance and communication. Many companies have SDG-relevant performance data but lack SDG communication or show a discrepancy between measurable and claimed SDGs. The presence of stakeholder engagement practices, a sustainability committee and sustainability assurance are significantly associated with performance-communication alignment and better contribution to the SDGs.

Practical implications – The study provides support for policy and regulatory interventions to address decoupling by mapping companies' SDG performance and communication behaviours at the international level and analysing which CG mechanisms express a higher likelihood of alignment between performance and communication, thereby enhancing corporate contribution to the SDGs.

Social implications – Progress towards SDGs requires companies to engage in meaningful social-impact actions and transparent disclosure. The study highlights the widespread decoupling between SDG performance



and communication behaviours and suggests CG mechanisms that can enhance corporate commitment to achieving the SDGs.

Originality/value – The authors introduce an *ad hoc* measure to detect decoupling between performance and communication for SDGs, based on the United Nations (UN) Conference on Trade and Development guidelines. This is also the first study to examine the role of sustainability-oriented CG mechanisms in aligning performance and communication in the specific context of the UN SDGs.

Keywords Sustainable development goals, SDG performance, SDG disclosure, Decoupling, Corporate governance

Paper type Research paper

1. Introduction

In 2015, the United Nations (UN) established 17 sustainable development goals (SDGs) and 169 targets to be achieved by 2030 (United Nations [UN], 2015). Halfway through the path, companies are increasingly claiming to support the SDGs, while substantial efforts still remain in the early stages (Global Reporting Initiative and Support to the Goals, 2022).

The achievement of SDGs requires companies to integrate SDG-oriented sustainable practices into their business strategies and operations. However, research indicates that corporate involvement and disclosure on SDGs may be symbolic in nature, thus not reflecting firms' substantive actions (Pineda-Escobar, 2019; Silva, 2021; Van der Waal and Thijssens, 2020). For example, companies may use external corporate disclosures and declarations of commitment to SDGs to meet public expectations without actually undertaking substantive actions to contribute to the goals (e.g. Silva, 2021). This results in decoupling, here defined as the mismatch between performance and communication (Sauerwald and Su, 2019) related to SDGs. Decoupling is a critical issue because it undermines stakeholders' and public bodies' ability to monitor the effective achievement of SDGs and to identify and reward genuinely SDG-committed companies. Importantly, the literature suggests that corporate governance (CG) mechanisms can play a key role in enhancing corporate action towards sustainability objectives and mitigating decoupling (e.g. García-Sánchez *et al.*, 2022; Gull *et al.*, 2023a, 2023b; Palea *et al.*, 2024; Sauerwald and Su, 2019). Along these lines, the UN itself advocates for both increased SDG disclosure in sustainability reports (in line with the SDG target 12.6.1) and substantive action through sustainable CG (United Nations Conference on Trade and Development [UNCTAD], 2022).

Despite the relevance of this topic at an international policy level, the literature on decoupling in relation to SDGs is still scarce. Previous research has focused more generally on corporate social responsibility (CSR) and environmental, social and governance (ESG) practices (e.g. Aboud *et al.*, 2024; Gull *et al.*, 2023a, 2023b; Sauerwald and Su, 2019). We consider the SDGs to be a related yet distinct topic, given their global importance to the planet and their key role for the UN in assessing the progress towards the goals set by the 2030 Agenda for Sustainable Development (Delgado-Ceballos *et al.*, 2023).

To the best of our knowledge, research so far has focused on the factors affecting corporate disclosure on SDGs, including CG mechanisms (Bose *et al.*, 2024; Martínez-Ferrero and García-Meca, 2020; Pizzi *et al.*, 2021; Rosati and Faria, 2019; Taglialatela *et al.*, 2023; Van der Waal and Thijssens, 2020) without considering potential decoupling from SDG performance (Hummel and Szekely, 2022). Moreover, the very few studies conducted on SDG decoupling have mostly relied on manual content analyses of corporate sustainability reports (e.g. Heras-Saizarbitoria *et al.*, 2022; Mhlanga *et al.*, 2018; Silva, 2021; Van der Waal and Thijssens, 2020). In contrast, no studies have carried out extensive quantitative analyses, such as the one we are proposing, at a corporate level. Such a gap

limits the understanding of the extent of SDG decoupling and the factors that may enhance alignment and effective contribution.

To fill this gap, our paper aims to identify the decoupling between corporate performance and communication in relation to environment-oriented SDGs, as well as the role of sustainability-oriented CG in promoting their alignment and enhancing corporate contribution to these goals. To do so, we first quantitatively assess the diffusion and type of SDG performance-communication decoupling among companies at an international level. Second, we examine which sustainability-oriented CG mechanisms increase the likelihood that companies show an alignment between their performance and communication regarding environmental SDGs. Based on prior literature, sustainability-oriented CG mechanisms include the establishment of a board-level sustainability committee, the adoption of sustainability-linked executive compensation, the presence of environmental management teams (EMTs), the implementation of stakeholder engagement initiatives, a firm's adherence to the UN Global Compact and the external assurance of sustainability reports (e.g. [Berliner and Prakash, 2014](#); [Farooq and De Villiers, 2020](#); [Gromis di Trana et al., 2022](#); [Haque and Ntim, 2020](#); [Jabbour et al., 2013](#); [Palea et al., 2024](#); [Radu and Smaili, 2021](#)).

We focus on the environmental aspects of SDGs, in that environmental issues, including climate change, represent the most urgent global challenge for both governments ([European Commission \[EC\], 2022](#); [Intergovernmental Panel on Climate Change \[IPCC\], 2022](#)) and companies ([Gordano et al., 2023](#); [KPMG, 2022](#); [Palea et al., 2024](#)). We rely on an international sample of 5,605 firms in the European Economic Area (EEA), the USA, China and Japan, for a total of 29,556 firm-years in 2015–2022. We measure SDG performance and SDG communication at the firm level using raw corporate data from the LSEG database (2024). For SDG performance, we follow the UNCTAD guidelines, which outline quantitative key performance indicators (KPIs) for monitoring corporate contributions to the SDGs ([UNCTAD, 2022](#)). For SDG communication, we consider whether companies explicitly declare support for one or more environmental SDGs in their corporate disclosures. SDG decoupling behaviours are then identified based on performance measurability and the presence of communication related to environmental SDGs (hereafter referred to simply as SDGs).

Our findings reveal a widespread lack of engagement with SDGs, with many companies (48.8%) showing neither measurable performance indicators related to these goals nor explicit communication of commitment. Additionally, we observe an extremely limited performance-communication alignment in SDG action (2.2%). A portion of companies (18.5%) claims commitment to certain SDGs but fails to report performance indicators for them, at best providing KPIs for other SDGs. On the other extreme, a significant share (30.8%) report KPIs relevant to SDG performance but do not state any commitment to the SDGs. These results point to companies' limited accountability regarding SDGs, likely driven by a lack of awareness. Moreover, our analysis suggests that while some governance mechanisms may offer greater potential for use as both substantive and symbolic tools, others are more likely to be used as either substantive or symbolic. We find that the presence of stakeholder engagement practices, sustainability committee and sustainability assurance are positively associated with the alignment between SDG performance and communication and a higher corporate contribution to the goals, i.e. they increase the likelihood that companies engage in both substantive and symbolic actions on environment-oriented SDG. Environment management teams and the Global Compact signatory status may play a more substantive role, while sustainability-linked executives' compensation may be primarily associated with symbolic SDG actions.

The study contributes to advancing knowledge on corporate sustainability, reporting and governance related to SDGs in several ways. From a theoretical perspective, our study suggests that decoupling may arise not only from institutional pressures but also from a

lack of companies' awareness regarding their actions and consistency with SDGs. Our evidence indeed indicates that most companies fail to communicate about the SDGs despite providing SDG-relevant performance data. The study also contributes to the extant literature on the commitment to SDGs at the firm level. Unlike prior research on SDG decoupling (Heras-Saizarbitoria *et al.*, 2022; Mhlanga *et al.*, 2018; Silva, 2021; Van der Waal and Thijssens, 2020), we use a quantitative analysis that allows us to focus on an extensive international sample, with data collected from 2015 – when the UN 2030 Agenda was launched – to 2022. Furthermore, our research extends the literature on the relationship between CG and sustainable behaviour (e.g. Berliner and Prakash, 2014; Farooq and De Villiers, 2020; Gromis di Trana *et al.*, 2022; Haque and Ntim, 2020; Jabbour *et al.*, 2013; Palea *et al.*, 2024; Radu and Smaili, 2021) by providing insights into the role played by different sustainability-oriented governance mechanisms in promoting SDG performance and its alignment with SDG communication.

From a methodological point of view, our study contributes to the literature on decoupling by proposing a novel methodology to measure SDG performance based on policy-relevant indicators (UNCTAD, 2022) and publicly available data. Such a method can be easily implemented in large-scale analyses, including those of policymakers, to detect potential firm-level decoupling between SDG performance and communication and enhance corporate contribution. Importantly, our methodology considers different degrees of alignment between performance and communication, which allows for a better understanding of nuances in SDG decoupling and contribution.

From a policy perspective, this study has important implications for evaluating companies' contribution to the SDGs, assessing decoupling and promoting the adoption of effective sustainable governance mechanisms (UNCTAD, 2022). For this purpose, our analysis adopts corporate performance indicators developed by the UN at a firm level (UNCTAD, 2022) to evaluate corporate SDG commitment. Finally, our findings are valuable for both policymakers and practitioners as they highlight the need for improved capacity building (i.e. enhancement of SDG-oriented corporate skills and organisational structures) to effectively address the SDGs at the corporate level, along with adequate sustainable CG.

The remainder of this paper is structured as follows. Section 2 presents the research framework and develops our research questions. Section 3 provides the research design. Section 4 shows the results, while Section 5 discusses the findings. Section 6 provides practical implications and Section 7 concludes.

2. Theoretical framing and literature

2.1 *Corporate decoupling in relation to the sustainable development goals*

The SDGs were established by the UN as part of the 2030 Agenda for Sustainable Development to provide a roadmap for countries and governments towards a more sustainable future (UN, 2015). Although sustainable development was set as a public policy goal (Bebbington, 2009), the accomplishment of the SDGs largely relies on business organisations (UN, 2015). Large corporations, for instance, are responsible for a significant proportion of global greenhouse gas (GHG) emissions (OECD, 2024). Therefore, the reorientation of companies' business models towards sustainability is key to the transition (Schaltegger *et al.*, 2012).

Against this background, companies face increasing pressure from institutions (e.g. governments, international agreements, societal norms and values) to engage with SDGs (Van Zanten and Van Tulder, 2018). Adhering to these pressures can increase companies' organisational legitimacy, which is critical for their survival, growth and profitability (DiMaggio and Powell, 1983; Meyer and Rowan, 1977). On the other hand, companies face significant challenges in implementing SDGs-related actions. For instance, they encounter

difficulties in translating SDGs into actionable targets (Berrone *et al.*, 2023), as SDG targets have been primarily designed at the governmental level to track countries' progress towards sustainable development. Companies also experience conflicting incentives that, on one side, encourage the adoption of the SDGs while, on the other side, introduce risks associated with a strong commitment. Executives indeed recognise the long-term benefits of achieving SDG targets (Mhlanga *et al.*, 2018); however, concerns about quarterly financial targets hinder their willingness to invest accordingly (Scheyvens *et al.*, 2016).

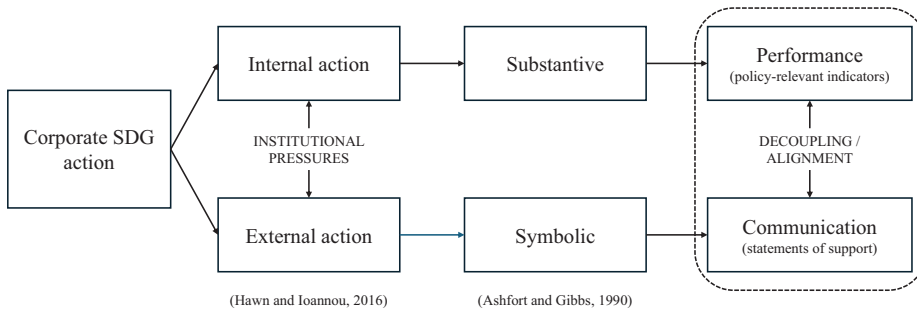
To meet institutional pressures and gain or preserve legitimacy, firms can strategically adopt internal and external actions (Hawn and Ioannou, 2016). Internally focused actions aim at achieving *substantive* structural changes in core practices, norms, structures and routines. Externally focused actions, instead, are those oriented to gain organisational legitimacy through *symbolic* means (Ashforth and Gibbs, 1990). These kinds of actions are highly visible and ceremonial and do not necessarily lead to structural change (Pache and Santos, 2021).

In this study, we consider SDG internal substantive actions as those that generate a measurable performance towards one or more SDGs based on relevant KPIs (hereafter referred to as SDG performance, see Section 3.1 for methodological aspects). For instance, environmental SDGs can be addressed by increasing efficiency in water use and reliance on clean fuels (Delgado-Ceballos *et al.*, 2023). By contrast, we consider a claim of commitment towards the SDGs as an external symbolic action of communication (hereafter referred to as SDG communication; see Section 3.2 for methodological aspects).

As the literature suggests, substantive and symbolic actions may not be aligned, leading to decoupling (e.g. Sauerwald and Su, 2019). This typically occurs in response to institutional pressures perceived as detrimental to the organisation's efficiency (Oliver, 1991; Pache and Santos, 2021). For example, companies may attempt to avoid fully conforming to institutional demands by disguising their lack of conformity through symbolic actions. In the context of SDGs, they may use communication to portray a commitment to such goals when, in reality, no such commitment exists (Heras-Saizarbitoria *et al.*, 2022; Pineda-Escobar, 2019; Silva, 2021; Van der Waal and Thijssens, 2020). Decoupling practices include greenwashing, which involves presenting misleading information that is inconsistent with actual performance [European Securities and Markets Authority (ESMA), 2023]. However, decoupling is not limited to greenwashing. It also occurs when companies have a positive impact on SDGs through processes, products and services but fail to recognise or communicate their contributions (Amores-Salvadó *et al.*, 2023; Delmas and Burbano, 2011). This lack of communication prevents them from fully benefitting from their sustainability efforts (Hawn and Ioannou, 2016). In this article, we use the term "SDG decoupling" to encompass all forms of non-alignment between SDG performance and communication. Figure 1 illustrates the decoupling construct used in the study.

Studies on decoupling in relation to the SDGs suggest a prevailing symbolic use of SDG claims of commitment (Heras-Saizarbitoria *et al.*, 2022; Mhlanga *et al.*, 2018; Silva, 2021; Van der Waal and Thijssens, 2020). For instance, Heras-Saizarbitoria *et al.* (2022) conduct a qualitative analysis of sustainability reports published by organisations claiming to be committed to SDGs, showing that companies refer to SDGs in a rather simple, functionalistic and deterministic way without disclosing any meaningful reflection. Similarly, Van der Waal and Thijssens (2020) examine 30 of the most extensive SDG reporters among Forbes Global 2000 companies, highlighting that almost all of them are silent about their substantive actions, measurement of SDG outcomes or ways to achieve SDGs.

While these studies have mostly relied on manual content analysis of firms' sustainability reports, our aim is to conduct a quantitative analysis that can provide a more comprehensive



Source(s): Authors' own work

Figure 1. Research conceptual framework

and nuanced understanding of corporate decoupling behaviours in relation to the SDGs. Therefore, our first research objective is to investigate, to a broad extent, the presence, scope and types of SDG decoupling behaviours. Because environmental issues, including climate change, have become the most urgent global challenge for both governments (EC, 2022; IPCC, 2022) and companies (Gordano *et al.*, 2023; KPMG, 2022; Palea *et al.*, 2024), our focus is on environment-related SDGs. Our first research question is as follows:

RQ1. Do companies engage in SDG performance-communication decoupling practices, and if so, to what extent?

2.2 Sustainability-oriented governance and sustainable development goal decoupling

Previous academic literature shows that CG is key to enhancing corporate engagement in sustainability, including SDGs (e.g. Aguilera *et al.*, 2021; Walls *et al.*, 2012). This perspective aligns with the recommendations of sustainable CG put forth by policymakers to promote sustainable development (e.g. UNCTAD, 2022). In response to pressures stemming from stakeholders to be sustainable, companies frequently adopt governance tools designed to address and manage sustainability issues (Aguilera *et al.*, 2021), which can be defined as “sustainability” or “sustainability-oriented” CG mechanisms (Palea *et al.*, 2024). These mechanisms can play different functions and involve different actors, ranging from the establishment of a sustainability committee to stakeholder engagement and external sustainability assurance (Palea *et al.*, 2024).

The implementation of sustainability-oriented CG mechanisms (hereafter also referred to simply as “CG mechanisms”) can be positively associated with the alignment of substantive and symbolic sustainability actions. Managers and stakeholders, including shareholders, may have divergent interests, with managers often exploiting principal-agent information asymmetry in opportunistic behaviour (Hill and Jones, 1992). For example, managers may encounter short-term incentives that undermine their willingness to commit to stakeholder-oriented long-term strategies (e.g. Scheyvens *et al.*, 2016). As such, certain sustainability-oriented CG mechanisms can facilitate the convergence of managers’ and stakeholders’ interests on sustainability strategies (Almici, 2023; Birindelli and Palea, 2022; Palea *et al.*, 2024) and reduce information asymmetry, thereby leading to a lower risk of decoupling. For instance, the instalment of board-level sustainability committees can serve as a monitoring function, ensuring top management support and enhancing the quality of sustainability information provided to stakeholders (Gull *et al.*, 2023a, 2023b; Radu and Smaili, 2021).

Additionally, companies can try to reduce information asymmetry by demanding external assurance of sustainability reports (García-Sánchez *et al.*, 2022; Uyar *et al.*, 2023) or adhering to the principles of the UN Global Compact (Berliner and Prakash, 2014; Brown *et al.*, 2018). Similarly, the use of sustainability incentives to orient managers' behaviours can help in mitigating agency problems (Haque and Ntim, 2020; Radu and Smaili, 2021). Sustainability strategies can also benefit from participative governance activities, both by creating internal teams of employees dedicated to environmental issues (EMTs; e.g. see Jabbour *et al.*, 2013) or through active stakeholder engagement in the definition of corporate strategies (Fordham and Robinson, 2018; Gromis di Trana *et al.*, 2022; Palea *et al.*, 2024).

However, under a symbolic management approach, CG mechanisms can be adopted as a form of "ceremonial conformity" to increase corporate legitimacy without undertaking meaningful actions (Ashforth and Gibbs, 1990). In this case, their adoption is not associated with a reduced decoupling. This view supports previous studies indicating that different CG mechanisms are not necessarily associated with sustainable performance (Berliner and Prakash, 2014; Birindelli and Palea, 2022; García-Sánchez *et al.*, 2022; Haque, 2017; Haque and Ntim, 2020; Rodrigue *et al.*, 2013). More specifically, some research suggests that certain CG mechanisms are more likely than others to be used as symbolic governance devices. For instance, previous studies show that sustainability-linked compensation can exacerbate executives' short-termism (Haque, 2017; Haque and Ntim, 2020). Meanwhile, other governance mechanisms can be ineffective due to the absence of enforcement or control measures, as in the case of Global Compact membership (Berliner and Prakash, 2014; Palea *et al.*, 2024) or the potential for managerial manipulation in sustainability reporting even when subject to external assurance (Farooq and De Villiers, 2020).

Despite the growing literature on the impact of CG mechanisms on sustainable behaviours, however, few studies address their effect on firms' effective commitment to the SDGs. Research so far has mainly been conceptual and qualitative (e.g. Fiandrino *et al.*, 2022; Scarpa *et al.*, 2023). Some empirical studies focus on the impact of CG on SDG disclosure (Bose *et al.*, 2024; Martínez-Ferrero and García-Meca, 2020; Rosati and Faria, 2019) but neglect potential decoupling between SDG performance and communication. Rosati and Faria (2019) examine early SDG reporters, identifying factors for early reporting in external assurance, the share of female directors and board members' age. Similarly, Martínez-Ferrero and García-Meca (2020) highlight that CEO independence, board composition and board attendance positively influence firms' inclusion of SDGs in sustainability reports. Bose *et al.* (2024) further find that the extent of SDG disclosure, measured by the number of SDGs supported, correlates positively with sustainability report issuance and stakeholder engagement. However, these studies primarily measure SDG commitment based on firms' claims without distinguishing between symbolic and substantive actions (Hummel and Szekely, 2022). In contrast, our focus is on the role of CG in fostering substantive SDG-oriented actions and ensuring consistent communication. Our second research question is formulated as follows:

- RQ2. Do sustainability-oriented CG mechanisms contribute to reducing the decoupling between SDG performance and communication, and if so, which ones?

3. Research design

3.1 Identification of sustainable development goal performance-communication decoupling

3.1.1 Measuring sustainable development goal performance. Detecting decoupling involves identifying and combining internal and external actions. As mentioned above, we use SDG

performance as a proxy for SDG internal/substantive actions. We then proxy SDG external communication by considering companies' direct claims of contributing to SDGs. By combining these two elements – performance and communication – we can detect decoupling behaviours.

To build our measure of SDG performance, we rely on the UNCTAD *Guidance on Core Indicators for Sustainability and SDG Impact Reporting* (UNCTAD, 2022). The UNCTAD Guidance identifies a set of core indicators to measure a firm's contribution towards the SDGs. These indicators cover four distinct areas of performance, i.e. economic, environmental, social and institutional. We focus on environmental SDGs according to the UNCTAD Guidance: SDG 6, *Clean water and sanitation*; SDG 7, *Affordable and clean energy*; SDG 12, *Responsible consumption and production*; and SDG 13, *Climate action* [1]. Table 1 reports the UNCTAD (2022) indicators for such SDGs.

We collect corporate data to calculate the UNCTAD indicators reported in Table 1 from the LSEG (formerly Refinitiv, Thomson Reuters or Asset4) database. LSEG analysts gather firm-level data from diverse sources, including sustainability reports, annual reports, company websites, non-governmental organisation websites, the Carbon Disclosure Project, stock exchange filings, investor roadshows and other resources (LSEG, 2024). Additionally, the database is widely used by practitioners, analysts and researchers, which enhances the comparability and replicability of our analysis. In light of this, we deem it suitable for our research purposes (de Villiers *et al.*, 2022). Following data collection, we decide to drop the *ozone-depleting substances* indicator (comprised in SDG 12), as its inclusion would considerably reduce the number of observations due to missing values. The final list of indicators used is provided in Table 1, Column 2. By using raw corporate data sourced by LSEG from multiple channels, we aim to ensure a focus on actual SDG performance rather than corporate “talk”.

We normalise performance indicators by following Xu *et al.* (2020). Based on the indicators included in Table 1, we build a composite score for each SDG (i.e. SDG6score, SDG7score, SDG12score and SDG13score) by normalising data using the min–max method and aggregating them using the arithmetic means. Min–max normalisation is a method used to scale numerical data to a specific range, typically [0, 1], to allow comparisons among values with different scales (e.g. cubic meters, gigajoules and tonnes). We use the following formula to normalise SDG indicator values on a scale of 0–1:

Table 1. UNCTAD indicators used for our analysis

SDG	(1) UNCTAD indicators	(2) Indicators used
6 – Clean water and sanitation	Water recycling and reuse	Water recycled/value added
	Water use efficiency	Water use/value added
	Water stress	Water withdrawal/value added
7 – Affordable and clean energy	Renewable energy use	Renewable energy/total energy use
	Energy efficiency	Energy use total/value added
12 – Responsible consumption and production	Hazardous waste	Hazardous waste/value added
	Reduction of waste generation	Total waste/value added
	Waste reused, re-manufactured and recycled	Waste recycled/value-added
	Ozone-depleting substances and chemicals dependency	–
13 – Climate action	Greenhouse gas emissions (Scope 1)	Scope 1 emissions/value added
	Greenhouse gas emissions (Scope 2)	Scope 2 emissions/value added

Source(s): Authors' own work

$$\text{Normalised value} = (X - X_{\min}) / (X_{\max} - X_{\min})$$

where X is the data point, $X_{\min}$ is the minimum value in the data set and $X_{\max}$ is the maximum value in the data set.

For indicators with a negative polarity (i.e. the higher the indicator value, the worse the SDG performance), the complement to 1 is used (i.e. the minimum value corresponds to the maximum absolute value and vice versa) [2].

$$\text{Normalised value (negative polarity)} = 1 - (X - X_{\min}) / (X_{\max} - X_{\min})$$

After normalisation, we calculate SDG scores by aggregating indicators related to a specific SDG through arithmetic means. Each SDG score is bounded between 0 and 1 and the higher the score, the better the firm performance towards achieving the specific SDG (e.g. SDG6score = 1 means maximum contribution towards SDG 6).

Then, we classify firm SDG performance into two broad categories. We consider a company's performance as "Unmeasurable" (UP) if none of the SDG scores (SDG6score, SDG7score, SDG12score and *SDG13score*) is calculable, i.e. the company lacks available data for the complete list of UNCTAD indicators for all the SDGs under consideration. As UNCTAD clarifies, the indicators included in the guidelines represent the minimum required by governments to evaluate the contribution of the private sector to the SDGs (UNCTAD, 2022).

We postulate that if SDG performance is measurable, it is likely that the company is at least in the process of monitoring its impacts, and thus, presumably, it adopts or will adopt internal/substantive actions. We, therefore, consider the measurability of performance as a signal of companies' implementation of some internal/substantive actions. More specifically, we consider firm performance on the SDGs to be "Measurable" (MP) if at least one of the SDG scores is calculable. When more than one "Measurable" SDG performance is available, we compute an overall SDG performance score as the arithmetic means of all the company's "Measurable" SDG scores [3]. In doing so, we assume that "Measurable" SDGs are those material for the company. In contributing to SDGs, companies tend indeed to prioritise goals that are material to them (Berrone *et al.*, 2023). Not all the environmental SDGs are necessarily relevant for the companies in our sample, which belong to different industries. Within the "Measurable" performance category, we further distinguish between "Lower" performance if the arithmetic means of SDG scores lie below the median of the distribution and "Higher" performance if the arithmetic means is above the median. This categorisation allows us to evaluate, for companies adopting some form of internal/substantive actions, their relative contribution (lower or higher) based on the outcome.

3.1.2 Measuring sustainable development goal communication. We measure SDG communication as the presence of a specific declaration of engagement with a certain SDG within corporate disclosures. To detect such information, we rely on the LSEG database, whose analysts assess whether a firm has declared actions supporting a specific SDG across corporate disclosures. For each of the 17 SDGs, the database provides a dummy variable, which takes the value of 1 if LSEG analysts have detected the presence of corporate declarations in support of the specific SDG; and 0 otherwise. Given our focus on environmental SDGs, we consider the dummy indicators related to SDGs 6, 7, 12 and 13. We then distinguish the following two broad categories of SDG communication: "Communication" (C), when a company claims to support at least one of the SDGs considered (i.e. at least one of the dummy variables is equal to 1) and "No communication" (NC) otherwise.

3.1.3 *Categorisation of sustainable development goal performance-communication behaviours.* We identify different behaviours based on the type of firm performance and communication described above, as follows:

- (1) “*Unmeasurable performance – No communication*” (UP-NC): companies that lack sufficient data to measure any of the SDG scores and do not explicitly express support for any of the SDGs. This cluster represents a zero-level of SDG commitment and the alignment of no-communication with no-performance.
- (2) “*Unmeasurable performance – Communication*” (UP-C): companies whose performance is not measurable yet express support for SDGs. This cluster identifies a decoupling of performance from communication. The omission and vagueness of performance indicators to support companies’ claims of sustainability objectives can be considered a form of “greenwashing” (ESMA, 2023), either conscious or unconscious.
- (3) “*Measurable performance – No communication*” (MP-NC): companies that show a measurable performance but do not claim to contribute to SDGs. This cluster presents a decoupling of communication from performance. The phenomenon of under-communicating the sustainability practices in which a business engages has been labelled by prior researchers as “greenhushing” (Font et al., 2017; Todaro and Torelli, 2024).
- (4) “*Measurable performance – Communication SDG-inconsistent*” (MP-INC): companies that claim to support one or more SDGs but whose performance is measurable for other, not-claimed SDGs [4]. This cluster, while it does not fully represent a decoupling behaviour, shows an inconsistency between performance and communication or quasi-decoupling. In this case, there is a mismatch between the SDGs measured and those claimed. This corporate behaviour could be either conscious or unconscious; in the latter case, it may arise from difficulties in associating a certain SDG with its key indicators.
- (5) *Measurable performance – Communication SDG-consistent*: companies that claim to support one or more SDGs and show data for the relevant KPIs. Within this group, we further categorise companies based on their performance level as follows:
 - “*Lower performance – Communication SDG-consistent*” (LP-CONS): companies that communicate their commitment to a particular SDG provide data to measure their performance on the same SDG but have lower performance levels compared to their peers. This cluster identifies an alignment behaviour, albeit with a lower contribution to the SDGs compared to other companies.
 - “*Higher performance – Communication SDG-consistent*” (HP-CONS): companies that communicate their commitment to one or more SDGs, provide data to measure their performance on the same SDGs and outperform their peers. This cluster identifies an alignment behaviour, which pairs with a better performance and a greater contribution to the SDGs.

3.2 *Identification of corporate governance mechanisms associated with sustainable development goal alignment*

We address RQ2 on the relationship between CG mechanisms and the alignment between SDG performance and communication as follows. Based on the classification proposed in the previous paragraph, we identify two main decoupling strategies: Unmeasurable Performance – Communication (UP-C) and Measurable Performance – No Communication (MP-NC).

Drawing on our theoretical background, we recognise that CG mechanisms can serve either a substantive role – fostering internal changes to modify organisational or operational structures – or a symbolic role aimed at achieving or retaining external legitimacy. Accordingly, on one hand, CG mechanisms may encourage companies already contributing towards SDGs, but lacking statements of commitment, to become aware of their actions and align their communication with performance, thus acknowledging their commitment to stakeholders. On the other hand, and more significantly, CG mechanisms may drive communicative companies to take inward substantive action on the SDGs rather than merely focusing on outward communication.

We argue that CG mechanisms that are associated with both types of alignment are effective in reducing SDG decoupling, hence improving conscious corporate SDG action. These mechanisms are thus relevant for the goals of the UN, which aims both at improving corporate disclosures (in line with SDG 12.6.1) and enhancing SDG-oriented governance. Instead, if a CG mechanism is associated with only one of the two directions of alignment, it may be considered to have a more substantive (when promoting the alignment of performance to communication) or symbolic role (when fostering communication in performing companies). Therefore, these mechanisms can be considered a desirable feature but less relevant.

As a first step, we compare companies that communicate without providing sufficient data to measure SDG performance (UP-C) with those that both measure performance and communicate it at different levels of consistency, i.e. “Measurable Performance – Communication SDG-Inconsistent” (MP-INC) and “Measurable Performance – Communication SDG-Consistent” (LP-CONS and HP-CONS). The aim is to unravel what is the role of CG mechanisms in reducing firms’ likelihood of adopting mere symbolic actions (i.e. only communicating) and aligning performance with communication (i.e. communicating transparently). To this end, we estimate the following multinomial logit model:

$$\ln \frac{Pr(k)}{Pr(UP-C)} = \beta_0 + \sum_{n=1}^6 \beta_n CGmechanisms_{i,t-1} + \sum_{n=7}^{11} \beta_n controls_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

where i denotes the firm and t indicates the year. Our baseline category is UP-C. k identifies comparison categories, where $k = 1$ is MP-INC; $k = 2$ is LP-CONS; and $k = 3$ is HP-CONS.

We then assess whether CG mechanisms increase the likelihood that companies align their performance and communication compared to companies measuring SDG performance without communicating it. This analysis aims to identify mechanisms that foster alignment of communication with performance (i.e. engaging in communication once substantive actions are adopted) rather than the other way around. Accordingly, in this analysis, our base reference category is MP-NC. Hence, we estimate the following multinomial logit model:

$$\ln \frac{Pr(k)}{Pr(MP-NC)} = \beta_0 + \sum_{n=1}^6 \beta_n CGmechanisms_{i,t-1} + \sum_{n=7}^{11} \beta_n controls_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

where i denotes the firm and t indicates the year. MP-NC is our baseline category. k identifies comparison categories, where $k = 1$ is MP-INC; $k = 2$ is LP-CONS; and $k = 3$ is HP-CONS.

In both models, *CGmechanisms* are six dummy variables that assume a value of 1 if the related governance mechanism is present and 0 otherwise. *CGmechanisms*, described in subsection 2.2, are sustainability-oriented CG mechanisms (Birindelli and Palea, 2022; Palea et al., 2024). These include a firm’s stakeholder engagement (*StakeholderEngagement*)[5], sustainability committee (*SustCommittee*), external sustainability reporting assurance

(*SustAssurance*), environmental management teams (*EMTs*)[6], UN Global Compact membership (*GCsignatory*), and sustainability linked executives' compensation (*ExecutiveSustComp*).

Based on prior research, *Controls* include firm size, measured by total assets (Rosati and Faria, 2019) (*Assets*); profitability, measured as return on equity (Palea et al., 2024) (*ROE*); institutional ownership, calculated as the percentage of shares owned by institutional investors (García-Sánchez et al., 2020) (*InstOwnership*); board independence, measured as the proportion of independent directors of the total number of board members (Pizzi et al., 2021; Taglialatela et al., 2023) (*IndepBoard*); and region and industry (2-digit SIC codes) fixed effects (Palea et al., 2024).

3.3 Sample selection

Our sample comprises publicly listed companies operating in non-financial sectors obtained from the LSEG database (LSEG, 2024). We focus on the period 2015–2022, i.e. the years after the launch of the SDGs and extract relevant data for our variables (see previous subsections). Our final sample includes 5,605 companies for a total of 29,556 firm-year observations. Companies are headquartered in the world's largest economic areas, i.e. the EEA (European Union [EU], the UK, Switzerland and Norway), USA, China and Japan. Companies located in these regions show the largest data availability in the LSEG database over the period under consideration. This can be explained by the fact that these regions are both among the highest emitting [7] and active in fighting climate change [European Commission (EC), 2019; Ministry of Economy and Trade and Industry, 2020]. In contrast, we observe very few observations for other countries (Brazil, Canada, India and South Africa). Accordingly, we exclude them from our analysis, which controls for country effects, to avoid losing degrees of freedom and a reduction of statistical power of our tests (Ioannidis et al., 2017). In any case, our sample includes the largest regions in terms of gross domestic product [8]. Table 2 reports the distribution of the sample observations by year, region and sector.

Panel A shows an increase in the number of observations over the years, with most firm-year observations distributed within the timeframe 2020–2022 (50.63%). Panel B reports that most observations are from the USA and EEA, with 47.89% and 28.52% firm-years, respectively. Panel C shows that most of our sample comprises companies from the manufacturing (56.50%) and service (40.05%) sectors.

4. Results

4.1 Diffusion of sustainable development goal performance-communication decoupling behaviours

Our first analysis responds to RQ1 by showing the distribution of performance and communication behaviours across our sample.

Figure 2 illustrates the distribution of firm-years across different categories. The majority of observations fall into the “Unmeasurable performance” category (15,422 firm-years, 52.2%) and/or the “No communication” category (23,531 firm-years, 79.6%). This reflects a lack of internal (“Unmeasurable performance”) or external (“No communication”) action for the SDGs. Within the overlap of these groups, 14,420 observations (UP-NC, 48.8%) show no commitment to the SDGs and appear completely uninvolved in addressing these globally significant sustainability goals.

The second largest category is “Measurable Performance – No Communication” (MP-NC, 9,111 observations, 30.8%), while the third largest is “Measurable Performance – SDG-Inconsistent Communication” (MP-INC, 4,457 firm-years, 15.1%). Firms in these categories

Table 2. Sample distribution

Year	Firm-years	%
<i>Panel A. Distribution of observations by year</i>		
2015	1,826	6.18
2016	2,278	7.71
2017	2,903	9.82
2018	3,460	11.71
2019	4,123	13.95
2020	4,582	15.50
2021	5,096	17.24
2022	5,288	17.89
Total	29,556	100.00
<i>Panel B. Distribution of observations by region</i>		
Region		
China	4,086	13.82
EEA	8,430	28.52
Japan	2,974	10.06
USA	14,066	47.59
Total	29,556	100.00
<i>Panel C. Distribution of observations by sector</i>		
Sector		
Primary	145	0.49
Manufacturing	16,699	56.50
Construction	425	1.44
Trade	451	1.53
Service	11,836	40.05
Total	29,556	100.00

Source(s): Authors' own work

may be unaware of their contributions to SDGs, either failing to declare their involvement or exhibiting a mismatch between the SDGs they measure and those they claim to support. This behaviour may be intentional and result from difficulties in aligning specific SDGs with KPIs or a lack of awareness of the UNCTAD guidelines.

Additionally, 1,002 observations (UP-C, 3.4%) claim a commitment to SDGs without showing relevant performance indicators to assess their contribution, exposing them to potential greenwashing risks (ESMA, 2023) or indicating a lack of awareness of UNCTAD guidelines.

Finally, only a small fraction of observations is actively involved with SDGs and shows an alignment between performance and communication (566 firm-years, 2.2%). Of these, 391 observations outperform their peers with measurable performance (HP-CONS, 1.6%), while 175 are underperforming (LP-CONS, 0.6%). Post hoc analysis of SDG performance-communication behaviours corroborates our findings, as differences among categories are statistically significant at the 99.9% confidence level [Pearson's χ^2 (4 d.f.) = 4,200.00***].

Overall, our results indicate that more than one-third of the observations relate to companies that report on relevant data for assessing SDG implementation without communicating it. Among those that do communicate, we observe a widespread misalignment between corporate performance indicators and communication of supported SDGs. Hence, these findings suggest that more corporate awareness of the SDG framework is needed.

		Unmeasurable performance (UP)	Measurable performance (MP)	
			Lower (LP)	Higher (HP)
No communication (NC)		UP-NC <i>n</i> = 14,420 48.8%	MP-NC <i>n</i> = 9,111 30.8%	
Communication (C)	Inconsistent with KPIs (INC)	UP-C <i>n</i> = 1,002 3.4%	MP-INC <i>n</i> = 4,457 15.1%	
	Consistent with KPIs (CONS)		LP-CONS <i>n</i> = 175 0.6%	HP-CONS <i>n</i> = 391 1.6%

Note(s): The figure portrays the categories for SDG performance and communication, scaled by their relative frequency. UP-NC: “Unmeasurable performance – No communication”. MP-NC: “Measurable performance – No communication”. UP-C: “Unmeasurable performance – Communication”. MP-INC: “Measurable performance – Communication SDG-inconsistent”. LP-CONS: “Lower performance – Communication SDG-consistent”. HP-CONS: “Higher performance – Communication SDG-consistent”. Categories and relative labels are defined in subsection 3.1.3

Source(s): Authors’ own work

Figure 2. Graphical representation of SDG performance and communication behaviours

4.2 The relation between corporate governance mechanisms and sustainable development goal decoupling

Table 3 presents the sample distribution by CG mechanism and SDG performance-communication behaviour. Importantly, higher frequencies of CG mechanisms are observed in firms with aligned performance and communication (LP-CONS and HP-CONS), thus suggesting a potential effect of these mechanisms in reducing SDG decoupling and promoting performance-communication alignment. In particular, the presence of CG mechanisms appears to be higher in better-performing companies (HP-CONS). The only exception is

Table 3. Distribution of observations by CG mechanisms and SDG performance-communication behaviour

Panel A. Full sample											
SDG communication – performance behaviour											
	UP-NC		MP-NC		UP-C		MP-INC		LP-CONS		Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
	n	%	n	%	n	%	n	%	n	%	n
CG mechanisms											
<i>StakeholderEngagement</i>	1,541	10.7	5,617	61.7	560	55.9	3,551	79.7	147	84.0	11,766
<i>SustCommittee</i>	2,474	17.2	6,212	68.2	599	59.8	3,770	84.6	154	88.0	13,558
<i>SustAssurance</i>	496	3.4	3,333	36.6	237	23.7	2,452	55.0	102	58.3	6,896
<i>EMTs</i>	2,534	17.6	5,601	61.5	426	42.5	3,015	67.6	126	72.0	11,969
<i>GCSignatory</i>	512	3.6	2,392	26.3	132	13.2	1,410	31.6	66	37.7	4,675
<i>ExecutiveSustComp</i>	2,121	14.7	3,247	35.6	298	29.7	2,110	47.3	99	56.6	8,109
Panel B. Manufacturing sector											
SDG communication – performance behaviour											
	UP-NC		MP-NC		UP-C		MP-INC		LP-CONS		Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
	n	%	n	%	n	%	n	%	n	%	n
CG mechanisms											
<i>StakeholderEngagement</i>	926	13.0	3,469	63.1	290	63.2	2,310	84.7	102	87.9	7,321
<i>SustCommittee</i>	1,413	19.2	3,881	69.3	299	60.2	2,428	85.1	109	89.3	8,346
<i>SustAssurance</i>	276	3.7	2,083	37.2	110	22.1	1,598	56.0	71	58.2	4,310
<i>EMTs</i>	1,712	24.0	3,731	67.9	254	55.1	2,071	75.6	92	78.6	8,035
<i>GCSignatory</i>	263	3.7	1,594	29.1	62	13.5	973	35.7	50	43.1	3,049
<i>ExecutiveSustComp</i>	1,152	16.1	1,926	35.0	117	25.5	1,350	49.5	73	62.9	4,755
	926	13.0	3,469	63.1	290	63.2	2,310	84.7	102	87.9	7,321
Panel C. Services sector											
SDG communication – performance behaviour											
	UP-NC		MP-NC		UP-C		MP-INC		LP-CONS		Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
	n	%	n	%	n	%	n	%	n	%	n
CG mechanisms											
<i>StakeholderEngagement</i>	564	8.9	1,918	61.9	244	58.0	1,121	81.3	38	88.4	3,996
<i>SustCommittee</i>	953	14.5	2,107	66.7	266	59.0	1,217	84.1	37	82.2	4,697
<i>SustAssurance</i>	202	3.1	1,133	35.8	112	24.8	773	53.4	30	64.7	2,334
<i>EMTs</i>	768	12.2	1,673	54.1	151	35.7	842	60.8	30	68.2	3,545
<i>GCSignatory</i>	220	3.5	719	23.3	58	13.8	403	29.2	15	34.9	3,733
<i>ExecutiveSustComp</i>	915	14.4	1,203	38.8	164	39.0	693	50.3	25	58.1	3,084

Note(s). The table reports the distribution of observations by CG mechanisms and SDG performance-communication behaviour. The percentages refer to the number of observations within the same class. UP-NC: “Unmeasurable performance – No communication”; MP-NC: “Measurable performance – No communication”; UP-C: “Unmeasurable performance – Communication”; MP-INC: “Measurable performance – Communication”; LP-CONS: “Lower performance – Communication SDG-consistent”; HP-CONS: “Higher performance – Communication SDG-consistent”. Categories and relative labels are defined in subsection 3.1.3

Source(s). Authors’ own work

related to *EMTs*, which are highly present in all categories with Measurable Performance (MP-NC, MP-INC, LP-CONS, HP-CONS, with a percentage higher than 60%).

Table 4 displays the results from our econometric models [equations (1) and (2)], which respond to our RQ2 on the role of CG mechanisms in contributing to SDG performance-communication alignment.

Results in Table 4 suggest that different CG mechanisms have different roles in promoting the alignment between performance and communication and enhancing corporate contribution to SDGs. The mechanism with a stronger association with SDG performance-communication alignment is *StakeholderEngagement*, which significantly increases the likelihood that companies align their performance and communication compared to both UP-C and MP-NC base categories. In particular, companies with *StakeholderEngagement* have a four times higher likelihood of falling into HP-CONS compared to UP-C (Column 1c, odds ratio 3.755***) and MP-NC (Column 2c, odds ratio 4.556***). For comparison, the coefficients for LP-CONS (Columns 1b and 2b, odds ratios of 2.420*** and 3.048***, respectively) and MP-INC (Columns 1a and 2a, odds ratios 1.893*** and 2.343***, respectively) are significantly lower. These results suggest that stakeholder engagement practices, keeping all other factors equal, contribute to aligning performance and communication and promoting a higher level of performance compared to peers.

A similar effect is also observed for *SustCommittee*. The coefficients show that the presence of a board-level committee to define CSR strategies increases the likelihood of alignment between performance and communication. The coefficients are statistically significant for all categories of performance and communication in comparison to both UP-C (Columns 1a–c) and MP-NC (Columns 2a–c). The higher coefficients are observed on LP-CONS (Column 1b, odds ratio = 1.987*** and Column 2b, odds ratio = 1.859***) and HP-CONS (Column 1c, odds ratio = 2.048*** and Column 2c, odds ratio = 1.875***). This indicates that firms with a sustainability committee are twice as likely to belong to clusters where SDG performance aligns with communication compared to those exhibiting decoupling behaviours. However, the difference between LP-CONS and HP-CONS is not statistically significant, suggesting that the presence of a sustainability committee may not be correlated with higher levels of performance.

Another important CG mechanism in promoting SDG performance-communication alignment is sustainability assurance (*SustAssurance*). The results indicate that *SustAssurance* is significantly associated with MP-INC and HP-CONS, both compared to UP-C and MP-NC. Furthermore, the coefficients on HP-CONS compared to UP-C (Column 1c, 1.834***) and MP-NC (Column 2c, 1.778***) are higher than the coefficients on MP-INC (Column 1a, 1.520*** and Column 2a, 1.427***). Accordingly, our findings suggest that sustainability assurance represents an important mechanism for promoting the alignment of SDG performance and communication and a higher level of performance.

The other CG mechanisms selected for our analysis, instead, show mixed results. *EMTs* do not show a statistically significant association with almost any level of SDG performance-communication alignment, either compared to UP-C or MP-NC. Such a result may arise from the fact that *EMTs* are widespread across all types of companies with “Measurable Performance” (see Table 3, Columns 2 and 4–7). The only slightly significant coefficient is reported in Column 1a (1.253*), showing a minor increase in the likelihood of companies with *EMTs* of falling in the MP-INC category compared to UP-C. This provides some evidence of *EMTs* as a mechanism associated with corporate engagement in substantive actions, as expressed by performance measurement.

The coefficients for *GCSignatory* indicate that Global Compact signatories have a slightly higher likelihood of being classified in the MP-INC, LP-CONS, or HP-CONS categories

Table 4. Results of logistic regressions

Model	Equation (1) – Multinomial logistic regression (base: UP-C)			Equation (2) – Multinomial logistic regression (base: MP-NC)		
	k = 1: MP-INC (1a)	k = 2: LP-CONS (1b)	k = 3: HP-CONS (1c)	k = 1: MP-INC (2a)	k = 2: LP-CONS (2b)	k = 3: HP-CONS (2c)
<i>Independent variables</i>						
<i>StakeholderEngagement</i>	1.893*** (0.175)	2.420*** (0.603)	3.755*** (0.717)	2.343*** (0.121)	3.048*** (0.725)	4.556*** (0.809)
<i>SustCommittee</i>	1.466*** (0.141)	1.987*** (0.503)	2.048*** (0.384)	1.398*** (0.076)	1.859*** (0.449)	1.875*** (0.317)
<i>SustAssurance</i>	1.520*** (0.150)	1.295 (0.297)	1.834*** (0.289)	1.427*** (0.073)	1.215 (0.270)	1.778*** (0.243)
<i>EMTs</i>	1.253* (0.118)	1.397 (0.301)	1.253 (0.197)	0.854 (0.046)	1.053 (0.211)	0.912 (0.119)
<i>GCsignatory</i>	1.286** (0.142)	1.486* (0.306)	1.380** (0.214)	0.982 (0.050)	1.114 (0.217)	1.057 (0.132)
<i>ExecutiveSustComp</i>	1.023 (0.099)	1.108 (0.214)	0.861 (0.131)	1.443*** (0.069)	1.610*** (0.278)	1.263* (0.156)
<i>Controls</i>	YES	YES	YES	YES	YES	YES
<i>Industry fixed effects</i>	YES	YES	YES	YES	YES	YES
<i>Region fixed effects</i>	YES	YES	YES	YES	YES	YES
<i>Constant</i>	0.005*** (0.002)	0.000*** (0.000)	0.000*** (0.000)	5.291*** (1.921)	0.0755** (0.094)	0.480 (0.467)
<i>Observations (group)</i>	4,186	167	377	4,186	167	377
<i>Observations (total)</i>	5,601			12,130		
<i>Pseudo R-squared</i>	0.1104			0.0782		

Note(s): Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$ and * $p < 0.1$. The table shows the results of regression analysis. Coefficients are odds ratios. One-year lag between dependent and independent variables. UP-C (“Unmeasurable performance – Communication”), MP-NC (“Measurable performance – No Communication”), MP-INC: “Measurable performance – Communication SDG-inconsistent”, LP-CONS: “Lower performance – Communication SDG-consistent”, HP-CONS: “Higher performance – Communication SDG-consistent”. Categories and relative labels are defined in subsection 3.1.3

Source(s): Authors’ own work

compared to UP-C (Columns 1a–c, with odds ratios of 1.286**, 1.486* and 1.480**, respectively). These findings suggest that *GCsignatory* increases the likelihood of showing a measurable SDG performance rather than exhibiting a communication-only behaviour, but it does not contribute to increasing communication efforts that align with SDG performance.

Finally, *ExecutiveSustComp* shows a mirrored behaviour to *GC signatory*. In this case, all the coefficients of *ExecutiveSustComp* on the different alignment behaviours (MP-INC, LP-CONS and HP-CONS) compared to UP-C are not statistically significant (Columns 1a–c), while they are positively and statistically significant compared to MP-NC (Columns 2a–c, with odds ratios 1.443***, 1.610*** and 1.263*, respectively). These results suggest that sustainability-linked executives' compensation is not associated with an increased alignment compared to communication-only behaviours, and it can be mostly associated with communication efforts rather than substantive actions.

Robustness checks for different model specifications are provided in the [Appendix](#).

5. Discussion

Advancing the path towards sustainable development requires companies to embrace their role as transformational agents. However, pressures surrounding the SDGs may result in the strategic adoption of decoupling behaviours. Hence, prior studies have started to investigate corporate decoupling practices in relation to SDGs ([Heras-Saizarbitoria et al., 2022](#); [Silva, 2021](#); [Van der Waal and Thijssens, 2020](#)). Our study contributes to this stream of studies by providing a more nuanced understanding of corporate commitment to the SDGs. In doing so, we consider different decoupling behaviours that involve varying degrees of misalignment and map their diffusion across an extensive international sample during the period 2015–2022.

Our findings indicate that, for a significant proportion of observations (48.8%), SDG performance cannot be assessed and SDGs are not mentioned in corporate disclosures. This indicates a pervasive lack of any SDG engagement by companies. On the other extreme, only a limited number of observations (2.2%) present key indicators to assess the performance on the SDG they claim to contribute to. Between the extremes, our analysis shows that decoupling in relation to the SDGs is widespread.

Specifically, we observe that decoupling between SDGs performance and communication is mostly represented by companies that are silent about their commitment to the SDGs while disclosing relevant KPIs (30.8% of observations). This evidence complements prior research that has shown that companies tend to use an SDG-friendly vocabulary to engage in communicative efforts rather than substantive actions ([Heras-Saizarbitoria et al., 2022](#); [Silva, 2021](#); [Van der Waal and Thijssens, 2020](#)). We indeed suggest that the opposite behaviour is more diffused on a broad scale. This kind of misalignment can be likewise detrimental for companies, as effective communication is important to enhance corporate reputation, increase market value ([García-Meca and Martínez-Ferrero, 2021](#)) and reduce the cost of capital ([Palea and Drogo, 2020](#)). The phenomenon, commonly referred to as “greenhushing” in the literature, has been found to be related to several factors, including low moral intensity and an intent to protect the company from stakeholders' scepticism ([Font et al., 2017](#)). In relation to SDGs, we argue that decoupling can be largely unintentional, with companies being unaware of their contribution to specific SDGs. In this vein, our analysis expands on the literature on decoupling ([Oliver, 1991](#); [Pache and Santos, 2021](#)) within the specific context of the SDGs. The SDGs pose unique challenges to companies because of their aspirational nature, multifaceted nature and lack of mandatory reporting guidelines. We argue that, in relation to SDGs, decoupling may arise not only from institutional pressures to commit to the goals but also from a lack of companies' awareness regarding their actions and

contribution to SDGs. Consistent with this, we find that the discrepancy between performance and communication can also be largely attributed to the disclosure of KPIs on other SDGs compared to those claimed to be supported (15.1% of observations), while the percentage of cases at “risk of greenwashing” (i.e. where companies communicate about the SDGs but lack performance metrics to support their claims) is quite limited (3.4% of observations). This evidence further supports that companies may be unaware of the SDGs that are material for them and to which they are able to contribute the most. Alternatively, companies may face difficulties measuring SDG performance correctly or relating their actions to specific SDGs.

Against this backdrop, the study provides evidence of the role of CG mechanisms in contributing to the alignment between performance and communication and promoting a higher contribution to the SDGs. To date, research in this area has examined general aspects of CG, such as board independence and meeting attendance (Rosati and Faria, 2019; Martínez-Ferrero and García-Meca, 2020) and primarily measured SDG commitment based on firms’ claims, without addressing potential decoupling (Hummel and Szekely, 2022).

Our results suggest that sustainability CG mechanisms can contribute to the alignment of performance and communication, but in different ways and to a different extent. Consistent with the symbolic vs substantive management argument of legitimation (Ashforth and Gibbs, 1990), our findings support that certain mechanisms are more likely to be used as both symbolic and substantive governance devices, thereby contributing to the alignment between performance and communication. In contrast, others are more likely to be adopted with either a substantive or symbolic approach to the governance of environmental sustainability. This supports theoretical development on the role of governance mechanisms, which can serve both as monitoring mechanisms to align managers’ and stakeholders’ interests (Hill and Jones, 1992) and as impression management tools to manage stakeholders’ concerns on SDGs (Ashforth and Gibbs, 1990).

More specifically, our results show that the presence of stakeholder engagement practices, a sustainability committee and sustainability assurance can promote the alignment between performance and communication. These mechanisms, indeed, increase the likelihood that companies show an alignment compared to both companies that lack communication about their contribution and companies that lack substantive actions to accompany their claims. By virtue of this, we can argue that such CG mechanisms promote corporate tangible contributions through internal actions, while signalling a commitment to SDGs to external stakeholders through explicit communication. In particular, stakeholder engagement and sustainability assurance are also associated with better corporate contribution to SDGs (i.e. a higher SG performance compared to peers). This is consistent with prior evidence on the effectiveness of implementing stakeholder engagement practices (Birindelli and Palea, 2022; Gromis di Trana *et al.*, 2022; Palea *et al.*, 2024) and providing sustainability assurance (e.g. Uyar *et al.*, 2023) to enhance firm green performance. Hence, we extend this literature by indicating that these CG characteristics facilitate the establishment of a sustainability orientation, which results in a lower likelihood of decoupling in relation to SDGs.

Our results also support that other CG mechanisms can be a desirable feature as they can promote SDG action, but they do not foster the alignment between performance and communication. The presence of EMTs is primarily a substantive governance mechanism, as they are commonly found in SDG-performing companies. Such a result is consistent with previous evidence highlighting green teams as an effective tool for employee engagement in environmental issues (Birindelli and Palea, 2022; Jabbour *et al.*, 2013; Palea *et al.*, 2024). EMTs are internal organisational functions that contribute to the value chain by developing operational procedures and actively influencing how companies operate from within.

However, because EMTs are prominently internal mechanisms, our analysis suggests that they might not be a sufficient governance tool to promote the alignment of internal actions with external statements of commitment to the SDGs.

However, we suggest that EMTs might not be a sufficient governance mechanism to promote the alignment of internal actions with external statements of commitment to the SDGs. Similarly, our results indicate that being a Global Compact signatory may encourage substantive action towards the SDGs rather than merely making statements of commitment, but it is not associated with an alignment between performance and communication. This could be motivated by the fact that signatories of the UN Global Compact are likely to have already engaged with the UN SDGs but may view explicitly claiming their contributions to these goals as redundant. Finally, our analysis suggests that the adoption of sustainability-linked executives' compensation policies does not promote substantive actions; instead, it plays a more symbolic role in SDG commitment by enhancing SDG communication. This may be driven by the conflicting incentives executives face in reconciling short-term financial targets with long-term sustainability initiatives (Scheyvens *et al.*, 2016). Prior evidence on the impact of sustainability executive compensation has been mixed. For instance, while Flammer *et al.* (2019) report that sustainability incentives lead to lower emissions and increased green innovations, Haque and Ntim (2020) suggest that they result in the symbolic improvement of process-oriented carbon performance but not actual carbon performance. We contribute to this ongoing debate by supporting that sustainability compensation policies may be implemented to symbolise the alignment of corporate strategies with the SDGs without implementing substantive actions to contribute to them.

6. Conclusion

In this study, we investigate the decoupling between corporate performance and communication in relation to environmental SDGs and the role of sustainability-oriented CG mechanisms in promoting their alignment and enhancing corporate contribution. We develop a novel measure of SDG decoupling that builds upon the UNCTAD guidelines to assess SDG performance. Using an international sample of 5,605 firms in the period 2015–2022, our analysis contributes to the literature on decoupling in the context of SDGs (e.g. Heras-Saizarbitoria *et al.*, 2022; Mhlanga *et al.*, 2018; Silva, 2021; Van der Waal and Thijssens, 2020) by providing evidence of the large diffusion of decoupling, with most companies that fail to communicate about the SDGs despite having SDG-relevant performance data. The study also enriches the literature on the relationship between CG and sustainable behaviour (e.g. Birindelli and Palea, 2022; Flammer *et al.*, 2019; Gull *et al.*, 2023a, 2023b; Haque and Ntim, 2020; Palea *et al.*, 2024; Rodrigue *et al.*, 2013; Uyar *et al.*, 2023) by showing that the presence of certain CG mechanisms designed to address sustainability issues – stakeholder engagement practices, sustainability committee and sustainability assurance – are able to effectively reduce decoupling between performance and communication.

Our research has relevant implications for policymakers, practitioners and investors. Firstly, our findings highlight the need for policy interventions aimed at raising corporate conscious contribution to SDGs through capacity building. In this regard, sustainable CG can strengthen corporate knowledge, skills and resources needed to effectively understand, implement and communicate sustainable practices aligned with the SDGs (EC, 2023). We provide evidence of the positive impact that certain CG mechanisms can have in promoting both structural changes (substantive actions) and communication skills (symbolic actions) in the context of SDGs. Such CG mechanisms can thus be more effective than others in improving capacity-building on SDGs. Furthermore, they may function as a signal for investors to formulate forward-looking investment allocation strategies and channel capital

to support companies with increased potential to engage in sustainable development. All of this has implications for society at large, as transparent corporate reporting, adoption of SDG-oriented CG mechanisms and communication to investors and other key stakeholders are key elements to advance progress on the SDGs (UNCTAD, 2022).

The study also presents some limitations that can be addressed by future research. As we focused on single SDGs that are more directly related to the environmental dimension, future research could construct a comprehensive SDG performance measure that also considers the interconnections among SDGs. Additionally, even if we did not use ESG ratings to avoid biases from divergent scoring methodologies across ESG data providers (Billio *et al.*, 2021; Christensen *et al.*, 2022), we relied only on publicly available data retrieved from the LSEG database. While this allows our method for measuring SDG decoupling to be replicated on a large scale, further research is encouraged to validate our findings using other databases and/or measures of performance. Furthermore, while acknowledging the limited availability of ESG data even for listed companies (Migliavacca, 2023), future studies could delve into the analysis of decoupling practices by non-listed companies. As more data are released following the adoption of the most recent directives on sustainability reporting (e.g. the Corporate Sustainability Due Diligence Directive and the Corporate Sustainability Reporting Directive), it will be possible to explore the role of different stakeholders' group activism, the composition of environmental committees or the impact of governance mechanisms at the value chain level, as well as expanding the scope of the analysis to least-represented industrial sectors. With larger sample sizes, it will also be possible to further explore the causal relationship of different CG mechanisms through quasi-experimental designs. Overall, further research is suggested to investigate the factors affecting firms' effective commitment to the SDGs and consistent communication.

Notes

1. We exclude SDG 15, *Life on land*, from our analysis as it requires the retrieval of asset-specific information (e.g. the position of buildings with respect to water bodies and natural resources and so on), which is rarely included in databases. We exclude SDG9 *Industry, Innovation and Infrastructure*, cited by the UNCTAD in its guidance, as it only includes GHG emissions as environmental indicators, which are already included in the SDG13 KPIs.
2. For example, if companies A, B and C have renewable energy use ratios of 10%, 50% and 100%, respectively, the normalised value of this variable for A will be $(10 - 10)/(100 - 10) = 0$; for B, it will be $(50 - 10)/(100 - 10) = 0.4444$; and for C, it will be $(100 - 10)/(100 - 10) = 1$. If companies A, B and C have GHG emissions scope 1 of 100, 1,500 and 2,000 tonnes, respectively, the normalised value of the variable for A will be $1 - (100 - 100)/(2,000 - 100) = 1 - 0 = 1$; for B, it will be $1 - (1,500 - 100)/(2,000 - 100) = 1 - 0.7368 = 0.2632$; and for C, it will be $1 - (2,000 - 100)/(2,000 - 100) = 1 - 1 = 0$.
3. For instance, if for company A, SDGs 6 and 7 are "Measurable", the overall SDG score is the average of the scores for the two SDGs (*SDG6score* and *SDG7score*).
4. For instance, a company claiming to contribute to SDG 6 but measuring its performance on SDG 13 only will fall under this category.
5. The item indicates if the company has put in place stakeholder engagement practices, which can include the periodic assessment of stakeholders to identify relations, gather new information and evaluate priorities; the consultation of stakeholders on relevant topics (e.g. by survey) to conduct an effective materiality assessment; the establishment of a two-way communication to collaborate on the development of innovative projects (e.g. through hackathons) to create shared value.

6. The variable indicates the presence of any individual/team composed of employees who are operational on a day-to-day basis and are not the board committees (directors) that perform the functions dedicated to environmental issues and should be responsible for carrying out the implementation of the environmental strategy.
7. Available at: www.worldometers.info/co2-emissions/co2-emissions-by-country/
8. Available at: https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?most_recent_value_desc=true

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Appendix

Robustness checks

We conduct different robustness checks. Firstly, we re-estimate our main models [equations (1) and (2)] as ordinal logistic regressions, where MP-INC, LP-CONS and HP-CONS represent increasing levels of SDG performance-communication alignment, compared to the base categories UP-C [Equation (1)] and MP-NC [Equation (2)]. The results, reported in Table A1, validate our categorisation of performance and communication behaviours (subsection 3.1.3). Indeed, the large gap between the first cut point (/cut1) and the last one (/cut3) supports that a significant change in the underlying latent variable is required to transition from the lowest category (UP-C, MP-NC) to the highest (HP-CONS). Cut points between the past two outcome categories (/cut2,/cut3) are closer, which may reflect that differences between the two are less pronounced. However, results and post hoc analysis from our main models [equations (1) and (2)] highlight significant differences in the governance drivers. This evidence further supports our choice to unpack the MP-CONS category into lower (LP-CONS) and higher performance (HP-CONS) sub-categories, and use the latter as our target category for performance-communication alignment and better contribution. Results in Table A1 additionally support *CSRcommitte*, *StakeholderEngagement* and *SustAssurance* as the main CG mechanisms associated with a transition to higher performance-communication categories.

Table A1. Results of ordinal logit regression results

Model	Ordinal (base: UP-C)	Ordinal (base: MP-NC)
<i>Independent variables</i>	(1)	(2)
<i>StakeholderEngagement</i>	2.104*** (0.174)	2.448*** (0.120)
<i>SustCommittee</i>	1.636*** (0.148)	1.454*** (0.075)
<i>SustAssurance</i>	1.315*** (0.104)	1.439*** (0.869)
<i>EMTs</i>	1.192** (0.096)	0.952 (0.044)
<i>GCsignatory</i>	1.138* (0.083)	1.007 (0.048)
<i>ExecutiveSustComp</i>	0.920 (0.071)	1.414*** (0.064)
Controls	YES	YES
Industry fixed effects	YES	YES
Region fixed effects	YES	YES
/cut1	3.013	-1.657
/cut2	7.486	1.115
/cut3	7.898	1.502
Observations	5,601	12,130
Pseudo R-squared	0.087	0.069

Note(s): Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$ and * $p < 0.1$. The table shows the results of the ordinal regression analysis. Coefficients are odds ratios. One-year lag between dependent and independent variables. In Model 1, the dependent variable is an ordinal variable including the following categories: UP-C (“Unmeasurable performance – Communication”), MP-INC (“Measurable performance – Communication SDG-inconsistent”), LP-CONS (“Lower performance – Communication SDG-consistent”), HP-CONS (“Higher performance – Communication SDG-consistent”). Base outcome: UP-C. In Model 2, the dependent variable is an ordinal variable including the following categories: MP-NC (“Measurable performance – No communication”), MP-INC (“Measurable performance – Communication SDG-inconsistent”), LP-CONS (“Lower performance – Communication SDG-consistent”), HP-CONS (“Higher performance – Communication SDG-consistent”). Base outcome: MP-NC. Categories and relative labels are defined in subsection 3.1.3

Source(s): Authors’ own work

We also perform a multinomial logistic regression using “Unmeasurable performance – No communication” (UP-NC) as our reference base category and the complete set of performance-communication behaviours identified in subsection 3.1.3 (MP-NC, UP-C, MP-INC, LP-CONS and HP-CONS) as the dependent variable. In doing so, we examine whether CG mechanisms can drive substantive actions (performance) or symbolic actions (communication) more. Considering all performance-communication categories, on the one hand, allows using a larger number of observations; on the other hand, it reduces interpretability of CG mechanisms’ impacts. Table A2 reports the results of multinomial regression analysis. Firstly, we observe that each CG mechanism is positively and significantly associated with all performance-communication behaviours. This indicates that sustainable governance drives companies from inaction (UP-NC) to some form of substantive or symbolic actions. In line with results from equations (1) and (2), *StakeholderEngagement* reports sensibly higher coefficients on HP-CONS (odds ratio = 15.579***), thus supporting its effectiveness for the alignment of performance and communication and the promotion of higher SDG contribution. *CSRcommittee* shows the highest coefficient for HP-CONS (odds ratio = 3.751***) and LP-CONS (odds ratio = 3.707***), and the lowest for UP-C (odds ratio = 1.896***), which further supports the association between the presence of a sustainability committee and increased performance-communication alignment. The analysis also corroborates our findings for the impact of *SustAssurance*, which shows a stronger association with HP-CONS (odds ratio = 2.967***).

EMTs show a stronger relation with the outcomes LP-CONS (odds ratio = 1.863***), MP-NC (odds ratio = 1.800***) and MP-INC (odds ratio = 1.670***). While we do not have clear evidence of its relationship with performance-communication alignment, we can support it can be conducive of performance measurement and, thus, SDG substantive actions. Similarly, *GCsignatory* reports a higher association with LP-CONS (odds ratio = 1.523***), HP-CONS (odds ratio = 1.427***) and MP-NC (odds ratio = 1.358***), thus suggesting it may primarily drive performance measurement. For *ExecutiveSustComp*, the association is stronger for the outcomes LP-CONS (odds ratio =

Table A2. Results of multinomial regression analysis

Model Independent variables	Multinomial (base: UP-NC)				
	MP-NC	UP-C	MP-INC	LP-CONS	HP-CONS
<i>StakeholderEngagement</i>	3.410*** (0.181)	4.286*** (0.383)	7.986*** (0.503)	10.314*** (2.531)	15.579*** (2.864)
<i>SustCommittee</i>	2.009*** (0.099)	1.896*** (0.180)	2.768*** (0.170)	3.707*** (0.903)	3.751*** (0.648)
<i>SustAssurance</i>	1.670*** (0.133)	1.437*** (0.169)	2.384*** (0.205)	2.076*** (0.487)	2.967*** (0.457)
<i>EMTs</i>	1.800*** (0.086)	1.361*** (0.127)	1.670*** (0.097)	1.863*** (0.375)	1.603*** (0.218)
<i>GCsignatory</i>	1.358*** (0.110)	1.021 (0.132)	1.336*** (0.120)	1.523** (0.316)	1.427** (0.206)
<i>ExecutiveSustComp</i>	1.270*** (0.064)	1.749*** (0.167)	1.821*** (0.109)	2.016*** (0.355)	1.574*** (0.204)
Controls	YES	YES	YES	YES	YES
Industry fixed effects	YES	YES	YES	YES	YES
Region fixed effects	YES	YES	YES	YES	YES
Constant	0.000*** (0.000)	0.011*** (0.007)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Observations (group)	7,400	871	4,186	167	377
Observations (total)	23,414				
Pseudo R-squared	0.2738				

Note(s): Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$ and * $p < 0.1$. The table shows the results of multinomial regression analysis. Coefficients are odds ratios. One-year lag between dependent and independent variables. Base outcome: UP-NC (“Unmeasurable performance – No communication”). MP-NC: “Measurable performance – No communication”. UP-C: “Unmeasurable performance – Communication”. MP-INC: “Measurable performance – Communication SDG-inconsistent”. LP-CONS: “Lower performance – Communication SDG-consistent”. HP-CONS: “Higher performance – Communication SDG-consistent”. Categories and relative labels are defined in subsection 3.1.3

Source(s): Authors’ own work

Equation (2) – Multinomial logistic regression
(base: MP-NC)

Panel A. Manufacturing sector									
Independent variables									
	k = 1: MP-INC	k = 2: LP-CONS	k = 3: HP-CONS	k = 1: MP-INC	k = 2: LP-CONS	k = 3: HP-CONS			
	(1a)	(1b)	(1c)	(2a)	(2b)	(2c)			
<i>StakeholderEngagement</i>	1.928*** (0.241)	2.520*** (0.786)	5.463*** (1.586)	2.432*** (0.159)	3.277*** (0.968)	6.812*** (1.847)			
<i>SustAssurance</i>	1.321*** (0.174)	2.012** (0.643)	2.359*** (0.614)	1.316*** (0.090)	1.959** (0.591)	2.188*** (0.506)			
<i>SustCommittee</i>	1.730*** (0.250)	1.077 (0.304)	1.995*** (0.439)	1.439*** (0.094)	0.891 (0.233)	1.688*** (0.307)			
<i>EWMTs</i>	1.235* (0.156)	1.365 (0.361)	1.274 (0.264)	1.016 (0.064)	1.079 (0.258)	0.997 (0.168)			
<i>GGCsignatory</i>	1.474** (0.231)	1.926** (0.494)	1.443** (0.305)	1.044 (0.067)	1.384 (0.314)	0.997 (0.157)			
<i>ExecutiveSustComp</i>	1.327** (0.190)	1.589* (0.379)	1.005 (0.211)	1.514*** (0.092)	1.812*** (0.361)	1.191 (0.192)			
Controls	YES	YES	YES	YES	YES	YES			
Industry fixed effects	YES	YES	YES	YES	YES	YES			
Region fixed effects	YES	YES	YES	YES	YES	YES			
Constant	0.005*** (0.002)	0.000*** (0.000)	0.000*** (0.000)	8.062*** (3.724)	0.052** (0.086)	0.321 (0.395)			
Observations (group)	2,856	122	236	2,856	122	236			
Observations (total)	3,463			8,820					
Pseudo R-squared	0.1184			0.0839					
Panel B. Services sector									
Independent variables									
	k = 1: MP-INC	k = 2: LP-CONS	k = 3: HP-CONS	k = 1: MP-INC	k = 2: LP-CONS	k = 3: HP-CONS			
	(1a)	(1b)	(1c)	(2a)	(2b)	(2c)			
<i>StakeholderEngagement</i>	1.835*** (0.268)	2.667** (1.147)	2.619*** (0.717)	2.202*** (0.196)	2.995*** (1.234)	3.035*** (0.784)			
<i>SustAssurance</i>	1.806*** (0.270)	1.509 (0.652)	1.503 (0.429)	1.611*** (0.151)	1.338 (0.581)	1.355 (0.361)			
<i>SustCommittee</i>	1.251 (0.188)	1.575 (0.683)	1.773** (0.426)	1.490*** (0.133)	1.817 (0.814)	2.100*** (0.436)			
<i>EWMTs</i>	1.109 (0.165)	1.811 (0.705)	1.174 (0.309)	0.795 (0.094)	1.311 (0.500)	0.829 (0.191)			
<i>GGCsignatory</i>	1.205 (0.207)	1.352 (0.563)	1.631** (0.407)	0.905 (0.085)	0.859 (0.366)	1.380 (0.299)			
<i>ExecutiveSustComp</i>	0.832 (0.121)	1.045 (0.401)	0.904 (0.675)	1.293*** (0.106)	1.672 (0.623)	1.444* (0.298)			
Controls	YES	YES	YES	YES	YES	YES			
Industry fixed effects	YES	YES	YES	YES	YES	YES			
Region fixed effects	YES	YES	YES	YES	YES	YES			
Constant	0.004*** (0.004)	0.000*** (0.000)	0.000*** (0.000)	5.291*** (1.921)	0.0755** (0.094)	0.480 (0.467)			
Observations (group)	1,448	45	139	1,448	45	139			
Observations (total)	2,083			4,104					
Pseudo R-squared	0.1062			0.0744					

Source(s): Authors' own work

2.016***), MP-INC (odds ratio = 1.821***) and UP-C (odds ratio = 1.749***). Taking this evidence together, we cannot support clear-cut evidence of its impact on performance-communication alignment and suggest that it may primarily drive communication efforts.

Finally, Table A3 reports results for cross-sectoral analysis based on equations (1) and (2). Results are comparable to those reported in Section 4 for the baseline full-sample analysis, also due to the high representativeness of the manufacturing and services sectors in our sample.

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