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Carbon Performance and Executive Compensation: The Moderating Role of Governance

Abstract

Amid growing global emphasis on corporate environmental responsibility, the role of executive compensation *(EC)* in driving carbon performance *(CP)* remains underexplored, particularly in a cross-country context. This paper addresses this limitation directly by examining the association between *EC* and *CP*, considering the moderating effects of corporate governance (*CG*) and national governance quality (*NGI*). Using a panel dataset of 1,122 firms across 28 countries from 2002 to 2019 (i.e., 13,413 firm-year observations), we find that *EC* is positively associated with carbon reduction initiatives (process-oriented *CP*), while negatively associated with carbon intensity (poor-outcome-oriented *CP*). Our results further reveal that *CG* mechanisms, such as board size, independent directors, CEO-chair duality, gender diversity, and sustainability committee, moderate the *EC–CP* nexus, strengthening the alignment between executive incentives and environmental objectives. Additionally, firms in countries with low *NGI* rely more on *EC* to achieve meaningful *CP* improvements. These findings remain robust across alternative model specifications and endogeneity tests. By integrating insights from neo-institutional theory, this study contributes to the literature by demonstrating how governance structures at both firm and national levels shape the effectiveness of *EC* in promoting sustainability. Our results offer practical implications for policymakers, investors, and corporate leaders seeking to design governance frameworks that strengthen the link between executive incentives and *CP* in diverse institutional contexts.

Keywords: Social and environmental accounting, carbon performance, corporate governance, national governance quality, executive compensation, sustainability development, neo-institutional theory.

JEL Classification: G34, M12, Q50

Abbreviations

CA	Carbon Accounting
CG	Corporate Governance
CP	Carbon Performance
CRI	Carbon Reduction Initiatives
CSR	Corporate Social Responsibility
EC	Executive Compensation
ESG	Environmental, Social and Governance
ETS	Emission Trading Scheme
GHG	Greenhouse Gas Emissions
INT	Corporate Carbon Intensity /Actual Carbon Performance
KYOTO	Kyoto Protocol Ratification
NGI	National Governance Quality Index
NIT	Neo-Institutional Theory
UNGC	United Nations Global Compact
WGI	Worldwide Governance Indicators

1 Introduction

Over the past three decades, global concerns regarding climate change have intensified among supranational bodies, governments, business leaders, and international communities (Haque and Ntim, 2020). Efforts to mitigate such environmental impacts have led to an increased focus on accounting for and reducing greenhouse gas (GHG) emissions, which are widely recognised as a critical global challenge (Tang and Demeritt 2018; Eleftheriadis and Anagnostopoulou 2015). Consequently, companies are facing growing pressures from stakeholders to improve their environmental performance through carbon reduction initiatives and 'green' investments (Moussa et al. 2020). Given the financial and reputational implications of corporate carbon emissions, carbon-related information has become a crucial factor in assessing corporate risk and performance. Indeed, prior research indicates that firms with higher carbon emissions are typically associated with decreases in their market value (Orazalin et al., 2024; Chapple et al. 2013; Hughes 2000; Cooper et al. 2018; Baboukardos 2017; Choi and Luo 2021; Griffin et al. 2017).

Carbon performance has thus become a strategic priority for firms, influencing both long-term investment decisions and executive compensation contracts (Vesty et al., 2015; Cohen et al., 2023)[1]. Executive compensation is a widely recognised mechanism for aligning managerial decision-making with stakeholder values and interests, including corporate sustainability and environmental performance (Mahoney and Thorn 2006; Elmagrhi et al. 2020; Morrison et al. 2024). Traditionally, *EC* policies have focused on supporting the implementation of firm strategies, especially on achieving financial performance targets (Malmi and Brown, 2008; Maas, 2018). Prior research highlights the tension between short-term financial goals and long-term sustainability objectives (Maas, 2018; Tauringana & Chithambo, 2015). Nevertheless, recent evidence suggests that incentive-based compensation may motivate executives to prioritise environmental projects, such as carbon reduction programmes (Mahoney & Thorn, 2006; Elmagrhi

[1]For example, a recent report by The Conference Board highlights a significant increase in the integration of climate-related metrics into executive compensation plans among S&P 500 companies, rising from 25% in 2021 to 54% in 2023. The trend reflects a growing emphasis on aligning executive incentives with environmental performance goals (The Conference Board, 2024).

et al., 2020), where such policies can be reoriented to incentivise environmental responsibility, particularly in high-emission industries (Tauringana and Chithambo, 2015; Haque, 2017; Haque and Ntim, 2020). Despite this, a fundamental conflict arises between short-term financial incentives and long-term carbon reduction strategies, which often require substantial investment and potentially reduce short-term profitability. This raises an important question: can EC effectively promote carbon mitigation efforts, and if so, under what governance conditions?

Despite growing global attention to corporate environmental responsibility, the role of executive compensation *(EC)* in shaping carbon performance *(CP)* remains underexplored, particularly across different institutional contexts. Recent literature increasingly explores these dynamics (e.g., Aresu et al., 2023; Orazalin et al., 2024; Morrison et al., 2025; Simic et al., 2024; Saa et al., 2025). For instance, Orazalin et al. (2024) examine how board sustainability committees influence the relationship between climate change initiatives, *CP*, and market value across 35 countries, revealing that while process-based climate initiatives enhance market value, they can paradoxically lead to increased GHG emissions, raising greenwashing concerns. Similarly, Morrison et al. (2025) investigate board sustainability committees and GHG performance in 22 industrialised European countries, highlighting a legitimacy gap, where such initiatives do not necessarily lead to emissions reductions. While prior research has extensively explored the relationship between CP and firm value, stakeholder pressures, CG, and voluntary disclosure (Velte et al., 2020), limited empirical evidence examines the role of incentive-based mechanisms, such as *EC*, in promoting/shaping both symbolic and substantive CP outcomes.

Furthermore, emerging studies suggest that governance structures – both at the corporate and national levels – play a crucial role in shaping firms' environmental performance (Haque, 2017; Moussa et al., 2020; Galbreath, 2010; Aggarwal & Dow, 2012; Ben-Amar & McIlkenny, 2015; Homroy & Slechten, 2019; Hsueh, 2019). Given the varying regulatory frameworks, institutional quality, and governance practices across countries, a cross-country analysis is necessary to understand how these factors collectively influence corporate environmental strategies. Thus, while the extant literature has predominantly focused on firm-level determinants of *CP*, including stakeholder pressures, governance mechanisms, disclosure practices, and financial incentives (Velte et al. 2020; Simic et al., 2024), the influence of *EC* in driving *CP*, and how corporate governance (*CG)* and national governance quality (*NGI*) moderate this relationship, remains a critical yet understudied issue.

This study, therefore, addresses these gaps within the extant literature by conducting a cross-country analysis of 1,122 S&P Global firms across 28 countries, covering 13,413 firm-year observations over an 18-year period (2002-2019). We provide novel insights into the interplay between *EC*, *CP*, and governance structures at both firm and national levels. Unlike prior research, which largely examines *EC* and *CP* in isolation or within single jurisdictions (Haque and Ntim, 2020; Simic et al., 2024) or emphasises the market valuation effects of *CP* (Orazalin et al., 2024; Morrison et al., 2025), this paper explores the moderating role of both *CG* and *NGI* in aligning executive incentives with substantive *CP* improvements. Moreover, in line with prior research (e.g., Busch and Hoffmann 2011; Haque 2017; Haque and Ntim 2020; Moussa et al. 2020; Delmas et al. 2013), we distinguish between two dimensions of carbon performance: process-oriented *CP* (symbolic commitments and initiatives) and outcome-oriented *CP* (actual reductions in emissions intensity). Given the potential for agency conflicts in firms' carbon strategies, strong *CG* mechanisms are essential to align executive decision-making with stakeholder interests (Elmagrhi et al. 2020). Effective governance, including board structures, plays a key role in overseeing management and designing compensation policies that encourage sustainability efforts (Conyon and Peck 1998).

We find the following novel empirical insights. First**,** our multilevel regression analysis suggests that *EC* is positively associated with process-oriented *CP* (carbon reduction initiatives), but negatively associated with outcome-oriented *CP* (emission intensity). This supports both the legitimation perspective (where firms engage in symbolic environmental actions to maintain legitimacy) and the efficiency perspective (where firms adopt substantive strategies to improve environmental performance). Second, we find that CG structures significantly moderate this relationship. Firms with larger boards, a higher proportion of independent directors, and CEO-chair role duality are more likely to align *EC* with both symbolic and actual carbon performance. Furthermore, firms with gender-diverse boards and sustainability committees are more inclined to tie compensation incentives to substantive carbon performance improvements, reinforcing neo-institutional theory (NIT) arguments that strong governance enhances managerial accountability. Third, we show that national governance quality plays a crucial role in shaping these dynamics. In countries with weak governance institutions, *EC* emerges as a key driver of carbon performance improvements, as firms rely on internal incentive mechanisms to compensate for regulatory gaps. Conversely, in countries with strong governance structures, firms are more responsive to regulatory pressures, reducing the necessity for compensation-driven environmental incentives.

Our study makes several contributions to the literature. *First*, we extend the growing body of research on EC and CP (e.g., Saa et al., 2025; Simic et al., 2024; Orazalin et al., 2024; Morrison et al., 2025; Berrone and Gomez-Mejia, 2009; Cohen et al., 2023) by providing empirical evidence on how *EC* influences firms' environmental strategies. Unlike prior studies (e.g., Haque and Ntim, 2020; Adu et al., 2023; Orazalin et al., 2024; Morrison et al., 2025), we demonstrate that *EC* not only drives symbolic environmental commitments, but also contributes to substantive carbon performance improvements. Additionally, by incorporating insights from NIT, we highlight how firms operating in diverse regulatory environments adjust compensation policies to navigate environmental expectations. Our findings also complement existing research on the integration of corporate social responsibility (CSR) criteria into EC contracts across countries or international publicly traded firms (Aresu et al., 2023; Cohen et al., 2023), providing further empirical support for the strategic role of EC in sustainability initiatives.

*Second***,** we contribute to the CG literature by highlighting the moderating role of board structures in aligning executive incentives with environmental objectives. While board independence, gender diversity, and the presence of sustainability committees have been shown to influence firms' carbon disclosure and mitigation efforts (Liao et al., 2015; Velte, 2017; Morrison et al., 2025), our study extends these insights by demonstrating how board oversight strengthens the link between EC and substantive CP. In contrast to prior research that primarily focuses on governance mechanisms at the firm level (Peters & Romi, 2014; Simic et al., 2024), our analysis accounts for both corporate and national governance factors, offering a more comprehensive view of how board structures interact with external governance environments to shape sustainability outcomes. By identifying governance conditions under which EC becomes an effective tool for carbon mitigation, our study provides critical insights for firms seeking to design governance frameworks that enhance the credibility of their environmental commitments.

*Finally***,** we introduce national governance quality as a critical contextual factor influencing the effectiveness of compensation-driven environmental incentives, offering cross-country insights that have been largely overlooked in prior research. While existing studies highlight the impact of governance quality on corporate environmental disclosures and risk management (Peters & Romi, 2014; Saa et al., 2025), our study specifically examines how national governance institutions affect the EC–CP relationship. We provide evidence that firms in countries with strong regulatory frameworks rely less on incentive-based mechanisms, as compliance with environmental standards is primarily driven by regulations. In contrast, firms operating in countries with weak institutional governance tend to use higher executive compensation (EC) to enhance their carbon performance (CP), compensating for the lack of stringent regulatory enforcement. Accordingly, our findings contribute to the ongoing discourse on global sustainability governance by demonstrating that both firm-level and national governance structures influence corporate reliance on executive incentives to face the environmental challenges. These insights offer valuable implications for firms, policymakers, and investors in designing incentive structures that promote corporate sustainability across diverse regulatory environments.

The remainder of the paper is organised as follows: Section 2 provides a critical review of the theoretical and empirical literature and develops the hypotheses. Section 3 explains the data and research methodology, while Section 4 presents the empirical results and discussion. Finally, Section 5 offers a brief conclusion that highlights implications for policy and practice.

2 Theoretical framework and hypotheses development

2.1 Theoretical framework

According to institutional theory, organisations, like nations, are not only entities that produce goods and services, and compete for resources, they are also viewed as a system of cultural, ethical, moral, and social values, which ultimately seek legitimacy (Judge et al. 2010; Judge et al. 2008). Institutional theory (DiMaggio and Powell 1983; Oliver 1991; Scott 1995) argues that firms must comply with regulations, norms and stakeholder expectations to gain or maintain institutional legitimacy. To achieve this, firms incorporate their values with those within the institutional environment in which they operate (Berrone and Gomez-Mejia 2009).

Under this perspective, neo-institutional theory (North 1991) conceptualises ‘institutions’ as enduring systems of accepted economic and social practices, norms, and beliefs across overall society (e.g., religion, work, politics, laws, and regulations). *NIT* highlights the interplay between economic and social institutions in shaping organisational behaviour (Scott 2014). It emphasises that firms respond to institutional pressures driven by both efficiency (substantive, economic) and legitimation (symbolic, social) motives (Ntim and Soobaroyen, 2013; Haque and Ntim, 2018). The efficiency (instrumentality, substantiveness) perspective aligns with economics-based theories (e.g., resource dependence and agency theories), suggesting that economic institutions (nations, companies, and individuals) that focus on maximising their economic interests and pursuing growth by competing with other societal members for scarce societal resources (Haque and Ntim, 2020), seek to substantively engage in carbon reduction initiative in order to enhance efficiency and financial performance (Aguilera 2005). Conversely, the legitimation perspective is based on the sociologists’ viewpoint, which views institutions as entities (organisations and nations) that are more than a means to compete for resources; they are seeking social acceptance and their right to exist (Judge et al. 2010; Judge et al. 2008) by conforming to institutional constraints and forces, such as social values and stakeholder expectations (Oliver 1991). This perspective is highly consistent with socio-political theories (e.g., legitimacy and stakeholder theories) that explain a firm’s motivation and behaviour in terms of ‘social, moral, or symbolic’ practices within society.

DiMaggio and Powell (1991) introduced three forms of institutional isomorphism: coercive (regulatory pressures), mimetic (emulating best practice), and normative (the influence of professional standards). These forms explain how firms respond to institutional forces, pressures, and constraints. Coercive isomorphism arises from formal regulations and government mandates, or from indirect and informal pressures like cultural expectation; normative isomorphism stems from inspiration from professionalisation or adopting global norms, standards, and practices; and mimetic isomorphism involves emulating of successful environmental practices. These forms of isomorphisms lead organisations to adopt similar structures and practices to those within the same organisational environment that aim to improve their economic growth and/or organisational legitimacy (Haque and Ntim, 2018).

In the context of climate change, firms in emission-intensive industries are likely to face similar institutional pressures, such as community concerns, activist and media attention, and changes in consumer preference. These firms may respond by adopting similar carbon management practices to enhance both legitimacy and economic performance. Thus, carbon-related institutional pressures, constraints, and forces can be viewed in the three aforementioned forms of institutional isomorphism. For example, firms may need to (i) comply with national environmental regulations/guidelines to reduce the harmful impact of *GHG* (coercive, regulative), (ii) adhere to international norms on climate change and global warming, such as the Kyoto Protocol and Paris Agreement (normative), and/or (iii) learn from the best practice of good environmental performers as legitimate and successful social actors (mimetic, educative). Such isomorphic responses enable firms to benefit from being environmentally legitimate and recognise the value of conforming to stakeholder expectations, potentially yielding reputational benefits and improved access to resources.

Gaining environmental legitimacy allows firms to access new markets, reduce risks, and attract stakeholders (Liao et al. 2015; Godfrey 2005). Good environmental performers can benefit from increased customer trust, as some consumers are willing to pay a premium price for eco-friendly or 'green' products (Castaldo et al. 2009). In addition, some employees prefer to work in environmentally conscious firms, which leads environmentally legitimate firms to enjoy greater productivity and less employee turnover (Brammer et al. 2007). Also, investors and partners may invest money in legitimate, sustainable firms (Doh et al. 2009), which can enable such companies to have better access to resources (DiMaggio and Powell 1983). For example, attracting and securing expert talent by hiring high-performing employees able to rapidly respond to environmental mishaps might encourage firms to enhance their environmental performance (Berrone and Gomez-Mejia 2009).

In this sense, this study builds on prior research (Haque and Ntim, 2018, 2020) by employing NIT as a multi-dimensional theoretical framework to address its objectives. It can capture both symbolic/process-oriented *CP*, reflecting firms' commitments to environmental practices, and substantive/efficiency/outcome-oriented *CP*, which measures actual *GHG* emissions. Applying this theoretical framework helps our study to explain the multi-dimensional links among symbolic (initiatives and commitments) and substantive (carbon footprint and emissions intensity) *CP*, *EC*, and governance at the firm and national levels. Hence, traditional theories (e.g., stakeholder, legitimacy, and agency theories) are limited in independently capturing these interrelationships together. Moreover, this study addresses prior calls (e.g., Aguilera 2005) for adopting novel theoretical perspectives that may offer more advanced insights than traditional ones.

2.2 Executive compensation and carbon performance

As discussed, firms benefit from being environmentally legitimate and recognising the value of conforming to institutional pressures, such as regulation, global standards, social values, and stakeholder expectations. Drawing on *NIT*, and consistent with stakeholder-agency theory, stakeholders have a legitimate claim on a firm's resource allocation, pushing for investments that address environmental and emission concerns (Tauringana and Chithambo 2015). Responsible shareholders, enfranchised by the firm's processes, often advocate for having social and environmental objectives (Mahoney and Thorn 2006). Moreover, from the economic standpoint of *NIT*, carbon reduction investments can enhance a firm's value by reducing energy usage, creating opportunities to enter new markets, and improving its environmental image (Liao et al. 2015; Orazalin et al., 2024). Thus, shareholders may reward superior environmental performers with higher valuations and attracting investors (Clark and Crawford 2012). Accordingly, firms with better *CP* can see long-term financial gains (Hassan and Romilly 2018; Lee et al. 2015; Sariannidis et al. 2013; Iwata and Okada 2011).

However, NIT also suggests that powerful executives might resist such initiatives due to the uncertainty of short-term financial returns from environmental projects (Berrone and Gomez-Mejia 2009). This doubt may cause conflicts of interest with executives preferring not to invest in long-term projects like emission reductions that require significant time and substantial funds to come to fruition (Haque 2017; Darnall et al. 2010). Implementing effective carbon reduction strategies often necessitates (i) new technologies and equipment installation, (ii) the re-design of production systems, operational procedures, or policies, and (iii) skilled personnel[2], making these

[2]Berrone and Gomez-Mejia (2009) argue that achieving strong environmental performance, such as implementing good carbon reduction strategies, requires adopting new technologies, installing equipment, and re-designing production processes, which can be challenging. Moreover, successful implementation of environmental protection or carbon abatement projects depends on skilled professionals, who can lead green initiatives (i.e., designing green products and services), react effectively to environmental mishaps, and minimise legal and social sanctions (Haque and Ntim 2020).

initiatives challenging (Berrone and Gomez-Mejia, 2009; Haque and Ntim, 2020). Thus, executives may view the link between environmental and financial performance as not straightforward, ambiguous even, so they may not be motivated to pursue emission reduction (Tauringana and Chithambo 2015; Bansal 2005). Indeed, they may opt for symbolic actions to maintain their environmental image rather than committing to substantive changes[3] (Bui et al. 2020).

One way to align management decisions with stakeholder expectations is for firms to strategically employ incentive-based executive compensation plans (Mahoney and Thorn 2006; Elmagrhi et al. 2020; Morrison et al., 2025). While *EC* has traditionally focused on financial performance (Maas 2018), more recent research indicates that aligning incentives with carbon reduction goals and performance can motivate executives in this direction (Tauringana and Chithambo, 2015; Haque, 2017; Haque and Ntim 2020; Cohen et al., 2023; Simic et al., 2024; Morrison et al., 2025). Indeed, incentive-based mechanisms seem to be an effective tool in encouraging firms' executives to become involved with carbon reduction investments. In line with this, recent studies emphasise the role of executive compensation in linking environmental claims to actual sustainability efforts. Specifically, companies with sustainability plans and carbon neutrality goals are more likely to include environmental targets in executive pay, highlighting compensation as a key indicator of genuine commitment to sustainability and a potential tool for identifying greenwashing (Ratti et al., 2023).

Empirically, prior environmental accounting literature has documented a positive association between compensation policies and environmental performance (Haque 2017; Haque and Ntim 2018, 2020; Berrone and Gomez-Mejia 2009; Cordeiro and Sarkis 2008; Maas 2018; Mahoney and Thorn 2006; Aresu et al., 2023; Cohen et al., 2023; Morrison et al., 2025; Simic et al., 2024; Saa et al., 2025). For example, Cordeiro and Sarkis (2008), and Berrone and Gomez-Mejia (2009)

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[3]Even when executives acknowledge the value of strong environmental performance, they may avoid investing in carbon reduction projects, viewing them as less conservative. Instead, managers might engage in symbolic actions to appear environmentally responsible, effectively greenwashing their poor performance (Bui et al. 2020). To enhance legitimacy, firms should incentivise management to adopt genuine environmental strategies, such as carbon reduction initiatives, especially those in high-polluting industries.

found a significant positive link between total CEO compensation and the environmental performance of US firms. Similarly, Mahoney and Thorn (2006), and Ji (2015) found that long-term compensation has a positive link with CSR among Canadian and US firms, respectively. Further, by analysing a sample from industrialised European countries, Haque and Ntim (2020) found *EC* to be positively related to emission reduction initiatives but not to actual *GHG* emissions. Haque (2017), along with Saa et al. (2025) and Morrison et al. (2025), also documented similar findings, with the former focusing on UK firms and the latter providing evidence at a global scale.

In sum, this study expects firms to link compensation policy with *CP*. To critically challenge this supposition and gain the necessary insight, we examine the association between *EC* and *CP* by using a global sample to learn whether executive compensation can effectively promote carbon reduction initiatives, and environmental responsibility generally across firms' decision-making, which might encourage their executives to improve their *CP*. Following prior research (e.g., Busch and Hoffmann 2011; Delmas et al. 2013; Haque 2017; Haque and Ntim 2020; Moussa et al. 2020; Orazalin et al., 2024), this study uses two distinct measures, arising from contrasting perspectives, of *CP*: the symbolic/process-oriented *CP* (carbon reduction initiatives) and the substantive/outcome-oriented *CP* (emissions intensity). From the legitimation perspective of *NIT*, compensation policies may promote carbon reduction initiatives that will improve process-oriented *CP*, exposing us to lesser climate-related risk and gaining better legitimacy in the short term, as symbolic behaviour, but without necessarily achieving substantial emission reductions. On the other hand, from the efficiency perspective of *NIT*, well-designed compensation packages could also incentivise executives to engage in *GHG* abatement projects, enhancing the actual environmental performance and yielding financial benefits (Campbell et al. 2007). Thus, the first two hypotheses are:

H1(a): *EC has a positive association with process-oriented CP (emission reduction initiatives).*

H1(b): *EC has a negative association with poor-outcome-oriented CP (emission intensity).*

2.3 The moderating role of corporate governance

NIT posits that organisations operate within a broader social and institutional environment that shapes their behaviours to secure legitimacy, stability, and resource access (DiMaggio and Powell

1983). In this context, corporate governance mechanisms can serve as institutional structures that influence managerial actions, including how *EC* may align with climate change and carbon impacts. In line with the agency theory literature, corporate governance mechanisms are essential for aligning managers' interests with those of stakeholders (Aguilera 2005; Aresu et al., 2023). From a neo-institutional perspective, strong corporate governance can reinforce the legitimacy of firms by aligning executive incentives with socially and environmentally responsible practices. For example, governance mechanisms that ensure robust board oversight, independence, and diversity will help foster a culture of accountability and transparency, which in turn, puts pressure on executives to go beyond mere symbolic compliance and engage in substantive carbon reduction efforts.

Indeed, effective corporate governance, characterised by robust internal structures, plays a crucial role in monitoring management performance and developing incentive packages that motivate executives to meet both financial and non-financial goals (Conyon and Peck 1998). The board of directors, in particular, is responsible for guiding executives toward decisions that meet stakeholder needs and expectations, thereby enhancing the firm's *CP* (Mahoney and Thorn 2006; Elmagrhi et al. 2020; Orazalin et al., 2024). Therefore, boards with effective internal structures are more likely to shape a well-designed compensation package that aims to encourage executives to pursue carbon reduction goals and move beyond mere symbolic engagement (addressing legitimacy concerns) to achieve substantive reductions in carbon emissions, thereby improving operational efficiency (Berrone and Gomez-Mejia 2009; Luo and Tang 2016; Liao et al. 2015; Aresu et al., 2023; Morrison et al., 2025; Saa et al., 2025; Orazalin et al., 2024). Conversely, boards with weaker structures may prioritise appearance over substance, focusing on superficial efforts only, linking compensation to minimal environmental performance indicators and neglecting substantive improvements (Bui et al. 2020; Kassinis and Vafeas 2002).

Accordingly, this study focuses on five key corporate governance mechanisms in board structure: board size, independent directors, CEO-chair role duality, women on the board, and the presence of a sustainability committee. Each mechanism can significantly influence the link between *EC* and *CP*. For instance, larger boards tend to have a broader range of expertise and perspectives, which can enhance decision-making processes related to environmental strategies (Galbreath 2010). Independent directors are more likely to advocate for long-term value creation, including environmental sustainability, as they are less influenced by internal management (Haque 2017; Liao et al. 2015). The separation of CEO and chair roles, known as CEO-chair duality, is believed to strengthen board independence, reducing potential conflicts of interest and promoting decisions that prioritize carbon reduction (Prado-Lorenzo and Garcia-Sanchez 2010; Galbreath 2010). Greater female representation on boards is linked to stronger sustainability practices, as more diverse boards are more likely to adopt comprehensive and forward-looking environmental policies (Haque 2017; Ben-Amar et al. 2017; Tingbani et al. 2020). Finally, the presence of a sustainability committee indicates a firm's commitment to integrating environmental considerations into its strategic planning and governance framework (Peters and Romi 2014; Liao et al. 2015; Liu 2024)

Prior studies in carbon accounting (CA) have demonstrated that corporate governance, particularly effective board characteristics, significantly influences *CP* (Haque 2017; Moussa et al. 2020; Galbreath 2010; Aggarwal and Dow 2012; Ben-Amar and McIlkenny 2015; Homroy and Slechten 2019; Hsueh 2019; Aresu et al., 2023; Morrison et al., 2025; Saa et al., 2025; Orazalin et al., 2024). For example, Galbreath (2010) found that firms with a larger number of directors and independent members on the board tend to achieve higher *CP*. Similarly, Haque (2017) showed that boards with greater gender diversity and independence are more likely to implement effective carbon-reduction initiatives. Aggarwal and Dow (2012) noted that institutional ownership and board entrenchment significantly impact climate change and carbon mitigation policies in large US firms. Additionally, Calza et al. (2016) found that firms with high state ownership exhibit greater environmental proactivity, while concentrated ownership is associated with less 'green' proactivity. Moreover, de Villiers et al. (2011) linked strong environmental performance to robust board oversight, namely higher independence, larger boards, active CEO participation, and legal expertise. Similarly, Aresu et al. (2023) demonstrated that corporate governance mechanisms have a moderating effect, with greater board independence strengthening the CSR–EC relationship, while blockholder ownership weakens it. Morrison et al. (2025) further highlighted that strong sustainability integration within board governance effectively reduces GHG emissions. Similarly, Simic et al. (2024) found that board gender diversity significantly moderates the relationship between executive compensation and voluntary carbon assurance.

Collectively, governance structures that promote board oversight, independence, and gender diversity, and establish specialized sustainability committees, signal to external stakeholders their firm's commitment to genuine environmental stewardship. These mechanisms help institutionalize sustainability goals within decision-making processes, ensuring that *EC* is aligned with both short-term symbolic actions and long-term substantive *CP* improvements. By embedding such governance mechanisms, firms enhance their legitimacy in the institutional environment while strengthening the link between *EC* and *CP*. This alignment incentivizes executives to improve environmental outcomes, addressing both stakeholder expectations and institutional pressures. Therefore, our study argues that effective corporate governance allows a firm's board of directors to evaluate carbon-related risks and integrate them into compensation policies. By linking *EC* with *CP*, good governance practices can create incentive schemes that motivate senior management to enhance environmental outcomes. Accordingly, the following hypotheses are proposed:

H2(a): *Good corporate governance reinforces a positive association between EC and process-oriented CP (reduction initiatives).*

H2(b): *Good corporate governance reinforces a negative association between EC and poor-outcome-oriented CP (emission intensity).*

2.4 The moderating role of national governance quality

Based on the institutional theory perspective, organisational practices, including governance practices that address emissions impacts, are shaped by coercive, mimetic, and normative pressures within their institutional environment (DiMaggio and Powell 1983). Given the international context of this study, variations in country-level institutional factors – such as legal frameworks, political influences, social norms, and cultural values – are likely to influence how firms respond differently to diverse stakeholder expectations (Lau et al. 2002). Different governments implement different regulations, policies, and reforms to achieve their institutional goals and plans, including those related to environmental impacts and emissions management (Arranz et al. 2019; Hartmann and Uhlenbruck 2015).

Moreover, national governance and corporate governance often complement each other in protecting stakeholders' interests (Doidge et al. 2007). Since institutional environments shape corporate behaviour and strategies (Sun et al. 2019), firms operating across different countries are expected to exhibit variations in their environmental and corporate practices. Clearly, a firm's *CP* is not only influenced by its corporate governance but also by the quality of the national governance systems in which it operates. National governance quality can affect a firm's strategic decision-making, such as designing policies and incentive structures that meet the expectations of diverse stakeholders.

Prior research has investigated the influence of national institutional frameworks on environmental performance and how it matters. For example, using a sample of European companies, Orazalin and Mahmood (2021) concluded that higher quality in country-level governance leads to better environmental performance. Similarly, Hartmann and Uhlenbruck (2015) found that the macro-level institutional environment is significantly and positively related to corporate environmental performance. Studies by Welford (2004) and Abreu et al. (2012), among others, demonstrate how differences in institutional and legal systems across countries affect firms' adoption of CSR practices. Furthermore, Ortas et al. (2015) argue that variations in environmental, social, and governance (ESG) performance can be attributed to differences in social, cultural, legal, and regulatory contexts across countries.

Drawing on a neo-institutional perspective, this study posits that the quality of national governance influences firms' engagement in carbon reduction initiatives and encourages them to reshape their policies, strategic plans, and incentive schemes to effectively mitigate emissions, thereby leading to improved outcome-oriented carbon performance. Consequently, the following hypotheses are proposed:

H3(a): *The positive association between EC and process-oriented CP is stronger in countries with higher national governance quality*.

H3(b): *The negative association between EC and poor-outcome-oriented CP is stronger in countries with higher national governance quality*.

3 Research design and methodology

3.1 Sample and data

Our sample covers all listed firms in the S&P Global 1200 Index[4]. Data for all listed firms as of March 2021 were collected from several sources. Firm-level data on carbon performance, compensation, and corporate governance were obtained from LSEG (formerly known as Refinitiv ASSET4 ESG database)[5], and financial data from the Worldscope database. For national-level data, GDP per capita and worldwide governance indicators were collected from the World Bank, and data on national culture from the Geert Hofstede website. The initial sample consisted of 17,961 firm-year observations. After removing 4,548 observations with missing data for firm-level and national-level variables – due to incomplete ESG information in LSEG, World Bank data, and other independent variable data – the final sample is based on an unbalanced panel dataset of 13,413 firm-year observations from 1,122 listed firms across 28 countries and 11 industries, covering a period of 18 years (2002 to 2019)[6]. ***Table 1*** presents the distribution of our final sample across countries and industries.

Insert **Table 1** about here

3.2 Empirical model and variables

In order to examine the associations among *CP*, compensation, corporate governance, and national governance quality, we followed prior research in the CA literature (e.g., Aggarwal and Dow 2012; Luo and Tang 2016; Clarkson et al. 2008; Busch and Hoffmann 2011; Bui et al. 2020; Apergis et al. 2013) by using correlations as univariate analysis and ordinary least squares (OLS) regression as main multivariate analysis to examine the interrelationships among these constructs.

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[4]The S&P Global 1200 Index is an internationally diversified index covering approximately 70% of global market capitalisation. It consists of companies listed in seven headline indices across 30 countries: S&P 500 (US), S&P Europe 350, S&P TOPIX 150 (Japan), S&P/TSX 60 (Canada), S&P/ASX All Australian 50, S&P Asia 50, and S&P Latin America 40 – as many of these indices are accepted leaders in their regions (Hassan 2018).
[5]Refinitiv's ASSET4 ESG database became part of the London Stock Exchange Group (LSEG) following LSEG's acquisition of Refinitiv in 2021. Therefore, throughout this paper, we refer to the database as LSEG.
[6]As corporate environmental data in LSEG is only available from 2002, our dataset begins from 2002.

As presented in the conceptual framework (***Figure 1***), this study captures two different measures of *CP* (*CRI* and *INT*) as dependent variables, one for ECs as an independent variable, and seven corporate and national governance measures as moderators.

Insert **Figure 1** about here

Given the unbalanced panel data over 18 years, using an estimator technique like OLS may introduce biased output. Zalata et al. (2018) argue that panel data analysis can suffer from cross-sectional and time-series correlations, which have potential to bias the findings. To minimize this bias and ensure robust results, this study follows prior research (e.g., Derchi et al. 2021; Zalata et al. 2018; Trumpp and Guenther 2017) by employing OLS regressions with (i) clustered standard errors at the firm level, controlling for cross-sectional correlation and potential heteroskedasticity among firms' observations over different years; (ii) year dummy variables to account for time-series correlation; (iii) dummy variables for the firm's primary ICB code to control for industry-specific variations over firms' performance, consistent with (Mahoney and Thorn 2006). Using carbon performance (*CRI* and *INT*) as the dependent variable, our study estimates the following models to examine how *EC* is linked to *CRI* and *INT* **(*H1a, H1b***):

$$CP(CRI)_{it} = \alpha + \beta_1\, EC_{it} + \sum \beta_k\, CONTROLS_{it} + \varepsilon_{it} \tag{1}$$

$$CP(INT)_{it} = \alpha + \beta_1\, EC_{it} + \sum \beta_k\, CONTROLS_{it} + \varepsilon_{it} \tag{2}$$

In these models, carbon performance *(CP)* of a specific firm *i* in a specific year *t*, either carbon initiatives (*CRI*) or carbon intensity (*INT)*, is a function of executive compensation (*EC*), control variables (*CONTROLS*), and the error term ε. In particular, *CONTROLS* at firm level includes board size (*BSIZ*), CSR/sustainability committee (*CSRCO*), board independence (*INEDs*), board gender diversity (*WOB*), CEO-chair duality (*CEOD*), firm size (*FSIZ*), leverage (*LEV*), profitability (*ROA*), liquidity / financial slack / cash flow (*CF*), and market-to-book value of equity (*MTB*). Meanwhile, *CONTROLS* at country level includes: being a United Nations global compact signatory (*UNGC*), an emission trading scheme (*ETS*)[7], gross domestic product per capita (*GDPPC*), the legal system (*LEGAL*), Kyoto protocol ratification (*KYOTO*), and four culture scores, namely power distance (*PDI*), individualism (*IND*), long-term orientation (*LTO*), and uncertainty avoidance (*UAI*). ***Table 2*** describes all the variables used in these empirical models.

Furthermore, if there is a significant relationship between *EC* and *CP*, the moderating effects of firm-specific corporate governance (***H2a*** and ***H2b***) and national governance quality (***H3a*** and ***H3b***) on this relationship are tested. Specifically, both **Eq. (1)** and **Eq. (2)** are extended by adding firm-specific corporate governance measures (*CG*) and the interaction of these measures with executive compensation (*EC***CG*) as independent variables to examine the moderation role of firm-specific corporate governance mechanisms, as shown in **Eq. (3)**. Similarly, the moderating role of national governance quality is examined through adding its measure (*NGI*) and the interaction of *NGI* with executive compensation (*EC***NGI*) as independent variables to the main models **Eq. (1)** and **Eq. (2)** as shown in **Eq. (4)**:

$$CP\ (CRI/INT)_{it} = \alpha + \beta_1\ EC_{it} + \beta_2\ CG_{it} + \beta_3\ (EC * CG)_{it} + \sum \beta_k\ CONTROLS_{it} + \varepsilon_{it} \qquad (3)$$

$$CP(CRI/INT)_{it} = \alpha + \beta_1\ EC_{it} + \beta_2\ NGI_{it} + \beta_3\ (EC * NGI)_{it} + \sum \beta_k\ CONTROLS_{it} + \varepsilon_{it} \qquad (4)$$

In model (3), the carbon performance (*CP*) of a specific firm *i* in a specific year *t*, either carbon initiatives (*CRI*) or carbon intensity (*INT*), is a function of executive compensation (*EC*) and firm-specific corporate governance measures (*CG*), namely board size (*BSIZ*), CSR/sustainability committee (*CSRCO*), board independence (*INEDs*), board gender diversity (*WOB*), and CEO-chair duality (*CEOD*), the interaction of these measures with executive compensation (*EC***CG*), control variables (*CONTROLS*), and the error term *ε*. In model (4), we replace corporate governance variables with the national governance index (*NGI*), and the interaction of *NGI* with executive compensation (*EC***NGI*). ***Table 2*** describes all the variables used in these empirical models.

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[7]ETS is a formal carbon institution used by governments to stimulate cost-effective *GHG* reduction (Luo et al. 2018).

Insert **Table 2** about here

3.2.1 Dependent variables

Following prior research (e.g., Busch and Hoffmann 2011; Haque 2017; Haque and Ntim 2020; Moussa et al. 2020; Delmas et al. 2013), this study distinguishes between two dimensions of carbon performance: process-oriented *CP* (initiatives, symbolic) and outcome-oriented *CP* (actual, substantive, efficient). While the process-oriented *CP* reflects strategic initiatives and symbolic efforts aimed at reducing emissions, the outcome-oriented *CP* captures the quantifiable actual and substantive results of these efforts in terms of actual *GHG* emissions.

This study measures the symbolic/process-oriented *CP* using the Carbon Reduction Initiatives (*CRI*) index, which represents a firm's internal activities aimed at addressing climate change and reducing *GHG* emissions. The *CRI* index encompasses a range of firm-level initiatives, namely renewable energy use, energy efficiency improvements, participation in emissions trading, and risk assessments related to climate change. A higher *CRI* score indicates a stronger commitment to addressing environmental concerns and reflects a firm's strategic initiatives in reducing emissions. The *CRI* index used in this study is based on 10 indicators, following the methodologies used by Matsumura et al. (2014), Haque (2017), Haque and Ntim (2020), and Adu et al. (2022). Our study has tested the reliability and validity of this measure through a Cronbach's alpha test, and confirmed this with an alpha value of 0.8108, exceeding the acceptable threshold of 0.65 (Thompson and Hansen 2012). This indicates that all individual items in the constructed variable have relatively high internal consistency and are thereby considered valid measures. ***Table 3*** provides details of all activities used to construct the *CRI* index.

On the other hand, this study measures substantive/efficient/outcome-oriented *CP* using firm carbon intensity (*INT*). Previous studies (e.g., Haque and Ntim 2020; Matsumura et al. 2014) have used absolute emissions (in tonnes) to measure outcome-based *CP,* while others (e.g., Lannelongue et al. 2015; Busch and Hoffmann 2011) advocate for the use of emission intensity as the ratio of total emissions to a business metric such as sales revenue. Olsthoorn et al. (2001, p. 454) argue, for instance, that '1000 tons of CO2 emitted does not mean a lot without information about the context in which this emission took place'. Thus, carbon intensity may better reflect the outcome-oriented/actual *CP* from the efficiency perspective, in terms of the extent to which the improvements to and the efficient plans adopted by firms are making progress toward lowering carbon emissions from their operations, for example (Olson 2010). In this way, emission intensity allows for more useful comparisons across firms of different sizes, sectors, and economies, as it adjusts for economic conditions and operational scale (Luo et al. 2018). Lower emission intensity signifies more efficient *CP*, as fewer emissions are generated per unit of output (Hoffmann and Busch 2008; Busch and Lewandowski 2018). In line with prior research (Qian and Schaltegger 2017; Busch and Hoffmann 2011; Luo et al. 2018; Patten 2002; Qian and Xing 2018), our study calculates *INT* as the natural logarithm of the ratio of total carbon emissions (Scope 1 and Scope 2) to total sales[8].

To ensure robustness, this study also employs two additional measures: The Emissions Pillar Score (*ESCOR*) from the LSEG database as an alternative for process-oriented *CP*, and the natural logarithm of total *GHG* emissions (*GHG*) for outcome-oriented *CP*.

Insert **Table 3** about here

3.2.2 Independent and moderating variables

As outlined in the study's conceptual framework (***Figure 1***), *EC* is the main independent variable, measured as the natural logarithm of the total compensation paid to senior executives (in US dollars). Additionally, this study also employed another compensation measure related to equity-based compensation (*EQC*) as a robustness check. *EQC* is the natural logarithm of the provision for stock option compensation as reported by the firm (in US dollars).

Regarding the moderating variables, this study examines the moderating effects of governance at both the firm and national levels on the relationship between *EC* and *CP*. At the firm level, five broad-characteristic variables are considered as internal corporate governance mechanisms, namely board size (*BSIZ*), having a sustainability committee (*CSRCO*), board independence

[8]Since INT reflects actual polluted emission levels, outcome-oriented CP should be read as a negative indicator. Specifically, a lower INT value indicates better carbon performance, greater efficiency, and reduced environmental impact, while a higher value indicates poor performance.

(*INEDs*), board gender diversity (*WOB*) and CEO-chair duality (*CEOD*). Board size is measured as the natural logarithm of total board members, while the presence of a sustainability committee is coded as a dummy variable, with 1 representing firms with a dedicated committee for CSR and sustainability, and 0 otherwise. Board independence is measured by the percentage of independent non-executive directors, and board gender diversity by the percentage of female directors. Lastly, CEO-chair duality is coded as a dummy variable, with 1 indicating that the CEO also serves as board chairman, and 0 otherwise.

At the national level, our study explores the moderating effect of national governance quality (*NGI*) on the *EC-CP* nexus, capturing the country's overall regulatory environment. The *NGI* variable is derived from the World Bank's Worldwide Governance Indicators (*WGI*) project, which measures voice and accountability, regulatory quality, rule of law, control of corruption, government effectiveness, and political stability. These indicators, frequently used in CA research (e.g., Choi and Luo 2021; Guenther et al. 2016; Alrazi et al. 2016; Hassan and Romilly 2018), are strongly statistically correlated and often appear to be measuring the same broad concept (Langbein and Knack 2010). Therefore, following Hassan (2018), our study applies the principal component analysis to the six indicators, measuring *NGI* by using the first principal component in subsequent analysis. This component explains 76% of the variation in the original six indicators, as shown in ***Appendix 1***.

3.2.3 Control variables

To control for the determinants of *CP*, this study follows prior research (Haque 2017; Haque and Ntim 2020; Moussa et al. 2020; Hassan and Romilly 2018; Qian and Xing 2018; Xue et al. 2020) and incorporates a range of control variables at both the firm and country levels. At the firm level, corporate governance indicators, namely board size (*BSIZ*), having a CSR committee (*CSRCO*), board independence (*INEDs*), board gender diversity (*WOB*), and CEO-chair duality (*CEOD*) are included, along with firm-specific characteristics, namely firm size (*FSIZ*), leverage (*LEV*), profitability (*ROA*), liquidity / financial slack / cash flow (*CF*), and market-to-book ratio (*MTB*). Country-level indicators include UN Global Compact (*UNGC*) signatory status, emissions trading schemes (*ETS*), GDP per capita (*GDPPC*), the legal system (*LEGAL*), Kyoto Protocol ratification (*KYOTO*), along with cultural indicator indices, namely power distance (*PDI*), individualism

(*IND*), long-term orientation (*LTO*), and uncertainty avoidance (*UAI*). The full definitions of all variables are presented in ***Table 2***.

For instance, *FSIZ* is expected to significantly impact *CP*, with larger firms subject to greater public scrutiny, making them more proactive in carbon reduction activities (Moussa et al. 2020). However, large firms may increase *GHG* emissions due to higher production, unless they invest in environmentally friendly technology, which requires substantial capital (Haque and Ntim 2018). Firms with higher *ROA* and *CF* are more likely to invest in energy-efficient technologies and adopt proactive environmental strategies (de Villiers et al. 2011; Moussa et al. 2020). Thus, both *ROA* and *CF* are expected to positively relate to process-oriented *CP* and negatively to poor-outcome-oriented *CP*. *LEV* is controlled as highly leveraged firms may engage more in environmental initiatives to meet stakeholder expectations and enhance legitimacy (Haque 2017). *MTB* is included since firms with higher values are likely to seek more investment opportunities and engage in environmental activities for competitive advantage (de Villiers et al. 2011; Haque and Ntim 2020). At the country level, national and international environmental policies, such as those promoted by UNGC, ETS, and KYOTO, are anticipated to positively influence process-oriented *CP* (Haque and Ntim 2018; Luo and Tang 2016). *GDPPC* is included to reflect economic development, with the expectation that wealthier countries invest more in carbon reduction, while less developed nations may prioritize economic growth over pollution prevention (Luo et al. 2018). *LEGAL* is controlled as it influences *CG* structures, business culture, and firm-stakeholder relationships (Alrazi et al. 2016). Following prior studies (Zhou et al. 2016; Prado-Lorenzo and Garcia-Sanchez 2010; Trumpp and Guenther 2017), it is expected that firms in code law countries will be more stakeholder-oriented and environmentally responsible, whereas common law systems will focus more on shareholder wealth maximization[9]. Therefore, a positive association between *CP* and code law, and accordingly a negative association with common law, is expected.

[9]Code law is mainly adopted by countries with predominantly French, German, and Scandinavian origins. In contrast, common law is adopted by countries with predominantly English origins (Zhou et al. 2016).

4 Data analysis and discussion

4.1 Descriptive statistics and univariate analysis

Table 4 summarises the descriptive statistics of all variables. It shows that the values of the *CRI* (*ESCOR*) index range from a minimum of 0 (0) to a maximum of 10 (99.81), with a mean value of 4.833 (53.58) and a standard deviation of 2.610 (34.15). In addition, actual carbon emission *GHG* (*INT*) values range from 2.303 (-4.605) to 19.29 (9.650), with a mean value of 13.23 (3.810) and a standard deviation of 2.410 (2.077). Regarding *EC*, the values range from 4.904 to 21.83, with a mean value of 16.54 and a standard deviation of 1.102. Further, and consistent with the results of prior studies examining international samples (Qian and Schaltegger 2017; Lu and Wang 2021), ***Table 4*** shows that the average board size among the sample firms is around 11 members, and the proportion of both independent and female directors on the board are 71% and 19%, respectively. Furthermore, and similar to the research by Lu and Wang (2021), this study finds that around half of the sample firms (50.3%) have separate board-chair and CEO roles (CEOD = 0), and 62% of the sample have board-level committees responsible for decision-making related to sustainability activities. ***Table 5*** presents the bivariate correlations among all variables. The correlation coefficients among all independent variables are below 0.8, suggesting no serious multicollinearity problems[10] (i.e., high correlations); they are suitable to include in the regression models. ***Table 5*** shows that both proxies of *EC* (*EC*, *EQC*) are positively correlated with process-oriented *CP* (*CRI*), which is consistent with ***H1(a)***. It also shows that *EC* and *EQC* are negatively correlated with the outcome-oriented *CP* (*INT*), consistent with ***H1(b)***. Overall, the results of the bivariate analysis support both ***H1(a)*** and ***H1(b).*** Furthermore, most control variables are significantly correlated with all *CP* variables, suggesting that the change in all control variables can explain the changes (either an increase or decrease) in *CP*.

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[10]We also estimated the variance inflation factor (VIF) for all regressions to test for any serious multicollinearity. The VIF values of all independent variables were below the critical value of 10, which indicates that all estimations have no serious multicollinearity problems, see Chatterjee et al. (2000). For brevity, the VIF results are not shown but are available upon request.

Insert **Table 4** about here

Insert **Table 5** about here

4.2 Multivariate analyses and discussion

4.2.1 Carbon performance and executive compensation

Table 6 reports the estimated regression results of model (1) and model (2) for both carbon performance dimensions, *CRI* and *INT*, respectively. Column (1) reports the estimated results of **Eq. (1)** for testing ***H1(a)*** on the relationship between *EC* and *CRI* as the main test variables, combined with all firm- and national-level control variables. It is shown that *EC* has a statistically significant positive association with *CRI*, as expected. In terms of the outcome-oriented (substantive) *CP*, column (2) shows the estimated results of **Eq. (2)** for testing ***H1(b)*** on the relationship between *EC* and *INT* as the main test variables, together with the control variables. It reports that the association between *EC* and *INT* is negative and statistically significant at the 5% level. This result is also consistent with what is expected in ***H1(b)***. These results generally confirm that *EC* has a statistically significant positive (negative) association with good (poor) *CP*, as expected.

Insert **Table 6** about here

Altogether, the results presented in ***Table 6*** support both ***H1(a)*** and ***H1(b)***, confirming that the level of *EC* is positively associated with process-oriented *CP* (carbon reduction initiatives) and negatively associated with outcome-oriented *CP* (high carbon intensity). These findings support the legitimation and efficiency aspects of *NIT* used to develop both hypotheses. Moreover, consistent with the agency theory literature, the results suggest that the incentive-based mechanism, *EC*, serves as an effective instrument to encourage managers to seek better carbon performance. These findings indicate that *EC* is likely to enhance managers' commitment to engage with carbon reduction initiatives by the integration of such commitments into their policies, operational processes, and strategic actions, in seeking environmental legitimacy and meeting stakeholder expectations. This supports the legitimation aspect of *NIT* and socio-political theories. Additionally, contrary to Haque and Ntim (2020), Morrison et al. (2025) and Saa et al. (2025), our study shows that *EC* not only improves initiatives-based *CP* but also encourages executives to reduce their footprint of harmful *GHG* emissions, potentially through long-term investments in carbon abatement projects that can substantively reduce a firm's emission intensity, which is reflected in their financial performance. This highlights the efficiency aspect of *NIT* and the economic perspectives. Overall, these findings corroborate prior environmental accounting research (Haque 2017; Haque and Ntim 2018, 2020; Berrone and Gomez-Mejia 2009; Cordeiro and Sarkis 2008; Maas 2018; Mahoney and Thorn 2006; Cohen et al., 2023; Orazalin et al., 2024; Morrison et al., 2025; Simic et al., 2024; Saa et al., 2025), which documented a positive association between *EC* packages and good environmental/CSR/ESG performance.

4.2.2 The moderating role of corporate governance

Table 7 shows the estimated results for testing ***H2(a)*** in Panel A and ***H2(b)*** in Panel B for whether the internal corporate governance mechanisms of the board structure would moderate the link between *EC* and *CP*, expecting that the moderating effect would strengthen the positive (negative) relationship between *EC* and initiatives (high intensity) based *CP*. In particular, columns (1), (2), (3), (4), and (5) display the results for the moderating effects of *BSIZ, CSRCO*, *INEDs*, *WOB*, and *CEOD* on the *EC*-*CP* nexus, respectively. At all regressions, the interaction variables (moderation effects) have been created as proxies of *EC* (centred) with *CG* mechanisms (dummy)[11].

Consistent with ***H2(a)***, the estimated results in columns (1), (3), and (5) at Panel A (with symbolic/process-oriented *CP* and *CRI* as dependent variables) show that the coefficients of the interaction term *EC*BSIZ*, *EC*INEDs*, and *EC*CEOD* are positive and significant at the 1%, 5% and 5% levels, respectively. However, columns (2) and (4) display the coefficients of the interaction terms *EC*CSRCO* and *EC*WOB* as statistically insignificant (p-value > 10%). In summary, firms with a large board, more independent directors, and duality in their CEO and chair positions are more likely to link *EC* with symbolic/initiatives/process-oriented *CP*. Regarding the substantive (actual/outputs) *CP*, the results in Panel B (with substantive/actual/outcome-oriented

[11] The median-based dummy variables were created for the continuous *CG* variables and used to facilitate interpretations regarding the interaction terms and main relationship (*EC*-*CP*).

CP and *INT* as dependent variables) are generally consistent with ***H2(b)***. Specifically, the results in columns (3) and (4) show that the interaction terms *EC*INEDs* and *EC*WOB* are significantly and negatively connected to *INT*. Similarly, although the results in columns (1), (2), and (5) show a positive relationship between *EC* and *INT* when considering the interaction terms *EC*BSIZ*, EC**CSRCO* and *EC*CEOD,* the coefficients of the interaction terms are significantly and negatively associated with *INT*.

Insert **Table 7** about here

Altogether, this study provides evidence of the moderating role of several *CG*/board characteristics in linking *EC* to both initiatives/symbolic/process-oriented and substantive/outcome-oriented *CP*. First, the results indicate that firms with larger boards, a higher proportion of independent non-executive directors, and CEO-Chair role duality are likely to have a strengthened link between *EC* and carbon performance. These characteristics in board structure provide managers with greater incentives to engage symbolically in carbon reduction initiatives and substantively in carbon abatement projects to reduce their emissions intensity. Second, it suggests that the presence of women on the board and a sustainability committee seem to privilege, prioritise, and inform the decisions to link compensation packages to substantive/outcome-oriented *CP*, such as the level of actual *GHG* emissions, rather than symbolically in carbon-related initiatives and commitments only. As highlighted in the literature section, the structure of a firm's board plays a crucial role in designing and shaping effective incentive schemes that can guide and steer executives towards both improved carbon performance and aligned stakeholder expectations and needs for protecting and enhancing their environmental legitimacy.

4.2.3 The moderating role of national governance quality

Columns (1) and (2) of ***Table 8*** present the estimated results for testing ***H3(a)*** and ***H3(b)***, examining the moderating role of a country's governance quality (*EC*NGI*) on the relationship between *EC* and *CP* (*CRI* and *INT)*, along with firm- and national-level control variables. In column (1), the coefficient for the interaction term *EC*NGI* is statistically insignificant, indicating no significant moderating effect on process-oriented carbon performance. However, column (2) reveals a positive and significant coefficient of the interaction term between *EC* and good *NGI*, suggesting that high *NGI* positively moderates the relationship between *EC* and actual *CP*: *INT*.

Although these results are inconsistent with our hypotheses, a possible explanation for the insignificant interaction between *EC* and *NGI* on symbolic *CP* (column 1) is that countries with strong governance tend to prioritise substantive actions that directly reduce *GHG* emissions. Governments in these countries are more focused on actual, measurable reductions in carbon emissions rather than symbolic commitments or initiatives that merely signal intent without producing immediate environmental impact. Symbolic *CP*, such as the adoption of carbon reduction initiatives, often represents a firm's intention to act on environmental issues but may not lead to immediate reductions in emissions. Thus, *NGI* may not significantly influence how *EC* relates to these symbolic actions, as governments are more concerned with tangible outcomes like reduced emissions. In contrast, outcome-oriented *CP* (as shown in column 2) reflects measurable emissions reductions, which directly affect the national carbon footprint. Changes in firm-level carbon emissions contribute to a country's overall *GHG* emissions, given that climate change is a global issue requiring collective action. This connection could explain why *NGI* significantly moderates the relationship between *EC* and *INT*. Firms operating in countries with strong governance frameworks may already be motivated to reduce emissions through national regulations, policies, and guidelines, which provide sufficient incentives without the need for additional executive compensation considerations that may drive environmental performance.

The positive interaction between *EC* and *NGI* in relation to outcome-oriented *CP* suggests that firms in countries with high governance quality are more likely to achieve better carbon outcomes without relying heavily on incentive-based mechanisms like executive compensation. In these countries, national regulations, environmental policies, and societal expectations may already create strong external pressure on firms to reduce their emissions. Executives are likely inspired by their country's regulatory frameworks to pursue carbon abatement initiatives, making compensation less critical as a motivator. This aligns with previous research (Hartmann and Uhlenbruck 2015; Orazalin and Mahmood 2021; Ortas et al. 2015), which shows that high quality in overall national governance positively correlates with improved environmental performance. On the other hand, in countries with lower quality governance, firms may lack the external pressure or regulatory guidance needed to drive carbon reduction. In such environments, they are more likely to use executive compensation as a tool to incentivize managers to engage in substantive carbon reduction activities. Without strong national governance, compensation policies may serve as a key mechanism to align managerial actions with environmental goals, encouraging executives to implement strategies aimed at lowering *GHG* emissions. This suggests that in countries with lower governance quality, firms may rely more on internal incentive structures, such as executive compensation, to achieve better carbon performance. See ***Appendix 2*** for further analysis.

Insert **Table 8** about here

4.3 Robustness analyses

We performed a number of robustness tests to validate our main findings. First, following Moussa et al. (2020) and Haque and Ntim (2020), we examined whether the estimated findings are sensitive to measurement errors. We re-estimated our models by replacing *CRI* with *ESCOR* (an emissions score reflecting a firm's commitment to reducing environmental emissions), *INT* with *GHG* (total *GHG* emissions in tonnes), and *EC* with *EQC* (equity-based incentives measured by the provision of stock option compensation). The results (not reported) are consistent with the reported results, supporting both ***H1(a)*** and ***H1(b)***.

Second, as recommended by Lewandowski (2017) and Lee et al. (2016), we employed multiple estimation techniques to ensure robustness. Specifically, we used fixed-effects (*FE*) and generalized least squares (*GLS*) regressions. The Hausman test indicated the appropriateness of the *FE* estimation, and the results of the *FE* regressions were consistent with the main findings. Similarly, the *GLS* regression produced results closely aligned with the OLS estimates, confirming the robustness of our conclusions.

Third, to mitigate potential bias from variable omission (unobserved or uncontrolled effects), we introduced five additional control variables identified in prior literature as key determinants of CP: *Polluting Industries* (GHG-intensive industries), *Employees* (the natural logarithm of the number of employees), *Age of PPE* (the ratio of net property, plant, and equipment to gross PPE, indicating asset newness), *R&D Intensity* (the ratio of R&D expense to sales), and *Capital Intensity* (the ratio of capital expenditure to sales). Including these variables helped control for their influence on carbon performance and prevented model misspecification. However, not all relevant empirical studies control for these variables. Following prior studies (Haque and Ntim 2018; de Villiers et al. 2011; Haque 2017; Chithambo et al. 2020; Qian and Schaltegger 2017; Qian and Xing 2018), *Polluting Industries* and *Employees* were added to **Eq. (1)** to control for their effects on symbolic *CP*, while *Age of PPE*, *R&D Intensity,* and *Capital Intensity* were added to **Eq. (2)** for their effects on outcome/actual *CP* (emissions intensity). Accordingly, the estimated results remained qualitatively similar to the main results, indicating that our empirical models are robust and not misspecified with regard to these variables. Additionally, we added country dummies in our models to control for county-level fixed effects alongside the year and industry fixed effects, and the results are also similar to the reported evidence.

Fourth, although the primary aim of this study is to examine the association, not causality, between *EC* and *CP*, previous research suggests that environmental and CSR performance can influence executive compensation and vice versa (Mahoney and Thorn 2006; Berrone and Gomez-Mejia 2009; Cordeiro and Sarkis 2008). This raises concerns about reverse causality, where *CP* could either affect or be affected by *EC.* Simultaneity[12] can lead to biased or inconsistent estimates due to the simultaneous determination of independent and dependent variables (Hassan and Romilly 2018). To address this endogeneity issue, we employed a lead-lag structure technique by lagging independent and control variables by one year, consistent with prior studies (Misani and Pogutz 2015; Maas 2018). Specifically, we tested an alternative specification by lagging *CP* forward to t+1, and re-estimated **Eq. (1)** and **Eq. (2)** accordingly. The results remained consistent, suggesting that any simultaneity concerns have been effectively minimized.

Fifth, in line with a large body of prior empirical studies in CA (Chapple et al. 2013; Griffin et al. 2017; Trumpp and Guenther 2017; Wang et al. 2014; Moussa et al. 2020; Liao et al. 2015; Lewandowski 2017), this one initially includes all industries in the final sample. While several prior studies (Choi and Luo 2021; Jung et al. 2018) explicitly excluded financial firms due to their relatively low emissions impact and unique operating environments, we decided to include them due to their significant role in adopting energy efficiency initiatives and investing in carbon

[12]Simultaneity, or simultaneous causality, occurs when the independent variables are determined alongside the dependent variable (Chenhall and Moers 2007).

reduction projects (Luo and Tang 2016). Thus, further sensitivity analysis was conducted specifically for non-financial firms, and the results (not reported) remained consistent, indicating that the inclusion of financial firms does not significantly alter our findings.

Sixth, given that approximately half of our sample consists of US firms, we also examined the relationship between *EC* and *CP* for non-US firms. The results were qualitatively similar to the main findings, indicating that the conclusions are robust and not driven by the US context or market-specificity. Finally, to assess whether the findings are sensitive to the winsorisation process (see Moussa et al. 2020), we re-estimated our models by winsorising all continuous variables at the 1^{st} and 99^{th} percentiles. The results (not reported) remained consistent, confirming the robustness of our main findings.

5 Conclusion

In this study, we empirically examine the link between executive compensation (EC) and carbon performance (CP), distinguishing between carbon reduction initiatives and carbon intensity. We further explore the moderating roles of corporate governance (CG) structures and the quality of national governance (NGI) on the EC–CP nexus through the lens of neo-institutional theory. Our findings indicate that EC is positively associated with carbon reduction initiatives and negatively associated with carbon intensity, suggesting that well-structured executive incentives can drive substantive environmental performance improvements. Additionally, CG mechanisms, such as board size, independent directors, CEO–chair duality, gender diversity, and sustainability committees, play a critical role in aligning executive incentives with carbon reduction goals. Moreover, firms in countries with lower NGI rely more on EC to drive carbon performance, whereas those in stronger governance environments benefit from regulatory pressures and institutional frameworks.

Our findings offer several important practical implications for investors, practitioners, regulators policymakers and the broader society. *First*, investors and practitioners can use this evidence to identify firms that effectively align EC with carbon reduction initiatives, which may signal long-term sustainability and improved financial performance. Firms with strong CP tend to incentivise executives with higher compensation, encouraging investments in carbon abatement projects and emission reduction strategies. This highlights the importance of linking compensation policies to environmental goals, offering insights for firms aiming to enhance both their carbon performance and financial returns. *Second*, the findings emphasise the need for national and global policymakers and regulators to integrate sustainability-linked compensation structures into regulatory frameworks, ensuring that firms prioritise climate action. For example, by mandating the inclusion of carbon targets in sustainability-oriented compensation policies, regulators can encourage firms to achieve more meaningful CP and potentially meet global emission reduction targets.

Third, firms should adapt executive compensation strategies to reflect the national governance context in which they operate. In high-governance countries with strong regulatory enforcement, firms may rely primarily on compliance-based mechanisms and apply moderate EC incentives. In contrast, in low-governance countries where institutional oversight is weaker, firms should implement more substantial EC incentives explicitly tied to measurable carbon performance outcomes, effectively compensating for the lack of regulatory pressure. This strategy can enhance both environmental performance and perceived legitimacy in settings with limited enforcement capacity. Therefore, firms operating across multiple jurisdictions should adopt flexible, context-sensitive compensation frameworks that align with local governance conditions, thereby enhancing both environmental impact and financial performance. *Fourth*, and beyond corporate stakeholders, our findings have broader societal implications. By demonstrating that well-structured EC policies contribute to improved CP, our study underscores the role of corporate incentives in global climate mitigation efforts. These insights can shape public perception of corporate sustainability commitments, reinforcing the view that financial incentives can be leveraged as tools for environmental responsibility rather than short-term profit maximisation.

While our study offers valuable insights, it has some limitations that present avenues for future research. *First*, our sample is drawn from the Global 1200 index, covering 28 countries, but excluding key developing regions, such as the Middle East and specific emerging economies like India and South Africa. This may raise potential concerns regarding sample representativeness, as firms from these excluded regions may exhibit different environmental commitment and incentive schemes due to varying regulatory frameworks, economic contexts, and institutional environments. Moreover, our reliance on the LSEG (formerly Refinitiv) ESG database may introduce further bias, as ESG ratings from this source mainly cover larger, publicly listed companies and industries with advanced ESG disclosure practices. This possibly underrepresents smaller firms or industries with less transparent ESG reporting practices. Future research should therefore expand both geographical coverage and use complementary ESG databases or methodologies to enhance the robustness and generalisability of findings regarding EC–CP dynamics across diverse regulatory environments. *Second***,** we do not differentiate between types of EC packages, such as fixed salaries, performance-based bonuses, and stock options, which may influence CP differently. Further research could explore how specific compensation components drive CP. *Third***,** while our study focuses on board structures as moderators, future research could explore additional CG dimensions, such as shareholder activism, regulatory oversight, and stakeholder engagement to provide a more comprehensive understanding of governance influences on the EC-CP relationship. Additionally, beyond NGI, national governance quality (measured using WGI indicators in this study), alternative country-level factors – such as legal systems, national environmental policies, and national cultural values – could provide deeper insights into how institutional contexts shape the effectiveness of EC in driving CP.

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Tables

Table 1: The sample firms distributed by country and industry

		No of Firms	%	No of Obs.	%
Panel A: *Distribution of the sample by country*					
1	AUSTRALIA	48	4.28	647	4.82
2	AUSTRIA	2	0.18	27	0.2
3	BELGIUM	10	0.89	114	0.85
4	BRAZIL	11	0.98	58	0.43
5	CANADA	52	4.63	639	4.76
6	CHILE	9	0.8	75	0.56
7	CHINA	7	0.62	89	0.66
8	COLOMBIA	2	0.18	12	0.09
9	DENMARK	14	1.25	167	1.25
10	FINLAND	10	0.89	138	1.03
11	FRANCE	52	4.63	726	5.41
12	GERMANY	47	4.19	473	3.53
13	HONG KONG	16	1.43	170	1.27
14	IRELAND	4	0.36	58	0.43
15	ITALY	17	1.52	160	1.19
16	JAPAN	108	9.63	396	2.95
17	MEXICO	5	0.45	16	0.12
18	NETHERLANDS	17	1.52	201	1.5
19	NORWAY	7	0.62	95	0.71
20	PORTUGAL	2	0.18	23	0.17
21	SINGAPORE	4	0.36	41	0.31
22	SOUTH KOREA	7	0.62	27	0.2
23	SPAIN	18	1.6	179	1.33
24	SWEDEN	30	2.67	337	2.51
25	SWITZERLAND	36	3.21	496	3.7
26	TAIWAN	10	0.89	43	0.32
27	UNITED KINGDOM	83	7.4	1,248	9.3
28	UNITED STATES	494	44	6,758	50.4
	Total	**1,122**	**100**	**13,413**	**100**
Panel B: *Distribution of the sample by industry*					
1	Basic Materials	71	6.33	791	5.9
2	Consumer Discretionary	181	16	2,084	15.5
3	Consumer Staples	80	7.13	1,011	7.54
4	Energy	56	4.99	687	5.12
5	Financials	176	15.7	2,222	16.6
6	Health Care	102	9.09	1,197	8.92
7	Industrials	201	18	2,338	17.4
8	Real Estate	55	4.9	684	5.1
9	Technology	97	8.65	1,055	7.87
10	Telecommunications	38	3.39	485	3.62
11	Utilities	65	5.79	859	6.4

Total	**1,122**	**100**	**13,413**	**100**

Table 2: Summary of measures, variable definitions, and data sources

Variable	Symbol	Description	Source
Carbon performance (dependent) variables:			
Process-oriented carbon performance:	*CRI*	The Carbon Reduction Initiatives index (CRI) is calculated by adding 10 dummy variables that measure a firm's degree of engagement with carbon reduction initiatives, with higher index value indicating greater carbon performance of a firm (see ***Table 3*** for further details). Therefore, the score can range from a minimum of 0 to a maximum of 10.	*LSEG*
	ESCOR +	The Emissions Score is measured in accordance with the LSEG database. The score is expressed as a percentage reflecting a firm's commitment towards and effectiveness in reducing environmental emissions in production and operations processes.	*LSEG*
Outcome-oriented carbon performance:	*INT*	Carbon Intensity is calculated as the natural logarithm of the ratio of total carbon emissions to total sales.	*LSEG*
	GHG +	Total GHG emissions is measured by the natural logarithm of total carbon emissions in tonnes.	*LSEG*
Compensation (independent) variables:			
	EC	Total Executives Compensation is the natural logarithm of total compensation paid to all senior executives, as reported by the firm (in US dollars).	*LSEG*
	EQC +	Equity Compensation is the natural logarithm of the provision for stock option compensation which is reflected in the income statement.	*Worldscope*
Firm-level (moderating/control) variables			
Corporate governance:	*BSIZ*	Board Size is measured as the natural logarithm of the total number of board members.	*LSEG*
	CSRCO	CSR/Sustainability Committee: a dummy variable that equals 1 if the firm has a board level committee responsible for decision-making on CSR strategy, and 0 otherwise.	*LSEG*
	INEDs	Board Independence is the percentage of independent non-executive directors on the board as reported by the company.	*LSEG*
	WOB	Board Gender Diversity is the percentage of the board comprised of females.	*LSEG*
	CEOD	CEO-Chair Duality is a dummy variable that equals 1 if the CEO is also the chairman of the board of directors, and 0 otherwise.	*LSEG*
Firm characteristics:	*FSIZ*	Firm Size is calculated as the natural logarithm of total assets of a firm.	*Worldscope*
	LEV	Leverage ratio (gearing) in a firm is calculated as total debt divided by total assets.	*Worldscope*
	ROA	Return on Assets (Profitability) is calculated as earnings before interest and tax for the year divided by total assets, expressed as a percentage.	*Worldscope*
	CF	Cash flow is calculated by a firm's funds from operations over net sales or revenues, expressed as a percentage.	*Worldscope*
	MTB	This is the market-to-book value of equity, as a ratio.	*Datastream*
National-level (moderating/control) variables			
National governance:	*NGI*	The National Governance Index represents the level of quality in national governance and is calculated by using the first principal component of corporate governance indicators at the country level. This measure is derived from six corporate governance	*World bank (WGI)*

		indicators: voice and accountability, control of corruption, government effectiveness, political stability, the absence of violence or terrorism, regulatory quality, and rule of law. These indicators range from 0 to 100 and are highly correlated. The current study applies principal component analysis to these indicators and uses the first[13] principal component (*NG*) in subsequent analysis. This *NG* component explains 76% of the variation in the original six corporate governance indicators. (see ***Appendix 1*** for further details).	
	NGSUM +	The National Governance Index is the sum of six indicators from The Worldwide Governance Indicators (WGI): voice and accountability, control of corruption, government effectiveness, political stability and absence of violence or terrorism, regulatory quality, and rule of law.	*World bank (WGI)*
National characteristics:	*LEGAL*	Legal system is a dummy variable that equals 1 if the firm operates in a code law legal system, and 0 otherwise.	*La Porta et al. (1997) and CIA.*
	GDPPC	Gross Domestic Product per Capita is the natural logarithm of gross domestic product divided by total population.	*World bank (WDI)*
	KYOTO	Kyoto Protocol Ratification is a dummy variable that equals 1 if the Kyoto protocol is in force in the firm's country of origin, and 0 otherwise.	*United Nations*
	ETS	Emission Trading Scheme is a dummy variable that equals 1 if the company reports on its participation in any emissions trading scheme, and 0 otherwise.	*LSEG*
	UNGC	This is a dummy variable that equals 1 if the company signed the 'United Nations Global Compact', and 0 otherwise.	*LSEG*
National culture[14]:	*PDI*	The Power Distance Index is a scale from 0 to 100. Power Distance is the extent to which the less powerful members of organisations and institutions (like the family) accept and expect that power is distributed unequally. This dimension is thought to date from the advent of agriculture, and with it, of large-scale societies. Until that time, a person would know their group members and leaders personally. This is not possible where tens of thousands and more have to coordinate their lives. Without acceptance of leadership by powerful entities, none of today's societies could run.	*HOFSTEDE*
	IND	Individualism versus Collectivism is a scale measuring individualism from 0 to 100. Individualism is the extent to which people feel independent, as opposed to interdependent as members of larger wholes. Individualism does not mean egoism; rather it means that individual choices and decisions are expected. Collectivism does not mean closeness; it means that one 'knows one's place' in life, which is determined socially. With a metaphor from physics, people in an individualistic society are more like atoms flying around in a gas while those in collectivist societies are more like atoms fixed in a crystal.	*HOFSTEDE*
	UAI	Uncertainty Avoidance Index is on a scale from 0 to 100, measuring uncertainty avoidance which is a society's tolerance for uncertainty and ambiguity. Uncertainty avoidance has nothing to do with risk avoidance, nor with following rules. It has to do with anxiety and distrust in the face of the unknown and, conversely, with a wish to have fixed habits and rituals, and to know the truth.	*HOFSTEDE*
	LTO	Long- versus Short-Term Orientation is on a scale of 0 to 100. Long-term orientation deals with change. In a long-term-oriented culture, the basic notion about the world is that it is in flux, and preparation for the future is always necessary. In a short-term-oriented culture, the world is essentially as it was created, so that the past provides a moral compass, and adhering to it is morally good. Clearly, this dimension predicts life philosophies, religiosity, and educational achievement.	*HOFSTEDE*

[13] The second principal component had an eigenvalue of less than 1 and added almost 13% to the variation in the original six national governance indicators; therefore, it was decided to use the first component only in the subsequent analysis.

[14] See https://geerthofstede.com/research-and-vsm/dimension-data-matrix/ for more detail.

Table 3: Individual items in carbon reduction initiatives (the CRI index)

No.	Carbon reduction initiatives	Score
1	Does the company make use of renewable energy?	0 or 1
2	Does the company have environmentally friendly or green sites or offices?	0 or 1
3	Does the company report on initiatives to reduce, reuse, substitute, or phase out toxic chemicals or substances?	0 or 1
4	Does the company show an initiative to reduce, reuse, recycle, substitute, phase out, or compensate CO2 equivalents in the production process?	0 or 1
5	Does the company report on initiatives to reduce, reuse, recycle, substitute, or phase out SOx (sulphur oxides) or NOx (nitrogen oxides) emissions?	0 or 1
6	Does the company evaluate the commercial risks and/or opportunities in relation to climate change?	0 or 1
7	Does the company have processes in place to improve its energy efficiency?	0 or 1
8	Does the company have a policy to improve emission reduction?	0 or 1
9	Does the company report on initiatives to reduce the environmental impact of transportation used for its staff?	0 or 1
10	Does the company report on making environmental investments to reduce future risks or increase opportunities?	0 or 1
	Possible total score of a firm (10)	**0 or 10**

Table 4: Descriptive statistics for all variables

Variables	Obs.	Mean	Std dev.	Min	Max
Carbon performance (dependent) variables					
CRI (score)	11,529	4.833	2.610	0	10
ESCOR (score)	13,413	53.58	34.15	0	99.81
INT (In)	8,835	3.810	2.077	-4.605	9.650
GHG (In)	8,840	13.23	2.410	2.303	19.29
Compensation (independent) variables					
EC (In)	13,413	16.54	1.102	4.904	21.83
EQC (In)	8,999	10.23	1.531	2.303	16.65
Firm-level (moderating/control) variables					
Corporate governance:					
BSIZ (number)	13,413	11.33	3.224	1	36
INEDs (%)	13,413	70.79	22.21	0	100
WOB (%)	13,413	18.50	11.79	0	71.43
CSRCO (indicator)	13,413	0.615	0.487	0	1
CEOD (indicator)	13,413	0.497	0.500	0	1
Firm characteristics:					
FSIZ (In)	13,413	16.80	1.614	11.58	22.22
LEV (%)	13,413	25.77	18.16	0	391.6
ROA (%)	13,413	7.091	7.515	-97.99	128.4
CF (%)	13,413	20.15	14.31	-23.96	68.37
MTB (ratio)	13,413	3.242	18.43	-478.17	920.4
National-level (moderating/control) variables					
NGSUM (score)	13,413	7.986	1.705	-3.573	11.82
NGI (principal component/score)	13,413	0.273	1.701	-13.02	3.015
UNGC (indicator)	13,413	0.275	0.446	0	1
ETS (indicator)	13,413	0.183	0.387	0	1
KYOTO (indicator)	13,413	0.485	0.500	0	1
LEGAL (indicator)	13,413	0.281	0.450	0	1
GDPPC (In)	13,413	10.74	0.366	7.319	11.69
PDI (scale)	13,413	41.89	10.36	11	81
IND (scale)	13,413	81.03	16.52	13	91
LTO (scale)	13,413	40.33	20.41	13.10	100
UAI (scale)	13,413	51.02	16.08	8	99

Notes: All variables are defined in ***Table 2***. The *INT (In)* variable is the log of a ratio and there are a few observations between 1 and 0; therefore, some negative values were noticed.

Table 5: Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Carbon performance (dependent) variables													
(1) CRI	1												
(2) ESCOR +	0.84**	1											
(3) INT	0.16**	0.01	1										
(4) GHG +	0.36**	0.19**	0.85**	1									
Compensation (independent) variables													
(5) EC	0.14**	0.14**	-0.03**	0.15**	1								
(6) EQC +	0.27**	0.25**	-0.15**	0.17**	0.54**	1							
Firm-level (moderating/control) variables													
Corporate governance:													
(7) BSIZ	0.32**	0.27**	-0.02*	0.20**	0.17**	0.24**	1						
(8) INEDs	-0.05**	-0.04**	0.10**	0.08**	0.31**	0.22**	-0.16**	1					
(9) CSRCO	0.61**	0.63**	0.06**	0.13**	0.14**	0.17**	0.22**	-0.01	1				
(10) WOB	0.25**	0.29**	-0.11**	-0.08**	0.09**	0.11**	0.09**	0.19**	0.27**	1			
(11) CEOD	-0.06**	-0.11**	0.05**	0.11**	0.17**	0.14**	0.06**	0.14**	-0.11**	-0.05**	1		
Firm characteristics:													
(12) FSIZ	0.42**	0.42**	-0.17**	0.22**	0.28**	0.49**	0.52**	0.00	0.29**	0.17**	-0.03**	1	
(13) LEV	0.03**	0.04**	0.29**	0.21**	0.02	-0.05**	0.01	0.05**	0.05**	0.01	0.00	-0.02	1
(14) ROA	-0.06**	-0.07**	0.00	-0.06**	0.02	-0.01	-0.16**	0.03**	-0.06**	0.00	0.04**	-0.36**	-0.04**
(15) CF	-0.11**	-0.05**	0.08**	-0.11**	0.02*	0.01	-0.03**	0.07**	-0.04**	-0.01	-0.02*	0.04**	0.06**
(16) MTB	0.00	-0.01	-0.02	-0.01	0.01	0.02*	-0.02*	0.01	0.00	0.01	0.02*	-0.04**	-0.03**
National-level (moderating/control) variables													
(17) NGI	0.03**	0.02	-0.04**	-0.12**	0.03**	-0.16**	-0.20**	0.13**	0.02**	0.09**	-0.13**	-0.19**	-0.05**
(18) UNGC	0.42**	0.43**	-0.03**	0.10**	-0.06**	0.09**	0.23**	-0.18**	0.32**	0.22**	-0.16**	0.28**	0.01
(19) ETS	0.48**	0.38**	0.28**	0.38**	0.07**	0.12**	0.17**	-0.05**	0.29**	0.07**	-0.09**	0.24**	0.07**
(20) KYOTO	0.24**	0.32**	-0.14**	-0.15**	-0.36**	-0.26**	0.08**	-0.45**	0.26**	0.08**	-0.47**	0.13**	-0.06**
(21) LEGAL	0.25**	0.27**	-0.15**	-0.07**	-0.33**	-0.14**	0.15**	-0.45**	0.15**	0.05**	-0.18**	0.19**	-0.05**
(22) GDPPC	-0.04**	0.00	0.00	-0.04**	0.29**	0.16**	-0.06**	0.25**	0.05**	0.10**	0.17**	-0.14**	0.04**
(23) PDI	0.05**	0.09**	0.00	0.06**	-0.18**	0.01	0.25**	-0.31**	0.03**	-0.07**	0.10**	0.20**	-0.02*
(24) IND	-0.13**	-0.19**	0.07**	0.03**	0.35**	0.18**	-0.17**	0.51**	-0.11**	0.11**	0.20**	-0.19**	0.08**
(25) LTO	0.24**	0.28**	-0.19**	-0.10**	-0.30**	-0.15**	0.18**	-0.51**	0.20**	-0.03**	-0.26**	0.20**	-0.09**
(26) UAI	0.20**	0.22**	0.00	0.08**	-0.18**	-0.06**	0.21**	-0.33**	0.12**	-0.04**	0.05**	0.16**	0.02

	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
Firm characteristics:												
(14) ROA	1											
(15) CF	0.17**	1										
(16) MTB	0.06**	0.01	1									
National-level (moderating/control) variables												
(17) NGI	0.07**	-0.10**	0.01	1								
(18) UNGC	-0.06**	-0.08**	-0.03**	0.02*	1							
(19) ETS	-0.05**	-0.07**	-0.01	0.01	0.26**	1						
(20) KYOTO	-0.07**	-0.06**	-0.02**	0.16**	0.44**	0.19**	1					
(21) LEGAL	-0.08**	-0.10**	-0.02**	-0.07**	0.49**	0.16**	0.63**	1				
(22) GDPPC	0.09**	0.01	0.02*	0.40**	-0.13**	-0.03**	-0.31**	-0.33**	1			
(23) PDI	-0.12**	0.06**	-0.02*	-0.58**	0.14**	0.02*	0.18**	0.36**	-0.42**	1		
(24) IND	0.08*	-0.02*	0.02**	0.27**	-0.31**	-0.11**	-0.59**	-0.70**	0.44**	-0.57**	1	
(25) LTO	-0.09**	-0.12**	-0.03**	-0.01	0.40**	0.16**	0.72**	0.79**	-0.33**	0.35**	-0.69**	1
(26) UAI	-0.14**	-0.09**	-0.03**	-0.21**	0.31**	0.12**	0.31**	0.62**	-0.17**	0.61**	-0.45**	0.49**

Notes: This table shows the Pearson Correlation of variables used in this study. * and ** indicate correlation with statistical significance at the 5% and 1% levels, respectively.
+ indicates alternative measures for robustness checks. All variables are defined in ***Table 2***.

Table 6: The relationship between EC and CP

Carbon performance (dependent) variables	Symbolic carbon performance (*CRI*)	Substantive carbon performance (*INT*)
Variables	(1)	(2)
Compensation (independent) variables		
EC	0.115***	-0.0573**
	(0.0336)	(0.0262)
Firm-level (control) variables		
Corporate governance		
BSIZ	0.373**	0.261*
	(0.152)	(0.158)
CSRCO	2.250***	0.345***
	(0.0947)	(0.0986)
INEDs	0.00426**	0.00544***
	(0.00211)	(0.00208)
WOB	0.0212***	-0.00368
	(0.00353)	(0.00331)
CEOD	0.176**	-0.00177
	(0.0855)	(0.0743)
Firm characteristics		
FSIZ	0.539***	0.0319
	(0.0369)	(0.0355)
LEV	-0.00598***	0.00933***
	(0.00222)	(0.00222)
ROA	0.0249***	-0.0144***
	(0.00486)	(0.00462)
CF	-0.00787**	0.0133***
	(0.00310)	(0.00412)
MTB	0.000630	-0.00110
	(0.00115)	(0.000959)
National-level (control) variables		
UNGC	0.625***	0.0498
	(0.0968)	(0.0869)
ETS	1.577***	0.472***
	(0.0889)	(0.0822)
GDPPC	0.240*	-0.0794
	(0.126)	(0.123)
LEGAL	0.329*	-0.647***
	(0.176)	(0.165)
KYOTO	0.248	-0.308**
	(0.151)	(0.132)
PDI	-0.0153***	-0.0163***
	(0.00543)	(0.00529)
IND	-0.00119	-0.0162***
	(0.00415)	(0.00388)
LTO	0.00104	-0.00556
	(0.00358)	(0.00375)
UAI	0.00978***	0.0119***
	(0.00378)	(0.00355)
Constant	-12.34***	7.784***
	(1.533)	(1.515)
No of Obs.	11,529	8,835
No of Firms	1,121	971
Adjusted R-sq.	0.609	0.638
Industry FE	YES	YES
Year FE	YES	YES

Notes: The table presents OLS regressions of executive compensation on carbon performance and the control variables. *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. The coefficients are estimated using the clustered standard errors technique; parenthetical values are the robust standard errors clustered at the firm level. All variables are defined in ***Table 2***.

Table 7: The moderating effects of CG mechanisms on the EC–CP nexus

Panel A: Dependent variable symbolic carbon performance (CRI)

Variables	(1)	(2)	(3)	(4)	(5)
Compensation (independent) variables					
EC	0.0186	0.0415	0.0720*	0.134***	0.0642*
	(0.0450)	(0.0592)	(0.0374)	(0.0431)	(0.0379)
Interaction variables					
*EC*BSIZ*	0.152***				
	(0.0520)				
*EC*CSRCO*		0.100			
		(0.0630)			
*EC*INEDs*			0.139**		
			(0.0557)		
*EC*WOB*				-0.0465	
				(0.0467)	
*EC*CEOD*					0.117**
					(0.0555)
Firm-level (moderating/control) variables					
Corporate governance					
BSIZ/ (=1)	-2.273***	0.241***	0.237***	0.241***	0.246***
	(0.876)	(0.0775)	(0.0776)	(0.0775)	(0.0775)
CSRCO/ (=1)	2.260***	0.609	2.254***	2.263***	2.258***
	(0.0945)	(1.046)	(0.0949)	(0.0948)	(0.0946)
INEDs/ (=1)	0.140*	0.144*	-2.167**	0.149*	0.145*
	(0.0815)	(0.0818)	(0.935)	(0.0816)	(0.0814)
WOB/ (=1)	0.393***	0.380***	0.382***	1.158	0.382***
	(0.0705)	(0.0702)	(0.0705)	(0.782)	(0.0704)
CEOD/ (=1)	0.190**	0.190**	0.186**	0.188**	-1.754*
	(0.0858)	(0.0858)	(0.0857)	(0.0859)	(0.932)
Firm characteristics					
FSIZ	0.540***	0.538***	0.532***	0.542***	0.537***
	(0.0358)	(0.0361)	(0.0360)	(0.0359)	(0.0361)
LEV	-0.00618***	-0.00620***	-0.00625***	-0.00626***	-0.00623***
	(0.00224)	(0.00224)	(0.00224)	(0.00224)	(0.00224)
ROA	0.0251***	0.0245***	0.0246***	0.0251***	0.0248***
	(0.00490)	(0.00489)	(0.00489)	(0.00490)	(0.00489)
CF	-0.00787**	-0.00759**	-0.00769**	-0.00774**	-0.00760**
	(0.00312)	(0.00312)	(0.00313)	(0.00312)	(0.00312)
MTB	0.000590	0.000615	0.000668	0.000672	0.000601
	(0.00116)	(0.00116)	(0.00117)	(0.00117)	(0.00116)
National-level (control) variables					
UNGC	0.679***	0.678***	0.674***	0.667***	0.678***
	(0.0958)	(0.0962)	(0.0959)	(0.0959)	(0.0958)
ETS	1.583***	1.587***	1.590***	1.589***	1.593***
	(0.0883)	(0.0883)	(0.0881)	(0.0884)	(0.0884)
GDPPC	0.226*	0.222*	0.202	0.216*	0.231*
	(0.126)	(0.126)	(0.126)	(0.126)	(0.126)
LEGAL	0.391**	0.394**	0.397**	0.382**	0.382**
	(0.175)	(0.175)	(0.175)	(0.175)	(0.175)
KYOTO	0.313**	0.332**	0.354**	0.325**	0.343**
	(0.155)	(0.156)	(0.156)	(0.155)	(0.155)
PDI	-0.0117**	-0.0132**	-0.0143***	-0.0138**	-0.0129**
	(0.00550)	(0.00544)	(0.00545)	(0.00542)	(0.00546)
IND	0.00300	0.00300	0.00292	0.00230	0.00332
	(0.00404)	(0.00409)	(0.00406)	(0.00408)	(0.00409)
LTO	0.000209	-0.000275	-0.000382	-0.000276	5.30e-05
	(0.00358)	(0.00360)	(0.00358)	(0.00359)	(0.00360)
UAI	0.00833**	0.00880**	0.00892**	0.00893**	0.00910**
	(0.00373)	(0.00374)	(0.00375)	(0.00373)	(0.00375)
Constant	-9.975***	-10.28***	-10.41***	-11.68***	-10.76***
	(1.555)	(1.675)	(1.579)	(1.608)	(1.537)
No of Obs.	11,529	11,529	11,529	11,529	11,529
Adjusted R-sq.	0.608	0.607	0.607	0.607	0.607
Industry FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES

Panel B: Dependent variable substantive carbon performance (INT)

Variables	(1)	(2)	(3)	(4)	(5)
Compensation (independent) variables					

EC	0.00336	0.0628	-0.0155	-0.00385	0.0101
	(0.0460)	(0.0548)	(0.0282)	(0.0354)	(0.0304)
Interaction variables					
*EC*BSIZ*	-0.0857*				
	(0.0509)				
*EC*CSRCO*		-0.142**			
		(0.0567)			
*EC*INEDs*			-0.145***		
			(0.0478)		
*EC*WOB*				-0.0779**	
				(0.0388)	
*EC*CEOD*					-0.168***
					(0.0472)
Firm-level (moderating/control) variables					
Corporate governance					
BSIZ/ (=1)	1.564*	0.148**	0.155**	0.141**	0.141**
	(0.849)	(0.0707)	(0.0704)	(0.0704)	(0.0701)
CSRCO/ (=1)	0.347***	2.691***	0.350***	0.351***	0.341***
	(0.0977)	(0.965)	(0.0978)	(0.0979)	(0.0974)
INEDs/ (=1)	0.138*	0.136*	2.547***	0.133*	0.130*
	(0.0780)	(0.0779)	(0.816)	(0.0781)	(0.0778)
WOB/ (=1)	-0.0733	-0.0636	-0.0663	1.232*	-0.0691
	(0.0638)	(0.0640)	(0.0638)	(0.649)	(0.0636)
CEOD/ (=1)	-0.00698	-0.0138	-0.00474	-0.0105	2.794***
	(0.0744)	(0.0744)	(0.0740)	(0.0744)	(0.789)
Firm characteristics					
FSIZ	0.0346	0.0353	0.0441	0.0336	0.0376
	(0.0350)	(0.0347)	(0.0346)	(0.0348)	(0.0347)
LEV	0.00953***	0.00950***	0.00956***	0.00953***	0.00953***
	(0.00220)	(0.00220)	(0.00220)	(0.00220)	(0.00219)
ROA	-0.0147***	-0.0141***	-0.0140***	-0.0147***	-0.0144***
	(0.00464)	(0.00462)	(0.00459)	(0.00463)	(0.00463)
CF	0.0133***	0.0132***	0.0131***	0.0131***	0.0133***
	(0.00409)	(0.00408)	(0.00409)	(0.00410)	(0.00410)
MTB	-0.00107	-0.00110	-0.00114	-0.00109	-0.000978
	(0.000963)	(0.000952)	(0.000955)	(0.000960)	(0.000964)
National-level (control) variables					
UNGC	0.0471	0.0431	0.0494	0.0443	0.0432
	(0.0862)	(0.0863)	(0.0861)	(0.0863)	(0.0859)
ETS	0.484***	0.486***	0.481***	0.479***	0.478***
	(0.0824)	(0.0823)	(0.0824)	(0.0825)	(0.0822)
GDPPC	-0.0961	-0.0901	-0.0670	-0.0862	-0.109
	(0.122)	(0.122)	(0.124)	(0.123)	(0.122)
LEGAL	-0.660***	-0.653***	-0.669***	-0.679***	-0.645***
	(0.163)	(0.163)	(0.163)	(0.164)	(0.162)
KYOTO	-0.296**	-0.299**	-0.329**	-0.309**	-0.334**
	(0.133)	(0.133)	(0.132)	(0.133)	(0.133)
PDI	-0.0171***	-0.0165***	-0.0154***	-0.0165***	-0.0172***
	(0.00538)	(0.00530)	(0.00530)	(0.00532)	(0.00529)
IND	-0.0152***	-0.0154***	-0.0152***	-0.0158***	-0.0159***
	(0.00379)	(0.00378)	(0.00377)	(0.00380)	(0.00379)
LTO	-0.00630*	-0.00640*	-0.00607*	-0.00604	-0.00677*
	(0.00369)	(0.00367)	(0.00367)	(0.00369)	(0.00369)
UAI	0.0116***	0.0113***	0.0112***	0.0118***	0.0110***
	(0.00356)	(0.00352)	(0.00350)	(0.00357)	(0.00352)
Constant	7.704***	6.744***	7.467***	7.770***	7.779***
	(1.626)	(1.726)	(1.588)	(1.590)	(1.532)
No of Obs.	8,835	8,835	8,835	8,835	8,835
Adjusted R-sq.	0.638	0.638	0.638	0.638	0.639
Industry FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES

Notes: The table presents OLS regressions of *CG* moderating effects on the *EC-CP* nexus and control variables. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The coefficients are estimated using the clustered standard errors technique; parenthetical values are the robust standard errors clustered at the firm level. All variables are defined in ***Table 2***. The interaction variables are created for proxies of executive compensation with *CG* mechanisms (dummy), respectively. In this analysis, median-based dummy variables were created for the continuous *CG* variables, making for easier interpretations regarding the interaction terms and main relationship (*EC-CP*).

Table 8: The moderating effect of a country's governance quality on the EC–CP nexus

Carbon performance (dependent) variables	Symbolic carbon performance (*CRI*)	Substantive carbon performance (*INT*)
Variables	(1)	(2)
Compensation (independent) variables		
EC	0.152***	-0.134***
	(0.0427)	(0.0339)
Interaction variables		
*EC*NGI*	-0.0810	0.141***
	(0.0557)	(0.0447)
Firm-level (control) variables		
Corporate governance		
BSIZ	0.381**	0.254
	(0.153)	(0.158)
CSRCO	2.245***	0.340***
	(0.0948)	(0.0987)
INEDs	0.00433**	0.00516**
	(0.00211)	(0.00207)
WOB	0.0215***	-0.00432
	(0.00354)	(0.00331)
CEOD	0.174**	0.00778
	(0.0856)	(0.0739)
Firm characteristics		
FSIZ	0.540***	0.0331
	(0.0369)	(0.0352)
LEV	-0.00613***	0.00974***
	(0.00223)	(0.00222)
ROA	0.0248***	-0.0138***
	(0.00487)	(0.00458)
CF	-0.00797**	0.0135***
	(0.00310)	(0.00410)
MTB	0.000594	-0.000990
	(0.00114)	(0.000948)
National-level (moderating/control) variables		
NGI	1.208	-1.948**
	(0.935)	(0.757)
UNGC	0.626***	0.0534
	(0.0965)	(0.0865)
ETS	1.577***	0.477***
	(0.0886)	(0.0820)
GDPPC	0.237*	-0.0736
	(0.126)	(0.122)
LEGAL	0.281	-0.541***
	(0.174)	(0.165)
KYOTO	0.349**	-0.588***
	(0.161)	(0.137)
PDI	-0.0174***	-0.00967*
	(0.00604)	(0.00551)
IND	-0.00184	-0.0145***
	(0.00412)	(0.00390)
LTO	0.00175	-0.00748**
	(0.00363)	(0.00372)
UAI	0.00960**	0.0125***
	(0.00379)	(0.00347)
Constant	-12.75***	8.444***
	(1.674)	(1.658)
Observations	11,529	8,835
Adjusted R-squared	0.609	0.641
Year FE	YES	YES
Industry FE	YES	YES

Notes: The table presents OLS regressions of *NG* moderating effects on the EC-CP nexus and control variables. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. The coefficients are estimated using the clustered standard errors technique; parenthetical values are the robust standard errors clustered at the firm level. All variables are defined in ***Table 2***. The interaction variables are created for proxies of executive compensation with *NG* (dummy), respectively. In this analysis, a median-based dummy variable was created for the continuous *NGI* variable making for easier interpretations regarding the interaction terms and main relationship (*EC-CP*).

Figures

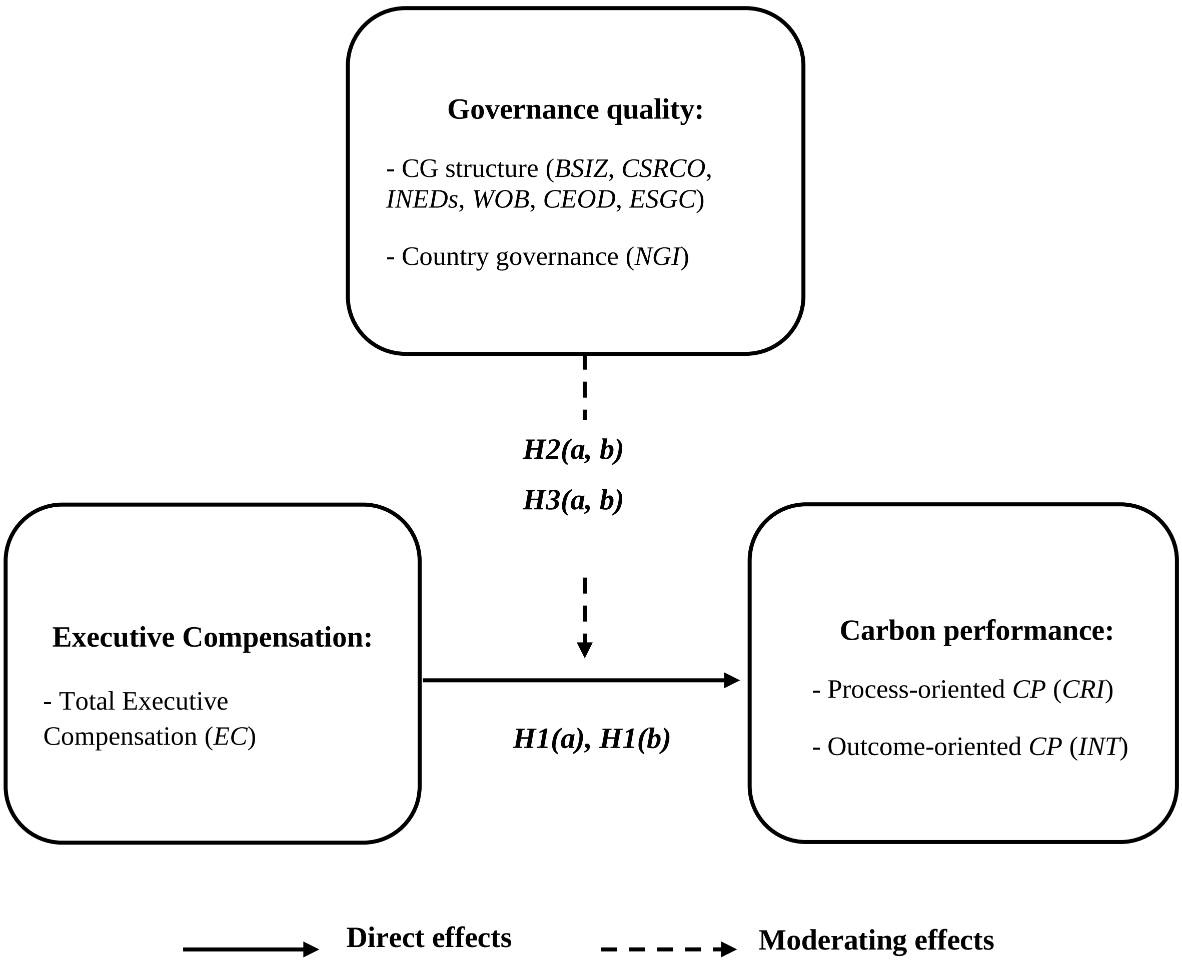


Figure 1: Conceptual framework

Appendices

Appendix 1: Principal component analysis of the national governance indicators

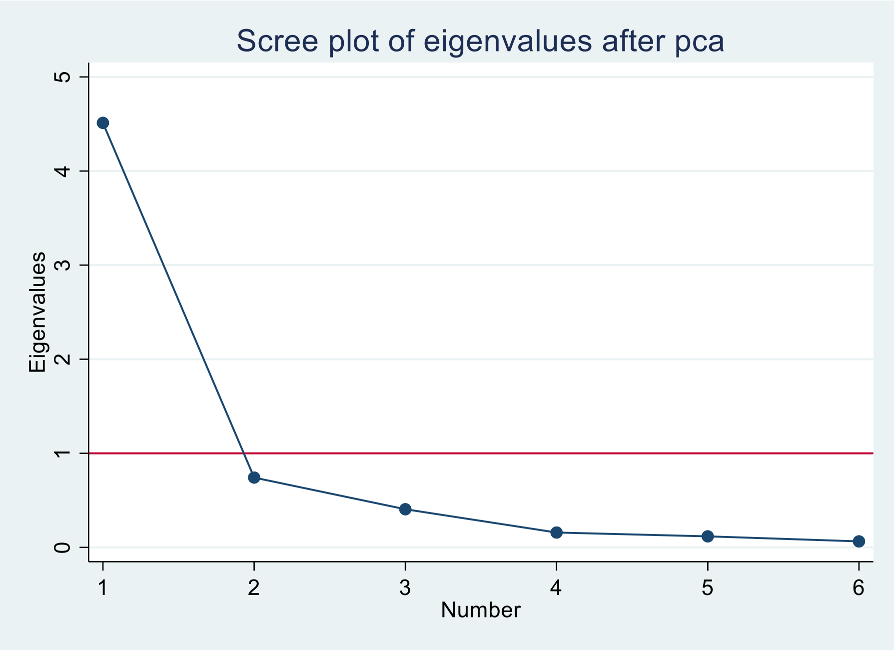
Kaiser-Meyer-Olkin measure of sampling adequacy

Variable	kmo
var	0.8565
pvr	0.8223
ger	0.8268
rqr	0.9112
rlr	0.8552
ccr	0.9021
Overall	0.8664

. ** this test justified to use PCA because the variances in the elements are highly correlated by 0.866.

Principal components/correlation | Number of obs = 21,996
Number of comp. = 6
Trace = 6
Rotation: (unrotated = principal) | Rho = 1.0000

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	4.56105	3.7771	0.7602	0.7602
Comp2	.783957	.390335	0.1307	0.8908
Comp3	.393622	.249159	0.0656	0.9564
Comp4	.144463	.0752864	0.0241	0.9805
Comp5	.0691764	.0214484	0.0115	0.9920
Comp6	.047728	.	0.0080	1.0000



Appendix 2: The relationship between executive compensation and carbon performance in countries with good and poor national governance

National governance quality index	High/Good *NGI*		Low/Poor *NGI*	
Carbon performance (dependent) variables	*CRI*	*INT*	*CRI*	*INT*
Variables	(1)	(2)	(3)	(4)
Compensation (independent) variables				
EC	0.0681	0.0215	0.0988**	-0.117***
	(0.0497)	(0.0352)	(0.0418)	(0.0344)
Firm-level (control) variables				
Corporate governance				
BSIZ	0.368*	0.478**	0.458**	0.00572
	(0.200)	(0.195)	(0.216)	(0.253)
CSRCO	1.435***	0.428***	2.683***	0.178
	(0.125)	(0.140)	(0.126)	(0.117)
INEDs	0.00453*	0.00375	0.00848**	0.00685*
	(0.00247)	(0.00252)	(0.00341)	(0.00350)
WOB	0.0265***	-0.00651	0.0155***	-0.00624
	(0.00501)	(0.00443)	(0.00471)	(0.00484)
CEOD	0.106	-0.104	0.239**	0.0936
	(0.130)	(0.118)	(0.101)	(0.0880)
Firm characteristics				
FSIZ	0.535***	0.0280	0.559***	0.0220
	(0.0533)	(0.0471)	(0.0450)	(0.0479)
LEV	-0.0114***	0.0107***	-0.00560**	0.0112***
	(0.00401)	(0.00327)	(0.00246)	(0.00268)
ROA	0.0154***	-0.00571	0.0272***	-0.0247***
	(0.00594)	(0.00560)	(0.00654)	(0.00678)
CF	-0.00888**	0.00935	-0.00770*	0.0170***
	(0.00424)	(0.00571)	(0.00414)	(0.00488)
MTB	0.00538	-0.00626**	9.84e-05	-0.000325
	(0.00343)	(0.00315)	(0.00120)	(0.000967)
National-level (control) variables				
UNGC	0.727***	0.176	0.617***	-0.0582
	(0.131)	(0.114)	(0.123)	(0.129)
ETS	1.419***	0.506***	1.745***	0.434***
	(0.113)	(0.114)	(0.121)	(0.111)
GDPPC	0.377**	-0.197	-0.156	-0.0120
	(0.170)	(0.153)	(0.255)	(0.228)
LEGAL	0.0298	-0.398**	0.422	-0.493
	(0.216)	(0.201)	(0.496)	(0.416)
KYOTO	0.210	-0.386**	-0.306	-1.188***
	(0.209)	(0.154)	(0.517)	(0.407)
PDI	-0.0105	-0.00353	-0.0205	-0.00404
	(0.00778)	(0.00710)	(0.0136)	(0.0111)
IND	0.00967	-0.0171***	-0.00558	-0.00986**
	(0.00666)	(0.00549)	(0.00609)	(0.00474)
LTO	0.0172***	-0.0190***	-0.0101**	0.00776*
	(0.00512)	(0.00502)	(0.00494)	(0.00455)
UAI	0.00385	0.0132***	0.0289***	0.0177**
	(0.00453)	(0.00392)	(0.00892)	(0.00806)
Constant	-14.00***	7.431***	-6.018**	5.602**
	(2.166)	(1.942)	(2.353)	(2.405)
No of Obs.	5,230	4,598	6,299	4,237
No of Firms	823	643	709	577
Adjusted R-sq.	0.557	0.648	0.664	0.663
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Notes: The table presents OLS regressions of executive compensation on carbon performance and the control variables. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The coefficients are estimated using the clustered standard errors technique; parenthetical values are the robust standard errors clustered at the firm level. All variables are defined in ***Table 2***.