BJM BRITISH JOURNAL of MANAGEMENT
BRITISH ACADEMY OF MANAGEMENT

British Journal of Management, Vol. 00, 1–30 (2023)
DOI: 10.1111/1467-8551.12715

Board Sustainability Committees, Climate Change Initiatives, Carbon Performance, and Market Value

Nurlan S. Orazalin [1,2] Collins G. Ntim [1] and John K. Malagila [3]
[1]Southampton Business School, University of Southampton, Southampton, SO17 1BJ, UK, [2]Bang College of Business, KIMEP University, Almaty, 051000, Kazakhstan, and [3]Essex Business School, University of Essex, Colchester, Essex, CO4 3SQ, UK
Corresponding author email: N.Orazalin@soton.ac.uk, orazalin@kimep.kz

We examine the interrelationships among board sustainability committees, process-based climate change initiatives, outcome-based carbon performance, and market value through the lens of economic- and social-based theoretical perspectives. Using a panel dataset of 8408 observations from 35 countries between 2002 and 2019, we find that higher levels of actual greenhouse gas (GHG) emissions are negatively associated with market value. Further, we reveal a positive association between process-based climate change initiatives and market value. We then provide evidence that process-based climate change initiatives are positively related to increased levels of GHG emissions. We also observe that the presence of a board sustainability committee has a positive impact on market value, but does not seem to improve outcome-based carbon performance. Finally, we show that the predicted relationships vary across different country-groups, sector-groups, and periods. Our empirical findings are robust to alternative measures, endogeneities, and sample selection bias. Overall, our evidence supports the symbolic legitimation/greenwashing view, in that firms are likely to employ process-based climate change initiatives under a symbolic approach to create positive impressions among stakeholders and protect their legitimacy.

Introduction

Climate change has attracted growing interest among academics, practitioners, policymakers, and regulators over the past few decades (Giannarakis, Zafeiriou and Sariannidis, 2017; Jiang *et al.*, 2021), becoming a dominant issue on the economic, political, and business agenda. Caused by the excessive amount of greenhouse gas (GHG) emissions, global climate change is currently a major issue of concern for businesses, governments and other stakeholders (Bui, Houqe and Zaman, 2020; Downar *et al.*, 2021), adversely affecting the environment, socio-economic systems, and subsequently human lives (Goworek *et al.*, 2018; Sun *et al.*, 2020). Hence, international organizations and national governments have introduced a number of initiatives, policies and practices to combat global warming and climate change (Baboukardos, 2018; Gaganis *et al.*, 2021). For example, the 1997 Kyoto Protocol and the 2015 Paris Agreement are among the most important international agreements that aim to mitigate GHG emissions and improve resilience to climate change (Luo and Tang 2021). At the same time, business organizations are under tremendous pressure from stakeholders to respond to climate change by reporting their environmental impacts and engaging in relevant initiatives in order to reduce their actual GHG emissions (Backman, Verbeke and Schulz, 2017).

Despite the steadily growing research within the climate change literature, limited attention has so far been paid to process-based corporate climate change initiatives (PCCIs) aimed at improving corporate carbon performance by actual emissions (CCPE) and financial outcomes (Dahlmann, Branicki and Brammer, 2019; Wright and Nyberg, 2017). In particular, prior studies have focused largely on the impact of outcome-based CCPE (actual GHG emissions) on financial outcomes and yielded mixed results (e.g. Clarkson *et al.*, 2015; Jacobs, Singhal and Subramanian, 2010; Lewandowski, 2017; Matsumura, Prakash and Vera-Muñoz, 2014). For example, Baboukardos (2017) and Choi and Luo (2021) find a negative association between GHG emissions and market value (MV), and argue that market participants react negatively to excessive emissions. By contrast, Lewandowski (2017) reports that lower GHG emissions are associated with lower MV, thus suggesting that corporate commitment to emissions reductions causes financial burdens. However, the above/prior studies have focused mostly on individual countries/regions, thereby failing to consider cross-country differences. Accordingly, the existing inconclusive findings cannot be generalized across diverse economies with different institutional and regulatory settings. As government responses to climate change vary substantially across countries and have different financial consequences for firms (Choi and Luo, 2021), there is a need to explore the relationships among PCCIs, outcome-based CCPE, and financial outcomes within diverse/multiple economies (Haque and Ntim, 2020; Jiang *et al.*, 2021). In this case, a cross-country analysis with various country-level factors can help in explaining the mixed findings documented in the prior literature.

Consequently, in this study, we employ a sample of global firms from 35 countries between 2002 and 2019 to examine the value relevance of both PCCIs and outcome-based CCPE. We also investigate whether the effects of PCCIs and CCPE on MV are moderated by the presence of a board sustainability committee (BSCOM). Past research has increasingly highlighted the role of corporate governance (CG) in formulating climate change initiatives/strategies that create shareholder value (Cumming, Girardone and Śliwa, 2021; Luo and Tang, 2021). For instance, effective board governance can increase accountability for environmental/social impacts by promoting environmentally responsible activities and encouraging engagement in corporate social responsibility (CSR) practices in order to manage environmental risks/concerns in an efficient and effective manner (Harjoto *et al.*, 2015). In this regard, a BSCOM plays a crucial role in designing environmental initiatives and introducing best sustainability management practices to promote stakeholder engagement, enhance accountability, address environmental issues, and improve corporate outcomes (Luo and Tang, 2021; Orazalin, 2020). Thus, the BSCOM is becoming an increasingly prevalent/major governance mechanism to address climate change, promote sustainability, and create value for all stakeholders (Burke, Hoitash and Hoitash, 2019). However, there is a dearth of research on the impact of BSCOMs on PCCIs and performance outcomes (Helfaya and Moussa, 2017; Orazalin, 2020). We suggest that examining the moderating role of BSCOMs in this context may provide useful insights into corporate climate change strategies/practices across countries with different institutional frameworks and regulatory systems. As argued by Sullivan and Gouldson (2017), CG practices, corporate responses to climate change, and performance outcomes are interrelated and interdependent, and therefore it is important to assess them as a comprehensive, dynamic and interactive system rather than examining each of them individually. Therefore, we seek to address this dearth of research by distinctively examining the moderating effect of BSCOMs on the relationships among PCCIs, outcome-based CCPE, and MV in a multi-country context.

To assess these relationships, we adopt legitimacy, resource-based view (RBV) and stakeholder perspectives to form a dynamic multi-dimensional economic- and social-based theoretical framework. According to the legitimacy perspective, firms exposed to greater stakeholder pressures may engage in process-oriented environmental initiatives, such as PCCIs, and introduce CG mechanisms, such as a BSCOM, in order to protect/maintain/improve their legitimacy (Suchman, 1995). This can be achieved by symbolic legitimation/greenwashing/impression management strategies that might not necessarily improve outcome-based CCPE (Ashforth and Gibbs 1990). In contrast, substantive legitimation strategies that shape economically efficient actions may lead to improved CCPE and MV (Ashforth and Gibbs 1990). From the RBV perspective, firms may improve their environmental/carbon performance and sustain competitive advantage by engaging in environmental initiatives/strategies that require unique resources (e.g. finance, physical assets, human capital, and processes) and capabilities (e.g. adapting to climate change, developing eco-friendly products/processes/services and implementing green projects/innovations to reduce emissions) (Barney, 1991; Hart and Dowell, 2011). In this regard, the benefit aspect of the RBV supports the adoption of PCCIs, which may improve outcome-based CCPE, and ultimately increase MV (Barney, 1991; Hart, 1995). However, the cost perspective of the RBV suggests that the implementation of PCCIs that require significant resources is associated with higher levels of risks and opportunity costs, and thus can be detrimental to MV (Andreou and Kellard, 2021; Oberndorfer *et al.*, 2013). The stakeholder perspective suggests that corporate commitment to environmental activities enhances a firm's relationships with its stakeholders (Freeman 1984). In this context, firms with effective CG practices can strengthen stakeholder relationships by implementing sustainability practices and promoting environmental strategies (Michelon and Parbonetti, 2012) and ultimately improve MV by balancing the conflicting interests of their stakeholders (Freeman, 1984). Hence, the stakeholder aspect supports the implementation of PCCIs and the adoption of CG mechanisms, such as a BSCOM, to enhance corporate image, strengthen stakeholder relationships, and improve MV.

Our study makes several new contributions to the extant literature. First, our study is among the first to examine the effects of both PCCIs and outcome-based CCPE on MV. While the prior literature has largely explored the relationship between outcome-based CCPE and MV, there has been limited research on the value relevance of PCCIs (He *et al.*, 2021). Our findings indicate that increased levels of GHG emissions are associated with lower MV, whereas PCCIs have a positive impact on MV. Second, extending the work of Bui, Houqe and Zaman (2021) on assurance of CCPE (both Scope 1 and Scope 2 emissions) and reporting integrity, we assess whether a BSCOM can moderate the PCCIs/CCPE and MV relationships. While there is growing research on the link between carbon/environmental performance and MV, there is limited empirical evidence on whether CG characteristics affect the value relevance of PCCIs and outcome-based CCPE (Bui, Houqe and Zaman, 2020). Our findings suggest that the presence of a BSCOM improves MV, but does not seem to enhance outcome-based CCPE. Third, our study is among the first to examine the impact of PCCIs on outcome-based CCPE, and subsequently investigate the moderating role of BSCOMs on this relationship. Despite the increasing calls for climate change research (Busch and Hoffmann, 2011; Wright and Nyberg, 2017), the relationship between PCCIs and outcome-based CCPE has received limited attention. Our finding reveals that firms that engage in PCCIs continue to emit high GHG emissions, thus supporting the symbolic legitimation view. Finally, extending the study of Bui, Houqe and Zaman (2020) on climate governance (governance mechanisms/measures aimed at mitigating climate risks), CCPE and carbon disclosure, we explore whether the predicted relationships differ between countries under the European Union Emission Trading System (EU ETS) and non-EU ETS countries. Our findings indicate that market participants react more negatively to increased emissions in EU ETS countries compared with non-EU ETS countries. Our results also reveal that the EU ETS leads to observable reductions in emissions and suggest that regulatory pressures might affect corporate engagement in climate mitigation activities/initiatives.

The rest of this paper is organized as follows. Section 2 provides the study's background. Section 3 presents the theoretical framework, followed by a review of prior studies and hypotheses development in Section 4. Section 5 explains the research methodology. Section 6 presents the results, and Section 7 concludes.

Climate change initiatives around the world

Growing concerns over the increasing levels of GHG emissions worldwide have led the global community to respond to global warming and climate change by undertaking various initiatives, deals, and reforms. The United Nations Framework Convention on Climate Change (UNFCCC), introduced in 1992 following the Rio Earth Summit and entering into force in 1994, was the first international effort to address global warming and climate change. However, the UNFCCC was unsuccessful in reducing GHG emissions worldwide, as confirmed by numerous reports/data (Gills and Morgan, 2020). For example, annual global emissions in terms of gigatonnes of carbon dioxide (GtCO2) increased from 23.7 GtCO2 in 1995 to more than 30 GtCO2 every year during 2006–2012 and to well above 35 GtCO2 each year during

2012–2018 (Olivier and Peters, 2020). According to the United Nations Environmental Programme, total GHG emissions in GtCO2 reached a record high of 55.3 in 2018 (United Nations Environment Programme, 2019).

The Kyoto Protocol, adopted in 1997, was the first global treaty, which extended the UNFCCC. The Protocol provided a legally binding framework for participating countries to introduce standards, guidelines, and reforms to mitigate GHG emissions. As part of the Protocol, European countries implemented a number of climate change policies/legislations to introduce the EU ETS (European Commission, 2015). The Paris climate agreement was introduced in December 2015 to replace the Kyoto Protocol, effectively from 2016. The agreement requires each nation to prepare, submit, and maintain nationally determined contributions intended to reduce emissions and to facilitate adaptation to climate change.[1] To date, a number of countries have adopted and implemented domestic laws/regulations to combat climate change. Nevertheless, and as demonstrated by the 2021 UN climate change Conference of the Parties (COP26) in Glasgow, there has been little progress in developing and implementing explicit guidelines/policies for businesses that could help regulators assess corporate commitments to climate change mitigation and control GHG emissions (Climate Change Committee 2021). Consequently, this study seeks to explore how global companies, operating in different jurisdictions with different environmental regulations and stakeholder pressures, respond to climate change risks/threats.

Theoretical framework

As we explore the associations among BSCOMs, CCPE, PCCIs, and MV, we deem it appropriate to draw insights from RBV, legitimacy and stakeholder theoretical perspectives to form a dynamic multi-dimensional socio-economic-based theoretical framework to inform our analysis. In this case, the RBV suggests that a firm's competitive advantage evolves from essential resources that are valuable, rare, inimitable and difficult to substitute (Barney, 1991). These resources include physical assets, financial resources, human capital and organizational processes that may develop unique capabilities and competencies that are instrumental to competitive advantage and increased MV (Backman, Verbeke and Schulz, 2017). The RBV concept adapted to climate change suggests that firms can improve environmental performance and sustain competitive advantage by adopting proactive environmental strategies that require unique resources and capabilities (Hart, 1995). In particular, the adoption of PCCIs can enhance economic efficiency, reduce operating and litigation costs, mitigate business risks, strengthen stakeholder relationships, and create sustainable advantage (Hart and Dowell, 2011). PCCIs may also develop resource combinations for green innovation, prevent GHG emissions and waste, and enhance internal resilience to climate change (Weber and Neuhoff, 2010). Hence, from the benefit aspect of the RBV, firms with the advantages of valuable resources have a greater capacity to engage in PCCIs aimed at enhancing economic efficiency and gaining sustained competitive advantage, which, in turn, can be positively valued by market participants (Haque and Ntim, 2020; Hart 1995; He *et al.*, 2021).

However, improvements in outcome-based CCPE require substantial economic resources to implement PCCIs to have a positive effect on MV. In this regard, the cost perspective of the RBV suggests that engaging in PCCIs imposes high costs on any organization, and economic efficiency may be achieved gradually over longer periods of time (He *et al.*, 2021; Oberndorfer *et al.*, 2013). Thus, the adoption of PCCIs that require significant time, effort, and financial resources that otherwise could be invested in other profitable projects is associated with higher levels of risks and opportunity costs, and thus can damage MV (Busch and Hoffmann, 2011).

The legitimacy view postulates that firms should align their business activities with the social values of the society in which they operate (Deegan, 2002; Meyer and Rowan, 1977). Legitimacy, therefore, refers to the degree to which various stakeholders regard the actions of an organization as desirable, proper, and useful (Suchman, 1995). With strong

[1]The agreement also requires developed countries to provide financial support through a joint investment of 100 billion US dollars annually for combating global warming and climate change and promoting sustainability in developing economies (United Nations, 2015).

legitimacy, firms can get good access to economic resources, attract and retain talented employees, improve relationships with stakeholders, and compete more effectively in the market (Oliver, 1991; Pfeffer and Salancik, 1978). In this regard, firms seeking legitimacy can be motivated by symbolic ('greenwashing/impression management') and/or substantive ('economically efficient') legitimation strategies. Symbolic strategies drive a firm's engagement in superficial impressions to manage stakeholders' concerns on sustainability-related issues rather than to bring meaningful improvements in environmental/social outcomes (Ashforth and Gibbs, 1990). In this case, firms with weak carbon/environmental performance are exposed to greater stakeholder pressures, and therefore may undertake symbolic/greenwashing efforts in order to gain/maintain/repair legitimacy (Suchman, 1995), but such efforts might not improve carbon/environmental performance (Crossley, Elmagrhi and Ntim, 2021).

In contrast, substantive strategies involve fundamental changes in a firm's goals, behaviour and practices to meet the expectations and needs of societal stakeholders (Ashforth and Gibbs, 1990). In this regard, firms can undertake economically efficient actions to tackle climate change by adopting PCCIs that may lead to improved outcome-based CCPE and MV. However, as the adoption of comprehensive PCCIs requires significant investments and resources, it is more likely that firms will employ symbolic PCCIs and promote governance mechanisms, such as BSCOMs, to create positive impressions (greenwashing) among stakeholders and protect MV (Berrone and Gomez-Mejia, 2009; Maas and Rosendaal, 2016), but such commitments do not improve outcome-based CCPE (Aguilera *et al.*, 2007).

Finally, the stakeholder perspective suggests that corporate commitment to environmental/social activities enhances a firm's relationships with all stakeholders (Freeman, 1984). The prior literature suggests that strong corporate environmental performance can reduce employee turnover, thus supporting the notion that potential employees prefer organizations with greater environmental accountability (Backhaus, Stone and Heiner, 2002; Berrone and Gomez-Mejia, 2009). Customers also respond positively to strong environmental performance by increasing their demand for environmentally sustainable products/services and paying premium prices (Berrone and Gomez-Mejia, 2009; Du, Bhattacharya and Sen, 2007). In this context, firms with effective CG practices can strengthen stakeholder relationships by implementing sustainability practices and promoting environmental initiatives/strategies (Michelon and Parbonetti, 2012), and ultimately improve MV by balancing the conflicting interests of all stakeholders (Freeman, 1984). Hence, the stakeholder aspect supports the implementation of PCCIs, the promotion of CG mechanisms, such as BSCOMs, and the implementation of sustainability-related practices to enhance corporate image, strengthen the relationships with stakeholders, and improve MV.

Taken together, the legitimacy, RBV, and stakeholder theoretical perspectives suggest that global companies exposed to different stakeholder pressures and environmental regulations can adopt PCCIs and establish BSCOMs that may (i) enhance reputation and maintain legitimacy on a symbolic/greenwashing level (Burke, Hoitash and Hoitash, 2019; Busch and Hoffmann, 2011; Haque and Ntim, 2020; Walls, Berrone and Phan, 2012) and/or (ii) substantively mitigate emissions through improved efficiency and reduced operating costs (Bui, Houqe and Zaman, 2020; Bui, Houqe and Zaman, 2021; Dahlmann, Branicki and Brammer, 2019).

Literature review and hypotheses development

Carbon performance, climate change initiatives, and market value

According to the benefit aspect of the RBV, proactive environmental strategies are likely to reduce carbon emissions and improve MV through enhanced operational efficiency, effective energy savings, and greater access to resources (Hart, 1995; Hart and Dowell, 2011). However, from the cost perspective, such environmental initiatives require substantive efforts, involve high risks and costs, and subsequently may damage MV (He *et al.*, 2021; Oberndorfer *et al.*, 2013). This argument also supports Porter's (1980) view of competitive strategy, in that any managerial effort to improve process-based environmental performance is regarded as a waste of resources. At the same time, firms focus on improving outcome-based carbon/environmental performance in order to enhance stakeholder relationships, sustain competitive advantage, and ultimately improve MV (Busch and Hoffmann, 2011), as capital markets penalize firms with higher levels of GHG emissions and reward firms with better outcome-based CCPE (Choi and Luo, 2021). In this circumstance, substantive environmental initiatives/practices/processes may lead to improved outcome-based CCPE. However, firms are less likely to undertake concrete actions in pursuing such complicated and costly initiatives, since they require significant economic resources and investments amid economic/financial benefits (Haque and Ntim, 2020). Hence, from the symbolic legitimation/greenwashing strategies perspective, firms may engage in symbolic PCCIs to gain legitimacy, impress stakeholders, and ultimately improve MV, without undertaking substantive/economically efficient efforts to improve outcome-based CCPE (Aguilera *et al.*, 2007).

Prior research argues that corporate environmental initiatives are significantly influenced/shaped by huge pressures and demands from stakeholders (Phan and Baird, 2015; Reid and Toffel, 2009). This is especially pertinent for long-term and complicated issues of climate change, where businesses face conflicting critiques and competing demands from stakeholders and shareholders (Wright and Nyberg, 2017). However, firms cannot easily integrate costly climate change challenges within the goal of profit maximization and value creation (Andreou and Kellard, 2021; Wright and Nyberg, 2017). Hence, when firms are forced to select between economic goals and environmental targets, they normally favour economic goals (Van der Byl and Slawinski, 2015). This is consistent with the argument that comprehensive PCCIs are generally aimed at achieving corporate economic/financial goals of cost reduction, profit maximization and market expansion (Dauvergne and Lister, 2013). In other words, businesses may invest in environmental activities and green projects not only to ameliorate environmental problems, but also to improve corporate economic sustainability (Banerjee, 2003). Thus, firms have strong incentives in translating climate-related grand challenges away from practices that may constrain their profit-generating abilities, while emphasizing more immediate responses that can be aligned with profit maximization and value creation (Wright and Nyberg, 2017). However, the adoption of process-based environmental management initiatives/practices is considered by stakeholders as a pure marketing/greenwashing tool used for impression management purposes (Brammer and Millington, 2008). Thus, capital markets react more positively to improved outcome-based CCPE than to PCCIs (Busch and Hoffmann, 2011). Yet, although complex PCCIs may not be fully recognized by capital markets, especially in their early stages (Haque and Ntim, 2020), they might reflect a firm's substantive intentions/incentives to assess, manage, and reduce emissions (Dahlmann, Branicki and Brammer, 2019).

Prior empirical studies examining the effects of outcome-based CCPE on MV are limited and have provided mixed results (e.g. Busch and Hoffmann, 2011; Lewandowski, 2017; Matsumura, Prakash and Vera-Muñoz, 2014; Siddique *et al.* 2021). For example, Clarkson *et al.* (2015) and Tuesta, Soler and Feliu (2021) find a negative association between GHG emissions and MV and conclude that firms with excessive emissions suffer more from negative market valuations. By contrast, Jacobs, Singhal and Subramanian (2010) provide evidence that lower GHG emissions are significantly associated with lower MV, thus indicating that firms with higher emissions have greater MV. However, most of these studies have assessed outcome-based CCPE without ascertaining whether process-based environmental initiatives, such as PCCIs, create shareholder value. The empirical findings by Busch and Hoffmann (2011) and Haque and Ntim (2020) are apparent exceptions. In particular, Busch and Hoffmann (2011) report that process-based carbon management strategies are negatively associated with MV and argue that market participants consider such initiatives less reliable than outcome-based CCPE with respect to estimating future MV. Further, Haque and Ntim (2020) conclude that firms pursue carbon mitigation initiatives in order to reduce legitimacy risks and improve MV, without making substantial improvements in outcome-based CCPE. Based on the RBV and symbolic legitimation perspectives, as well as the discussion above, we develop the following hypotheses:

H1a: Firms with better CCPE (lower GHG emissions) are more likely to have higher MV.

H1b: Firms with greater PCCIs are less likely to have higher MV.

Carbon performance, climate change initiatives, and market value: The moderating effect of a board sustainability committee

The existence of a BSCOM is an important CG arrangement, but has been less explored in recent research, especially in relation to climate change. Corporate boards establish BSCOMs to address stakeholder needs (Burke, Hoitash and Hoitash, 2019), promote sustainability (García-Sánchez, Hussain and Martínez-Ferrero, 2019) and enhance the efficacy of board monitoring (Dixon-Fowler, Ellstrand and Johnson, 2017). Such committees play a crucial role in implementing environmental initiatives and introducing best sustainability management practices that might promote stakeholder engagement, address environmental issues, and improve corporate outcomes (Luo and Tang, 2021; Peters and Romi, 2014). The prior literature suggests that the establishment of a BSCOM improves CG practices (Spira and Bender, 2004), promotes sustainability strategies (Orazalin, 2020), enhances the effectiveness of carbon mitigation initiatives (Haque, 2017; Mackenzie, 2007), and increases corporate transparency (Michelon and Parbonetti, 2012). From a stakeholder perspective, a BSCOM serves as an effective mechanism and substantive management practice that may satisfy the interests of relevant stakeholders (Kılıç *et al.*, 2021), improve sustainability performance (Al-Shaer and Zaman, 2019), and achieve sufficient financial outcomes (Burke, Hoitash and Hoitash, 2019). Thus, in the eyes of stakeholders, the BSCOM has become an effective lever for carbon mitigation management to create shared values for both shareholders and stakeholders (Burke, Hoitash and Hoitash, 2019). However, the symbolic legitimation approach argues that such committees serve as an impression management tool to protect legitimacy and enhance accountability towards stakeholder groups, and thus do not necessarily mitigate sustainability-related risks (Burke, Hoitash and Hoitash, 2019; Rodrigue, Magnan and Cho, 2013). In other words, firms may establish a BSCOM for greenwashing purposes to create positive impressions among stakeholders and protect MV from sustainability risks (Walls, Berrone and Phan, 2012).

Prior empirical studies have largely suggested that certain CG mechanisms may influence the link between environmental performance and financial outcomes (Choi and Luo, 2021), without considering the moderating role of BSCOMs. For example, using data on South African firms, Ntim and Soobaroyen (2013) reveal that the interaction between CG and CSR is positively related to MV and conclude that effective CG mechanisms reinforce the positive nexus between CSR and MV. In the European context, Haque and Ntim (2020) report that incentive-based governance mechanisms enhance carbon reduction initiatives, which in turn lead to higher MV. Further, Choi and Luo (2021) find that good CG mechanisms attenuate the negative impacts of carbon emissions on MV. Observably, these studies do not assess whether a BSCOM can moderate the PCCIs/CCPE and MV relationships. Given the importance of BSCOMs in promoting environmental initiatives (Kassinis and Vafeas, 2002; Shaukat, Qiu and Trojanowski, 2016) and creating shareholder value (Singh *et al.*, 2018), we expect that a BSCOM is likely to affect the CCPE–MV and the PCCIs–MV relationships. We thus propose the following hypotheses:

H2a: BSCOMs moderate the relationship between CCPE and MV.

H2b: BSCOMs moderate the relationship between PCCIs and MV.

Carbon performance and climate change initiatives

According to the legitimacy view, firms may engage in environmental management initiatives in order to achieve specific objectives, such as improving legitimacy, protecting reputation, gaining support from stakeholders, and facilitating access to critical resources (Ashforth and Gibbs, 1990; Suchman, 1995). In this regard, firms may seek to gain legitimacy for their business operations by implementing symbolic and/or substantive PCCIs. Symbolic PCCIs seek to demonstrate corporate commitment to carbon mitigation activities, but the design and implementation of such activities aim at gaining legitimacy and support from stakeholders rather than at making meaningful improvements in outcome-based CCPE (Crossley, Elmagrhi and Ntim, 2021). In contrast, substantive PCCIs seek to implement carbon mitigation activities, which may result in fundamental changes of carbon management behaviour and improvement of outcome-based CCPE. In particular, a firm's process-based environmental management initiatives/practices and climate change targets can be substantive in nature and reflect its real intentions/incentives to reduce GHG emissions (Dahlmann, Branicki and Brammer, 2019). However, long-term and comprehensive PCCIs (i.e. changes in production processes, the implementation of intricate projects, new technologies, and cross-functional employee training) are costly, time-consuming, and not easily observable by the market (Berrone, Fosfuri and Gelabert, 2017). As climate change issues are perceived to be serious threats to corporate reputation/legitimacy, firms simply engage in symbolic/greenwashing activities with the aim of enhancing legitimacy, without undertaking substantial commitments to improve outcome-based CCPE (Aslam *et al.*, 2021; Shevchenko, 2021). Accordingly, firms exposed to greater stakeholder pressures are more likely to engage symbolically rather than substantively in PCCIs, with the aim of protecting corporate reputation and improving environmental legitimacy (Haque and Ntim, 2020).

Empirically, Busch and Hoffmann (2011) report that process-based environmental management initiatives are unrelated to outcome-based CCPE. Similarly, Haque and Ntim (2020) conclude that firms symbolically adopt climate change activities to enhance legitimacy without undertaking substantive efforts to improve outcome-based CCPE. This is consistent with greenwashing/impression management arguments (Bansal and Clelland, 2004; Bansal and Kistruck, 2006) that firms exposed to greater pressures from stakeholders and the media are more likely to adopt symbolic environmental initiatives, such as PCCIs, in order to protect their legitimacy and manage stakeholders' impressions about environmental risks. However, these symbolic efforts do not bring meaningful improvements to environmental/carbon performance (Aslam *et al.*, 2021; Shevchenko, 2021). Nevertheless, given that firms seeking legitimacy may adopt symbolic and/or substantive legitimation strategies, we propose the following non-directional hypothesis:

H3: There is an association between PCCIs and CCPE.

Carbon performance and climate change initiatives: The moderating effect of the board sustainability committee

The stakeholder view suggests that the presence of a BSCOM indicates a firm's commitment to environmental and sustainability-related issues in order to build stronger stakeholder relationships (Al-Shaer and Zaman, 2019; Amran *et al.*, 2014). In particular, BSCOMs play critical roles in the adoption of effective sustainability strategies (Orazalin, 2020), in the management of CSR risks and environmental issues (Burke, Hoitash and Hoitash, 2019; Orazalin and Mahmood, 2021), and in improving the quality of sustainability information (Al-Shaer and Zaman, 2018; Kılıç *et al.*, 2021). Such committees realize the importance of environmentally responsible activities and offer incentives for the firm to engage in carbon mitigation activities in response to stakeholder demands (Luo and Tang, 2021). Thus, from the stakeholder perspective, firms that have a BSCOM are more likely to engage in PCCIs to address stakeholder needs and promote sustainability. Empirically, Haque (2017) reports a positive relationship between BSCOMs and carbon mitigation initiatives in UK companies. Similarly, Dixon-Fowler, Ellstrand and Johnson (2017) document that a BSCOM has a positive impact on environmental performance by providing a more effective monitoring function in the context of S&P 500 companies.

However, the symbolic legitimation view argues that firms adopt governance mechanisms and engage in environmental initiatives under a symbolic approach to protect legitimacy and manage stakeholders' concerns on environmental issues (Haque and Ntim, 2020; Rodrigue, Magnan and Cho, 2013). In this regard, a BSCOM may serve as an impression management tool to manage stakeholders' concerns on climate change, protect reputation, and enhance legitimacy (Ashforth and Gibbs, 1990). For example, Walls, Berrone and Phan (2012) report that a BSCOM is positively related to environmental concerns and conclude that firms facing greater environmental risks use a BSCOM as a risk management tool. Rodrigue, Magnan and Cho (2013) provide evidence that BSCOMs are established symbolically, to manage shareholder perceptions, and therefore their role in improving environmental performance is limited. In a similar vein, Burke, Hoitash and Hoitash (2019) argue that a BSCOM is a symbolic mechanism to enhance accountability towards stakeholder groups and does not mitigate sustainability-related risks, thus supporting the notion that such committees are established mainly to protect MV from sustainability risks.

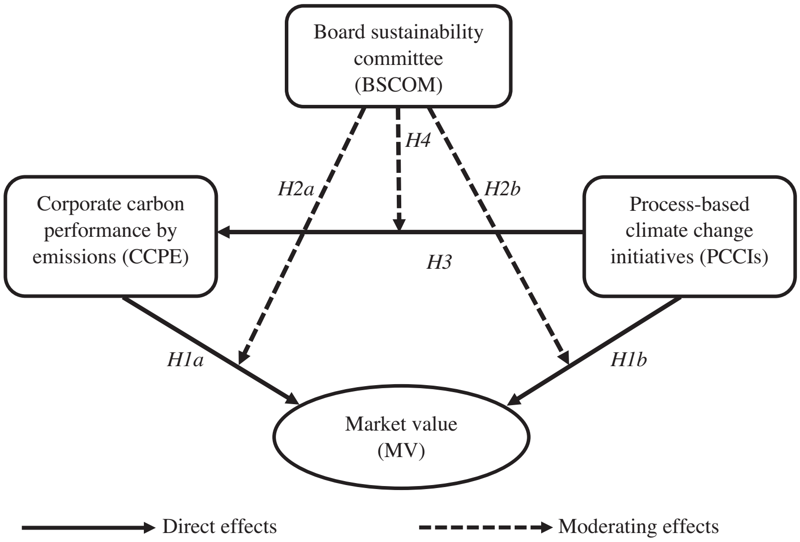

Figure 1. The conceptual framework

Together, it is argued that even though sustainability committees are a critical determinant of environmental initiatives/strategies (Mackenzie, 2007; Orazalin, 2020), the design of those committees and their impacts on climate change-related activities are driven mainly by the economic motives of managers and shareholders (Burke, Hoitash and Hoitash, 2019; Rodrigue, Magnan and Cho, 2013). Thus, based on the above discussion, which emphasizes the importance of BSCOMs in promoting sustainability practices, addressing climate change issues, protecting legitimacy and managing stakeholder impressions, we expect that the presence of a BSCOM is likely to influence the impact of PCCIs on CCPE. Accordingly, we construct the following hypothesis:

H4: A BSCOM moderates the relationship between PCCIs and CCPE.

Figure 1 presents the conceptual framework, outlining the predicted relationships among CCPE, PCCIs, MV, and BSCOMs. It shows the direct effects of CCPE and PCCIs on MV, the direct effect of PCCIs on CCPE, and the moderating effects of BSCOMs on these relationships.

Methodology

Sample and data

We focus on all companies in the world with the required data available from 2002 to 2019. Our initial sample consisted of all non-financial firms from 45 countries based on the availability of carbon data in the ASSET4 ESG database. We excluded financial institutions owing to their specific accounting requirements, different governance systems and regulatory environments (Luo and Tang, 2021; Orazalin, 2020). We then filtered the remaining firms, retaining those with the required data for at least five consecutive years.[2] Table 1 outlines the sample selection process, which yielded 8408 firm-year observations from 592 firms, representing 10 sectors and operating in 35 countries. Data on PCCIs, carbon emissions, and internal CG mechanisms were obtained from Refinitiv's ASSET4 ESG database, which provides comprehensive, objective, and systematic information on environmental, social, and governance performance indicators of publicly listed companies (Haque, 2017; Orazalin, 2020). The financial data were obtained from the Worldscope database. Further, to account for country-specific effects, data on country governance indicators were collected from the Worldwide Governance Indicators developed by Kaufmann, Kraay and Mastruzzi (2011), and other country-level variables, including GDP growth and inflation rates, were gathered from the World Bank database (World Bank, 2020). Table 2 presents the sample distributions, and, similar to

[2]This approach is consistent with prior research (Baboukardos, Mangena and Ishola, 2021) to capture changes in carbon performance, climate change initiatives, and MV over time.

Table 1. Sample selection

	No. of observations
All firm-year observations based on the availability of carbon data in the ASSET4 ESG	20,591
Less: observations with insufficient data on PCCIs	5127
Less: observations with insufficient data on CG	3688
Less: observations with insufficient financial data	3368
Final sample	8408

most cross-country studies of this nature, it shows that Japan, with 1760 observations (20.93%), is the most represented country, followed by the United States with 1613 observations (19.18%) and the UK with 1105 observations (13.14%). Further, the sample shows that the industrial, materials, and consumer discretionary sectors have the most observations, namely 1745 (20.75%), 1564 (18.60%), and 944 (11.23%), respectively.[3]

Models and variables

In order to assess the direct effects of CCPE and PCCIs on MV and the moderating effect of BSCOMs on the CCPE–MV and the PCCIs–MV relationships, we employ the following model:

$$\begin{aligned} MV_{it} = {} & \alpha_0 + \beta_1 * CCP_{it} + \beta_2 * BSCOM_{it} \\ & + \beta_3 * (CCP * BSCOM_{it}) + \beta_4 * BSIZE_{it} \\ & + \beta_5 * INDIR_{it} + \beta_6 * BGEN_{it} \\ & + \beta_7 * SIZE_{it} + \beta_8 * PROF_{it} \\ & + \beta_9 * DEBT_{it} + \beta_{10} * CASH_{it} \\ & + \beta_{11} * CAPIN_{it} + \beta_{12} * WGI_{kt} \\ & + \beta_{13} * GDP_{kt} + \beta_{14} * INF_{kt} \\ & + \varepsilon_{it}, \end{aligned} \tag{1}$$

where CCP_{it} is either the PCCIs or CCPE of firm i at time t, and CCP*BSCOM is the interaction term between CCP and BSCOM. All other variables are defined/measured in Table 3.

Further, we employ the following model[4] to estimate the direct effect of PCCIs on CCPE and the moderating effect of the BSCOM on the PCCIs–CCPE link:

$$\begin{aligned} CCPE_{it} = {} & \alpha_0 + \beta_1 * PCCIs_{i[t;t-1;t-2]} \\ & + \beta_2 * BSCOM_{i[t;t-1;t-2]} \\ & + \beta_3 * \left(PCCIs * BSCOM_{i[t;t-1;t-2]}\right) \\ & + \beta_4 * BSIZE_{i[t;t-1;t-2]} \\ & + \beta_5 * INDIR_{i[t;t-1;t-2]} \\ & + \beta_6 * BGEN_{i[t;t-1;t-2]} \\ & + \beta_7 * SIZE_{i[t;t-1;t-2]} \\ & + \beta_8 * PROF_{i[t;t-1;t-2]} \\ & + \beta_9 * DEBT_{i[t;t-1;t-2]} \\ & + \beta_{10} * CASH_{i[t;t-1;t-2]} \\ & + \beta_{11} * CAPIN_{i[t;t-1;t-2]} \\ & + \beta_{12} * WGI_{k[t;t-1;t-2]} \\ & + \beta_{13} * GDP_{k[t;t-1;t-2]} \\ & + \beta_{14} * INF_{k[t;t-1;t-2]} \\ & + \varepsilon_{i[t;t-1;t-2]} \end{aligned} \tag{2}$$

where PCCIs*BSCOM is the interaction term between PCCIs and the BSCOM.

As shown in Figure 1, our conceptual framework contains four main variables, namely PCCIs, CCPE, BSCOM, and MV. First, following prior studies (e.g. Eleftheriadis and Anagnostopoulou, 2015; Giannarakis, Zafeiriou and Sariannidis, 2017), we develop the PCCI index to measure PCCIs. The index is constructed based on 40 firm-specific activities that measure PCCIs.[5] Appendix 1 (supporting information) presents all 40 PCCIs and their measurements. To assess the

[3]The sample is distributed evenly over the 18-year period, with about 450 observations each year.

[4]The effects of PCCIs on CCPE might be observed gradually over time (Haque and Ntim, 2020). Hence, in addition to year t, we use the first and second lag values of PCCIs and other variables to ascertain whether PCCIs lead to emission reduction in later years.

[5]As climate change represents a global environmental threat, corporate impacts on the environment and ecosystems should be assessed at the planet level rather than at the national level (Atkins and Maroun, 2018; Dumay, Guthrie and Farneti, 2010). Therefore, we assess PCCIs based on a wide range of climate change activities/practices designed to address environmental and ecological issues that are common in any part of the world.

Table 2. Sample distribution by country and sector

Country	Firms	Obs.	Percent (%)	Cum. (%)
Panel A: Sample distribution by country				
Australia	25	380	4.52	4.52
Austria	2	28	0.33	4.85
Belgium	6	98	1.17	6.02
Brazil	7	82	0.98	6.99
Canada	25	373	4.44	11.43
China	3	39	0.46	11.89
Denmark	10	151	1.80	13.69
Finland	9	132	1.57	15.26
France	26	392	4.66	19.92
Germany	26	309	3.68	23.60
Greece	3	44	0.52	24.12
Hong Kong	5	80	0.95	25.07
Hungary	1	12	0.14	25.21
India	5	59	0.70	25.92
Ireland	6	98	1.17	27.08
Italy	12	173	2.06	29.14
Japan	146	1760	20.93	50.07
Luxembourg	2	31	0.37	50.44
Malaysia	1	12	0.14	50.58
Mexico	4	53	0.63	51.21
Netherlands	13	211	2.51	53.72
Norway	6	88	1.05	54.77
Portugal	2	29	0.34	55.11
Russia	2	22	0.26	55.38
Saudi Arabia	1	10	0.12	55.49
Singapore	2	31	0.37	55.86
South Africa	7	83	0.99	56.85
South Korea	13	150	1.78	58.63
Spain	14	210	2.50	61.13
Sweden	20	272	3.24	64.37
Switzerland	15	234	2.78	67.15
Thailand	2	24	0.29	67.44
Turkey	2	20	0.24	67.67
United Kingdom	69	1105	13.14	80.82
United States	100	1613	19.18	100.00
Total	592	8408	100.00	
Panel B: Sample distribution by sector				
Communication services	32	487	5.79	5.79
Consumer discretionary	69	944	11.23	17.02
Consumer staples	45	661	7.86	24.88
Energy	46	680	8.09	32.97
Health care	40	622	7.40	40.37
Industrials	124	1745	20.75	61.12
Information technology	52	731	8.69	69.81
Materials	115	1564	18.60	88.42
Real estate	22	334	3.97	92.39
Utilities	47	640	7.61	100.00
Total	592	8408	100.00	

Note: EU ETS countries include Austria, Belgium, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, and the United Kingdom. The remaining countries are non-EU ETS countries.

Table 3. Definition of variables

Variables	Symbols	Operationalization	Source
Substantive measures			
Market value	MV	Tobin's Q calculated as total assets minus book value of equity plus market value of equity divided by total assets	Datastream/ Worldscope ASSET4-ESG
Corporate carbon performance by emissions	CCPE	The natural logarithm of total GHG emissions, including Scope 1 (direct emissions from corporate activities) and Scope 2 (indirect emissions from the consumption of purchased electricity, cooling, heat, steam, etc.) emissions in tonnes. Higher CCPE values indicate greater levels of GHG emissions (i.e. weaker carbon performance).	
Symbolic constructs/measures			
Process-based corporate climate change initiatives	PCCIs	The index is a weighted average sector-adjusted index calculated based on 40 firm-specific items (see Appendix 1 in supporting information) related to climate change initiatives and practices. It ranges between 0% (no climate change initiatives and practices) and 100% (fully instituted climate change initiatives and practices)	ASSET4-ESG
Board sustainability committee	BSCOM	A dummy value of 1 is assigned if the board has a sustainability committee, and 0 otherwise	ASSET4-ESG
Corporate governance variables			
Board size	BSIZE	The natural logarithm of the number of board directors	ASSET4-ESG
Board independence	INDIR	The percentage of independent directors on the board	ASSET4-ESG
Board gender diversity	BGEN	The percentage of female directors on the board	ASSET4-ESG
Firm-specific control variables			
Firm size	SIZE	The natural logarithm of total assets	Worldscope
Profitability	PROF	Net income divided by total assets	Worldscope
Leverage	DEBT	Total debt divided by total assets	Worldscope
Slack	CASH	Cash and cash equivalents divided by total assets	Worldscope
Capital intensity	CAPIN	Property, plant and equipment divided by total assets	Worldscope
Country-specific variables			
Country governance quality	WGI	Composite index of a country's governance quality. Calculated based on dimensions including government effectiveness, regulatory quality, and rule of law obtained from the Worldwide Governance Indicators developed by Kaufmann, Kraay and Mastruzzi (2011). The score is expressed as a percentage and ranges between 0% and 100%	Worldwide Governance Indicators
GDP growth	GDP	The sum of gross value added by all resident producers plus product taxes and minus subsidies not included in the value of products	World Bank
Inflation rates	INF	Annual percentage change in retail prices of goods and services that may be fixed or changed during the year	World Bank

validity and reliability of the index, Cronbach's alpha of individual dimensions of the PCCIs is estimated.[6] The PCCI index, which is a weighted average sector-adjusted index, is then calculated based on these 40 firm-specific PCCIs.[7] Second, consistent with related studies (Downar *et al.*,

[6]The obtained alpha coefficient of 0.889, which is sufficiently higher than the cut-off level of 0.700, suggests that the instrument is reliable and that the dimensions of the PCCIs have high internal consistency.

[7]ASSET4 ESG measures climate change initiatives/activities/practices against all companies operating in the same sector. Hence, following the measurement approach used in prior research (Gupta, Crilly and Greckhamer, 2020; Zaman *et al.*, 2021), we develop the PCCI index for each firm by comparing its activities with those of other firms from the same sector.

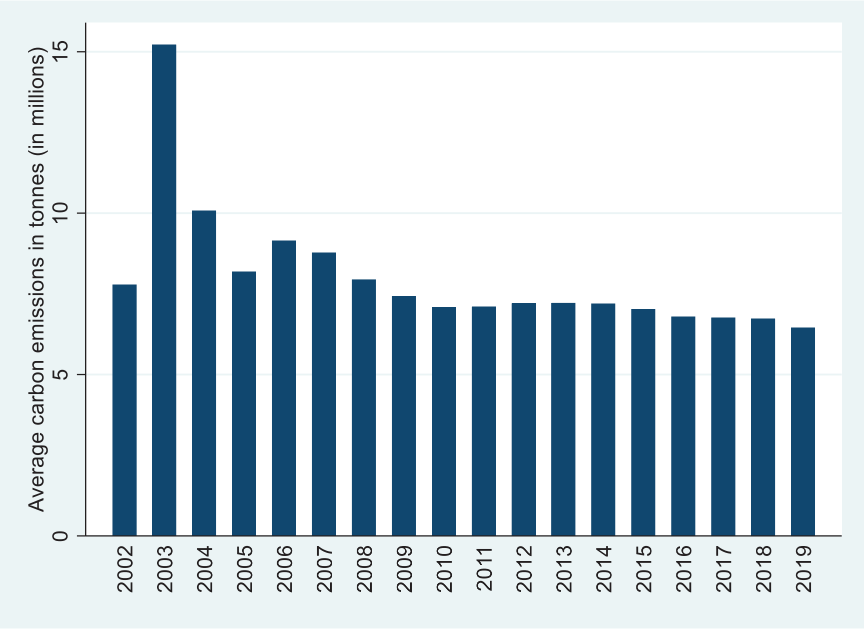

Figure 2. ***Year-wise distribution of carbon emissions in tonnes (in millions)*** *[Colour figure can be viewed at wileyonlinelibrary.com]*

2021; Moussa *et al.*, 2020), we measure CCPE as the natural logarithm of total GHG emissions, including Scope 1 and Scope 2 emissions.[8] Third, we measure BSCOM based on data obtained from the ASSET4 ESG, consistent with prior studies (Dixon-Fowler, Ellstrand and Johnson, 2017; Orazalin, 2020). Finally, following related studies (Rind *et al.*, 2021; Singh *et al.*, 2018), we measure MV using Tobin's Q, which depends on various measures associated with the adoption of clean/green technologies, stockholder pressures for PCCIs, emissions mitigation efforts, and R&D costs (Faria, Tindall and Terjesen, 2022), and hence better reflects environmental stakeholders' perceptions about corporate sustainability (Siddique *et al.*, 2021).[9]

We also use several control variables to account for the confounding effects of firm- and country-specific characteristics that may affect MV and CCPE. Following prior studies (e.g. Berrone and Gomez-Mejia, 2009; Bui, Houqe and Zaman, 2020), we include several CG characteristics, such as board size, board independence and board gender diversity. Further, consistent with prior studies (Haque, 2017; Siddique *et al.*, 2021), we control several firm characteristics, including firm size, profitability, leverage, slack, and capital intensity. Finally, we use country governance indicators and macro-economic factors, such as GDP growth and inflation, following prior studies (Jiang *et al.*, 2021; Marin and Vona, 2021; Siddique *et al.*, 2021).

Empirical results

Descriptive statistics and correlation analysis

Figures 2 and 3 present the year-wise distribution of carbon emissions and PCCIs, respectively, for the period 2002–2019. The yearly average of carbon emissions shows a declining trend from 2003 to 2005 and from 2007 to 2010, followed by a stable pattern between 2010 and 2014, and again a further reduction from 2015 onwards. Figure 3 shows

[8]Scope 1 includes direct GHG emissions in tonnes resulting from corporate activities, whereas Scope 2 represents indirect GHG emissions arising from the consumption of purchased energy resources, such as electricity, cooling, heat and steam. Scope 3, which includes other indirect emissions, is not included in the analysis owing to missing data for the majority of firms and years. Higher CCPE values indicate greater levels of GHG emissions (i.e. weaker carbon performance).

[9]Tobin's q calculation includes the market value of shares/stocks. In additional analysis, we also checked the robustness of our findings using other stock-based valuation measures, such as price-to-book and market-to-book ratios, which for brevity are not reported here but are available upon request.

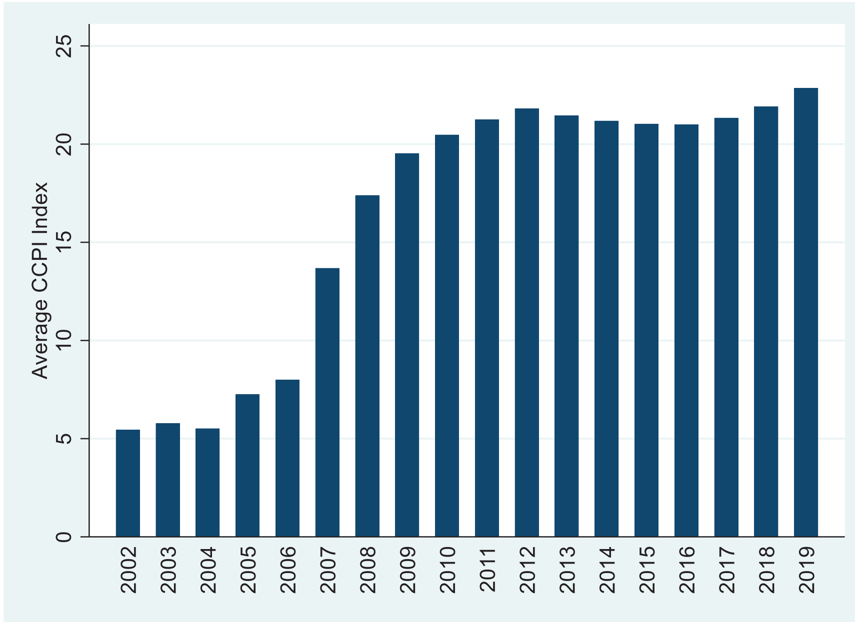

Figure 3. ***Year-wise distribution of climate change initiatives***
Source: authors' own calculation based on data obtained from the Refinitiv database
[Colour figure can be viewed at wileyonlinelibrary.com]

Table 4. Descriptive statistics

Variable	Obs.	Mean	Std Dev.	Min	Max
MV (ratio)	8408	1.66	1.02	0.33	15.99
CCPE (ln)	7778	13.72	2.19	6.86	19.29
PCCIs (%)	8408	50.00	28.84	0.47	99.97
BSCOM	8408	0.80	0.40	0.00	1.00
BSIZE (ln)	8408	2.41	0.31	0.69	3.50
INDIR (%)	8408	56.94	27.76	0.00	100.00
BGEN (%)	8408	14.99	13.05	0.00	63.64
SIZE (ln)	8408	23.36	1.29	18.99	27.41
PROF (%)	8408	5.33	6.91	−78.62	106.22
DEBT (%)	8408	24.96	14.07	0.00	87.00
CASH (ratio)	8408	0.07	0.08	0.00	0.60
CAPIN (ratio)	8408	0.31	0.22	0.00	1.00
WGI (%)	8408	89.47	9.83	34.29	99.83
GDP (%)	8408	1.79	2.12	−9.13	25.16
INF (%)	8408	1.67	1.58	−4.48	16.33

that the average index of PCCIs remains relatively stable during the first three years and increases steadily from 2005 to 2012. Then, it slightly decreases from 2012 to 2015 and again rises steadily during the next four years. Overall, the pattern shows a steady improvement in PCCIs over time, and this trend is generally comparable with the observations of Haque (2017).

Table 4 reports the descriptive statistics of the variables. The MV variable has a mean value of 1.66 and varies between 0.33 and 15.99. The PCCIs variable has a mean value of 50.00% and ranges from 0.47% to 99.97%. The CCPE values vary between 6.86 and 19.29, with a mean value of 13.72. The statistics for BSCOM show that approximately 80% of the firms have a BSCOM. Further, the correlation coefficients in Table 5 show that CCPE is negatively correlated with MV and positively correlated with PCCIs and BSCOM. Serious multicollinearity problems arise if correlation coefficients among predictors exceed a cut-off value of 0.80 (Gujarati, 2004). The matrix shows that none of the coefficients exceeds this value, indicating the absence of multicollinearity.[10]

Multivariate results and discussion

Carbon performance, board sustainability committees, climate change initiatives, and market value.

[10]We also estimate the variation inflation factor (VIF) for each explanatory variable. As suggested by Chatterjee et al. (2000), a VIF value exceeding a threshold value of 10 indicates the presence of multicollinearity. The results (not reported) reveal that the highest VIF is 2.33 and the mean VIF is 1.39, indicating that multicollinearity does not appear to be an issue in our study.

Table 5. Correlation matrix

Variables	MV	CCPE	PCCIs	BSCOM	BSIZE	INDIR	BGEN	SIZE	PROF	DEBT	CASH	CAPIN	WGI	GDP	INF
MV	1.00														
CCPE	−0.23**	1.00													
PCCIs	−0.12**	0.27**	1.00												
BSCOM	−0.09**	0.11**	0.48**	1.00											
BSIZE	−0.10**	0.27**	0.24**	0.09**	1.00										
INDIR	−0.03**	0.14**	0.14**	0.12**	−0.11**	1.00									
BGEN	0.13***	−0.02	0.19**	0.15***	−0.01	0.16**	1.00								
SIZE	−0.18**	0.62**	0.44**	0.18**	0.41**	0.17**	0.12**	1.00							
PROF	0.57**	−0.12**	−0.07**	−0.08**	−0.05**	−0.03**	0.09**	−0.07**	1.00						
DEBT	−0.22**	0.21**	0.03**	0.03**	0.10**	0.02	0.03**	0.18**	−0.28**	1.00					
CASH	0.14**	−0.21**	0.00	0.01	−0.05**	0.00	−0.18**	−0.15**	0.09**	−0.27**	1.00				
CAPIN	−0.11**	0.44**	−0.02	0.06**	0.03**	0.02	−0.06**	0.07**	−0.06**	0.11**	−0.19**	1.00			
WGI	0.04**	−0.14**	−0.14**	−0.08**	−0.21**	0.07**	0.14**	−0.12**	0.01	−0.05**	0.01	−0.11**	1.00		
GDP	0.15**	0.04**	−0.13**	−0.11**	−0.03**	0.02*	0.06**	0.01	0.17**	−0.06**	−0.06**	0.03**	−0.05**	1.00	
INF	0.09**	0.09**	−0.09**	−0.06**	−0.01	0.01	0.08**	0.02	0.15**	0.02	−0.17**	0.11**	−0.37**	0.17**	1.00

*Correlation is significant at the 0.05 level (2-tailed);
**correlation is significant at the 0.01 level (2-tailed).

Table 6 reports the regression results of MV on CCPE, PCCIs, and BSCOM. Model (1) shows that CCPE is negatively related to MV ($p < 0.01$), indicating that firms with excessive GHG emissions suffer more from negative market valuation. This evidence supports *H1a* and corroborates the findings of Baboukardos (2017) and Choi and Luo (2021) that capital markets react negatively to increased levels of emissions. Model (2) displays a positive association between PCCIs and MV ($p < 0.01$), contrary to expectations of *H1b*. This finding suggests that firms facing increased climate-related risks/threats are more likely to adopt process-based environmental initiatives/strategies, such as PCCIs, which can be perceived positively by market participants, resulting in value enhancement (Haque and Ntim, 2020). This evidence also supports the symbolic legitimation view, in that firms are likely to engage in symbolic PCCIs to impress stakeholders, gain/maintain legitimacy, and ultimately improve MV (Berrone and Gomez-Mejia, 2009; Suchman, 1995). Further, Model (3) shows that BSCOM is positively associated with MV ($p < 0.05$). This evidence suggests that firms with a BSCOM have a higher MV and supports the view that CG practices, such as a BSCOM, improve organizational performance (Choi and Luo, 2021; Kılıç *et al.*, 2021). However, Models (4) and (5) show that the coefficients for the interaction terms (CCPE*BSCOM and PCCIs*BSCOM) are insignificant, indicating that BSCOM has no moderating role on the CCPE–MV and the PCCIs–MV links. These findings are consistent with the view that a BSCOM established under a symbolic approach can generate value, but it can be ineffective at mitigating sustainability-related risks and improving environmental performance (Burke, Hoitash and Hoitash, 2019; Rodrigue, Magnan and Cho, 2013). Given that the formation of CSR/sustainability committees is purely voluntary and that firms may establish such committees for greenwashing purposes (Dixon-Fowler, Ellstrand and Johnson, 2017), our findings appear to indicate that executives can influence the formation of a BSCOM, and hence may exert dominance over its decision making. This supports the view that environmentally sensitive firms tend to nominate their executives to BSCOMs to pursue economic/financial motives, and hence the establishment of a BSCOM serves as an impression management tool (Rodrigue, Magnan and Cho, 2013).

Table 6. Impacts of carbon performance, climate change initiatives, and board sustainability committees on market value

	(1) MV	(2) MV	(3) MV	(4) MV	(5) MV
CCPE	−0.067***			−0.069***	
	(−9.79)			(−10.09)	
PCCIs		0.002***			0.001***
		(4.16)			(3.59)
BSCOM			0.055**	0.107***	0.063**
			(2.14)	(4.15)	(2.21)
CCPE*BSCOM				0.010	
				(0.90)	
PCCIs*BSCOM					0.001
					(1.27)
BSIZE	0.050	0.047	0.053*	0.048	0.048
	(1.63)	(1.56)	(1.75)	(1.57)	(1.57)
INDIR	−0.000	−0.001**	−0.001**	−0.000	−0.001***
	(−0.70)	(−2.55)	(−2.36)	(−0.92)	(−2.65)
BGEN	0.004***	0.004***	0.004***	0.004***	0.004***
	(3.22)	(3.33)	(3.33)	(3.12)	(3.28)
SIZE	−0.049***	−0.133***	−0.120***	−0.052***	−0.134***
	(−4.49)	(−14.28)	(−14.47)	(−4.74)	(−14.34)
PROF	0.059***	0.061***	0.062***	0.059***	0.061***
	(15.65)	(16.53)	(16.59)	(15.71)	(16.58)
DEBT	0.000	0.000	0.000	0.000	0.000
	(0.57)	(0.44)	(0.23)	(0.69)	(0.47)
CASH	0.867***	0.995***	0.998***	0.853***	0.994***
	(4.99)	(5.89)	(5.90)	(4.90)	(5.87)
CAPIN	−0.001	−0.155***	−0.158***	−0.009	−0.159***
	(−0.03)	(−4.11)	(−4.17)	(−0.24)	(−4.20)
WGI	−0.005	−0.006	−0.006	−0.005	−0.006
	(−0.80)	(−1.08)	(−1.15)	(−0.95)	(−1.16)
GDP	0.027***	0.027***	0.027***	0.027***	0.027***
	(3.74)	(3.88)	(3.81)	(3.80)	(3.89)
INF	0.019*	0.020*	0.019*	0.019*	0.020*
	(1.71)	(1.90)	(1.82)	(1.78)	(1.91)
Constant	2.609***	4.883***	4.588***	2.821***	4.949***
	(4.19)	(8.78)	(8.42)	(4.50)	(8.84)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	7778	8408	8408	7778	8408
R-squared	0.525	0.521	0.520	0.526	0.521

Note: This table reports the regression results of carbon performance, climate change initiatives and sustainability committees on market value. All variables are defined and measured in Table 3. *t*-statistics estimated using robust standard errors are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively

Carbon performance, board sustainability committees, and climate change initiatives. Table 7 reports the regression results of CCPE against PCCIs and BSCOM. Models (1)–(6) show that PCCIs, $PCCIs_{t-1}$, and $PCCIs_{t-2}$ are positively associated with CCPE ($p < 0.01$). These results indicate that firms that engage in PCCIs continue to produce high emissions. This is consistent with prior studies (Boiral, 2016; Talbot and Boiral, 2018) that provide evidence of symbolic process-based environmental initiatives in the form of active engagements in environmentally friendly activities and extensive environmental reporting, but these symbolic commitments do not necessarily improve outcome-based CCPE (Shevchenko, 2021). Theoretically, this finding supports the symbolic legitimation/greenwashing view, in that firms are likely to engage in PCCIs under a symbolic approach to protect/maintain/improve legitimacy, but such initiatives do not result in observable emissions

Table 7. Impacts of climate change initiatives and board sustainability committees on carbon performance

	(1) CCPE	(2) CCPE	(3) CCPE	(4) CCPE	(5) CCPE	(6) CCPE
PCCIs	0.008***			0.008***		
	(13.23)			(12.95)		
BSCOM	0.176***			0.159***		
	(4.14)			(3.50)		
PCCIs*BSCOM				−0.001		
				(−0.68)		
PCCIs$_{t-1}$		0.007***			0.007***	
		(11.66)			(11.35)	
BSCOM$_{t-1}$		0.110***			0.104**	
		(2.59)			(2.21)	
PCCIs$_{t-1}$*BSCOM$_{t-1}$					−0.000	
					(−0.24)	
PCCIs$_{t-2}$			0.007***			0.007***
			(10.48)			(10.30)
BSCOM$_{t-2}$			0.092**			0.082*
			(2.14)			(1.69)
PCCIs$_{t-2}$*BSCOM$_{t-2}$						−0.001
						(−0.35)
BSIZE$_{[t;t-1;t-2]}$	−0.055	−0.046	−0.076	−0.056	−0.046	−0.077
	(−1.00)	(−0.80)	(−1.33)	(−1.01)	(−0.81)	(−1.34)
INDIR$_{[t;t-1;t-2]}$	0.003***	0.003***	0.002***	0.003***	0.003***	0.002***
	(5.29)	(5.32)	(4.73)	(5.29)	(5.32)	(4.73)
BGEN$_{[t;t-1;t-2]}$	0.002	0.003*	0.003*	0.002	0.003*	0.003*
	(1.60)	(1.85)	(1.73)	(1.60)	(1.85)	(1.73)
SIZE$_{[t;t-1;t-2]}$	0.868***	0.878***	0.885***	0.868***	0.878***	0.885***
	(65.83)	(64.50)	(63.98)	(65.80)	(64.50)	(64.00)
PROF$_{[t;t-1;t-2]}$	−0.006***	−0.005**	−0.005**	−0.006***	−0.005**	−0.005**
	(−2.99)	(−2.50)	(−2.33)	(−2.98)	(−2.50)	(−2.32)
DEBT$_{[t;t-1;t-2]}$	0.007***	0.006***	0.006***	0.007***	0.006***	0.006***
	(6.26)	(5.96)	(5.40)	(6.25)	(5.96)	(5.40)
CASH$_{[t;t-1;t-2]}$	−0.659***	−0.657***	−0.664***	−0.662***	−0.658***	−0.665***
	(−3.70)	(−3.56)	(−3.47)	(−3.71)	(−3.56)	(−3.48)
CAPIN$_{[t;t-1;t-2]}$	2.164***	2.143***	2.145***	2.164***	2.143***	2.145***
	(23.53)	(22.54)	(21.94)	(23.53)	(22.54)	(21.94)
WGI$_{[t;t-1;t-2]}$	0.018**	0.016**	0.013	0.018**	0.016**	0.013
	(2.38)	(1.97)	(1.40)	(2.38)	(1.97)	(1.40)
GDP$_{[t;t-1;t-2]}$	0.004	0.008	0.013	0.004	0.008	0.013
	(0.45)	(0.85)	(1.39)	(0.44)	(0.84)	(1.38)
INF$_{[t;t-1;t-2]}$	0.038***	0.042***	0.048***	0.038***	0.042***	0.048***
	(2.88)	(3.13)	(3.38)	(2.88)	(3.13)	(3.39)
Constant	−9.483***	−9.619***	−9.525***	−9.464***	−9.611***	−9.515***
	(−11.66)	(−11.21)	(−10.09)	(−11.63)	(−11.20)	(−10.08)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7778	7212	6779	7778	7212	6779
R-squared	0.769	0.771	0.773	0.769	0.771	0.773

Note: This table reports the regression results of climate change initiatives and sustainability committees on carbon performance. All variables are defined and measured in Table 3. *t*-statistics estimated using robust standard errors are reported in parentheses.
***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively

reductions (Haque and Ntim, 2020). Further, BSCOM, BSCOM$_{t-1}$, and BSCOM$_{t-2}$ are positively related to CCPE, indicating that firms with a BSCOM are likely to have high emissions. These findings corroborate past studies (Burke, Hoitash and Hoitash, 2019; Walls, Berrone and Phan, 2012), which reveal a positive association between a BSCOM and environmental concerns and argue

Table 8. Additional analysis: carbon performance, climate change initiatives, board sustainability committees and market value in shareholder-based and stakeholder-based countries

Panel A: Impacts of CCPE, PCCIs, and BSCOM on MV

	(1) MV	(2) MV	(3) MV	(4) MV	(5) MV
CCPE	−0.067***			−0.070***	
	(−9.56)			(−10.04)	
CCPE*SHARE	0.009			0.007	
	(1.07)			(0.87)	
PCCIs		0.002***			0.001***
		(4.15)			(3.48)
PCCIs*SHARE		0.000			0.000
		(0.33)			(0.27)
BSCOM			0.055**	0.100***	0.070**
			(2.13)	(3.84)	(2.30)
BSCOM*SHARE			−0.013	−0.050	0.034
			(−0.30)	(−1.12)	(0.57)
CCPE*BSCOM				0.011	
				(1.02)	
CCPE*BSCOM*SHARE				0.080***	
				(3.68)	
PCCIs*BSCOM					0.001
					(1.30)
PCCIs*BSCOM*SHARE					0.002
					(0.91)
SHARE	0.733**	0.791***	0.761***	0.847***	0.798***
	(2.48)	(2.75)	(2.66)	(2.83)	(2.76)
Controls	Yes	Yes	Yes	Yes	Yes
Year/Sector/Country fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	7778	8408	8408	7778	8408
R−squared	0.525	0.521	0.520	0.527	0.521

Panel B: Impacts of PCCIs and BSCOM on CCPE

	(1) CCPE	(2) CCPE	(3) CCPE	(4) CCPE	(5) CCPE	(6) CCPE
$PCCIs_{t-1}$	0.008***		0.007***			
	(12.12)		(11.28)			
$PCCIs_{t-1}$*$SHARE_{t-1}$	−0.000		0.001			
	(−0.15)		(1.38)			
$BSCOM_{t-1}$		0.177***	0.094*			
		(4.17)	(1.90)			
$BSCOM_{t-1}$*$SHARE_{t-1}$		−0.236***	−0.239**			
		(−3.33)	(−2.45)			
$PCCIs_{t-1}$*$BSCOM_{t-1}$			−0.001			
			(−0.81)			
$PCCIs_{t-1}$*$BSCOM_{t-1}$*$SHARE_{t-1}$			0.000			
			(0.11)			
$SHARE_{t-1}$	0.220	0.148	0.323			
	(0.60)	(0.40)	(0.88)			
$PCCIs_{t-2}$				0.007***		0.007***
				(10.88)		(10.21)
$PCCIs_{t-2}$*$SHARE_{t-2}$				0.000		0.002*
				(0.10)		(1.66)
$BSCOM_{t-2}$					0.154***	0.072
					(3.61)	(1.41)

Table 8. (Continued)

Panel B: Impacts of PCCIs and BSCOM on CCPE

	(1) CCPE	(2) CCPE	(3) CCPE	(4) CCPE	(5) CCPE	(6) CCPE
$BSCOM_{t-2}{}^{*}SHARE_{t-2}$					−0.221***	−0.244**
					(−3.16)	(−2.41)
$PCCIs_{t-2}{}^{*}BSCOM_{t-2}$						−0.002
						(−0.99)
$PCCIs_{t-2}{}^{*}BSCOM_{t-2}{}^{*}SHARE_{t-2}$						0.000
						(0.03)
$SHARE_{t-2}$				0.344	0.288	0.441
				(0.89)	(0.74)	(1.14)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year/Sector/Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7212	7212	7212	6779	6779	6779
R-squared	0.771	0.768	0.772	0.773	0.770	0.773

Note: This table reports the regression results for the effects of carbon performance, sustainability committees and climate change initiatives on market value and for the effects of climate change initiatives and sustainability committees on carbon performance for shareholder-based and stakeholder-based countries. SHARE is a dummy variable that equals one if firms belong to shareholder-based countries and zero if firms are operating in stakeholder-based countries. All variables are defined and measured in Table 3. *t*-statistics estimated using robust standard errors are reported in parentheses.
***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively

that firms exposed to greater environmental risks are more likely to use a BSCOM as an impression management tool to protect/maintain/improve their legitimacy. Further, the interaction terms (PCCIs*BSCOM, $PCCIs_{t-1}$*$BSCOM_{t-1}$, and $PCCIs_{t-2}$*$BSCOM_{t-2}$) are statistically insignificant, implying that BSCOM has no moderating impact on the PCCIs–CCPE link. This evidence suggests that, despite a firm's greater commitment to PCCIs, GHG emissions continue to increase regardless of whether a firm has a BSCOM or not. Collectively, Tables 6 and 7 suggest that firms that engage in PCCIs under a symbolic approach to enhance MV are more likely to establish a BSCOM as an impression management tool for greenwashing purposes to create positive impressions and gain/maintain/repair legitimacy. Nevertheless, PCCIs do not improve outcome-based CCPE, and BSCOMs do not reduce excessive GHG emissions, which in turn are perceived negatively by market participants.

Additional analyses

The prior literature suggests that environmental management systems, CG practices and organizational performance are heavily influenced by differing country- and sector- level environmental regulations, institutional systems, and regulatory frameworks (Andreou and Kellard, 2021; Bianchini and Croce, 2022; Gaganis *et al.*, 2021). In this regard, it is important to focus on variations in regional and sectoral contexts when assessing the factors and outcomes of corporate environmental impacts and climate change initiatives/practices (Aslam *et al.*, 2021; Kolk, Lindeque and van den Buuse, 2014; Liu *et al.*, 2021). Hence, we perform a set of country- and sector-group analyses.

First, we estimate whether the predicted relationships differ across shareholder-based and stakeholder-based CG countries/systems. We introduce the dummy variable SHARE, which equals one if firms belong to shareholder-based CG countries/systems and zero otherwise. Panel A of Table 8 shows that the coefficient of CCPE*BSCOM*SHARE is positive, indicating that the negative impact of emissions on MV is weaker for firms with a BSCOM in shareholder-based CG countries/systems. Further, SHARE is positively related to MV, indicating that firms operating in shareholder-based CG countries/systems have a higher MV. Panel B shows that the positive relationship between BSCOM and CCPE is stronger in stakeholder-based countries/systems. Altogether, the results suggest that firms from shareholder-oriented markets are more concerned about the economic consequences of their environmental impacts.

Table 9. Additional analysis: carbon performance, climate change initiatives, board sustainability committees, and market value in EU ETS and non-EU ETS countries

Panel A: Impacts of CCPE, PCCIs, and BSCOM on MV

	(1) MV	(2) MV	(3) MV	(4) MV	(5) MV
CCPE	−0.066***			−0.068***	
	(−9.63)			(−9.88)	
CCPE*EUETS	−0.038***			−0.040***	
	(−4.63)			(−4.75)	
PCCIs		0.002***			0.001***
		(4.19)			(3.34)
PCCIs*EUETS		0.001			−0.000
		(1.07)			(−0.64)
BSCOM			0.049*	0.099***	0.062**
			(1.90)	(3.77)	(2.15)
BSCOM*EUETS			0.123***	0.116***	0.148***
			(2.79)	(2.60)	(2.60)
CCPE*BSCOM				0.015	
				(1.42)	
CCPE*BSCOM*EUETS				−0.014	
				(−0.68)	
PCCIs*BSCOM					0.001
					(1.46)
PCCIs*BSCOM*EUETS					0.001
					(0.31)
EUETS	−0.066	−0.034	−0.044	−0.077	−0.048
	(−1.32)	(−0.71)	(−0.92)	(−1.54)	(−0.98)
Controls	Yes	Yes	Yes	Yes	Yes
Year/Sector/Country fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	7778	8408	8408	7778	8408
R-squared	0.526	0.521	0.521	0.528	0.522

Panel B: Impacts of PCCIs, and BSCOM on CCPE

	(1) CCPE	(2) CCPE	(3) CCPE	(4) CCPE	(5) CCPE	(6) CCPE
$PCCIs_{t-1}$	0.008***		0.007***			
	(12.09)		(11.25)			
$PCCIs_{t-1}$*$EUETS_{t-1}$	0.001		0.001			
	(0.64)		(0.73)			
$BSCOM_{t-1}$		0.177***	0.102**			
		(4.12)	(2.19)			
$BSCOM_{t-1}$*$EUETS_{t-1}$		0.001	−0.090			
		(0.02)	(−1.02)			
$PCCIs_{t-1}$*$BSCOM_{t-1}$			−0.000			
			(−0.24)			
$PCCIs_{t-1}$*$BSCOM_{t-1}$*$EUETS_{t-1}$			−0.002			
			(−0.73)			
$EUETS_{t-1}$	−0.546***	−0.570***	−0.541***			
	(−7.32)	(−7.54)	(−7.14)			
$PCCIs_{t-2}$				0.007***		0.007***
				(10.86)		(10.12)
$PCCIs_{t-2}$*$EUETS_{t-2}$				0.001		0.000
				(0.56)		(0.36)
$BSCOM_{t-2}$					0.149***	0.080*
					(3.44)	(1.67)
$BSCOM_{t-2}$*$EUETS_{t-2}$					0.044	−0.053
					(0.63)	(−0.57)

Table 9. (Continued)

Panel B: Impacts of PCCIs, and BSCOM on CCPE

	(1) CCPE	(2) CCPE	(3) CCPE	(4) CCPE	(5) CCPE	(6) CCPE
$PCCIs_{t-2}*BSCOM_{t-2}$						−0.000
						(−0.30)
$PCCIs_{t-2}*BSCOM_{t-2}*EUETS_{t-2}$						−0.003
						(−1.01)
$EUETS_{t-2}$				−0.585***	−0.604***	−0.577***
				(−7.66)	(−7.83)	(−7.45)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year/Sector/Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7212	7212	7212	6779	6779	6779
R-squared	0.771	0.767	0.771	0.773	0.769	0.773

Note: This table reports the regression results for the effects of carbon performance, sustainability committees and climate change initiatives on market value and for the effects of climate change initiatives and sustainability committees on carbon performance for EU ETS and non-EU ETS countries. EUETS is a dummy that equals one if firms are operating in EU ETS countries, and zero if firms are operating in non-EU ETS countries. All variables are defined and measured in Table 3. T-statistics estimated using robust standard errors are reported in parentheses.

***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively

This is consistent with the view that firms in shareholder-based countries are compelled by investor pressures to pursue short-term financial goals and value-enhancing developments, while firms in stakeholder-based regimes are motivated to promote social values and stakeholder perspectives (Allen *et al.*, 2021; Liu *et al.*, 2021). Overall, the results conform with past research in suggesting that climate governance (Bui, Houqe and Zaman, 2020), institutional pressures (Benlemlih, Arif and Nadeem, 2022), and legal systems (Andreou and Kellard 2021) affect corporate responses to climate change and performance outcomes.

Second, we repeat the estimations for EU ETS and non-EU ETS countries. We employ the dummy variable EUETS, which equals one if firms belong to EU ETS countries and zero otherwise. Panel A of Table 9 shows that the negative impact of CCPE on MV is more prominent for EU ETS countries, indicating that highly polluting firms in EU ETS countries are penalized more by market participants than are those in non-EU ETS countries. This evidence suggests that firms regulated under the EU ETS need to incur more costs to reduce emissions and increase energy efficiency according to the 'cap and trade' principle, and thus are more undervalued by markets for excessive emissions (Clarkson *et al.*, 2015). By contrast, highly polluting firms in non-EU ETS jurisdictions are penalized less by market participants owing to the absence of regulatory systems, such as the EU ETS (Choi and Luo, 2021). BSCOM*EUETS is positively related to MV, which suggests that capital markets react more positively to the presence of a BSCOM in EU ETS countries. Panel B shows that EUETS is negatively related to CCPE, indicating that the EU ETS leads to observable reductions in corporate emissions. In this case, the nature of climate governance (Bui, Houqe and Zaman, 2020), as well as internal and external governance systems (Choi and Luo 2021) that vary across countries, can explain the effect of stringent environmental regulations on corporate emissions.

Third, we estimate Equations (1) and (2) for three subsamples, namely Paris (2019–2016), Kyoto (2015–2005) and pre-reforms (2004–2002), to consider the effects of global climate change reforms/initiatives. Table 10 shows a significantly negative association between CCPE and MV in the Paris and Kyoto subsamples, and no association in the pre-reforms subsample. These results highlight the importance of global reforms/initiatives in raising awareness among market participants about the negative consequences of GHG emissions. Finally, we estimate the hypothesized relationships for environmentally sensitive and non-sensitive sectors. The results reveal that the negative effect of CCPE on MV is

Table 10. Additional analysis: carbon performance, climate change initiatives, board sustainability committees and market value in different periods

	PARIS (2019–2016)			KYOTO (2015–2005)			PRE- (2004–2002)		
Panel A: Impacts of CCPE and BSCOM on MV									
	(1) MV	(2) MV	(3) MV	(4) MV	(5) MV	(6) MV	(7) MV	(8) MV	(9) MV
CCPE	−0.091***		−0.091***	−0.054***		−0.056***	−0.030		0.049
	(−6.39)		(−6.37)	(−6.79)		(−7.04)	(−0.62)		(0.76)
BSCOM		0.055	0.074		0.082***	0.118***		−0.095	−0.105
		(0.82)	(1.41)		(2.75)	(3.99)		(−1.42)	(−0.83)
CCPE*BSCOM			−0.012			0.011			0.134**
			(−0.44)			(0.82)			(2.40)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year/Sector/Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2351	2351	2351	5211	5520	5211	216	537	216
R-squared	0.527	0.519	0.527	0.539	0.533	0.540	0.599	0.573	0.615
Panel B: Impacts of PCCIs and BSCOM on MV									
	(1) MV	(2) MV	(3) MV	(4) MV	(5) MV	(6) MV	(7) MV	(8) MV	(9) MV
PCCIs	0.002***		0.002**	0.002***		0.002***	−0.007**		−0.001
	(2.76)		(2.49)	(3.96)		(3.49)	(−2.39)		(−0.31)
BSCOM		0.055	0.037		0.082***	0.075**		−0.095	0.401*
		(0.82)	(0.54)		(2.75)	(2.42)		(−1.42)	(1.87)
PCCIs*BSCOM			0.001			0.000			0.013**
			(0.50)			(0.38)			(2.31)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year/Sector/Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2351	2351	2351	5520	5520	5520	537	537	537
R-squared	0.521	0.519	0.520	0.533	0.533	0.533	0.575	0.573	0.578
Panel C: Impacts of PCCIs and BSCOM on CCPE									
	(1) CCPE	(2) CCPE	(3) CCPE	(4) CCPE	(5) CCPE	(6) CCPE	(7) CCPE	(8) CCPE	(9) CCPE
$PCCIs_{t-2}$	0.007***		0.007***	0.007***		0.007***	0.024*		0.024*
	(7.16)		(5.94)	(7.89)		(7.61)	(1.73)		(1.86)
$BSCOM_{t-2}$		0.244***	0.180**		0.101**	0.040		0.152	0.191
		(2.67)	(2.04)		(2.04)	(0.65)		(0.37)	(0.32)
$PCCIs_{t-2}$*$BSCOM_{t-2}$			0.002			−0.000			−0.001
			(0.63)			(−0.23)			(−0.06)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year/Sector/Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2345	2345	2345	4380	4380	4380	54	54	54.000
R-squared	0.761	0.757	0.761	0.781	0.778	0.781	0.845	0.830	0.832

Note: This table presents the regression results for the effects of carbon performance, sustainability committees and climate change initiatives on market value and for the effects of climate change initiatives and sustainability committees on carbon performance for three different periods: PARIS (2019–2016), KYOTO, (2015–2005) and PRE (2004–2002). All variables are defined and measured in Table 3. T-statistics estimated using robust standard errors are reported in parentheses.
***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively

Table 11. Two-stage least squares

	First stage (1) CCPE	Second stage (2) MV	First stage (3) PCCIs	Second stage (4) MV	First stage (5) PCCIs	Second stage (3) CCPE
Lagged CCPE	0.952***					
	(33.46)					
CCPE_Industry	0.071**					
	(2.24)					
CCPE		−0.075***				
		(−9.36)				
Lagged PCCIs			0.876***		0.875***	
			(54.49)		(51.24)	
PCCIs_Industry			0.315***		0.311***	
			(5.03)		(4.80)	
PCCIs				0.002***		0.009***
				(3.17)		(12.00)
BSCOM	0.001	0.079***	2.414***	0.034	2.376***	0.134***
	(0.08)	(2.71)	(6.69)	(1.26)	(6.19)	(3.12)
BSIZE	−0.001	0.042	0.831*	0.033	0.782	−0.030
	(−0.09)	(1.15)	(1.75)	(0.93)	(1.59)	(−0.55)
INDIR	0.000	−0.000	0.006	−0.001**	0.007	0.003***
	(0.55)	(−0.82)	(1.41)	(−2.39)	(1.48)	(5.51)
BGEN	−0.001**	0.003***	0.017	0.004***	0.016	0.002
	(−2.35)	(3.31)	(1.35)	(3.71)	(1.21)	(1.56)
SIZE	0.043***	−0.042***	1.261***	−0.132***	1.313***	0.856***
	(9.51)	(−3.71)	(10.48)	(−14.16)	(10.54)	(59.93)
PROF	0.001	0.060***	0.023	0.062***	0.019	−0.008***
	(0.81)	(44.78)	(1.36)	(47.12)	(1.06)	(−4.00)
DEBT	0.000	0.001	−0.022**	0.001	−0.025***	0.007***
	(0.40)	(1.16)	(−2.53)	(1.33)	(−2.62)	(6.48)
CASH	−0.161***	0.882***	−0.329	0.977***	−0.557	−0.646***
	(−2.99)	(6.71)	(−0.19)	(7.58)	(−0.31)	(−3.27)
CAPIN	0.102***	0.012	−0.265	−0.170***	−0.279	2.181***
	(4.90)	(0.23)	(−0.43)	(−3.63)	(−0.43)	(30.26)
WGI	0.001	−0.002	0.135*	−0.003	0.165**	0.012
	(0.06)	(−0.40)	(1.81)	(−0.57)	(2.10)	(1.37)
GDP	0.006**	0.023***	0.016	0.028***	0.054	0.006
	(2.46)	(3.52)	(0.18)	(4.31)	(0.62)	(0.65)
INF	0.003	0.021**	0.020	0.025**	0.079	0.039***
	(0.62)	(2.13)	(0.16)	(2.50)	(0.59)	(2.63)
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector effects	Yes	Yes	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7007	7007	7590	7590	7212	7212
Cragg–Donald Wald F statistic	3088.08***		3108.39***		2548.95***	
Anderson–Rubin Wald Chi-sq.	14.46***		10.75***		15.02***	
Sargan (p-value)	0.154		0.393		0.573	

Note: This table reports the results of two-stage least squares (2SLS) estimates for the effects of climate change initiatives and carbon performance on market value and for the effects of climate change initiatives on carbon performance. All variables are defined and measured in Table 3. $T(z)$-statistics are reported in parentheses.
***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively

more pronounced in sensitive sectors, indicating that firms in sensitive sectors suffer more from negative market effects owing to their higher impacts on climate change (for brevity, results are not reported but are available upon request).

Robustness tests

We perform a number of sensitivity tests to check the robustness of our findings. First, to ensure that our main results are not affected by possible

Table 12. GMM and Heckman selection models

	GMM			Heckman		
	(1) MV	(2) MV	(3) CCPE	(4) MV	(5) MV	(6) CCPE
L.MV	0.512***	0.509***				
	(10.05)	(12.09)				
L.CCPE			0.587***			
			(17.46)			
CCPE	−0.112**			−0.050***		
	(−2.34)			(−4.63)		
PCCIs		0.005***	0.002**		0.004***	0.026***
		(4.45)	(2.22)		(2.93)	(6.67)
BSCOM	0.111**	0.052	0.031	0.117***	0.339***	0.940***
	(2.10)	(1.07)	(0.66)	(4.04)	(3.71)	(2.91)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Mills ratio				0.063*	0.523***	2.177***
				(1.84)	(3.40)	(4.03)
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector effects	Yes	Yes	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7212	7590	7007	7778	8408	8407
Arellano-Bond (AR-1)	0.000	0.000	0.000			
Arellano-Bond (AR-2)	0.202	0.731	0.816			
Hansen test *(p-value)*	0.100	0.129	0.315			
Wald chi2				0.000***	0.000***	0.000***

Note: This table reports the results of generalized method of moments (GMM) regressions and Heckman selection for the effects of climate change initiatives and carbon performance on market value and for the effects of climate change initiatives on carbon performance. All variables are defined and measured in Table 3. *t*-statistics for GMM and *z*-statistics for Heckman are reported in parentheses.
***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively

endogeneity,[11] we perform two-stage least squares (2SLS). Second, to confirm the absence of endogeneity, we employ a dynamic two-step system generalized method of moments (GMM), developed by Arellano and Bond (1991) and Blundell and Bond (1998).[12] Third, we run Heckman selection models using sector average values of the main independent variables as exclusion restrictions to address self-selection issues. The results from 2SLS (in Table 11) and from the GMM and Heckman models (in Table 12) are qualitatively similar to those reported in Tables 6 and 7, indicating the robustness of our main findings to endogeneity and sample selection bias. Fourth, we estimate Equations (1) and (2) using the relative changes in MV, CCPE, and PCCIs in year *t* (compared with year *t*-1), because it is possible that capital markets react positively to reductions in GHG emissions even if the level of CCPE is high. The un-tabulated results support the original findings regarding the relationships among MV, CCPE, and PCCIs. Fifth, we estimate Equations (1) and (2) using separate CCPE values of Scope 1 and Scope 2 emissions to assess their individual effects on MV. In addition, we replace CCPE with carbon intensity, measured as the ratio of GHG emissions to total assets. The un-tabulated results indicate that our findings are robust to the inclusion of these measures.

[11]Consistent with prior studies (Martínez-García, Terjesen and Gómez-Ansón, 2022; Ye *et al.*, 2019), we utilize the first lag and sector average values of the main independent variables as instruments. Following these studies, we rely on these instruments, as they are unlikely to be correlated with the error term and may not directly affect the dependent variables. The Cragg–Donald Wald F, Anderson–Rubin Wald chi-sq., and Sargan statistics, reported in Table 11, suggest that the selected instruments are suitable.

[12]The first and second lags of explanatory variables are used as instruments, whereas year dummies and country-specific variables are classified as exogenous variables, consistent with Wintoki *et al.* (2012).

Conclusion

Owing to the increasing levels of GHG emissions and particularly their adverse impacts on the environment, socio-economic systems, and subsequently human lives, climate change has attracted growing interest among academics, practitioners, policymakers, and regulators over the past few decades, thus becoming a dominant issue on the economic, political, and business agenda. However, there is limited evidence on the role of CG mechanisms, such as BSCOMs, in addressing climate change issues and on the value relevance of PCCIs and CCPE. Our study aimed to address this lacuna by empirically examining the interrelationships among BSCOMs, PCCIs, CCPE, and MV based on a dataset of 592 global firms operating in 35 countries from 2002 to 2019. Drawing on the dynamic multi-dimensional socio-economic-based theoretical framework, our study offers several new contributions to the extant literature.

First, it extends the extant literature (Choi and Luo, 2021; Tuesta, Soler and Feliu, 2021) by suggesting that higher levels of GHG emissions have a negative impact on MV, whereas PCCIs have a positive relationship with MV. Second, our results offer new evidence that PCCIs are positively related to increased levels of GHG emissions. Third, our results contribute to the CG and carbon literature (Benlemlih, Arif and Nadeem, 2022; Bui, Houqe and Zaman, 2020) by showing that the presence of a BSCOM is associated with higher GHG emissions. Our results support the symbolic legitimation view (Aslam *et al.*, 2021; Shevchenko, 2021), in that firms that symbolically engage in PCCIs may use the governance mechanism of a BSCOM as an impression management tool for greenwashing purposes to create positive impressions among stakeholders and protect their legitimacy. However, PCCIs do not lead to emissions reductions, and the presence of a BSCOM seems ineffective at improving outcome-based CCPE and mitigating climate-related risks. Our results also reveal that the predicted relationships vary across different country groups, sector groups, and periods.

Our study offers a number of important practical and policy implications. First, our findings suggest that managers and corporate boards should not neglect the detrimental effects of excessive carbon emissions on the environment and society, which may ultimately harm MV. Further, regulators and institutional investors should be proactive in raising awareness among all stakeholders about the negative consequences of GHG emissions. Second, regulators and policymakers need to develop enforceable policies/guidelines on PCCIs with mandatory carbon-mitigation targets at corporate, national, and global levels. In addition, they may consider introducing new legislation to motivate carbon-emitting firms to appoint a BSCOM focused exclusively on climate change and sustainability. Finally, policymakers and standard-setters ought to develop and issue specific standards for reporting climate change and carbon-related information, especially in the absence of mandatory carbon reporting. For example, reporting firms should obtain external assurance of their climate change disclosures from independent assurance providers, who, in turn, should examine and verify whether corporate reporting reflects a firm's commitment to improve outcome-based CCPE. Such measures would prevent symbolic/greenwashing practices and help environmentally sensitive investors to select eco-friendly projects and make informed investment decisions (Al-Shaer and Zaman, 2018; Baboukardos, Mangena and Ishola, 2021; Bui, Houqe and Zaman, 2021; Reimsbach, Hahn and Gürtürk, 2018).

Our study has some limitations that should be explicitly addressed by future research. First, our study is based on global companies whose shares are publicly traded in different stock markets. Consequently, the findings may not be generalizable to small- and medium-sized entities (SMEs). Hence, future research may provide new insights by examining whether these relationships hold in SMEs and non-publicly traded firms. Second, owing to data limitations, we capture the existence of a BSCOM rather than considering individual characteristics of committee members (e.g. age, culture, education, expertise, gender, independence, religion, and skills). Hence, future research may offer new insights by exploring these objective values of BSCOMs that may also influence CCPE, PCCIs, and MV. Finally, we analyze data on climate change, carbon emissions, and financial results reported by the sampled firms and do not consider other information that might reflect actual practices and performance. In this regard, future studies might conduct comprehensive case studies and interviews with executives, board members, investors and other stakeholders to provide new insights on climate change. Furthermore, PCCIs may take time to influence actual GHG emissions, and therefore our conclusion that PCCIs may be merely symbolic/greenwashing may not always hold, which is an issue that future research could revisit as more data become available.

Acknowledgments

The authors are most grateful to Professor Sofia Johan (the Associate Editor) and three anonymous reviewers for their valuable comments and constructive suggestions, which substantially improved the manuscript. The authors also thank Professor Ishmael Tingbani at the University of Southampton, UK and the participants at the 2022 British Accounting and Finance Association (BAFA) Annual Conference for their useful comments and suggestions on an earlier version of the manuscript.

References

Aguilera, R. V., D. E. Rupp, C. A. Williams and J. Ganapathi (2007). 'Putting the s back in corporate social responsibility: A multilevel theory of social change in organizations', *Academy of Management Review*, **32**, pp. 836–863.

Al-Shaer, H. and M. Zaman (2018). 'Credibility of sustainability reports: The contribution of audit committees', *Business Strategy and the Environment*, **27**, pp. 973–986.

Al-Shaer, H. and M. Zaman (2019). 'CEO compensation and sustainability reporting assurance: Evidence from the UK', *Journal of Business Ethics*, **158**, pp. 233–252.

Allen, M. L., M. M. C. Allen, D. Cumming and S. Johan (2021). 'Comparative capitalisms and energy transitions: Renewable energy in the European Union', *British Journal of Management*, **32**, pp. 611–629.

Amran, A., S. P. Lee and S. S. Devi (2014). 'The influence of governance structure and strategic corporate social responsibility toward sustainability reporting quality', *Business Strategy and the Environment*, **23**, pp. 217–235.

Andreou, P. C. and N. M. Kellard (2021). 'Corporate environmental proactivity: Evidence from the European Union's emissions trading system', *British Journal of Management*, **32**, pp. 630–647.

Arellano, M. and S. Bond (1991). 'Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations', *Review of Economic Studies*, **58**, pp. 277–297.

Ashforth, B. E. and B. W. Gibbs (1990). 'The double-edge of organizational legitimation', *Organization Science*, **1**, pp. 177–194.

Aslam, S., M. H. Elmagrhi, R. U. Rehman and C. G. Ntim (2021). 'Environmental management practices and financial performance using data envelopment analysis in Japan: The mediating role of environmental performance', *Business Strategy and the Environment*, **30**, pp. 1655–1673.

Atkins, J. and W. Maroun (2018). 'Integrated extinction accounting and accountability: Building an ark', *Accounting, Auditing and Accountability Journal*, **31**, pp. 750–786.

Baboukardos, D. (2017). 'Market valuation of greenhouse gas emissions under a mandatory reporting regime: Evidence from the UK', *Accounting Forum*, **41**, pp. 221–233.

Baboukardos, D. (2018). 'The valuation relevance of environmental performance revisited: The moderating role of environmental provisions', *British Accounting Review*, **50**, pp. 32–47.

Baboukardos, D., M. Mangena and A. Ishola (2021). 'Integrated thinking and sustainability reporting assurance: International evidence', *Business Strategy and the Environment*, **30**, pp. 1580–1597.

Backhaus, K. B., B. A. Stone and K. Heiner (2002). 'Exploring the relationship between corporate social performance and employer attractiveness', *Business and Society*, **41**, pp. 292–318.

Backman, C. A., A. Verbeke and R. A. Schulz (2017). 'The drivers of corporate climate change strategies and public policy: A new resource-based view perspective', *Business and Society*, **56**, pp. 545–575.

Banerjee, S. B. (2003). 'Who sustains whose development? Sustainable development and the reinvention of nature', *Organization Studies*, **24**, pp. 143–180.

Bansal, P. and I. Clelland (2004). 'Talking trash: Legitimacy, impression management, and unsystematic risk in the context of the natural environment', *Academy of Management Journal*, **47**, pp. 93–103.

Bansal, P. and G. Kistruck (2006). 'Seeing is (not) believing: Managing the impressions of the firm's commitment to the natural environment', *Journal of Business Ethics*, **67**, pp. 165–180.

Barney, J. (1991). 'Firm resources and sustained competitive advantage', *Journal of Management*, **17**, pp. 99–120.

Benlemlih, M., M. Arif and M. Nadeem (2022). 'Institutional ownership and greenhouse gas emissions: A comparative study of the UK and the USA', *British Journal of Management*, https://doi.org/10.1111/1467-8551.12613

Berrone, P., A. Fosfuri and L. Gelabert (2017). 'Does greenwashing pay off? Understanding the relationship between environmental actions and environmental legitimacy', *Journal of Business Ethics*, **144**, pp. 363–379.

Berrone, P. and L. R. Gomez-Mejia (2009). 'Environmental performance and executive compensation: An integrated agency-institutional perspective', *Academy of Management Journal*, **52**, pp. 103–126.

Bianchini, R. and A. Croce (2022). 'The role of environmental policies in promoting venture capital investments in cleantech companies', *Review of Corporate Finance*, **2**, pp. 587–616.

Blundell, R. and S. Bond (1998). 'Initial conditions and moment restrictions in dynamic panel data models', *Journal of Econometrics*, **87**, pp. 115–143.

Boiral, O. (2016). 'Accounting for the unaccountable: Biodiversity reporting and impression management', *Journal of Business Ethics*, **135**, pp. 751–768.

Brammer, S. and A. Millington (2008). 'Does it pay to be different? An analysis of the relationship between corporate social and financial performance', *Strategic Management Journal*, **29**, pp. 1325–1343.

Bui, B., M. N. Houqe and M. Zaman (2020). 'Climate governance effects on carbon disclosure and performance', *British Accounting Review*, **52**, 100880, https://doi.org/10.1016/j.bar.2019.100880.

Bui, B., M. N. Houqe and M. Zaman (2021). 'Climate change mitigation: Carbon assurance and reporting integrity', *Business Strategy and the Environment*, **30**, pp. 3839–3853.

Burke, J. J., R. Hoitash and U. Hoitash (2019). 'The heterogeneity of board-level sustainability committees and corporate social performance', *Journal of Business Ethics*, **154**, pp. 1161–1186.

Busch, T. and V. H. Hoffmann (2011). 'How hot is your bottom line? Linking carbon and financial performance', *Business and Society*, **50**, pp. 233–265.

Chatterjee, S., A. Hadi and B. Price (2000). Regression Analysis by Example*, 3rd edn*. New York: John Wiley and Sons, Inc.

Choi, B. and L. Luo (2021). 'Does the market value greenhouse gas emissions? Evidence from multi-country firm data', *British Accounting Review*, **53**(1), 100909, https://doi.org/10.1016/j.bar.2020.100909.

Clarkson, P. M., Y. Li, M. Pinnuck and G. D. Richardson (2015). 'The valuation relevance of greenhouse gas emissions under the European Union carbon emissions trading scheme', *European Accounting Review*, **24**, pp. 551–580.

Climate Change Committee (2021). COP26: Key outcomes and next steps for the UK. Retrieved from: https://www.theccc.org.uk/publication/cop26-key-outcomes-and-next-steps-for-the-uk/.

Crossley, R. M., M. H. Elmagrhi and C. G. Ntim (2021). 'Sustainability and legitimacy theory: The case of sustainable social and environmental practices of small and medium-sized enterprises', *Business Strategy and the Environment*, **30**, pp. 3740–3762.

Cumming, D., C. Girardone and M. Śliwa (2021). 'Corporate governance in extreme institutional environments', *British Journal of Management*, **32**, pp. 919–946.

Dahlmann, F., L. Branicki and S. Brammer (2019). 'Managing carbon aspirations: The influence of corporate climate change targets on environmental performance', *Journal of Business Ethics*, **158**, pp. 1–24.

Dauvergne, P. and J. Lister (2013). *Eco-Business: A Big-Brand Takeover of Sustainability*. Cambridge, MA: MIT Press.

Deegan, C. (2002). 'The legitimising effect of social and environmental disclosures – a theoretical foundation', *Accounting, Auditing and Accountability Journal*, **15**, pp. 282–311.

Dixon-Fowler, H. R., A. E. Ellstrand and J. L. Johnson (2017). 'The role of board environmental committees in corporate environmental performance', *Journal of Business Ethics*, **140**, pp. 423–438.

Downar, B., J. Ernstberger, S. Reichelstein, S. Schwenen and A. Zaklan (2021). 'The impact of carbon disclosure mandates on emissions and financial operating performance', *Review of Accounting Studies*, **26**, pp. 1137–1175.

Du, S., C. B. Bhattacharya and S. Sen (2007). 'Reaping relational rewards from corporate social responsibility: The role of competitive positioning', *International Journal of Research in Marketing*, **24**, pp. 224–241.

Dumay, J., J. Guthrie and F. Farneti (2010). 'GRI sustainability reporting guidelines for public and third sector organizations: A critical review', *Public Management Review*, **12**, pp. 531–548.

Eleftheriadis, I. M. and E. G. Anagnostopoulou (2015). 'Relationship between corporate climate change disclosures and firm factors', *Business Strategy and the Environment*, **24**, pp. 780–789.

European Commission (2015). 'EU ETS Handbook'. Retrieved from: https://climate.ec.europa.eu/system/files/2017-03/ets_handbook_en.pdf.

Faria, J. R., G. Tindall and S. Terjesen (2022). 'The Green Tobin's q: Theory and evidence', *Energy Economics*, **110**, 106033. https://doi.org/10.1016/j.eneco.2022.106033

Freeman, R. E. (1984). *Strategic Management: A Stakeholder Approach*. Boston, MA: Pitman/Ballinger.

Gaganis, C., P. Papadimitri, F. Pasiouras and A. Ventouri (2021). 'Informal institutions and corporate reputational exposure: The role of public environmental perceptions', *British Journal of Management*, **32**, pp. 1027–1061.

García-Sánchez, I. M., N. Hussain and J. Martínez-Ferrero (2019). 'An empirical analysis of the complementarities and substitutions between effects of CEO ability and corporate governance on socially responsible performance', *Journal of Cleaner Production*, **215**, pp. 1288–1300.

Giannarakis, G., E. Zafeiriou and N. Sariannidis (2017). 'The impact of carbon performance on climate change disclosure', *Business Strategy and the Environment*, **26**, pp. 1078–1094.

Gills, B. and J. Morgan (2020). Global Climate Emergency: After COP24, climate science, urgency, and the threat to humanity, *Globalizations*, **17**, pp. 885–902.

Goworek, H., C. Land, G. Burt, M. Zundel, M. Saren, M. Parker and B. Lambe (2018). 'Scaling sustainability: Regulation and resilience in managerial responses to climate change', *British Journal of Management*, **29**, pp. 209–219.

Gujarati, D. N. (2004). *Basic Econometrics*, 4th edn. New York, NY: McGraw-Hill.

Gupta, K., D. Crilly and T. Greckhamer (2020). 'Stakeholder engagement strategies, national institutions, and firm performance: A configurational perspective', *Strategic Management Journal*, **41**, pp. 1869–1900.

Haque, F. (2017). 'The effects of board characteristics and sustainable compensation policy on carbon performance of UK firms', *British Accounting Review*, **49**, pp. 347–364.

Haque, F. and C. G. Ntim (2020). 'Executive compensation, sustainable compensation policy, carbon performance and market value', *British Journal of Management*, **31**, pp. 525–546.

Harjoto, M., I. Laksmana and R. Lee (2015). 'Board diversity and corporate social responsibility', *Journal of Business Ethics*, **132**, pp. 641–660.

Hart, S. L. (1995). 'A natural-resource-based view of the firm', *Academy of Management Review*, **20**, pp. 986–1014.

Hart, S. L. and G. Dowell (2011). 'A natural-resource-based view of the firm: Fifteen years after', *Journal of Management*, **37**, pp. 1464–1479.

He, R., L. Luo, A. Shamsuddin and Q. Tang (2021). 'The value relevance of corporate investment in carbon abatement: The influence of national climate policy', *European Accounting Review*, **31**, pp. 1233–1261.

Helfaya, A. and T. Moussa (2017). 'Do board's corporate social responsibility strategy and orientation influence environmental sustainability disclosure? UK evidence', *Business Strategy and the Environment*, **26**, pp. 1061–1077.

Jacobs, B. W., V. R. Singhal and R. Subramanian (2010). 'An empirical investigation of environmental performance and the market value of the firm', *Journal of Operations Management*, **28**, pp. 430–441.

Jiang, Y., L. Luo, J. F. Xu and X. R. Shao (2021). 'The value relevance of corporate voluntary carbon disclosure: Evidence from the United States and BRIC countries', *Journal of Contemporary Accounting and Economics*, **17**, https://doi.org/10.1016/j.jcae.2021.100279.

Kassinis, G. and N. Vafeas (2002). 'Corporate boards and outside stakeholders as determinants of environmental litigation', *Strategic Management Journal*, **23**, pp. 399–415.

Kaufmann, D., A. Kraay and M. Mastruzzi (2011). 'The worldwide governance indicators: Methodology and analytical issues', *Hague Journal on the Rule of Law*, **3**, pp. 220–246.

Kılıç, M., A. Uyar, C. Kuzey and A. S. Karaman (2021). 'Drivers and consequences of sustainability committee existence? Evidence from the hospitality and tourism industry', *International Journal of Hospitality Management*, **92**, https://doi.org/10.1016/j.ijhm.2020.102753.

Kolk, A., J. Lindeque and D. van den Buuse (2014). 'Regionalization strategies of European Union electric utilities', *British Journal of Management*, **25**, pp. 77–99.

Lewandowski, S. (2017). 'Corporate carbon and financial performance: The role of emission reductions', *Business Strategy and the Environment*, **26**, pp. 1196–1211.

Liu, J., D. Zhang, J. Cai and J. Davenport (2021). 'Legal systems, national governance and renewable energy investment: Evidence from around the world', *British Journal of Management*, **32**, pp. 579–610.

Luo, L. and Q. Tang (2021). 'Corporate governance and carbon performance: Role of carbon strategy and awareness of climate risk', *Accounting and Finance*, **61**, pp. 2891–2934.

Maas, K. and S. Rosendaal (2016). 'Sustainability targets in executive remuneration: Targets, time frame, country and sector specification', *Business Strategy and the Environment*, **25**, pp. 390–401.

Mackenzie, C. (2007). 'Boards, incentives and corporate social responsibility: The case for a change of emphasis', *Corporate Governance: An International Review*, **15**, pp. 935–943.

Marin, G. and F. Vona (2021). 'The impact of energy prices on socioeconomic and environmental performance: Evidence from French manufacturing establishments, 1997–2015', *European Economic Review*, **135**, https://doi.org/10.1016/j.euroecorev.2021.103739

Martínez-García, I., S. Terjesen and S. Gómez-Ansón (2022). 'Board gender diversity codes, quotas and threats of supranational legislation: Impact on director characteristics and corporate outcomes', *British Journal of Management*, **33**, pp. 753–783.

Matsumura, E. M., R. Prakash and S. C. Vera-Muñoz (2014). 'Firm-value effects of carbon emissions and carbon disclosures', *Accounting Review*, **89**, pp. 695–724.

Meyer, J. W. and B. Rowan (1977). 'Institutionalized organizations: Formal structure as myth and ceremony', *American Journal of Sociology*, **83**, pp. 340–363.

Michelon, G. and A. Parbonetti (2012). 'The effect of corporate governance on sustainability disclosure', *Journal of Management and Governance*, **16**, pp. 477–509.

Moussa, T., A. Allam, S. Elbanna and A. Bani-Mustafa (2020). 'Can board environmental orientation improve U.S. firms' carbon performance? The mediating role of carbon strategy', *Business Strategy and the Environment*, **29**, pp. 72–86.

Ntim, C. G. and T. Soobaroyen (2013). 'Corporate governance and performance in socially responsible corporations: New empirical insights from a neo-institutional framework', *Corporate Governance: An International Review*, **21**, pp. 468–494.

Oberndorfer, U., P. Schmidt, M. Wagner and A. Ziegler (2013). 'Does the stock market value the inclusion in a sustainability stock index? An event study analysis for German firms', *Journal of Environmental Economics and Management*, **66**, pp. 497–509.

Oliver, C. (1991). 'Strategic responses to institutional processes', *The Academy of Management Review*, **16**, pp. 145–179.

Olivier, J. G. J. and J. A. H. W. Peters (2020). (2020). 'Trends in global CO2 and total greenhouse gas emissions': *Report*, 2019, The Hague. Retrieved from: https://www.pbl.nl/sites/default/files/downloads/pbl-2020-trends-in-global-co2-and-total-greenhouse-gas-emissions-2019-report_4068.pdf.

Orazalin, N. (2020). 'Do board sustainability committees contribute to corporate environmental and social performance? The mediating role of corporate social responsibility strategy', *Business Strategy and the Environment*, **29**, pp. 140–153.

Orazalin, N. and M. Mahmood (2021). 'Toward sustainable development: Board characteristics, country governance quality, and environmental performance', *Business Strategy and the Environment*, **30**, pp. 3569–3588.

Peters, G. F. and A. M. Romi (2014). 'Does the voluntary adoption of corporate governance mechanisms improve environmental risk disclosures? Evidence from greenhouse gas emission accounting', *Journal of Business Ethics*, **125**, pp. 637–666.

Pfeffer, J. and G. R. Salancik (1978). *The External Control of Organizations: A Resource Dependence Approach*. New York, NY: Harper & Row.

Phan, T. N. and K. Baird (2015). 'The comprehensiveness of environmental management systems: The influence of institutional pressures and the impact on environmental performance', *Journal of Environmental Management*, **160**, pp. 45–56.

Porter, M. E. (1980). *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. New York, NY: The Free Press.

Reid, E. M. and M. W. Toffel (2009). 'Responding to public and private politics: Corporate disclosure of climate change strategies', *Strategic Management Journal*, **30**, pp. 1157–1178.

Reimsbach, D., R. Hahn and A. Gürtürk (2018). 'Integrated reporting and assurance of sustainability information: An experimental study on professional investors' information processing', *European Accounting Review*, **27**, pp. 559–581.

Rind, A. A., S. Akbar, S. Boubaker, S. Lajili-Jarjir and S. Mollah (2021). 'The role of peer effects in corporate employee welfare policies', *British Journal of Management*, **33**, pp. 1609–1631.

Rodrigue, M., M. Magnan and C. H. Cho (2013). 'Is environmental governance substantive or symbolic? An empirical investigation', *Journal of Business Ethics*, **114**, pp. 107–129.

Shaukat, A., Y. Qiu and G. Trojanowski (2016). 'Board attributes, corporate social responsibility strategy, and corporate environmental and social performance', *Journal of Business Ethics*, **135**, pp. 569–585.

Shevchenko, A. (2021). 'Do financial penalties for environmental violations facilitate improvements in corporate environmental performance? An empirical investigation', *Business Strategy and the Environment*, **30**, pp. 1723–1734.

Siddique, M. A., M. Akhtaruzzaman, A. Rashid and H. Hammami (2021). 'Carbon disclosure, carbon performance and financial performance: International evidence', *International Review of Financial Analysis*, **75**, https://doi.org/10.1016/j.irfa.2021.101734.

Singh, S., N. Tabassum, T. K. Darwish and G. Batsakis (2018). ''Corporate governance and Tobin's Q as a measure of organizational performance', *British Journal of Management*, **29**, pp. 171–190.

Spira, L. F. and R. Bender (2004). 'Compare and contrast: Perspectives on board committees', *Corporate Governance: An International Review*, **12**, pp. 489–499.

Suchman, M. C. (1995). 'Managing legitimacy: Strategic and institutional approaches', *Academy of Management Review*, **20**, pp. 571–610.

Sullivan, R. and A. Gouldson (2017). 'The governance of corporate responses to climate change: An international comparison', *Business Strategy and the Environment*, **26**, pp. 413–425.

Sun, Y., Y. Yang, N. Huang and X. Zou (2020). 'The impacts of climate change risks on financial performance of mining industry: Evidence from listed companies in China', *Resources Policy*, **69**, https://doi.org/10.1016/j.resourpol.2020.101828.

Talbot, D. and O. Boiral (2018). 'GHG reporting and impression management: An assessment of sustainability reports from the energy sector', *Journal of Business Ethics*, **147**, pp. 367–383.

Tuesta, N. Y., C. C. Soler and R. V. Feliu (2021). 'Carbon management accounting and financial performance: Evidence from the European Union emission trading system', *Business Strategy and the Environment*, **30**, pp. 1270–1282.

United Nations (2015). 'Adoption of the Paris Agreement', Framework Convention on Climate Change, pp. 1–32.

United Nations Environment Programme (2019). 'Emissions Gap Report 2019'.

Van der Byl, C. A. and N. Slawinski (2015). 'Embracing tensions in corporate sustainability: A review of research from win-wins and trade-offs to paradoxes and beyond', *Organization and Environment*, **28**, pp. 54–79.

Walls, J. L., P. Berrone and P. H. Phan (2012). 'Corporate governance and environmental performance: Is there really a link?', *Strategic Management Journal*, **33**, pp. 885–913.

Weber, T. A. and K. Neuhoff (2010). 'Carbon markets and technological innovation', *Journal of Environmental Economics and Management*, **60**, pp. 115–132.

Wintoki, M. B., J. S. Linck and J. M. Netter (2012). 'Endogeneity and the dynamics of internal corporate governance', *Journal of Financial Economics*, **105**, pp. 581–606.

World Bank (2020). 'The World Bank Open Data'. Retrieved from: https://data.worldbank.org/ [18 February 2020]

Wright, C. and D. Nyberg (2017). 'An inconvenient truth: How organizations translate climate change into business as usual', *Academy of Management Journal*, **60**, pp. 1633–1661.

Ye, D., J. Deng, Y. Liu, S. H. Szewczyk and X. Chen (2019). 'Does board gender diversity increase dividend payouts? Analysis of global evidence', *Journal of Corporate Finance*, **58**, pp. 1–26.

Zaman, R., N. Atawnah, M. Haseeb, M. Nadeem and S. Irfan (2021). 'Does corporate eco-innovation affect stock price crash risk?', *British Accounting Review*, **53**, https://doi.org/10.1016/j.bar.2021.101031.

Nurlan S. Orazalin is a postgraduate researcher at Southampton Business School, University of Southampton, UK and an Assistant Professor of Accounting and Finance at Bang College of Business, KIMEP University, Kazakhstan. He earned his DBA in accounting from KIMEP University, Kazakhstan and an MS in Accounting from Texas A&M University, USA. Nurlan is a certified management accountant (CMA) and a member of the Institute of Management Accountants. His works have been published in leading academic journals focusing on accounting, auditing, accountability, corporate governance, finance and sustainability.

Collins G. Ntim (PhD accountancy, Glasgow, UK; CPA Australia) is a Professor of Accounting at the University of Southampton Business School, UK. He has previously served as a head of department, associate dean, and deputy head of school. He has published extensively in accounting, finance, business and management journals, focusing on accounting, finance, governance, development and sustainability research interests. His work has generated significant research income, as well as being cited widely by academics, policymakers and the media. He has consulted widely for several organisations, such as the Financial Reporting Council, UK and the World Bank. Collins also served as a full sub-panel 17 member for the 2021 UK Research Excellence Framework and is the current Vice-President of the British Accounting and Finance Association.

John K. Malagila [PhD Business Studies and Management, University of Southampton, UK; CPA (T)] is a Senior Lecturer (Associate Professor) in Accounting at the University of Essex Business School, UK. Previously, he worked as a Lecturer in Accounting, Academic Integrity Officer, and Accounting and Finance Programme Director, University of Southampton Business School, and as an Associate Professor in Accounting and Finance, University Bradford School of Management. His research work has been published in several internationally recognised journals, broadly and primarily in the areas of governance, accountability, sustainability, financial reporting/disclosure, public sector and critical perspectives on accounting and finance. He recently was a co-investigator of a successfully completed project to develop a national code of corporate governance for Ghana funded by the UK Economic and Social Research Council (ESRC) and Southampton Business School.

Supporting Information

Additional supporting information can be found online in the Supporting Information section at the end of the article.

Supporting Information