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Board Diversity and Corporate Sustainability Performance: Do CEO Power and Firm Environmental Sensitivity Matter?

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Abstract: The study assesses whether CEO power and firm environmental sensitivity matter to board diversity (i.e., board cultural (BCD) and board gender (BGD) diversity) and corporate sustainability performance nexus. Australian S&P/ASX300's firm data for a period of ten years (2011–2020) were used in the study's analysis. Although board diversity positively influences ESG performance, the presence of powerful CEOs and when firms operate in environmentally sensitive industries weaken the board diversity and sustainability performance nexus. Additionally, the study found that although board diversity is essential, the effect of BGD has a greater statistical power on sustainability than BCD, affirming the present focus on BGD.

Keywords: board cultural diversity; board gender diversity; corporate sustainability performance; CEO power; environmental sensitivity; Australia

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1. Introduction

Corporate sustainability performance and board diversity have gained significant attention in business. The link between these two factors lies in recognising that diverse boards, comprised of individuals with various backgrounds, perspectives, and experiences, may make more informed and strategic decisions that benefit the company and the broader society and environment [1,2]. While ample literature has examined the association between board diversity and sustainability performance, the role of powerful CEOs and industry types (i.e., environmentally sensitive and non-sensitive industries) in this nexus seems to be missing in the literature, although powerful CEOs shape organisational paths [3,4] and the nature of firms' environment is a key antecedent of sustainability [5–7]. Additionally, the board diversity literature seems to focus on board gender diversity (BGD), neglecting other board diversities. This study extends the board diversity (i.e., board cultural (BCD) and board gender (BGD) diversity) and sustainability performance literature by evaluating whether the presence of a powerful chief executive officer (CEO) and firm environmental sensitivity matter to the board diversity and sustainability performance nexus.

Sustainability performance issues have inundated the literature in recent times, especially on their antecedents, e.g., [8–14]. This is probably due to the continuous call to promote sustainability performance [15,16], as the concept reflects the impact of corporations' management practices and activities on society. Within the business process context, diversity in boardrooms has been projected to provide valuable resources for the effective functioning of boards [17,18]. Lu and Herremans [8] assert that "diversity allows for a healthy mix of knowledge and experience". In this regard, debates on the association between boardroom diversity and corporate sustainability performance have been extensive among academics and practitioners [8,9,19].

Empirical assessments of the association between corporate board and performance have been dominated by studies on board structure, composition, and characteristics, and their links to financial and sustainability performance, e.g., [9,20–23]. While the existing

literature on board diversity and corporate sustainability performance has mostly centred on gender diversity, to the point that board gender diversity quotas have been institutionalized in many countries—France, Germany, Belgium, Italy, Norway, and Spain—e.g., [24–28], other board diversities seem ignored.

Cumming and Leung [29] remark that the "value of diversity to a firm depends on the type of diversity", but not enough attention seems to have been given to board cultural diversity (BCD) in the literature [19,29–32]. Culture influences behaviour, personality, risk tolerance, and decision-making [33], and, hence, cultural diversity in boardrooms is expected to influence the board's actions, including sustainability performance. However, as a double-edged sword, the influence of culture on sustainability performance can either be positive or negative. Osazevbaru and Yahaya [34] expressed that "culture can either provide a lift or create a drag". Hence, cultural diversity in the boardrooms may not necessarily lead to improved board effectiveness and, by extension, improved corporate sustainability performance.

Agency and stakeholder theories, although contrasting theories, both project that increasing boardroom diversity generally decreases managerial power to advance effective board monitoring and potentially improve reporting performance [35–37]. Thus, the range of skills and expertise available due to improved boardroom diversity reduces agency costs, increases board monitoring capacity, and increases attention to stakeholders [14,38]. However, powerful CEOs are noted to inhibit effective board monitoring and promote managerial entrenchment, creating agency problems and thereby hampering firms' performance, including sustainability practices [3,39–43]. Contrarily, powerful CEOs are considered essential for firm performance as they present advantages that outweigh agency costs [44–46]. Powerful CEOs monitor management strictly for efficiency, which enhances performance [45–47], including sustainability performance [48].

Furthermore, stakeholder theory projects that the survival of firms is tied to their relationship with society as sustainability concerns increase [49,50]. Consequently, firms' level of engagement with society is affected by industry type (i.e., environmentally and non-environmentally sensitive industries) [51,52], as environmentally sensitive firms are subjected to more stringent sustainability issues [53]. Moreover, according to Cumming and Leung [29], the effects of diversity centre on industry type and nature of diversity, while certain industries are also noted to be male-dominated [8]. Regardless of these connexions, the present literature seems to be missing the role of industry type and CEO power on the board diversity and sustainability performance nexus.

To address this research gap and contribute to the literature, this study assesses the moderating role of firm environmental sensitivity and CEO power on the board diversity and sustainability performance nexus. It further expands the board diversity literature beyond BGD to the inclusion of BCD.

Following Australian S&P/ASX300 firms for a period of ten years (2011 to 2020), this study finds that, in addition to BGD, BCD positively associates with firms' sustainability performances. However, it found that BGD has a greater influence on ESG than BCD. This possibly explains the focus on BGD over other board diversities. Along with the literature that postulates that powerful CEOs inhibit board monitoring ability to hinder sustainability performance [3,41], this study finds the presence of CEO power to weaken the positive association between board diversity (i.e., BGD and BCD) and firms' sustainability performance. Additionally, the study found that firms' environmental sensitivity moderates the board diversity and sustainability performance relationship, suggesting that both CEO power and firm environmental sensitivity matter to the board diversity and sustainability performance nexus.

Overall, the study makes three important contributions to the literature. First, it expands that board diversity-sustainability performance nexus beyond BGD to include BCD. Second, the study empirically provides evidence of the effect of CEO power on board diversity and sustainability performance relationships. It projects that the presence of powerful CEOs reduces the positive effect of board diversity on firms' sustainability

performance relationship. This affirms that powerful CEOs impede the monitoring capacity of boards. Lastly, the study provides evidence that the nexus between board diversity and sustainability performance is affected by industry type. Specifically, the study projects that the positive effect of board diversity on ESG performance is weaker among firms operating in environmentally sensitive industries. Assessing the moderating roles of industry type and CEO power is essential for policy directed at enhancing sustainability performance and firms seeking to improve upon their sustainability issues. Environmentally sensitive firms and firms with CEO power seeking to improve their sustainability performance should institute other measures beyond board diversity to curtail their negative impacts on sustainability.

2. Literature Review

2.1. Theoretical Perspective

Several theories have been employed to explain the relationship between effective governance and corporate reporting performance. Agency and stakeholder theories have guided most of the governance and reporting performance literature [54]. Whereas agency theory calls for enhanced board monitoring mechanisms to improve reporting performance and curtail agency problems [55–58], stakeholder theory calls for effective corporate governance that directs firms' focus beyond shareholders' interest to all stakeholders (i.e., society at large) [59,60]. Thus, to be accountable to all stakeholders, corporate reporting has moved beyond just financial reports to the inclusion of non-financial (sustainability) reports [61]. However, to ensure improved reporting performance, agency and stakeholder theories advocate for effective governance systems [35–37].

Diversity in the boardroom is considered an effective corporate governance mechanism for improved reporting performance as diverse boards are identified to possess a variety of resources, skills, and expertise for enhanced corporate performance, including firms' sustainability performance [14,38]. However, from the perspective of social identity theory, diversity may not bring the desired positive outcome of corporate governance [62–65]. Aligned with the social identity theory, diversity may lead to "us and them" perception, which may hamper effective communication, harmonization of purpose, power struggles, eventually affecting the effectiveness of corporate governance [64,65]. Such situations may curtail effective corporate governance (i.e., reduce board monitoring capacity and increase agency problems) and/or hinder firms from meeting societal goals. Hence, it is expected to hinder corporate governance and reporting performance relationships.

2.2. Corporate Sustainability Performance

Aligned with the demands of stakeholder theory, corporate sustainability reporting has emerged in recent decades as a disclosure and accountability tool for corporations to be answerable to all stakeholders on their use of resources and their responsibilities to meet and balance the needs of current and future stakeholders [12,15]. The concept entails a complex system that accounts for a corporation's activities beyond financial performance to cover non-financial aspects, i.e., environment, social, and governance, "to protect, maintain and augment the human and natural resources required in the future" [15]. The heightened interest in sustainability reporting coupled with country-specific requirements and sustainability reporting standards (e.g., Global Reporting Initiative (GRI) Standards) has been the driving force behind the continuous increase in sustainability reporting globally [66,67].

According to Artiach, Lee, Nelson and Walker [15], the assessment of "the extent to which a firm embraces economic, environmental, social, and governance factors into its operations, and ultimately the impact they exert on the firm and society" is what is termed as corporate sustainability performance. Over decades, the literature has used a plethora of databases, indexes, and rating agencies with established methodologies in measuring corporate sustainability performance (e.g., DowJones Sustainability World Index, ESG disclosure scores by Bloomberg, Thomson Reuters—Refinitiv ESG Data, S&P Global ESG scores, MSCI, Sustainalytics ESG scores, etc.), e.g., [8,15,68–70]. Other studies

have also resulted in content analysis assessing corporate sustainability performance with the GRI standards on sustainability as the benchmark [9,13,71]. Some other studies have also used other different approaches. For instance, Gao and Zhang [72] linked stakeholder engagement, social auditing, and corporate sustainability, utilizing the AA1000 framework, and Herbohn et al. [73], developed a sustainability performance index based on the International Finance Corporation's Measuring Sustainability Framework (2001), while Goyal et al. [74] used a graph theoretic approach to measure environmental sustainability.

Most of the existing sustainability assessment studies have focused on measuring performance. One of the notable corporate sustainability assessments is the Refinitiv ESG scores, which transparently and objectively assess corporations' relative ESG performance, commitment, and effectiveness based on publicly available auditable data [75,76]. This platform measures sustainability performance by scoring corporations positively through the extent to which a firm embraces environmental, social, and governance factors in its operations [15,75,76].

2.3. Board Diversity

Aligned with agency and stakeholder theories, effective governance systems have been identified as some of the critical means for enhancing corporate financial and non-financial reporting performance [77]. As a result, many studies have assessed and confirmed an association between some board characteristics and corporate reporting performance, e.g., [9,20–24,27,70]. Regarding corporate sustainability performance, many studies have assessed the association between board size, board independence, as well as board diversity on sustainability performance e.g., [24–28].

While essential, the benefits of diversity are hinged on the type of diversity (gender, age, culture, etc.) [29]. Albeit, most prior literature focuses on BGD with little focus on other types of boardroom diversity [19,29,31,69]. The attention to gender diversity on boards in the literature is linked to the assertion that women make significant contributions to boards [78]. The socialization make-up of men and women is different, and such differences are noted to provide boards with valuable resources to function effectively [14,70,79]. Gender-diverse boards are noted to promote responsible business practices and effective governance performance as "women are more committed and involved, more diligent and ultimately create a good atmosphere in the board" [22,78,80,81]. This has significantly grown to be accepted as an important dimension of corporate governance [80] and is linked to advancing board monitoring power for effective and transparent reporting, including issues of sustainability reporting [22,79,80,82].

Corporate boards predominantly constitute diverse individuals with different cultural backgrounds [64,83], making cultural diversity an essential governance issue [19]. Culture is a way of life; hence, it influences individuals' behaviour, decisions, and even tolerance levels [33]. Its potential influence on board activities can be positive or negative to stakeholders; either it provides a lift or creates a drag. Though cultural diversity can bring about different perspectives and creativity, it can also introduce negative externalities and impose friction [19]. Thus, cultural diversity may present boards with a variety of skills and expertise for improved performance [64,84]. Aligned with social identity theory, it may also create 'in-groups and out-groups', 'us vs. them', which can impede board functioning [62,65]. Braendle et al. [85] thus call for more attention to BCD and its influence on board activities.

On this basis, some scholars concluded that cultural diversity in the boardroom significantly influences innovation and firm performance, e.g., [19,29,86–88], while others argue otherwise [9,89]. Wang and Clift [89] measured BCD based on racial diversity and concluded no significant relationship exists between racial diversity and firm financial performance. Zaid, Wang, Adib, Sahyouni and Abuhijleh [9] focused on culturally and traditionally inclined countries to conclude that foreign board members do not significantly influence corporate sustainability actions. In an international analysis, García-Meca et al. [90] concluded that boardroom cultural diversity inhibits banks' performance. On

the other hand, Harjoto et al. (2019) [88] postulated that a conscious increase in cultural diversity in boardrooms improves corporate social responsibility. De Klerk and Singh [64], focusing on sustainability in healthcare institutions, found a positive association between cultural diversity and sustainability performance. Giannetti and Zhao [91] affirmed the "double-edged sword" of BCD by asserting that the pros and cons of diversity lead to high-performance volatility and concluded that BCD might lead to inefficiencies and boardroom conflict.

2.4. CEO Powers

CEO power is the "ability of CEO to control boards decisions" [92]. According to Garcia-Sanchez, Raimo and Vitolla [3], CEOs shape organizational paths with regard to corporate strategies and directions. To Minnick and Noga [4] and Daily and Johnson [93], CEOs are the most powerful members of organizations and are responsible for resource allocation and corporate strategic decisions. Although CEOs are the most powerful members, the power of CEOs can be constrained by effective boards as boards perform two important functions: advisory and monitoring [93,94]. Notwithstanding, powerful CEOs have subtle means of entrenching themselves and securing authority [94], for either a self-serving interest [41,95] or efficient monitoring of management for enhanced firm performance [45–47].

This suggests that powerful CEOs can use their influence on boards to curtail the monitoring power of boards [3,41,93,94], which can be detrimental to transparent disclosures, including sustainability reporting. In this perspective, the presence of powerful CEOs is linked to informational opacity and agency problems [3,39–43]. However, according to efficiency and organizational theories, CEO power leads to strict monitoring of managerial activities, resulting in enhanced firm performance [44–47]. Brickley, Coles and Jarrell [44] postulate that the benefits of the presence of CEO power compensate for the agency's cost. CEO power is also found to enhance firm transparency when found within an effective governance system [46,47]. In this regard, powerful CEOs among a well-diversified board are expected to enhance transparency—corporate reporting performance.

CEO power emanates from several sources: CEO duality, CEO tenure, family CEO status, CEO ownership, the presence and role of the CEO on boards, CEO compensation ratio, and a greater percentage of executive directors or boards [3,41,96]. Although ample studies have assessed and affirmed a relationship between CEO power and firms' disclosure practices, most of these studies based the measure of CEO power on a single dimension of CEO power [97,98]. On a valid proxy for CEO power, Muttakin, Khan and Mihret [41] postulate that "no single measure is likely to capture every possible dimension of CEO power". They [41], therefore, used a CEO power index comprising a number of these CEO power sources to project that CEO power inhibits board monitoring ability. Following this, Garcia-Sanchez, Raimo and Vitolla [3] used a CEO power index to affirm that powerful CEOs negatively influence board decisions on disclosures. They [3] assessed CEO power on integrated reporting to affirm that powerful CEOs oppose the disclosure of integrated information.

2.5. Environmental Sensitivity

According to Li et al. [99], environmentally sensitive firms are those whose operations are considered to have higher chances of degrading or polluting the environment. The literature mostly classifies firms within the mining, industrial, oil and gas, fisheries, forestry, agriculture, construction, etc., as environmentally sensitive firms [52,99–102]. Due to their high potential for polluting the environment, environmentally sensitive industries are mostly subjected to stricter scrutiny concerning sustainability [5–7,52].

In this regard, a section of the literature projects that environmentally sensitive firms are more likely to present better environmental or sustainability disclosures than non-environmentally sensitive firms [101,103], in adherence to the need for survival as postulated in the lens of stakeholder theory [49,50]. However, other empirical assessments also posit that environmentally sensitive firms are more prone to negative sustainability impli-

cations [5,7,52]. Hence, they resort to impression management or greenwashing concerning their sustainability disclosures [5,104,105]. Hahn and Lülfs [106] add that the sustainability disclosures of firms with environmentally sensitive industries do not paint the true picture of their sustainability performance. Slack [107] agrees by asserting that the sustainability disclosures of environmentally sensitive industries are "largely window dressing that serves a strategic purpose" of manipulating public perception about their negative sustainability implications. These considerations suggest that firms within environmentally sensitive industries have weaker sustainability disclosures than portrayed. Focusing on the advent of integrated reporting, Solomon and Maroun [108] and Du Toit et al. [109] show a continuous decline in the sustainability performance of firms within environmentally sensitive industries, affirming that such firms may have been engaging in window dressing of sustainability disclosures to portray a better sustainability performance.

Notwithstanding the mixed view, firm environmental sensitivity is an essential antecedent of corporate sustainability performance that may influence the board diversity and sustainability performance nexus [8,100,110]. Due to the view that females are more sensitive to and practical about environmental issues than their male counterparts [111], males are believed to historically dominate environmentally impacting industries [8], and that industry type is an essential antecedent of firms' sustainability performance.

2.6. Board Diversity and Corporate Sustainability Performance

Aligned with agency and stakeholder theories, ample literature has assessed the antecedents of corporate sustainability performance, e.g., [8,9,19,24–28,52,68]. For example, the effects of board structure, composition, characteristics, expertise, and gender diversity on corporate sustainability performance have been assessed in the literature, e.g., [24–28]. However, one key antecedent of corporate sustainability performance that has not seen the required level of attention in the literature is the BCD [19,29–32], even though cultural diversity is an essential diversity feature that influences individual choices, decisions, and risk tolerance [34,85,112].

While the cultural identity of board members has been seen as a fundamental element of board effectiveness [34], empirical evidence of board diversity on board effectiveness provides mixed findings [9,29]. More culturally diverse boards have been identified as more creative, innovative, have deeper insight and perspectives, and have a deeper knowledge of problem-solving [113–116]. However, aligned with the social identity theory, such boards may also possess some communication challenges, conflict and mistrust, and longer decision-making processes, leading to inefficiencies [64,91,117–119].

The literature thus identifies cultural diversity as a double-edged sword that can either provide a lift or create a drag [19,29,34]. Whereas cultural diversity can encourage further discussions among boards for improved performance, it can also undermine trust within the group, which hinders performance [34,64,119]. Thus, as culture influences behaviour, the board of directors are susceptible to the positive and negative externalities of culture [19,30].

Nonetheless, improved diversity is associated with effective stakeholder management and satisfying their needs [37,120]. More culturally diverse boards are thus expected to be more prone to different stakeholders [37,88,116], making them more inclined toward the rights and interests of stakeholders. In this regard, a highly culturally diverse board should align to better sustainability performance. On the other hand, if the negative effects of cultural differences are prominent within a board (e.g., communication challenges, conflict and mistrust, and longer decision-making processes), it can impede or create a drag on the effectiveness of the board [34]. In this case, firm performance, including sustainability performance, will suffer. For example, De Wit et al. [121] argue that conflict and mistrust impede group outcome. Giannetti and Zhao [91] add that it leads to an erratic decision-making process, which may benefit or cost the firm.

This study thus expects cultural diversity in boardrooms to influence corporate sustainability performance. However, the influence is dependent on the cost and benefit of

cultural diversity [112]. Additionally, this study, along with the literature that projects BGD as an essential corporate governance dimension that advances managerial monitoring ability for transparent reporting, further tests the BGD and sustainability performance nexus. The study, therefore, proposes the following hypotheses.

H1. *Board cultural diversity has an association with firms' sustainability performance.*

H2. *Board gender diversity has an association with firms' sustainability performance.*

Diversity in the boardroom is generally linked to decreasing managerial power and advancing effective board monitoring [35]. Powerful CEOs, on the other hand, are noted to create agency problems, thereby inhibiting effective board monitoring and promoting managerial entrenchment, which can be detrimental to firms' sustainability practices [3,39–42]. On the other hand, powerful CEOs are considered essential, as they can use their power to strictly monitor management for enhanced performance of firms [45–47]. Organizational and efficiency theories suggest that the presence of powerful CEOs leads to enhanced firm value [44], while agency and economic theories posit that powerful CEOs create agency costs by inhibiting board monitoring capacity for their opportunistic behaviour [41,95].

CEOs are key players in decisions regarding corporate disclosure, including sustainability disclosures [3,122]. They are considered the most important individuals in organisations and are responsible for resource allocation and corporate strategic decisions [4]. Powerful CEOs may use this for a self-serving interest rather than for seeking the interest of shareholders or stakeholders [41,95] or to advance the profit maximisation goal of shareholders through efficient monitoring of management activities for enhanced firm performance [45–47].

Generally, boardroom diversity is linked to effective corporate board monitoring and decreased managerial power [35], including the CEO. Despite this, powerful CEOs have subtle means of entrenching themselves and securing authority [94] to control board decisions [92]. Thus, powerful CEOs can use their influence on boards to advance the profit maximisation goal of shareholders or seek the interest of stakeholders through strict monitoring of management activities [45,46]. They can also use this power to curtail the monitoring ability of boards for their opportunistic gains [3,41,93,94]. This may influence the board diversity and sustainability nexus [35].

Muttakin, Khan and Mihret [41] affirm this by asserting that powerful CEOs impede board monitoring ability. Garcia-Sanchez, Raimo and Vitolla [3] also posit that powerful CEOs oppose the disclosure of integrated (i.e., financial and sustainability) information. Koo and Kim [43] assert that powerful CEOs positively associate information opacity. On the contrary, Busenbark, Krause, Boivie and Graffin [46] postulate that powerful CEOs are linked to greater transparency in a strong governance environment. They are also linked to positive firm values [45,46]. In this view, the presence of powerful CEOs can inhibit or advance the effect of board diversity on firms' sustainability performance. The study thus hypothesizes the following.

H3. *The relationship between board cultural diversity and firms' sustainability performance will be moderated by the presence of a powerful CEO.*

H4. *The relationship between board gender diversity and firms' sustainability performance will be moderated by the presence of a powerful CEO.*

In line with the assertion that the effects of board diversity may not be the same for all firms in all industries (i.e., some industries are male-dominated, and culture is a double edge-sword), Byron and Post [123] postulate that institutional context should be considered when examining the effects of diversity. Industry type is one of the key aspects when evaluating antecedents of firms' sustainability performance [8,110]. The value of diversity also centres on firms' industry type and the nature of diversity [29]. Environmentally

sensitive industries are mostly subjected to stricter scrutiny concerning sustainability [5–7]. Although environmentally sensitive firms are considered to present better environmental disclosures [101,103], other studies project that environmentally sensitive firms are more prone to negative sustainability implications [5,7]. Li, Zhao, Chen, Jiang, Liu and Shi [99], therefore, called for the need to extend diversity studies into the industry context for a detailed assessment of the established relationship. On these bases, the study expects the environmental sensitivity of firms to influence the relationship between board diversity and firms' sustainability performance and proposes the following hypotheses.

H5. *The relationship between board cultural diversity and firms' sustainability performance will be moderated by firms' environmental sensitivity.*

H6. *The relationship between board gender diversity and firms' sustainability performance will be moderated by firms' environmental sensitivity.*

3. Methodology

To test the proposed hypotheses in this study, firms are drawn from the S&P/ASX300 index and data collected from the Refinitiv database. The S&P/ASX300 is an index of stocks listed on the Australian Securities Exchange (ASX) maintained by Standard & Poor's (S&P). It comprises a variety of firms across different industries. The total equity of S&P/ASX300 firms accounts for more than 85% of the market capitalization of the ASX firms [10]. Australia is one of the most culturally and linguistically diverse populations in the world (Diversity in Australia | Abroad Guide | Diversity Abroad, https://www.diversityabroad.com/articles/travel-guide/australia#:~:text=Australia%27s%20population%20of%20about%2023.4,many%20different%20countries%20and%20cultures (accessed on 7 November 2023)), with a continuous increase in gender and cultural diversity among boards and management teams [10,112,124–126]. Though cultural diversity in the boardroom in Australia does not proportionately align with that of the population, there is some growth in board cultural diversity among non-Anglo-Celtic and First Nations people [124]. Empirically assessing the impact of cultural diversity on corporate outcomes may inform policy directions. Furthermore, Dodd and Zheng [112] propound that the impact of board cultural diversity may vary across countries due to country-specific characteristics that may interplay with other cultures.

Although firms on the ASX300 are on track for parity in BGD, the same cannot be said about BCD [125,126]. The cultural background of boards influences board effectiveness [34]; hence, following the diversity recommendation by the Principle of Good Corporate Governance and Best Practice Recommendation in 2011, this study assesses the relationship between board diversity (BCD and BGD) and corporate sustainability performance of S&P/ASX300 firms from 2011 to 2020. It extends the literature by assessing whether firm environmental sensitivity and CEO power matter to the board diversity and sustainability performance relationship. Utilizing the Refinitiv database, sample firms are limited to 98 (see Table 1) based on the availability of board diversity (BCD and BGD) and corporate sustainability performance (ESG) data.

Table 1. Sample selection process.

	No. of Firms	Firm Year Observations
S&P/ASX300 firms from 2011 to 2020	300	3000
Less firms without BCD data in the period under consideration	(202)	(2020)
Less missing DV data		(87)
Less missing control variables data		(178)
Observations	98	715

3.1. Variable Definitions

This study assesses the relationship between board diversity and firms' sustainability performance and the moderating role of CEO power and firms' environmental sensitivity to the relationship. Hence BCD, BGD, ESG, firm's environmental sensitivity, as well as CEO power are the key variables of interest.

Following the literature, this study measures the dependent variable (i.e., sustainability) by Refinitiv's environment, social and governance (ESG) performance [70,75,76]. Refinitiv's ESG is a percentile score that evaluates firms' relative ESG performance, commitment, and effectiveness to ESG factors [75,76]. In line with Refinitiv's ESG score, the higher the ESG score, the higher the ESG performance of a firm and vice versa.

Board diversity, the study's independent variable, is assessed based on BCD and BGD. Board diversity is assessed from the Refinitiv database. The database defines BCD to represent the percentage of foreign nationals on boards or members of the board that have a different cultural background from the domicile country of the company [9,69]. BGD is also measured as the percentage of females on boards [11,14]. For robustness of the findings, the study follows the literature to include the Blau index of diversity and the Shannon index of diversity [127,128] as alternative measures of both BCD and BGD.

The moderating variable, CEO power, is measured in line with Garcia-Sanchez, Raimo and Vitolla [3] and Muttakin, Khan and Mihret [41]. Thus, the study used a CEO power index that includes the different dimensions of CEO power (i.e., CEO presence on boards, CEO duality and percentage of executives on the board [3]). A score of 1 is assigned for each of the three dimensions if there is a presence of a CEO on the board, if there is a CEO duality (i.e., the CEO is also the chair of the board) and if the percentage of executives on the board is above the median score; otherwise, 0 is assigned. The CEO power index is the sum of all three dimensions' scores for each year per firm. A maximum score of 3 if all three dimensions score 1 and a minimum of 0 if all three dimensions score 0 for the CEO power index. The second moderation variable, the firm's environmental sensitivity, is measured based on whether a firm's activities have a higher chance of polluting the environment or not [99]. Firms categorized in the more environmentally impacting industries (e.g., mining, industrial, oil and gas, etc.) are assigned 1; otherwise, 0 is assigned.

With regard to the control variables, variables identified to align with diversity and sustainability performance are considered. Thus, both board and firms' characteristics are controlled in line with the literature. Specifically, this study controlled for board size (Bsize) measured as the natural logarithm of total board size, board independence (Bindp) as the ratio of independent board members to total board size and audit committee (Acmtt) of the board measured as the ratio of independent board members on the audit committee [15,19,25,113,116].

Firm characteristics controlled for are firm size (Fsize), measured as a natural logarithm of total assets, return on assets (ROA) as the ratio of earnings before interest and tax to total assets, leverage (LEV) by the ratio of total debts to total assets, firm's intangible assets (intan), as a percentage of intangibles to lagged total assets. The existence of assurance or not of firms' sustainability performance (Assured) is also controlled for; 1 assigned if assured and, otherwise, 0 is assigned [19,114,116,123,129]. $\sum YD$ and $\sum IND$ are the year and industry dummies, respectively.

3.2. Empirical Model

To examine the relationship between board diversity (i.e., BCD and BGD) and corporate sustainability performance, and the moderating roles of CEO power and environmental sensitivity, the study employs a least-squares dummy variable (LSDV) regression model, a variant of the fixed effect model based on OLS [52,68,130] to test the hypotheses. The LSDV model maintains the pane structure of data by controlling for time-invariant characteristics

and cross-sectional variation by adding dummy variables of year and industry [130]. In line with Hypotheses 1 and 2, the following regression models are used.

$$ESG_{it} = b_0 + b_1 BCD_{it} + b_2 BGD_{it} + b_3 Control_{it} + \sum YD + \sum IND + \varepsilon_{it} \quad (1)$$

The following estimating models are employed to test the moderating role of CEO power and firms' environmental sensitivity (i.e., Hypotheses 3–6). Models 2 and 3 focus on the moderating roles of CEO power and firms' environmental sensitivity on BCD and ESG nexus (i.e., Hypotheses 3 and 5), while models 4 and 5 examine the moderating roles of CEO power and firms' environmental sensitivity on BGD and ESG nexus (i.e., Hypotheses 4 and 6).

$$ESG_{it} = b_0 + b_1 BCD_{it} + b_2 CEOpower_{it} + b_3 BCD_{it} * CEOpower_{it} + b_4 BGD_{it} + b_3 Control_{it} + \sum YD + \sum CD + \varepsilon_{it} \quad (2)$$

$$ESG_{it} = b_0 + b_1 BCD_{it} + b_2 EnvSen_{it} + b_3 BCD_{it} * EnvSen_{it} + b_4 BGD_{it} + b_3 Control_{it} + \sum YD + \sum CD + \varepsilon_{it} \quad (3)$$

$$ESG_{it} = b_0 + b_1 BGD_{it} + b_2 CEOpower_{it} + b_3 BGD_{it} * CEOpower_{it} + b_4 BCD_{it} + b_3 Control_{it} + \sum YD + \sum CD + \varepsilon_{it} \quad (4)$$

$$ESG_{it} = b_0 + b_1 BGD_{it} + b_2 EnvSen_{it} + b_3 BGD_{it} * EnvSen_{it} + b_4 BCD_{it} + b_3 Control_{it} + \sum YD + \sum CD + \varepsilon_{it} \quad (5)$$

4. Results and Discussion

4.1. Descriptive and Correlation Analysis

Tables 2 and 3 contain the descriptive statistics and correlation matrix of variables of interest in this study. Table 2 shows an above-average mean score of 0.539 and a deviation of 0.198 for ESG performance, indicating that sample firms' commitment and effectiveness towards ESG performance is above average. The cultural diversity of the board recorded a merger mean of approximately 21% (0.211), implying that, on average, 21% of board members of the sampled firms are foreigners, with a range of (0% to 78%). Board gender diversity (BCD) also recorded a mean value of 0.251, a little above BCD, indicating that, on average, 25% of the board are female directors, with a range of (0% to 57%). Environmental sensitivity recorded a mean of 0.406, while an average score of 1.52 was recorded for the CEO power index, suggesting that over 40% of the sample are environmentally sensitive firms and more than 50% of the sample, based on the CEO power index, have powerful CEOs.

Table 2. Descriptive statistics table.

	Mean	Std Dev.	Min.	Max.
ESG	0.539	0.198	0.029	0.919
BCD	0.211	0.121	0	0.778
BGD	0.251	0.104	0	0.571
EnvSen	0.406	0.491	0	1
CEOpower	1.521	0.615	0	3
Bsize	2.729	0.092	2.381	2.958
Bindp	0.707	0.199	0.083	1
Acmtt	0.964	0.081	0.6	1
Assured	0.352	0.478	0	1
Fsize	15.559	1.810	10.779	20.762
ROA	0.076	0.124	−0.975	0.881
LEV	0.247	0.164	0	1.326
Intan	0.241	0.321	0	3.075

Table 3. Correlation matrix.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) ESG	1.000						
(2) BCD	0.113 ***	1.000					
(3) BGD	0.337 ***	0.123 ***	1.000				
(4) CEOpower	−0.250 ***	−0.079 **	−0.148 ***	1.000			
(5) EnvSen	−0.106 ***	−0.070 **	−0.130 ***	−0.022	1.000		
(6) Bsize	0.612 ***	−0.016	0.170 ***	−0.140 ***	−0.011	1.000	
(7) Bindp	0.431 ***	0.119 ***	0.200 ***	−0.641 ***	−0.073 **	0.254 ***	1.000
(8) Acmtt	0.264 ***	0.076 **	0.049	−0.122 ***	−0.076 **	0.061 *	0.226 ***
(9) Assured	0.635 ***	0.011	0.188 ***	−0.103 ***	0.070 **	0.380 ***	0.212 ***
(10) Fsize	0.671 ***	−0.016	0.190 ***	−0.238 ***	−0.053 *	0.410 ***	0.321 ***
(11) ROA	−0.140 ***	0.043	−0.029	0.152 ***	−0.153 ***	0.121 ***	−0.101 ***
(12) LEV	0.057 *	−0.110 ***	0.051	0.012	0.099 ***	0.074 **	−0.004
(13) Intan	−0.178 ***	−0.077 **	−0.033	0.068 **	−0.151 ***	−0.080 **	−0.014

Variables	(8)	(9)	(10)	(11)	(12)	(13)
(8) Acmtt	1.000					
(9) Assured	0.100 ***	1.000				
(10) Fsize	0.056 *	0.379 ***	1.000			
(11) ROA	−0.025	−0.063 *	−0.229 ***	1.000		
(12) LEV	−0.113 ***	0.063 *	0.094 ***	−0.161 ***	1.000	
(13) Intan	0.008	−0.174 ***	−0.270 ***	0.153 ***	0.174 ***	1.000

***, **, * represent 1%, 5% and 10% statistical significance levels.

The correlation matrix (Table 3) shows that board diversity (i.e., BCD and BGD) positively relates firms' ESG. Environmental sensitivity of firms and CEO power are negatively associated with firms' sustainability performance. The low correlations among the explanatory variables and the mean–variance inflation factor (VIF) of 2.69 do not indicate multicollinearity issues [131].

4.2. Empirical Results—Board Diversity and ESG Performance

Tables 4 and 5 present the regression results for the study's models. Based on the regression model used, Table 4, column 1 shows a significant positive relationship between BCD and ESG. In detail, the results show that an increase in BCD is associated with increases in ESG of firms ($\beta = 0.091$, $p < 0.05$). From Table 5, column 1, the results project a positive significant association between BGD and ESG. Thus, the results indicate that increases in BGD are associated with increases in firm ESG performance ($\beta = 0.223$, $p < 0.00$). These signify the acceptance of Hypotheses 1 and 2, which examine whether board diversity positively associates with firms' ESG performance. Thus, assessing board diversity from gender (BGD) and cultural (BCD) diversities, the results project that board diversity positively influences firms' practices of sustainability.

These results align with agency and stakeholder theories as enhanced corporate governance mechanisms (i.e., improved board diversity) ensure quality reporting performance. They support the existing literature that projects BGD to positively influence firms' disclosure quality, e.g., [11,14,24,25,64,132]. With regard to BCD, the study aligned with studies that project cultural diversity as an essential element that influences boards' actions, e.g., [19,33,34,64,83,85]. Although a culturally diverse board is seen as a double-edged sword that can provide a lift or create a drag [34], this study found that BCD provides a lift in firms' sustainability performance. From the perspective of social identity theory, the finding on BCD portrays that firms experience more of the positive externalities of cultural diversity, leading to improved performance. Generally, the results project that board diversity is an essential influencer of firm sustainability performance by empirically providing evidence beyond the usual BGD to BCD.

Table 4. Relationships between board cultural diversity (BCD) and ESG Performance.

	DV: ESG						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
BCD	0.091 **	0.158 ***	0.218 **				
	(0.036)	(0.046)	(0.11)				
EnvSen		−0.102 ***		−0.085 **		−0.07 *	
		(0.027)		(0.033)		(0.039)	
BCD × EnvSen		−0.184 **					
		(0.075)					
CEOpower			−0.036 **		−0.046 **		−0.058 **
			(0.017)		(0.023)		(0.029)
BCD × CEOpower			−0.093 **				
			(0.046)				
BlauBCD				0.112 **	0.195 *		
				(0.052)	(0.117)		
blauBCD × EnvSen				−0.189 **			
				(0.086)			
blauBCD × CEOpower					−0.116 *		
					(0.067)		
shanBCD						0.089 **	0.172 *
						(0.044)	(0.099)
shanBCD × EnvSen						−0.154 **	
						(0.072)	
shanBCD × CEOpower							−0.081 *
							(0.046)
BGD	0.223 ***	0.212 ***	0.201 ***	0.212 ***	0.199 ***	0.213 ***	0.199 ***
	(0.048)	(0.048)	(0.049)	(0.049)	(0.05)	(0.049)	(0.05)
Bsize	0.618 ***	0.63 ***	0.593 ***	0.617 ***	0.596 ***	0.617 ***	0.598 ***
	(0.117)	(0.116)	(0.117)	(0.117)	(0.118)	(0.117)	(0.118)
Bindp	0.134 ***	0.129 ***	0.11 ***	0.132 ***	0.116 ***	0.132 ***	0.116 ***
	(0.024)	(0.024)	(0.026)	(0.024)	(0.026)	(0.024)	(0.026)
Acmtt	0.34 ***	0.333 ***	0.353 ***	0.334 ***	0.349 ***	0.334 ***	0.348 ***
	(0.059)	(0.059)	(0.059)	(0.059)	(0.06)	(0.06)	(0.06)
Assured	0.106 ***	0.105 ***	0.101 ***	0.106 ***	0.101 ***	0.106 ***	0.101 ***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Fsize	0.017 ***	0.018 ***	0.017 ***	0.018 ***	0.018 ***	0.018 ***	0.018 ***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
ROA	−0.124 **	−0.118 **	−0.119 **	−0.116 **	−0.117 **	−0.116 **	−0.118 **
	(0.052)	(0.052)	(0.052)	(0.052)	(0.053)	(0.052)	(0.053)
LEV	0.092 ***	0.095 ***	0.098 ***	0.093 ***	0.092 ***	0.092 ***	0.092 ***
	(0.031)	(0.031)	(0.031)	(0.031)	(0.032)	(0.031)	(0.032)
Intan	−0.002	−0.002	−0.001	−0.004	−0.003	−0.004	−0.003
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	−1.959 ***	−2.003 ***	−1.948 ***	−1.975 ***	−1.972 ***	−1.983 ***	−1.998 ***
	(0.234)	(0.234)	(0.238)	(0.236)	(0.244)	(0.237)	(0.248)
Adjusted R^2	0.672	0.674	0.673	0.671	0.671	0.671	0.671
F Statistics	51.46 ***	50.31 ***	48.64 ***	49.37 ***	47.84 ***	49.32 ***	47.85 ***
Observations	715	715	715	715	715	715	715
Mean VIF	2.15	2.69	3.02	3.03	3.01	3.05	3.02

The table denotes the regression output of board diversity (i.e., BCD and BGD) on ESG performance. Variables are winsorized at 1% and 99%, except dummy variables. Robust standard errors are reported in parentheses. ***, **, * denote 1%, 5% and 10% statistical significance levels.

Focusing on BCD, the finding supports the view that culturally diverse boards improve firms' performance [19,29,64,86–88]. It follows Harjoto, Laksmana and wen Yang [88], who concluded that a conscious increase in BCD leads to increases in firms' corporate social responsibility. However, the findings contradict those of Wang and Clift [89], García-Meca, García-Sánchez and Martínez-Ferrero [90], and Zaid, Wang, Adib, Sahyouni and Abuhijleh [9]. On financial performance, Wang and Clift [89] conclude that BCD has no significant effect on firms' financial performance, while García-Meca, García-Sánchez and Martínez-Ferrero [90] indicate BCD inhibits banks' performance. This study, however, examined BCD and sustainability performance, not financial performance. Zaid, Wang, Adib, Sahyouni and Abuhijleh [9], on the other hand, examined BCD and sustainability

performance but focused on culturally and traditionally inclined developing countries to conclude a non-significant relationship between BCD and the sustainability performance of firms. This study focused on a cosmopolitan developed economy and a matured exchange to establish a positive significant effect between BCD and firms' ESG performance. Thus, the results empirically position BCD as an essential diversity instrument that can be used to promote quality disclosure in the field of sustainability.

Table 5. Relationships between board gender diversity (BGD) and ESG Performance.

	DV: ESG						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
BGD	0.223 ***	0.268 ***	0.609 ***				
	(0.048)	(0.056)	(0.119)				
EnvSen		−0.1 ***		−0.07 *		0.265	
		(0.032)		(0.041)		(0.202)	
BGD × EnvSen		−0.134 **					
		(0.061)					
CEOpower			0.086 ***		0.126 ***		0.57 ***
			(0.02)		(0.03)		(0.164)
BGD × CEOpower			−0.255 ***				
			(0.068)				
BlauBGD				0.337 ***	0.702 ***		
				(0.063)	(0.131)		
blauBGD × EnvSen				−0.178 *			
				(0.093)			
BlauBGD × CEOpower					−0.291 ***		
					(0.078)		
shanBGD						1.404 ***	3.102 ***
						(0.337)	(0.696)
shanBGD × EnvSen						−1.136 **	
						(0.558)	
shanBGD × CEOpower							−1.532 ***
							(0.461)
BCD	0.091 **	0.086 **	0.098 ***	0.072 *	0.087 **	0.085 **	0.096 ***
	(0.036)	(0.037)	(0.036)	(0.037)	(0.037)	(0.037)	(0.037)
Bsize	0.618 ***	0.605 ***	0.577 ***	0.594 ***	0.568 ***	0.593 ***	0.571 ***
	(0.117)	(0.117)	(0.116)	(0.117)	(0.116)	(0.119)	(0.118)
Bindp	0.134 ***	0.13 ***	0.106 ***	0.124 ***	0.102 ***	0.142 ***	0.112 ***
	(0.024)	(0.024)	(0.025)	(0.024)	(0.025)	(0.024)	(0.025)
Acmtt	0.34 ***	0.336 ***	0.321 ***	0.327 ***	0.311 ***	0.313 ***	0.314 ***
	(0.059)	(0.059)	(0.059)	(0.059)	(0.059)	(0.06)	(0.059)
Assured	0.106 ***	0.107 ***	0.102 ***	0.105 ***	0.101 ***	0.105 ***	0.1 ***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Fsize	0.017 ***	0.017 ***	0.018 ***	0.018 ***	0.019 ***	0.019 ***	0.018 ***
	(0.007)	(0.007)	(0.006)	(0.007)	(0.006)	(0.007)	(0.007)
ROA	−0.124 **	−0.121 **	−0.108 **	−0.128 **	−0.115 **	−0.147 ***	−0.136 ***
	(0.052)	(0.052)	(0.052)	(0.052)	(0.052)	(0.053)	(0.053)
LEV	0.092 ***	0.092 ***	0.095 ***	0.086 ***	0.089 ***	0.08 **	0.09 ***
	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)
Intan	−0.002	−0.002	−0.006	0	−0.005	0	−0.004
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	−1.959 ***	−1.935 ***	−1.956 ***	−1.955 ***	−2.022 ***	−2.341 ***	−2.895 ***
	(0.234)	(0.234)	(0.233)	(0.234)	(0.234)	(0.259)	(0.332)
Adjusted R^2	0.672	0.673	0.680	0.675	0.681	0.669	0.676
F Statistics	51.46 ***	49.94 ***	49.94 ***	50.13 ***	49.97 ***	48.84	48.66 ***
Observations	715	715	715	715	715	715	715
Mean VIF	2.15	2.88	3.02	3.09	3.07	3.11	3.10

The table denotes the regression output of board diversity (i.e., BCD and BGD) on ESG performance. Variables are winsorized at 1% and 99%, except dummy variables. Robust standard errors are reported in parentheses. ***, **, * denote 1%, 5% and 10% statistical significance levels.

However, comparing the effects of BGD and BCD, BGD has a better influence on ESG than BCD. Thus, on average, a 1% increase in BGD increases ESG by 22.3%, whereas BCD

increases ESG by 9.1% (Tables 4 and 5, columns 1). This difference can be linked to the continuous attention on BGD over other diversity indicators.

The results relating to control variables also align with the literature. Board size, independence, and audit committee independence are positively and significantly related to firms' ESG performance. The results on the assurance of corporate sustainability reports also align with the literature as a positive significant association is established between assured ESG and firms' ESG performance [133,134]. Firm size and leverage are positively related to ESG. This aligns with the literature that asserts that politically visible firms are prone to quality disclosure to avoid too much public scrutiny [15,135].

4.3. Interaction Effect of CEO Power

In line with the agency theory, CEOs are important individuals with lots of power within organizations, as shareholders are scattered across with less individual power compared to the CEO [58]. With such power, they (CEOs) can be self-seeking by negatively impacting the monitoring capacity of boards [41] to the detriments of quality disclosure and the positive effects of board diversity. Powerful CEOs can also use this influence positively on boards for effective board functioning, thereby enhancing the performance of firms [45–47]. The moderating role of CEO power on board diversity and sustainability performance is thus tested (Hypotheses 3 and 4).

The results in Tables 4 and 5, columns 3, suggest that the presence of powerful CEOs reduces the positive effect of board diversity on firms' sustainability performance. Specifically, the results in Table 4, column 3 indicate that the interaction variable (BCD × CEOpower) negatively associates firms' ESG performance at a 5% significance level ($\beta = -0.093$, $p < 0.05$). The results of Table 5, column 3 show that the moderating variable (BGD × CEOpower) negatively and significantly impact firms' ESG performance at a 1% significance level ($\beta = -0.255$, $p < 0.01$). These results show that irrespective of the measures of board diversity (i.e., BCD or BGD), the presence of CEO power significantly reduces the positive significant effect of board diversity on firms' sustainability performance.

These outcomes align with the literature that shows that powerful CEOs inhibit the monitoring abilities of boards [41] and those that suggest that powerful CEOs dictate the direction of firms and can abuse it for their opportunistic gain [3,4]. The results, however, contradict the stream of literature that views CEO power as beneficial, e.g., [44–47]. Thus, the results contradict the stream of literature that projects that the presence of powerful CEOs leads to strict monitoring of managerial activities for improved firm performance [45–47]. The findings rather support the economic and agency theories that postulate that powerful CEOs create agency problems and have negative consequences on firms' performance [3,39–43].

Although board diversity is meant to advance board monitoring capacity and curtail excesses of the executive, including the CEO [35], the results suggest that the presence of a powerful CEO can negatively influence the monitoring capacity of boards to the detriment of sustainability performance [3,41,93,95]. This further aligns with Baldenius, Melumad and Meng [94] and Pathan (2009) [92], who opine that powerful CEOs have subtle means of entrenching themselves and securing authority for personal ambitions. These results affirm that CEO power matters to the board diversity and sustainability performance nexus.

4.4. Interaction Effect of Firms' Environmental Sensitivity

The study further tests the interaction effect of firms' environmental sensitivity on the board diversity and ESG nexus (i.e., Hypotheses 5 and 6). This is based on the assumption that environmentally sensitive industries are prone to issues of sustainability, and their survival is hinged on a better engagement with society in line with the stakeholder theory [49–52]. Moreover, the value of diversity centres on the firms' industry type [29].

Based on the results (Tables 4 and 5, columns 2), the interaction variables (i.e., BCD*EnvSen and BGD*EnvSen) were found to negatively impact board diversity and firms' sustainability performance nexus ($\beta = -0.184$, $p < 0.05$ and $\beta = -0.134$, $p < 0.05$, respectively for BCD and

BGD). This suggests that environmentally sensitive firms weaken the significant positive association between board diversity and ESG performance. This finding is robust for the two measures of board diversity used and signifies the acceptance of Hypotheses 5 and 6,

The results align with the view that environmentally sensitive firms exhibit more significant negative consequences on the environment [8,110], and their sustainability disclosure quality keeps declining overtime [52,108,109]. It, however, contradicts the section of the literature that views environmentally sensitive firms as superior in their sustainability disclosures due to the stricter scrutiny they are subjected to [7,101].

The findings further support the assertions of Cumming and Leung [29], Lu and Herremans [8], and Helfaya and Moussa [110] that industry context is essential in assessing the effect of diversity on sustainability performance. Thus, the study empirically proves that environmental sensitivity matters to the board diversity and sustainability relationship, even with the two measures of board diversity (i.e., BCD and BGD).

4.5. Further Analysis

For the robustness of the findings, the study uses alternative measures of board diversity (i.e., Blau and Shanon indexes of diversity), lead–lag analysis, and three-stage least-squares regression (3SLS) to deal with potential issues of endogeneity and to substantiate the results.

4.5.1. Alternative Measures of Board Diversity

Following the literature, the Blau index and Shannon index of BCD and BGD are used to alternately measure board diversity [9,127,128] for a robust assessment of the findings. From Table 4 (columns 4–7), the results show qualitatively and quantitatively similar findings to the initial relationships between BCD and ESG performance. Thus, the findings portray that BCD measured by the Blau index positively relates firms' ESG performance at a 5% significance level ($\beta = 0.112$, $p < 0.05$—column 4) and that of Shanon index at the 5% significance level ($\beta = 0.089$, $p < 0.05$—column 6). Similar results are reported for the Blau index of BGD and the Shanon index of BGD on firms' sustainability performance (Table 5). Thus, a positive relationship is established between the Blau index of BGD and firms' ESG performance at a 1% significance level ($\beta = 0.337$, $p < 0.01$—column 6), and that of Shanon index of BGD at a 1% significance level ($\beta = 1.404$, $p < 0.01$—column 6).

The interaction effects of CEO power and firms' environmental sensitivity are also affirmed for both the Blau index and the Shannon index of BCD and BGD. In line with the initial results, the interaction effects of CEO power recorded a significant negative effect on firm ESG performance for both Blau and Shannon indexes of diversity ($\beta = -0.116$, $p < 0.10$, $\beta = -0.081$, $p < 0.10$, respectively, for the Blau and Shanon index of BCD in Table 4 and $\beta = -0.291$, $p < 0.01$, $\beta = -1.532$, $p < 0.01$, respectively, the for Blau and Shanon index of BGD in Table 4). The interaction effects of firms' environmental sensitivity also recorded similar results to the initial findings. Thus, the moderation effect of environmental sensitivity and Blau and Shanon indexes of BCD (Table 4) recorded a significant negative relationship of -0.189 and -0.154, all at a 5% significance level, respectively, for Blau and Shanon indexes of BCD. Those of Blau and Shanon indexes of BGD recorded -0.178 and -1.136, at 10% and 5% significance levels for Blau and Shanon indexes of BGD.

The results consistently affirm the findings of the study that board diversity (i.e., BCD and BGD) positively influences firms' sustainability performance, while the presence of CEO power and firms' environmental sensitivity weakens the board diversity and sustainability performance relationship.

4.5.2. Three-Stage Least-Squares Regression (3SLS)

For the nature of inference in this study, issues of endogeneity may be of concern (e.g., simultaneity and correlated omitted variables) [14,136,137]. This study employs a lead–lag

analysis and a three-stage least-squares regression in line with the literature [8] based on the models below to address issues of endogeneity.

$$ESG_{it} = b_0 + a_1 BD_{it-1} + c_2 ESG_{it-1} + y_4 Q_{it} + \varepsilon_{it} \quad (6)$$

$$BD_{it} = b_0 + a_1 ESG_{it-1} + c_2 BD_{it-1} + y_4 Q_{it} + \varepsilon_{it} \quad (7)$$

where *ESG* is firms' ESG performance, *BD* is board diversity (i.e., BCD and BGD), and *Q* denotes all control variables.

The 3SLS simultaneously runs the models, treating the dependent variables *ESG* and *BD* as endogenous variables [8,138]. From Table 6, the results corroborate the study's initial findings. Thus, the results show a significant positive relationship between BCD and ESG ($\beta = 0.314$, $p < 0.00$—column 1) and a significant positive relationship between BGD and ESG ($\beta = 0.677$, $p < 0.00$—column 3). The interaction effect of CEO power on the board diversity and ESG relationship also recorded negative significant effects of −0.797 (BCD) and −2.113 (BGD), all at a 1% significance level (Table 6, columns 2 and 4). The moderation effect of firms' environmental sensitivity on the board diversity and ESG performance was also affirmed (i.e., $\beta = -0.323$, $p < 0.00$ and $\beta = -0.494$, $p < 0.00$, respectively, for BCD, column 1 and BGD, column 3).

Table 6. Three-stage least-squares regression (3SLS).

	DV: ESG			
	Board Cultural Diversity		**Board Gender Diversity**	
BCD	0.314 ***	1.598 ***	0.067 *	0.042
	(0.07)	(0.354)	(0.039)	(0.058)
BGD	0.209 ***	0.145 **	0.677 ***	0.415 ***
	(0.05)	(0.058)	(0.09)	(0.492)
EnvSen	−0.093 ***		−0.016	
	(0.03)		(0.037)	
BCD × EnvSen	−0.323 ***			
	(0.094)			
CEOpower		−0.203 ***		−0.565 ***
		(0.044)		(0.07)
BCD × CEOpower		−0.796 ***		
		(0.189)		
BGD × EnvSen			−0.494 ***	
			(0.106)	
BGD*CEOpower				−0.2.113 ***
				(0.264)
Bsize	0.697 ***	0.697 ***	0.578 ***	0.552 ***
	(0.124)	(0.138)	(0.123)	(0.181)
Bindp	0.094 ***	0.049	0.076 ***	0.007
	(0.025)	(0.03)	(0.026)	(0.041)
Acmtt	0.336 ***	0.401 ***	0.354 ***	0.173 *
	(0.063)	(0.07)	(0.063)	(0.096)
Assured	0.098 ***	0.077 ***	0.101 ***	0.093 ***
	(0.012)	(0.014)	(0.012)	(0.018)
Fsize	0.014 **	0.015 **	0.015 **	0.018 *
	(0.007)	(0.007)	(0.007)	(0.01)
ROA	−0.140 **	−0.178 ***	−0.129 **	−0.084
	(0.054)	(0.061)	(0.055)	(0.081)
LEV	0.105 ***	0.099 ***	0.098 ***	0.046
	(0.033)	(0.036)	(0.03)	(0.049)
Intan	−0.005	−0.003	−0.009	−0.046 *
	(0.017)	(0.019)	(0.017)	(0.026)
Year effect	Yes	Yes	Yes	Yes

Table 6. *Cont.*

	DV: ESG			
	Board Cultural Diversity		**Board Gender Diversity**	
Industry effect	Yes	Yes	Yes	Yes
Constant	−2.097 *** (0.253)	−2.442 (0.306)	−1.889 *** (0.248)	−2.51 *** (0.373)
R^2	0.6773	0.6117	0.6609	0.2745
Chi^2	1332.77	1119.43	1317.35	667.32
Prob. > Chi^2	0.0000	0.0000	0.0000	0.0000
Observations	627	627	627	627

The table denotes the 3SLS regression output of board diversity (i.e., BCD and BGD) on ESG performance. Variables are winsorized at 1% and 99%, except dummy variables. Robust standard errors are reported in parentheses. ***, **, * denote 1%, 5% and 10% statistical significance levels.

4.5.3. Lead–Lag Analysis

The lead–lag principle alleviating concerns of endogeneity, hinges on the assumption that 'Y_t cannot explain X_{t-1}' to 'exogenise' the endogenous explanatory variable [68,139]. Following the literature, the study further employs the lead–lag analysis to further address any issues of endogeneity [139,140]. The results, as shown in Table 7, affirm the initial results of the study that board diversity positively associates firms' sustainability performance. It further affirms that both CEO power and environmental sensitivity matter to the board diversity and sustainability performance nexus.

Table 7. Lead–lag analysis.

	DV: ESG			
	Board Cultural Diversity		**Board Gender Diversity**	
Lagged BCD	0.154 *** (0.051)	0.190 ** (0.093)		
Lagged BGD			0.285 *** (0.058)	0.638 *** (0.134)
EnvSen	−0.125 *** (0.028)		−0.114 *** (0.033)	
Lagged BCD × EnvSen	−0.176 ** (0.083)			
CEOpower		−0.032 * (0.017)		−0.082 *** (0.021)
Lagged BCD × CEOpower		−0.058 *** (0.018)		
Lagged BGD × EnvSen			−0.165 * (0.093)	
Lagged BGD × CEOpower				−0.259 *** (0.076)
BCD			0.091 ** (0.039)	0.102 *** (0.038)
BGD	0.224 *** (0.051)	0.214 *** (0.051)		
Bsize	0.606 *** (0.121)	0.560 *** (0.122)	0.619 *** (0.123)	0.587 *** (0.122)
Bindp	0.101 *** (0.025)	0.085 *** (0.027)	0.114 *** (0.025)	0.090 *** (0.026)
Acmtt	0.341 *** (0.063)	0.356 *** (0.063)	0.340 *** (0.063)	0.339 *** (0.063)
Assured	0.103 *** (0.012)	0.100 *** (0.012)	0.103 *** (0.012)	0.098 *** (0.012)

Table 7. *Cont.*

	DV: ESG			
	Board Cultural Diversity		**Board Gender Diversity**	
Fsize	0.017 **	0.017 **	0.015 **	0.016 **
	(0.007)	(0.007)	(0.007)	(0.007)
ROA	−0.111 **	−0.110 ***	−0.136 **	−0.115 **
	(0.052)	(0.053)	(0.055)	(0.054)
LEV	0.105 ***	0.109 ***	0.109 ***	0.108 ***
	(0.033)	(0.033)	(0.033)	(0.033)
Intan	−0.005	−0.006	−0.010	−0.013
	(0.017)	(0.017)	(0.017)	(0.017)
Year effect	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes
Constant	−1.888 ***	−2.795 ***	−1.891 ***	−1.912 ***
	(0.248)	(0.249)	(0.248)	(0.247)
Adjusted R^2	0.6661	0.6662	0.6627	0.6691
F Statistics	44.95 ***	43.50 ***	44.70 ***	44.47 ***
Observations	640	640	640	640

The table denotes the regression output of lagged board diversity (i.e., BCD and BGD) on ESG performance. Variables are winsorized at 1% and 99%, except dummy variables. Robust standard errors are reported in parentheses. ***, **, * denote 1%, 5% and 10% statistical significance levels.

5. Conclusions

The essence of board diversity is seen in the increasing number of publications in the field. However, while the type of diversity is essential to the benefits of diversity, the literature has so far mainly focused on BGD with less emphasis on BCD. Culture, as a double-edged sword, can potentially influence one's actions and decisions, including board effectiveness. Additionally, although the call for evidence on the effects of diversity has yielded ample research into board diversity and sustainability performance, the role of powerful CEOs and industry types in this nexus is missing in the literature. The literature largely links boardroom diversity to advancing board monitoring ability, board effectiveness, and reducing managerial power. Nonetheless, the presence of CEO power hinders board monitoring ability or advances board effectiveness, while industry type is an essential factor in the effects of diversity. Notwithstanding, the effects of CEO power and industry type on the board diversity and sustainability performance nexus are missing.

This study contributes to the literature on diversity and antecedents of corporate sustainability performance by assessing whether CEO power and firm environmental sensitivity matter to the board diversity (i.e., BCD and BGD) and corporate sustainability performance relationship. It further assesses the effect of board diversity beyond the BGD to BCD.

Using the S&P/ASX300 firms for a period of ten years (2011 to 2020), the findings of the study project that both BCD and BGD are essential antecedents for corporate sustainability performance. It concludes that BCD and BGD positively associate firms' ESG performance. However, the effect of BGD significantly influences ESG better than BCD, possibly explaining the focus of the literature and practice on BGD. On the moderation effects, the study further concludes that CEO power and industry type (environmental sensitivity) matter to the board diversity and sustainability performance relationship. It found that CEO power and environmental sensitivity moderate the board diversity and sustainability performance nexus. In detail, the study established that CEO power and environmental sensitivity negatively moderate diversity and sustainability performance relationships. This aligns with the view of the literature that projects that powerful CEOs create agency problems and mostly use this power for their opportunistic gains, which is detrimental to the board diversity and sustainability performance nexus. Concerning firms' environmental sensitivity, the conclusion aligns with the view that environmentally

sensitive firms are more prone to negative sustainability and essential to the effects of board diversity.

The findings of the study make three important contributions to the literature, practice, and policy. First, it extends the board diversity literature beyond BGD to BCD. It, however, affirms that BGD has more influence on ESG than BCD. Regardless, the positive influence of BCD on ESG advances the essence of BCD, hence the need for all stakeholders to pay attention to boardroom cultural diversity. Second, it brings attention to the effect of the presence of powerful CEOs on effective corporate governance. It shows that the presence of powerful CEOs negatively affects board monitoring ability, leading to a reduction in the positive effect of board diversity on firms' sustainability performance. Third, it projects that firms' industry type affects the effects of boardroom diversity. This is essential for every policy targeting mandating or encouraging board diversity quotas. The findings provide business practitioners, investors, and policymakers with valuable empirical evidence regarding other factors that may hinder the positive links between board diversity and corporate sustainability performance. The results are essentially interesting regarding factors to ensure effective corporate governance practices and the differences in effects with respect to industry type.

Although the contributions are essential, some limitations exist. This is a single-country study and, hence, may lack detailed cultural group representations, limiting the generalizability of the findings. Multiple-country studies are expected to advance the findings, generalizability of results and expand the literature. Additionally, the operationalisation of the adopted board cultural diversity may be limited, and future studies may adopt other extensive measures to advance the literature. Further studies can also consider more extensive industry classifications to ascertain specific industry effects on the board diversity and corporate sustainability performance association. Other scholars may also consider the different elements of sustainability performance (i.e., environmental, social and governance pillars) to advance the literature, and other estimating models may also enhance the methodology and enrich the findings of this study.

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