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Investigating how board gender diversity affects environmental, social and governance performance: Evidence from the utilities sector

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ABSTRACT

This study investigates the effect of board gender diversity (BGD) on environmental, social and governance (ESG) performance. This study considers the utilities sector as it has contributed more to Agenda 2030 than the non-environmental sectors. Specifically, the sample includes 53 utility firms from 15 European Union countries. The data is extracted from the Bloomberg database from 2011 to 2021. We apply the ordinary least squares technique and find that BGD positively influences ESG performance; this effect becomes stronger in the presence of at least three female board members. This study provides implications for practitioners and stakeholders of utility firms.

1. Introduction

Literature in the contemporary world has increasingly examined board gender diversity (BGD). This is attributable to the countries' urge to firms about increasing female participation on firm boards (The Economist, 2014). Further, this increase could be potentially attributed to Agenda 2030 of the United Nations (UN), which focuses on, among others, gender equality to empower women. In response to this, countries are adopting Agenda 2030 at the global level and therefore promoting women at the top level to participate in decision-making (Yadav and Prashar, 2022). Arguably, concerning BGD, female board members foster the discussion between the board members, which improves the quality of the decision-making process. It further increases the possibility for firms to implement innovative and competitive business strategies (Adams and Funk, 2012; De Cabo et al., 2011).

Mainly, under the sustainable development goals (SDGs), Agenda 2030 focuses on environmental, social, and governance (ESG) issues. ESG is 'the consideration of environmental, social and governance factors alongside financial factors in the investment decision-making process' (MSCI, 2019). Therefore, Agenda 2030 sheds light on the necessity for firms to address ESG issues to achieve a sustainable world, which is currently a pressing research question among scholars. The changing environment at the global level has raised the need for firms to consider environmental and social issues along with their financial goals (Yadav and Prashar, 2022). Consequently, firms are considering ESG issues

owing to the dynamic environment which requires them to stay alive and keep competing (Mehmood and De Luca, 2023b; Venturelli et al., 2023; Yadav and Prashar, 2022). It leads firms to voluntarily make ESG reporting and disclose ESG information in their sustainability reports for the stakeholders to show the efforts made towards achieving Agenda 2030. For instance, scholars report that firms' SDGs communication on social media significantly affects stakeholder engagement (De Luca et al., 2022; Mehmood et al., 2023).

The good governance of firms and their sustainable behaviour mainly rely on the decision-making of board members as they hold top authority positions (Mohammadi et al., 2021; Rao and Tilt, 2016). It is argued that female directors consider non-financial outcomes with greater interest in the decision-making process than their male counterparts, who focus more on financial outcomes (Hollindale et al., 2019). Therefore, the recent decade has witnessed increased female participation in firm boards in various countries owing to gender quotas (Yadav and Prashar, 2022). Specifically, European countries, including Spain, Norway, France and Italy, have higher women presence on firm boards, as reported by the Institutional Investor Advisory Services India Limited (IIAS) (Yadav and Prashar, 2022). Similarly, European countries such as Norway, France, Italy, and Belgium have apparently enforced a quota of 40%, in the listed firms, for female representation on firm boards (The Economist, 2018).

Related studies have examined the effect of BGD and firm ESG performance in both non-financial and financial firms and in developed and

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emerging countries (see (Arayssi et al., 2020; Cucari et al., 2018; Disli et al., 2022; Husted and Sousa-Filho, 2019; Manita et al., 2018; McGuinness et al., 2017; Pareek et al., 2021; Romano et al., 2020; Shakil et al., 2020; Wasiuzzaman and Wan Mohammad, 2020)). Nevertheless, previous literature provides mixed evidence on this relationship with positive, negative and insignificant effects. Therefore, this topic requires further examination. Specifically, according to our knowledge, no previous study has examined this relationship concerning the utilities sector. Apparently, many firms in the utilities sector are acting based on Agenda 2030 regarding the SDGs owing to their sustainability reporting (PWC, 2019). Based on this, the utilities sector requires specific attention due to the existence of direct interlinkage between some of the main targets set by Agenda (2030) and the business models of the utilities sector.

We analyse how BGD affects the ESG performance of utility firms using resource dependence theory. The critical resources of female directors help firms consider the non-financial aspects more and therefore, influence ESG performance (Kyaw et al., 2017; Manita et al., 2018). We consider the utilities sector owing to its significant contribution toward Agenda 2030 (Elalfy et al., 2020). Specifically, we examine EU countries to analyse this relationship, as developed countries in Europe have considerable representation of women on corporate boards (Shakil et al., 2020). Therefore, both aspects of the significant contribution of the utilities sector in achieving Agenda 2030 and the higher presence of female board members in firms of European developed nations make EU utility firms a suitable choice for examining the relationship between BGD and ESG performance. Currently, there are 27 EU countries. However, our final sample includes 53 utility firms from 15 EU countries based on the data availability. We find that BGD positively influences ESG performance in the utilities sector. These results are consistent with resource dependence theory. The results indicate that having female directors on corporate boards benefits firms and their stakeholders. Therefore, female directors contribute more towards managing stakeholders' concerns and contribute significantly to the implementation of Agenda (2030).

Recent literature has also increasingly examined the critical mass, a suitable number of female board members so that their voice is heard by the other group of male directors in the decision-making process (Konrad et al., 2008; Torchia et al., 2011). Therefore, we further examine the critical mass, a suitable number of women for firm boards in the utilities sector. Therefore, we use critical mass theory, according to which at least three female board members should be involved in influencing board decisions (Konrad et al., 2008; Torchia et al., 2011). We find support for critical mass theory as our results reveal that the ESG performance of the utilities sector significantly improves with the presence of three or more female board members.

This study significantly contributes to the literature in three ways. First, this is the first study to consider the utilities sector to further investigate the relationship between BGD and ESG performance. Second, we provide empirical evidence regarding utility firms of EU countries using the resource dependence theory. Third, this study provides evidence for the critical mass theory about the certain threshold or 'critical mass' of female board members in utility firms and its effect on ESG performance.

This paper proceeds as follows. Section 2 presents the review of the literature and hypothesis development. Section 3 discusses the research methodology, while Section 4 provides empirical analysis and discusses the results. Section 5 further concludes the paper.

2. Review of the literature

2.1. Utilities sector

Recently, scholars have increasingly examined utilities sector owing to its growing sustainability issues (Arena et al., 2019) as it has been under inspection regarding its environmental and social effects (Frijns

et al., 2013; IEA – International Energy Agency, 2018). 'Utility companies provide 'essential services' to households and businesses in the form of water, sewerage, energy, transportation, and telecommunications' (Cave and Wright, 2021). Social purposes mainly inspire utility companies to create public value (Traxler and Greiling, 2019). Arguably, utility firms provide solutions to vital social needs such as the water and waste sectors which should ensure adequate sources of water and sustainable disposal of waste. However, to do this, utility firms use high energy, are highly pollutant and entail higher financial inputs and physical infrastructure. Therefore, it potentially makes utility firms more vulnerable to the environment (Mergoni et al., 2022). Consequently, it is relevant for utility firms to make sustainability and corporate social responsibility (CSR) a part of their corporate strategy (Arena et al., 2019).

Agenda 2030 regarding SDGs is an example of firms' non-financial practices on a mandatory basis where firms must focus on achieving sustainable targets (Pizzi et al., 2020a). Management scholars have increasingly examined the utilities sector owing to sustainability reporting (Andrews and Slater, 2002; Cormier and Gordon, 2001). Scholars highlight that utility firms practically focus on engaging with stakeholders by implementing sustainability reporting practices (Ligorio et al., 2022). Apparently, utility companies are contributing to the development of best practices based on their growing voluntary or mandatory sustainable initiatives (Argento et al., 2019). Interestingly, scholars find that utility firms are disclosing data more regarding their efforts towards Agenda 2030 of achieving SDGs than non-environmental sectors (Elalfy et al., 2020).

2.2. BGD and ESG performance

In the last decade, scholars extensively examined gender diversity mainly because of the global initiative of gender representation on firm boards to break the 'glass ceiling' (Jalan et al., 2020). Apparently, gender diversity on corporate boards results in strategic variation/-change (Samara et al., 2023). Scholars have recently begun investigating how firms contribute to SDGs (Pizzi et al., 2020b). Accordingly, the scholars focus more on the topics concerning corporate social responsibility (Pizzi et al., 2020b). The focus towards sustainability at a global level is attributed to increasing awareness regarding unsustainable models of economic development that negatively affect the environment (Rosato et al., 2021). It is argued that environmental sustainability is challenging owing to global warming (Hunjra et al., 2020; Mor et al., 2021). Therefore, limiting global warming with lower carbon emissions can result in a sustainable world. Moreover, arguably strategic change based on open innovation can help manage sustainable targets (Venturelli et al., 2022).

According to resource dependence theory, board members provide critical resources to firms (Hillman and Dalziel, 2003), including their psychological characteristics, background, competencies, and experience, which influence firm performance (Kyaw et al., 2017; Manita et al., 2018). The critical resources of board members help firms in strategic decision-making to manage stakeholders' pressure (Hillman and Dalziel, 2003; Post et al., 2015). Apparently, board members' personal and professional skills are essential to good governance practices, irrespective of whether they are men or women (Girardone et al., 2021). However, women and men directors differ in perspectives and opinions (Burgess and Tharenou, 2002). The general perception about female directors is that they pay more attention to non-financial results than men, who focus more on financial results while making decisions (Hollindale et al., 2019). Therefore, BGD is among the corporate governance mechanisms that significantly contribute to firm ESG performance (Velte, 2016).

Arguably, resource dependence theory can explain the association between BGD and firm ESG performance (Shakil et al., 2020). Women usually tend to have many shared characteristics, including sensitivity, kindness and cooperativeness and being sympathetic for others as well

as their well-being (Eagly et al., 2003). Similarly, it is argued that women are more compassionate and, therefore, engage more in strategically important matters, for instance, stakeholders' concerns (Huse et al., 2009), including environmental and social issues (Disli et al., 2022). Accordingly, these characteristics contribute to sympathetic strategic decision-making, such as ESG, which results in higher firm ESG performance (Kyaw et al., 2017). Therefore, the critical resources of female directors allow them to participate in strategic decision-making, influencing both firm stakeholders and ESG performance (Manita et al., 2018).

In the literature, scholars have examined the effect of BGD on firm ESG performance. However, the evidence on this relationship is mixed as most studies note a positive effect (Arayssi et al., 2020; Disli et al., 2022; McGuinness et al., 2017; Pareek et al., 2021; Romano et al., 2020; Shakil et al., 2020; Wasiuzzaman and Wan Mohammad, 2020) while few note a negative effect (Cucari et al., 2018; Husted and Sousa-Filho, 2019). One study reports no significant association (Manita et al., 2018). While investigating this relationship, scholars have considered both non-financial and financial firms as well as developed and emerging countries.

The presence of women on firm boards could be useful for firms with respect to ESG performance. For instance, in the context of Italian listed non-financial firms, scholars find that higher BGD increases ESG performance (Romano et al., 2020). Similar findings are also reported for the US banks (Shakil et al., 2020). Another study also notes a positive association between BGD and ESG disclosure for Indian listed non-financial companies (Pareek et al., 2021). Scholars also consider 20 emerging countries and find that BGD positively influences sustainability performance (Disli et al., 2022). Further, a related study considered listed firms of Gulf Cooperation Council countries and found that higher BGD results in higher ESG disclosure scores (Arayssi et al., 2020). Another study reports that an increase in female board members improves ESG disclosure scores in the context of Malaysian listed firms (Wasiuzzaman and Wan Mohammad, 2020). Scholars further reveal that BGD increases the CSR performance of Chinese listed firms (McGuinness et al., 2017).

In some studies, scholars report an inverse link between BGD and ESG disclosure for the listed firms in Latin American countries (Husted and Sousa-Filho, 2019). They justify the negative effect in three ways. First, they argue that this effect is negative owing to the lack of a critical mass of female board members, at least three female directors (Konrad et al., 2008; Torchia et al., 2011), in their sample firms as only 2 out of 176 firms had at least three women directors (Husted and Sousa-Filho, 2019). Second, they discuss that even in the presence of the critical mass of female board members, this effect would have been negative owing to Latin America having high levels of collectivism, a cultural setting (Hofstede, 1984). Therefore, compared with the external stakeholders, both male and female directors may prioritise the firm (Husted and Sousa-Filho, 2019). Third, the scholars discuss that this effect is negative due to the lack of women on boards in Latin American firms, as only 35% of the firms had female directors (Husted and Sousa-Filho, 2019). Another study also notes a negative effect in the context of Italian listed firms and scholars argue that this inverse effect is attributable to the trend of still moderate female involvement in the Italian firm boards (Cucari et al., 2018). Lastly, scholars also show that the influence of BGD on ESG disclosure score is insignificant in the context of US listed firms (Manita et al., 2018).

In the case of the utilities sector specifically, we do not have previous evidence for the association between BGD and ESG performance. However, based on the arguments about the greater disclosure of ESG data by utility firms than the non-environmental sectors (Elalfy et al., 2020) and the vital role of female directors in firm strategic decision-making, for instance, ESG (Kyaw et al., 2017; Manita et al., 2018), we expect that BGD can significantly influence the ESG performance of the utilities sector. Therefore, the same logic for financial and non-financial firms, mainly about the positive role of BGD in firm ESG

performance could be applied to the utilities sector. Therefore, we develop our main study hypothesis as follows.

H1. BGD positively influences the ESG performance of the utilities sector.

2.3. Critical mass of female board members and ESG performance

According to critical mass theory, size affects group interactions. In the case of a minority group, its underrepresentation becomes a 'token' owing to the influence of the majority group, which gives lower status to the minority group (Kanter, 1977). Therefore, a subgroup can have a greater influence when its size extends to a certain threshold or 'critical mass' (Kanter, 1977). A minority group with a critical mass of at least three suggestions is better considered by the majority group (Asch, 1955), mainly in the case of cohering suggestions by the minority group (Nemeth, 1986).

Recent literature has increasingly examined the critical mass of female board members on firm boards using critical mass theory. Scholars discuss that the critical mass of female board members is mostly felt with the presence of at least three female board members (Konrad et al., 2008; Torchia et al., 2011). They argue that this critical mass of women directors enables them to become a voice so that they can significantly influence the firm board regarding their ideas (Konrad et al., 2008).

In the recent literature, scholars have examined the relationship between the critical mass of female board members and ESG performance. However, their findings are inconclusive as some report favourable results (Cambrea et al., 2023; Yadav and Prashar, 2022) while others reveal an insignificant relationship between the critical mass of female board members and ESG performance (Manita et al., 2018). Regarding favourable results, scholars find that three or more female board members significantly affect ESG performance (Cambrea et al., 2023; Yadav and Prashar, 2022). Interestingly, the scholars who find no significant impact argue that it is mainly because of their sample, as only a few firms had at least three women directors on boards (Manita et al., 2018). Scholars further discuss that their sample firms did not have enough cases of critical mass, at least three women directors to check its effect on ESG disclosure (Husted and Sousa-Filho, 2019). Therefore, we contribute to this debate by evaluating the impact of the critical mass of female board members on ESG performance.

As discussed earlier, there is no previous evidence for the association between BGD and ESG performance concerning the utilities sector. Therefore, this study further contributes to the literature regarding the critical mass of women directors in the utilities sector and their influence on ESG performance. We expect that a critical mass of female board members for utility firms could influence their ESG performance with greater intensity. Therefore, we develop our second hypothesis as follows.

H2. Three or more female board members significantly influence the ESG performance of the utilities sector.

3. Research methodology

3.1. Data and sample

This study investigates the effect of BGD on the ESG performance of the utilities sector of EU countries. We consider EU countries based on the considerable representation of female board members in developed Europe countries (Shakil et al., 2020). We use panel data for analysis based on different years and firms to examine this relationship. The sampling period covers 2011 to 2021, which starts from the post global financial crisis period until the recent years based on the data availability. We consider the period of post global financial crisis as firms of several developed economies struggled due to this crisis (Mehmood and De Luca, 2023a). We analyse the large dataset of the last 11 years at the firm level, which allows us to run a thorough factual examination to

investigate the BGD and ESG performance relationship. We extract the data for all the study variables from the Bloomberg database. At the time of data collection, there were 126 listed utility firms in 22 EU countries under the utilities sector, while there were no listed firms in 5 EU countries. However, the data were not available for many firms; we consider firms having data of at least three years. Hence, our final sample comprises 53 utility firms from 15 EU countries. We use Global Industry Classification Standard (GICS) to recognise the utilities sector. Table 1 shows the sample firms belonging to each sampling country of the EU and respective industries under the utilities sector.

3.2. Study variables

Table 2 presents the study variables and their definitions. BGD and ESG performance are the main variables of interest. We evaluate BGD using the percentage of female board members (Shakil et al., 2020; Yadav and Prashar, 2022). We further use two alternative measures, including the number of female board members (Imperiale et al., 2023; Yadav and Prashar, 2022) and a dummy variable equalling one in case of at least one female board member and zero otherwise. We further test the critical mass theory concerning female presence on firm boards and create three dummy variables. The female board member dummy 1 equals one in case of one female board member and zero otherwise, the female board members dummy 2 equals one in case of two female board members and zero otherwise, and the female board members dummy 3 equals one in case of at least three female board members and zero otherwise (Manita et al., 2018; Yadav and Prashar, 2022).

We evaluate ESG performance using the ESG disclosure score under the Bloomberg database (Romano et al., 2020). Bloomberg collects the ESG data disclosed by firms from several sources, including annual reports, websites, sustainability or CSR reports, and other public sources, and by contacting the company directly (Coluccia et al., 2020). The ESG disclosure score ranges from zero to 100, where zero represents companies that did not disclose ESG data, and 100 indicates that firms disclose all the data related to ESG.

The control variables are also incorporated in the study considering the earlier ESG literature. Regarding board characteristics, we use board size, board independence (Disli et al., 2022; Imperiale et al., 2023) and CEO duality (Imperiale et al., 2023; Yadav and Prashar, 2022). Moreover, regarding firm characteristics, we use firm leverage (Arayssi et al., 2016; Disli et al., 2022; Yadav and Prashar, 2022) and firm size (Disli et al., 2022; Yadav and Prashar, 2022).

3.3. Model specification

We test the following regression equations to investigate the

Table 1
Sample of utilities sector firms with respect to countries and industries.

	Country	Utilities sector industry					Total
		Electric Utilities	Gas Utilities	Independent Power and Renewable Electricity Producers	Multi-Utilities	Water Utilities	
1	Austria	2	–	–	–	–	2
2	Belgium	1	–	–	–	–	1
3	Denmark	1	–	–	–	–	1
4	Estonia	–	–	–	–	1	1
5	Finland	1	–	–	–	–	1
6	France	1	1	2	2	–	6
7	Germany	–	–	2	2	–	4
8	Greece	1	–	1	–	–	2
9	Italy	2	3	1	4	–	10
10	Lithuania	2	1	1	–	–	4
11	Poland	4	–	–	1	–	5
12	Portugal	1	–	–	1	–	2
13	Romania	3	–	–	–	–	3
14	Spain	4	2	4	–	–	10
15	Sweden	–	–	1	–	–	1
	Total	23	7	12	10	1	53

Table 2
Study variables and their definitions.

Variable	Notation	Measure
<i>Board gender diversity</i>	BGD	
Percentage of female board members	PFBM	The number of female board members to board size (in percentage)
Number of female board members	NFBM	The total number of female board members
Female board members dummy	DFBM	A dummy variable, 1 in case of at least one female board member, 0 otherwise
<i>Critical mass of female board members</i>	CMFBM	
Female board member dummy 1	FBM1	A dummy variable, 1 in case of one female board member, 0 otherwise
Female board members dummy 2	FBM2	A dummy variable, 1 in case of two female board members, 0 otherwise
Female board members dummy 3	FBM3	A dummy variable, 1 in case of at least three female board members, 0 otherwise
<i>ESG performance</i>	ESGP	
ESG disclosure score	ESGDS	ESG disclosure score ranges from zero to a hundred, accessed from the Bloomberg database
<i>Board characteristics</i>		
Board size	BS	The total number of board members
Board independence	BI	The number of independent board members to board size (in percentage)
CEO duality	CEOD	A dummy variable equals 1 if the CEO and chairman of the board are the same, 0 otherwise
<i>Firm characteristics</i>		
Firm leverage	FL	Total debt divided by total assets
Firm size	FS	Natural log of total assets

influence of BGD on ESG performance.

$$(ESGP)_{i,t} = \beta_0 + \beta_1(BGD)_{i,t} + \beta_2(C)_{i,t} + \beta_3\Sigma(CE)_{i,t} + \beta_4\Sigma(YE)_t + \epsilon_{i,t} \quad (1)$$

$$(ESGP)_{i,t} = \beta_0 + \beta_1(CMFBM)_{i,t} + \beta_2(C)_{i,t} + \beta_3\Sigma(CE)_{i,t} + \beta_4\Sigma(YE)_t + \epsilon_{i,t} \quad (2)$$

Where C refers to control variables, CE is country effects, YE is year effects, β_0 is a constant, Σ is the summation, ϵ is the error term, i is the firm, and t is the year. Table 2 presents the study variables and their definitions.

We apply the ordinary least squares (OLS) regression as a baseline regression method for estimating the empirical models of the study. The country and year effects are incorporated. Moreover, heteroskedasticity and residuals incorporating within-firm correlation are also controlled by using robust standard errors (Petersen, 2009). Scholars argue that the endogeneity issue exists between the board variables (Adams et al., 2010; Liang et al., 2013). Therefore, in the robustness check, we use the generalised method of moments (GMM), the two-step dynamic panel

data model, to address the potential endogeneity problem (Blundell and Bond, 1998; Bond et al., 2001). The post-estimation tests are also performed, including the Sargan test for over-identification and Arellano–Bond test for autocorrelation issues.

4. Empirical analysis and discussion

Table 3 shows the descriptive statistics for the study variables regarding the full sample and subsamples. The subsamples are based on the firms with and without women on corporate boards. Therefore, a mean-comparison test is also performed between the subsamples to indicate the statistical significance of mean differences. The mean value of the ESG disclosure score is 52.29, indicating that, on average, utility firms are disclosing almost half of the data for ESG. Further, the average value of the ESG disclosure score for firms with a female presence on corporate boards is 54.42, which is relatively higher than those without female directors (40.49), with a significant difference in means. It indicates that, on average, there is a stark difference in the ESG performance of firms in the utilities sector based on the boards with and without female presence. The average value of the percentage of female board members is 23.63% for the full sample. Moreover, on average, there are 27.90% female board members in the firms with women on corporate boards. It shows that there is a considerable presence of women on the corporate boards of utility companies. Further, the average value of the number of female board members for the full sample is 2.75, whereas the mean value for the firms with women on corporate boards is 3.24. It shows that, on average, there are 3 female directors on utilities sector firms' boards.

Table 3 further shows that the mean value of board size for the full sample is 11.47; for the subsamples, firms with and without female directors, the average values are 11.93 and 8.92, respectively, with a significant difference in the means. Further, the average value of board independence for the full sample is 56.80%. Further, the mean values for subsamples, firms with and without female board members, are 58.47% and 47.54%, respectively. The difference in means for board independence is significant. In the case of CEO duality, the average value for the full sample is 0.22, and for subsamples, firms with and without female board members, the mean values are 0.24 and 0.09, respectively. The average values of firm leverage for subsamples, firms with and without women directors, are 0.35 and 0.37, respectively. The mean values of firm size for the subsamples are 23.44 and 21.84, respectively. The standard deviation values represent no extreme volatility for the study variables.

Table 4 presents the correlation matrix for the study variables. It further shows the multicollinearity diagnostic test. The correlation outcomes reveal that BGD and all the control variables are significantly linked with the ESG performance of utility companies. Moreover, the

results for the multicollinearity diagnostic test indicate no problem of multicollinearity as the variance inflation factor values are less than 5 for all the explanatory variables.

Table 5 presents the OLS regression results for the effect of BGD on firm ESG performance in the utilities sector. Columns (1)–(3) show the influence of each measure of BGD on firm ESG performance. The results indicate that each measure of BGD, including the percentage of female board members, number of female board members, and female board members dummy, positively and significantly influences the ESG disclosure score. These results indicate that BGD results in higher ESG performance of utility firms. Therefore, these results support hypothesis 1 of the study.

The results show that the presence of female board members enables utility firms to act sustainably as per Agenda 2030. The female directors engage more in strategic issues, such as stakeholders' concerns (Huse et al., 2009), including environmental and social issues (Disli et al., 2022), owing to their compassion. Further, women directors exhibit a more participative leadership style in comparison to men directors (Eagly et al., 2003), enabling comprehensive discussions among the board members, which could drive the successful management of CSR issues (Bear et al., 2010). The critical resources of women directors help firms in strategic decision-making that influences firm stakeholders and ESG performance (Manita et al., 2018). Therefore, firms are able to make sympathetic strategic decisions, for instance, ESG, owing to the presence of female directors resulting in higher ESG performance (Kyaw et al., 2017). Therefore, these results align with resource dependence theory (Shakil et al., 2020) and support extant literature (Arayssi et al., 2020; Disli et al., 2022; McGuinness et al., 2017; Pareek et al., 2021; Romano et al., 2020; Shakil et al., 2020; Wasiuzzaman and Wan Mohammad, 2020).

Our findings show that BGD plays a key role in firm ESG performance. The increasing competition in the markets and the pressures from regulators, such as UN Agenda 2030, have made it necessary for firms to consider and address stakeholders' concerns at a broader level. Thus, firms need to consider CSR and play their part in minimising ESG issues for a sustainable world. Accordingly, consistent with our findings, the EU utilities sector is acting according to Agenda (2030) as, on the one hand, it is ensuring the representation of women on corporate boards, whereas, on the other hand, the presence of female board members is helping the utilities sector to focus more on strategic decision making related to ESG issues, which ultimately increases the ESG performance of utilities firms. Therefore, utility firms are paying attention to sustainable initiatives (Argento et al., 2019) and contributing toward Agenda 2030 of achieving SDGs (Elalfy et al., 2020).

The results regarding the control variables show that larger board size and higher board independence result in higher ESG performance. Therefore, these results support resource dependence theory which

Table 3
Descriptive statistics.

Variable	Full sample N = 425		Firms with female board members N = 360		Firms without female board members N = 65		Mean Diff	t-stat
	Mean	SD	Mean	SD	Mean	SD		
ESGDS	52.2926	14.5561	54.4241	13.6258	40.4875	13.9699	13.9366***	7.5600
PFBM	23.6320	15.2998	27.8989	12.5337	0.0000	0.0000	27.8989***	17.9300
NFBM	2.7459	1.9790	3.2417	1.7360	0.0000	0.0000	3.2417***	15.0400
FBM1	0.1576	0.3648	0.1861	0.3897	0.0000	0.0000	0.1861***	3.8500
FBM2	0.1482	0.3558	0.1750	0.3805	0.0000	0.0000	0.1750***	3.7000
FBM3	0.5412	0.4989	0.6389	0.4810	0.0000	0.0000	0.6389***	10.7000
BS	11.4729	4.1703	11.9333	4.0568	8.9231	3.8863	3.0103***	5.5400
BI	56.7980	20.3325	58.4689	19.6655	47.5435	21.6062	10.9254***	4.0600
CEOD	0.2165	0.4123	0.2389	0.4270	0.0923	0.2917	0.1466***	2.6600
FL	0.3530	0.1513	0.3496	0.1543	0.3718	0.1331	-0.0222	-1.0900
FS	23.1977	1.7003	23.4424	1.4692	21.8421	2.2006	1.6003***	7.4200

Note: Mean Diff is mean differences, and their statistical significance is computed based on the mean-comparison test for the subsamples of companies with and without female board members. N refers to the total number of observations. SD is the standard deviation. *** shows statistical significance at a 1% significance level. See Table 2 for study variables and their definitions.

Table 4
Correlation matrix and multicollinearity diagnostic test.

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1 ESGDS	1											
2 PFBM	0.4596***	1										
3 NFBM	0.5259***	0.8287***	1									
4 DFBM	0.3450***	0.6571***	0.5903***	1								
5 FBMI	-0.3228***	-0.3395***	-0.3821***	0.1838***	1							
6 FBM2	-0.0761	-0.0712	-0.1574***	0.1773***	-0.1805***	1						
7 FBM3	0.5396***	0.7737***	0.8181***	0.4615***	-0.4698***	-0.4531***	1					
8 BS	0.4096***	0.0543	0.5007***	0.2601***	-0.1421***	-0.0601	0.3347***	1				
9 BI	0.2496***	0.2630***	0.1936***	0.1936***	-0.1496***	-0.0345	0.2739***	0.046	1			
10 CEOD	0.1159**	0.0337	0.1456***	0.1281***	0.0235	-0.0424	0.1056**	0.1598**	-0.0611	1		
11 FL	0.1190**	0.0278	-0.0457	-0.0529	-0.1154**	-0.0797	0.1030**	-0.0330	-0.0490	0.0365	1	
12 FS	0.5567***	0.3180***	0.4545***	0.3392***	-0.1787***	0.0044	0.3725***	0.4821***	0.1394***	0.1679***	-0.2490***	1
VIF(1)	-	1.22	-	-	-	-	-	1.35	1.09	1.05	1.10	1.63
VIF(2)	-	-	1.51	-	-	-	-	1.52	1.07	1.05	1.09	1.55
VIF(3)	-	-	-	1.18	-	-	-	1.34	1.06	1.06	1.08	1.52
VIF(4)	-	-	-	-	1.76	1.80	2.75	1.38	1.12	1.06	1.14	1.62
N	425	425	425	425	425	425	425	425	425	425	425	425

Note: VIF is the variance inflation factor. VIF(1)-(3) shows the multicollinearity diagnostic test regarding each measure of BGD on ESG performance. VIF(4) presents the multicollinearity diagnostic test with respect to the critical mass of female board members and its impact on ESG performance. N refers to the total number of observations. ***, **, and * show statistical significance at 1%, 5% and 10% significance levels, respectively. See Table 2 for study variables and their definitions.

Table 5
OLS regression results for BGD and firm ESG performance.

Variable	(1)	(2)	(3)
	ESGDS		
PFBM	0.1198*** (3.8800)	-	-
NFBM	-	0.6145** (2.5900)	-
DFBM	-	-	3.7191*** (3.3500)
BS	0.3950*** (3.1100)	0.2257* (1.8000)	0.2532** (2.0500)
BI	0.0484** (2.2500)	0.0567** (2.5600)	0.0516** (2.3200)
CEOD	-1.0914 (-1.0900)	-1.1493 (-1.1100)	-1.3963 (-1.3700)
FL	16.6860*** (4.7900)	18.7093*** (5.2900)	18.6782*** (5.6200)
FS	4.4905** (15.3400)	4.7129*** (15.7800)	4.8163*** (16.3100)
Constant	-61.1857*** (-9.0700)	-63.6227*** (-9.0000)	-67.4876*** (-9.8100)
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
N	425	425	425
R-squared	0.8325	0.8278	0.8311
F-stat	105.75***	106.55***	111.34***

Note: Column 1 to 3 shows the OLS regression results for the impact of BGD on firm ESG performance with respect to each measure of BGD. N refers to the total number of observations. Robust t-statistic values are presented in parentheses. ***, **, and * show statistical significance at 1%, 5% and 10% significance levels, respectively. See Table 2 for study variables and their definitions.

states that the critical resources of board members, including their psychological characteristics, background and experience, are helpful in strategic decision making such as ESG issues that allow firms to handle stakeholders (Hillman and Dalziel, 2003; Post et al., 2015) and therefore improves firm ESG performance. Moreover, leverage is also positively related to ESG performance, indicating that leverage helps firms achieve high ESG performance. This is attributable to the fact that debt holders monitor and discipline firms' activities, which requires them to manage ESG issues (Gani and Jermias, 2006). The results further show that firm size positively affects firm ESG performance. They show that larger firms are better able to achieve high ESG performance owing to the availability of higher resources for managing ESG issues (Gani and Jermias, 2006).

Table 6 shows the results of OLS regression with respect to the critical mass of female board members on the ESG performance of utility companies. Therefore, we created three dummy variables, including the presence of one, two, and three or more female board members. The results indicate that all these three dummy variables positively and significantly influence firm ESG performance. However, a dummy variable, the presence of at least three female directors, greatly affects firm ESG performance. These results support hypothesis 2 of the study.

These results indicate that firms with at least three female board members are better able to contribute to addressing ESG issues, which increases firm ESG performance with greater intensity. These results support the argument that the presence of female board members is mainly favourable in the case of their critical mass, the presence of at least three female board members (Konrad et al., 2008; Torchia et al., 2011). This critical mass of women board members helps them have their voices heard on the corporate boards, and therefore, their ideas are greatly respected in the decision-making process (Konrad et al., 2008). Therefore, our findings are consistent with critical mass theory (Konrad et al., 2008; Torchia et al., 2011) as our results indicate the more significant influence with respect to the presence of at least three female board members on firm ESG performance (Cambrea et al., 2023; Yadav and Prashar, 2022).

Table 7 and Table 8 present the GMM regression results for the

Table 6
OLS regression results – testing critical mass theory.

Variable	ESGDS
FBM1	2.6511* (1.9700)
FBM2	4.7259*** (3.7600)
FBM3	4.7555*** (3.6600)
BS	0.2501** (2.0000)
BI	0.0456** (2.0700)
CEOD	-1.5121 (-1.5200)
FL	17.4458*** (4.8800)
FS	4.6829*** (15.3600)
Constant	-64.8058*** (-9.2200)
Country fixed effects	Yes
Year fixed effects	Yes
N	425
R-squared	0.8327
F-stat	108.54***

Note: This table shows the OLS regression results for the critical mass of female board members on firm ESG performance. N refers to the total number of observations. Robust t-statistic values are presented in parentheses. ***, **, and * show statistical significance at 1%, 5% and 10% significance levels, respectively. See Table 2 for study variables and their definitions.

Table 7
GMM regression results for BGD and firm ESG performance.

Variable	(1) ESGDS	(2)	(3)
ESGDS _(t-1)	0.8851*** (89.7200)	0.9240*** (26.7800)	0.9442*** (74.4200)
PFBM	0.0633*** (9.4100)	-	-
NFBM	-	0.4544** (1.9700)	-
DFBM	-	-	0.6731** (2.0700)
BS	0.0635* (1.8900)	0.0052 (0.0700)	0.0106 (0.1600)
BI	0.0930*** (11.4900)	0.0600*** (5.6000)	0.0572*** (5.0300)
CEOD	-0.8607 (-1.5800)	-1.1782** (-2.1800)	-1.6621*** (-3.4000)
FL	0.4490 (0.3300)	0.9695 (1.2200)	3.1349* (1.6700)
FS	1.6494*** (7.9600)	0.5907* (1.9300)	0.7502* (1.8300)
Constant	-41.3667*** (-9.7500)	-16.2657** (-2.3900)	-20.9795** (-2.1900)
N	365	365	365
Wald chi-squared test	210,304.48***	47,411.95***	33,942.24***
Sargan test p-value	1.0000	1.0000	1.0000
AR (2) p-value	0.4696	0.5003	0.4411

Note: Column 1 to 3 shows the GMM regression results for the influence of BGD on firm ESG performance with respect to each measure of BGD. N refers to the total number of observations. t-statistic values are presented in parentheses. ***, **, and * show statistical significance at 1%, 5% and 10% significance levels, respectively. See Table 2 for study variables and their definitions.

robustness test. The GMM technique is able to address the endogeneity issue (Blundell and Bond, 1998; Bond et al., 2001) that exists between the board variables (Adams et al., 2010; Liang et al., 2013). The robustness analysis results are consistent with the main findings, which

Table 8
GMM regression results – testing critical mass theory.

Variable	ESGDS
ESGDS _(t-1)	0.8625*** (136.6900)
FBM1	0.1646 (0.3300)
FBM2	2.2006*** (7.3300)
FBM3	3.3081*** (13.5200)
BS	-0.0683 (-1.1100)
BI	0.0665*** (12.1000)
CEOD	-1.7805** (-2.2000)
FL	5.0410*** (2.9300)
FS	1.4526*** (8.8700)
Constant	-34.6020*** (-10.2600)
N	365
Wald chi-squared test	367,457.38***
Sargan test p-value	1.0000
AR (2) p-value	0.3807

Note: This table shows the GMM regression results for the critical mass of female board members on firm ESG performance. N refers to the total number of observations. t-statistic values are presented in parentheses. ***, **, and * show statistical significance at 1%, 5% and 10% significance levels, respectively. See Table 2 for study variables and their definitions.

state that BGD positively affects the ESG performance of the utilities sector, as shown in Table 7. Further, the robustness analysis results concerning the critical mass of female board members are also consistent with the main findings, which show that the presence of three or more women board members significantly and positively influences firm ESG performance, as shown in Table 8.

5. Conclusion

BGD and firms' consideration of ESG issues are currently highly debated topics among scholars owing to Agenda 2030 of SDGs. Primarily, the aim of Agenda (2030) is to attain a sustainable world, and gender diversity is part of the main goals of this agenda. Therefore, scholars have increasingly been paying attention to these topics for non-financial and financial firms to ascertain their contribution towards achieving Agenda 2030. Nevertheless, there is no prior evidence regarding the utilities sector. Utility firms have a crucial position compared with the other firms regarding their high contribution to addressing the ESG issues because there is a direct interlinkage between some of the main goals of Agenda (2030) and their business models. This is evidenced by the recent literature positing that utility firms are disclosing greater ESG information through ESG reporting in comparison to non-environmental sectors. Further, extant literature also discusses that the presence of female board members allows firms to focus more on ESG issues. Therefore, we consider these important contributions of the utilities sector and the role of female board members with respect to ESG issues and investigate how BGD influences the ESG performance of the EU utilities sector. We find that the presence of female board members in utility firms improves ESG performance, supporting resource dependence theory. Further, we test the critical mass of female board members for the utilities sector and find that firms with at least three women directors have better ESG performance, therefore supporting critical mass theory.

This study contributes both theoretically and practically. Regarding the theoretical contributions, according to our knowledge, this is the

first study to examine the relationship between BGD and ESG performance, specifically for the utilities sector, considering resource dependence theory. The rationale for focusing on the utilities sector is that it has significantly contributed toward Agenda 2030 (Elalfy et al., 2020). Further, particularly, this study considers the utilities sector of EU countries owing to the great representation of female directors on the corporate boards of developed European countries (Shakil et al., 2020). Moreover, this study also utilises critical mass theory and provides evidence regarding ‘critical mass’, a certain threshold of female directors and its effect on the ESG performance of utility firms.

This study offers practical implications for practitioners and stakeholders of the utilities sector. Based on the findings, we suggest utility firms should appreciate women on their corporate boards to address ESG issues. Gender diverse corporate boards have distinct psychological characteristics, backgrounds, and enriched competencies and experience. Therefore, gender diverse boards can pay better attention to ESG issues and handle stakeholders’ concerns. Specifically, female directors consider more non-financial outcomes than male directors because they are more compassionate. Therefore, their sympathetic nature enables them to embrace stakeholders’ pressures and address their concerns. Thus, the presence of female board members is vital for utility firms regarding contributing to a sustainable world. We further suggest that utility firms should have at least three female board members, as this appears to help firms to manage more ESG issues, and the ESG performance improves with a higher magnitude. The need to have such a threshold of female board members is because their male counterparts prefer their ideas and opinions, which could result in effective strategic decision-making. Hence, it could allow utility firms to address stakeholders’ concerns related to ESG issues at a broader level and improve ESG performance.

This study also offers social implications as Agenda 2030 mainly focuses on several societal and environmental issues and raises their importance for a sustainable world. Therefore, based on the findings, we note that utility firms are considering ESG issues and contributing to CSR. Specifically, utility firms are acting upon sustainable targets as per the UN Agenda 2030.

Despite its significant contributions, this study has some limitations. Although this is the first study regarding the utilities sector that examines the effect of BGD on ESG performance, the sample size could be considered small based on the EU countries owing to the non-availability of data for many firms. Therefore, future studies could consider all the European countries to further contribute to the literature on the investigated relationship for the utilities sector. Further, other important variables, such as the CSR committee, are not included in the empirical model as the data were not available for this variable in the database for the sampling period. Hence, future studies could consider the CSR committee variable, for instance, how the presence of a CSR committee contributes to the ESG performance of utility firms, to highlight its relevance for utility firms. Moreover, further studies could better control for contextual effects by incorporating different macro-economic variables. Furthermore, future studies could also conduct a comparative analysis between the countries and regions to ascertain whether the conclusions for the examined relationship regarding the utilities sector differ.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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