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Revisiting the Impact of Board Gender Diversity on ESG Disclosure in the US

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Abstract: The objective of this study is to examine the effect of board gender diversity on the disclosures of environmental, social, and governance (ESG) of Fortune 500 non-financial firms in the United States of America. This study utilized a sample of US non-financial firms between 2013-2022 and generated unbalanced panel data for 343 non-financial firms from the Bloomberg database comprising 2,145 firm-year observations. The results indicate that board gender diversity is positively associated with ESG disclosure. Besides, the board gender diversity also has a significant positive relationship with individual components of ESG disclosure: environmental, social, and governance disclosures. This study also explores the impact of a critical mass of women on boards on the ESG disclosure score and its three components individually. In addition, the findings suggest that the critical mass of female board members favorably impacts the environmental and governance components of the ESG score. However, their contribution to the social score is limited. This study contributes to the limited but expanding literature on the relationship between corporate governance and ESG disclosure and encourages firms in developing nations to appoint more women to the boards.

Keywords: board gender diversity, CEO duality, critical mass, ESG disclosure, independent directors, Stakeholder theory.

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INTRODUCTION

Environmental, social, and governance (ESG) practices are a new measure of corporate responsibility that reflects a commitment to non-financial aims (Arayssi et al., 2020). The ESG disclosure score is an ethical assessment that tries to validate a company's CSR quality or its non-financial performance in three pillars: environment, governance, and social (Birindelli et al., 2018). Firms have realized that ESG disclosure is essential to convey their stakeholders' positive reputation and brand image in addressing environmental challenges (Tarmuji et al., 2016). According to Tarmuji et al. (2016), the trends in disclosing ESG practices in the global data stream have exponentially increased over time as an effort by businesses to stay sustainable. In most countries, non-financial information must be disclosed in corporate reports (Umoren et al., 2015). Better ESG practices may be achieved by combining financial and ESG data into a single integrated report that the firm and its stakeholders can use to make better decisions (Umoren et al, 2015). Hence, there exist various regulations around the globe

that mandate or motivate firms to make ESG disclosure, particularly in developed economies. For example, the European Union, the United Nations, and the Organization for Economic Cooperation and Development have issued regulations and recommendations for disclosing non-financial information that should include ESG issues (Wasiuzzaman & Wan Mohammad, 2020). This study examines the effect of board gender diversity on ESG disclosure and its individual components in the U.S.

This study is based on stakeholder theory. The stakeholder theory states that companies have the desire to participate in generating a profit but also that businesses have a range of stakeholders at numerous levels that allow them to operate businesses successfully. Suppliers, employees, investors, customers, and communities play a part in a company's ability to stay competitive in the marketplace (Freeman, 1994). Specifically, the study investigates how board gender diversity influences ESG, environmental, social, and governance disclosures. Thus, the study's research question is: "Is there any significant positive association between gender diversity and ESG disclosure and its individual components (environmental, social, and governance)?" Therefore, four hypotheses are proposed (H1a, H1b, H1c, and H1d).

As ESG practices are crucial for a firm's long-term value and performance, an independent, diverse, and diligent board improves ESG practices and transparency (Kamaludin et al., 2022). ESG has been found to have a positive relationship with firm's operational and market performances (Lunawat & Lunawat, 2022). A 10-year study analyzed by Arayssi et al. (2020) of publicly traded corporations demonstrates that more board independence and female board involvement aid in transferring a company's favorable image through enhancing social responsibility. Manita et al. (2018) demonstrate that corporate governance influences the sustainability disclosure of U.S. and European corporations. In the view of Mallin et al. (2013), corporate boards of directors are expected to include social and environmental obligations in their basic decision-making processes, resulting in firms' long-term value. Hence, regulators should ensure that boards of directors have sustainability expertise and can consider the ESG priorities of their constituents (Birindelli et al., 2018). According to a recent study conducted on the Indian region by Sood et al. (2023), the governance factor was the most influential of the three ESG factors on the investment decisions of individual stockholders, followed by the environmental parameter. The social factor was found to be the least influential.

Moreover, gender diversity is one of the critical components of board diversity that can improve disclosure. This is because boards with gender diversity devote more time to monitoring (Adams & Ferreira, 2009). Female directors are also more likely to serve on monitoring-related committees than male directors, all other factors being equal (Adams & Ferreira, 2009). A study by Giannarakis (2014) revealed that the presence of women on the board improves the level of CSR disclosure. Kumar & Ravi (2023) indicate that the perceptions of women as risk-averse, ethical, and conflict-averse may not remain valid for women in executive positions. Thus, the influence of women in the decision-making of top-management teams is still ambiguous. Empirically, several studies examined the impact of board gender diversity on ESG disclosure (Cucari et al., 2018; Husted & de Sousa-Filho, 2019; Lavin & Montecinos-Pearce, 2021; Manita et al., 2018). However, these studies mainly focused on the effects of gender diversity on ESG disclosure without examining how it influences its individual components: environmental, social, and governance. Besides, few studies were conducted in countries other than the USA (Gurol & Lagasio, 2023; Harjoto & Rossi, 2019; Kamaludin et al., 2022; de Masi et al., 2021; Tamimi & Sebastianelli, 2017; Wasiuzzaman & Wan Mohammad, 2020).

This study differs from previous studies because the study employs individual components of ESG disclosure in the U.S. Specifically, the study investigates how board gender diversity influences ESG, environmental, social, and governance disclosures. This study contributes to the literature in three ways. First, the study becomes one of the few studies to examine how gender diversity affects environmental, social, and governance disclosures.

Second, the study can help policymakers and regulators to provide effective policies and regulations that could motivate firms to improve the disclosure of the components. Third, the findings of this study will be helpful to the management and board of directors of U.S. firms in improving the disclosure of non-financial information to attract and retain investors. Also, according to Kanter's theory, women's contribution becomes apparent when the critical mass of three women on boards is attained, after which women's opinions are heard, and their effect becomes noticeable (Kanter, 1987). As per de Masi et al. (2021), the critical mass of women on boards positively impacts every element of ESG when the maximum level of women's involvement is attained for the governance score. Using the critical mass theory, this study aims to investigate the effect of women on boards on ESG disclosure. In particular, the study will examine the influence of the critical mass of women on boards on individual ESG components.

The rest of the paper is divided into four sections. Section 2 presents a review of the literature and research hypotheses. Section 3 presents the methodology, which considers the issue between board gender diversity and ESG disclosure, a description of the sample, a definition of the variables, and the analyses used. Section 4 presents the results and discussion. Finally, concluding remarks are given in Section 5.

METHODS

Data and Sample

This research focused on U.S. Fortune 500 firms to test the developed hypothesis. The data were obtained from the Bloomberg Database for 2013–2022. This study considers only non-financial firms whose financial and non-financial data are available on the Bloomberg database. It is because financial institutions, like banks and insurance companies, have different disclosure requirements. Besides, companies with missing data were eliminated from the sample. After removing missing values, a final sample of 343 firms with a total of 2,145 firm-year observations was obtained. The sample is presented in Table 1.

Table 1 Firm-wise Classification of Each Sector

No	Name of sector	No. of firms in each sector
1	Communication	15
2	Consumer Discretionary	69
3	Consumer Staples	34
4	Energy	25
5	Health Care	39
6	Industrial	68
7	Information Technology	36
8	Materials	27
9	Real Estates	05
10	Utilities	25
	Total	343

This study's final sample covers ten non-financial sectors segregated by the Global Industry Classification Standard (GICS) classification.

Variables of the Study

This study examined the effect of board gender diversity on ESG, environmental, social, and governance disclosures. The dependent variables are ESG, environmental, social, and governance disclosures. The Independent variables are board gender diversity (BGD), critical mass (CMASS), female CEO (FEMCEO), and female Chair (FEMCHAIR), whereas control variables include CEO duality (CEODUAL), board size (BSIZE), firm size (FSIZE), and independent directors (INDEPDIR). The descriptions of variables are presented in Table 2.

Table 2 Description of Variables

Variables	Abbreviation	Measure	References
Dependent variables			
Environment, Social, and Governance Disclosure	ESGD	The ESG Disclosure score from Blomberg Terminal.	(Giannarakis, 2014)
Environmental	ENV	Environmental disclosure score from Bloomberg.	(Wasiuzzaman & Wan Mohammad, 2020; Tarmuji et al., 2016)
Social	SOC	Social disclosure score from Bloomberg.	(Wasiuzzaman & Wan Mohammad, 2020; Harjoto & Rossi, 2019)
Governance	GOV	Governance disclosure score from Bloomberg.	(Wasiuzzaman & Wan Mohammad, 2020; Harjoto & Rossi, 2019; Tarmuji et al., 2016)
Independent variable			
Board gender diversity	BGD	Percentage of women directors on the company's Board.	(Adams & Ferreira, 2009)
Critical Mass	CMASS	It's a dummy variable that assumes the value 1 if a board has at least 3 women; 0 otherwise. It measures the critical mass.	(de Masi et al., 2021; Wasiuzzaman & Wan Mohammad, 2020)
Female CEO	FEMCEO	Dummy variable that assumes the value 1 if the board has Female CEO, otherwise; 0.	(Bennouri et al., 2018; Aabo et al., 2022; Kumar & Ravi, 2023)
Female Chair	FEMCHAIR	Dummy variable that assumes the value 1 if the board has female chair, otherwise; 0.	(Eberthardt-Toth, 2017; Bennouri et al., 2018)
Control variables			
CEO Duality	CEODUALITY	Dummy variable if CEO of firm is board of director as well assumes 1, otherwise; 0.	(Lagasio & Cucari, 2019)
Board Size	BSIZE	Number of directors on the company's board.	(de Masi et al., 2021; Mashudi et al., 2021; Tamimi & Sebastianelli, 2017)
Firm Size	FSIZE	Log of total revenue	(Sharma et al., 2020; Birindelli et al., 2018)
Independent Director	INDEPDIR	Number of Independent directors on company's board.	(de Masi et al., 2021; Mashudi et al., 2021)

Econometric Models

In order to analyze the impact of board gender diversity on the ESG and its individual component disclosures following equations are employed in this study.

$$\text{ESG Disc}_{it} = \beta_o + \beta_1 BGD_{it} + \beta_2 CMASS_{it} + \beta_3 FEMCEO_{it} + \beta_4 FEMCHAIR_{it} + \beta_5 CEODUALITY_{it} + \beta_6 BSIZE_{it} + \beta_7 FSIZE_{it} + \beta_8 INDEPDIR_{it} + \mu_{it} \quad (1)$$

$$\text{ENV Disc}_{it} = \beta_o + \beta_1 BGD_{it} + \beta_2 CMASS_{it} + \beta_3 FEMCEO_{it} + \beta_4 FEMCHAIR_{it} + \beta_5 CEODUALITY_{it} + \beta_6 BSIZE_{it} + \beta_7 FSIZE_{it} + \beta_8 INDEPDIR_{it} + \mu_{it} \quad (2)$$

$$\text{SOC Disc}_{it} = \beta_{ito} + \beta_{it1} BGD_{it} + \beta_{it2} CMASS_{it} + \beta_{it3} FEMCEO_{it} + \beta_4 FEMCHAIR_{it} + \beta_5 CEODUALITY_{it} + \beta_6 BSIZE_{it} + \beta_7 FSIZE_{it} + \beta_8 INDEPDIR_{it} + \mu_{it} \quad (3)$$

$$\text{GOV Disc}_{it} = \beta_o + \beta_1 BGD_{it} + \beta_2 CMASS_{it} + \beta_3 FEMCEO_{it} + \beta_4 FEMCHAIR_{it} + \beta_5 CEODUALITY_{it} + \beta_6 BSIZE_{it} + \beta_7 FSIZE_{it} + \beta_8 INDEPDIR_{it} + \mu_{it} \quad (4)$$

Where dependent variables for each individual company are ESGD (the ESG disclosure score), GOV (the governance disclosure score), ENV (the environmental disclosure score), and SOC (the social disclosure score), at time t, the subscript "it" refers to the company i. The independent variables are BGD, CMASS, FEMCEO, and FEMCHAIR, whereas the control variables are CEODUAL, BSIZE, FSIZE, and INDEPDIR. The Bloomberg terminal is the data source to extract all variable values.

RESULTS AND DISCUSSION

Descriptive Statistics

Table 3 presents descriptive data for the ESG, environmental, social, and governance disclosure factors utilized in this research. Control variables include CEO Duality (CEODUAL), Board Size (BSIZE), Firm Size (FSIZE), and independent directors (INDEPDIR).

The descriptive statistics indicate that the average ESG disclosure score among the Fortune 500 firms in the United States is 37.628. The lowest ESG score is 11.98, while the highest is 77.18. GOV has the highest average score among the three individual ESG components, with a mean of 60.710 (minimum value = 32.14, maximum value = 85.71). According to Crifo & Forget (2013), good governance has the largest influence on investors' decision-making processes; thus, firms focus more on governance reporting.

The average percentage of gender diversity on the board is 21.87%, with the lowest and highest proportions of 0% and 57.14%, respectively. It illustrates that some companies have no female directors on their boards, while others have as many as 57.14%. CMASS, FEMCEO, FEMCHAIR, and CEODUAL are dichotomous variables with mean values of 38.70%, 0.56%, 0.48%, and 51.20%, respectively. Average BSIZE is 11.02, FSIZE is 3.86, and INDEPDIR is 84.14.

Table 3 Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ESGD	2145	37.628	14.129	11.98	77.18
ENV	2145	29.238	18.795	0.78	80.62
SOC	2145	33.627	14.832	3.13	79.69
GOV	2145	60.710	8.066	32.14	85.71
BGD	2145	21.875	9.621	0	57.14
CMASS	2145	0.979	0.145	0	1
FEMCEO	2145	0.056	0.231	0	1
FEMCHAIR	2145	0.048	0.215	0	1
CEODUALITY	2145	0.510	0.500	0	1
BSIZE	2145	11.028	1.972	5	18
FSZE	2145	3.875	0.986	1.18	8.2
INDEPDIR	2145	84.14	9.641	16.67	100

Correlation Matrix

Table 4 presents the pairwise correlation coefficients, significance, and variance inflation factors (VIF) for each variable. Strong correlations are observed between ESG and its components. This is not a problem because the study does not intend to establish the relationship between ESG and its components. Besides, Table 4 shows that the correlation coefficients of the relationship between the independent variable (board gender diversity) and the dependent variables (ESG, environmental, social, and governance disclosures) are not high. These results suggest the absence of serious multicollinearity. This is justified by the multicollinearity results in Table 4, which vary from 1.10 to 2.92. Therefore, multicollinearity is tolerable because none exceeds 5 (Hair et al., 2010).

Regression Results

Table 5 illustrates the regression results for the four models designed to evaluate the relationship between board gender diversity (BGD) and ESG disclosure and its individual components (Environmental (ENV), Social (SOC), and Governance (GOV)) of U.S. Fortune 500 companies using multiple regression heteroskedastic panels with corrected standard errors (HPCSE).

A series of tests are performed to choose the most suitable pooled OLS, fixed effect, and random effect regression for each model. Each model's Hausman test result shows significance at 1%. Thus, this study utilizes a Fixed-effect panel regression rather than random effect and pooled OLS estimators. Each model is also tested for group-wise heteroskedasticity using a modified Wald test. Each model's outcome is 1% significant. Analyses use heteroskedastic panels corrected standard errors (HPCSE).

Table 4 Correlation Coefficients and VIF

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	VIF
(1) ESGD	1.000												
(2) ENV	0.975	1.000											2.92
	(0.000)												
(3) SOC	0.844	0.726	1.000										2.32
	(0.000)	(0.000)											
(4) GOV	0.786	0.705	0.650	1.000									2.22
	(0.000)	(0.000)	(0.000)										
(5) BGD	0.275	0.260	0.227	0.226	1.000								1.29
	(0.000)	(0.000)	(0.000)	(0.000)									
(6) CMASS	0.164	0.162	0.120	0.141	0.337	1.000							1.15
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)								
(7) FEMCEO	0.078	0.069	0.067	0.063	0.219	0.036	1.000						1.44
	(0.000)	(0.001)	(0.002)	(0.004)	(0.000)	(0.094)							
(8) FEMCHAIR	0.050	0.043	0.061	0.036	0.140	0.033	0.528	1.000					1.41
	(0.020)	(0.049)	(0.005)	(0.096)	(0.000)	(0.122)	(0.000)						
(9) CEODUALITY	0.146	0.163	0.079	0.121	0.078	0.022	0.005	0.013	1.000				1.10
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.302)	(0.810)	(0.552)					
(10) BSIZE	0.359	0.352	0.276	0.320	0.085	0.107	0.064	0.073	0.109	1.000			1.17
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.001)	(0.000)				
(11) FSIZE	-0.257	-0.271	-0.180	-0.183	0.061	-0.052	0.003	0.078	0.041	-0.100	1.000		1.12
	(0.000)	(0.000)	(0.000)	(0.000)	(0.005)	(0.017)	(0.890)	(0.000)	(0.059)	(0.000)			
(12) INDEPDIR	0.311	0.302	0.252	0.299	0.201	0.066	0.049	0.073	0.270	0.170	-0.012	1.000	1.21
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.023)	(0.001)	(0.000)	(0.000)	(0.576)		

Table 5 Multiple Regression Results Using Heteroskedastic Panels Corrected Standards Errors (HPCSE)

	Model 1		**Model 2**		**Model 3**		**Model 4**	
EV	DV= ESGD		DV= ENV		DV= SOC		DV= GOV	
	Coeff.	**p-value**	**Coeff.**	**p-value**	**Coeff.**	**p-value**	**Coeff.**	**p-value**
BGD	0.3052	0.000***	0.3802	0.000***	0.2712	0.000***	0.1319	0.000***
CMASS	3.6509	0.031**	5.2975	0.022***	1.7634	0.360	2.1511	0.020***
FEMCEO	0.1649	0.900	-0.0946	0.957	-0.41763	0.797	0.2556	0.751
FEMCHAIR	0.1205	0.934	0.0364	0.985	1.6810	0.366	-0.4577	0.583
CEODUALITY	1.5194	0.005***	2.8671	0.000***	0.0362	0.953	0.4803	0.142
BSIZE	1.9528	0.000***	2.5211	0.000***	1.5860	0.000***	1.0092	0.000***
FSIZE	-3.4416	0.000***	-4.8565	0.000***	-2.5367	0.000***	-1.3415	0.000***
INDPDIR	0.2976	0.000***	0.3739	0.000***	0.2709	0.000***	0.1787	0.000***
CONS	-6.6581	0.041**	-26.1697	0.000***	-4.5631	0.222	34.5076	0.000***
Prob>chi2		0.0000***		0.0000***		0.0000***		0.0000***
Wald chi2		1079.37		1060.66		507.83		719.26
R2		0.2942		0.2896		0.1762		0.2177
Hausman's test	203.81(p=0.0000)***		179.24(p=0.0000)***		200.17 (p=0.0000)***		150.96 (p=0.0000)*	
Hetero. Test	1.7e+30 (p=0.0000) ***		8.6e+31 (p=0.0000)***		8.8e+06(p=0.0000)***		1.9e+07(p=0.0000)***	

Notes: *p < 0.10; **p < 0.05; ***p < 0.01 DV means dependent variable
EV means explanatory variables (independent and control)
Source: Authors Computation Using Stata Version 14

Robustness Check using Lagged Governance Variables

To check the robustness, this study employed GLS with lagged governance variables (Birindelli et al., 2018; Manita et al., 2018). Also, the GLS results may suffer endogeneity problems. According to Zaid et al. (2020), using statistical models such as pooled OLS may provide biased findings since this estimator cannot account for the possibility of endogeneity. Earlier research emphasizes that the link between the board of directors' factors and firms' disclosure may encounter an endogeneity issue because of the homogeneity or omission of variables (Ben-Amar et al., 2017; Dwekat et al., 2022; Katmon et al., 2019). Consequently, the study estimates the proposed models by regressing the lagged governance variables on the dependent variables.

Table 6 presents the multiple regression results using heteroskedastic panels corrected standard errors (HPCSE) after lagging the governance variables. The findings in Table 6 show that the significant associations are maintained, indicating that the likelihood of reverse causation has been minimized. The results of Hausman's test are significant for all models; thus, the study selected the Fixed-effect regression technique instead of the random-effect technique. Besides, the model has heteroskedastic issues; thus, the study employed heteroskedastic panels corrected standard errors for the analysis. Table 6 indicates that board gender diversity is statistically significant and positively significant with ESGD (Model 5), ENV (Model 6), SOC (Model 7), and GOV (Model 8). These results correspond with the results presented in Table 6.

Table 6 Multiple Regression Results Using One-year Lagged governance variables

	Model 5		**Model 6**		**Model 7**		**Model 8**	
EV	DV= ESGD		DV= ENV		DV= SOC		DV= GOV	
	Coeff.	**p-value**	**Coeff.**	**p-value**	**Coeff.**	**p-value**	**Coeff.**	**p-value**
BGD	0.2683	0.000***	0.3284	0.000***	0.2566	0.000***	0.1042	0.000***
CMASS	3.3189	0.059	5.6449	0.019***	-0.0102	0.996	1.5994	0.097
FEMCEO	0.4068	0.777	0.3223	0.867	-1.0413	0.568	1.0721	0.238
FEMCHAIR	-0.1170	0.941	-0.5009	0.813	1.7306	0.401	-0.2905	0.754
CEODUALITY	1.5119	0.010**	2.7610	0.000***	-0.0509	0.939	0.7748	0.032**
BSIZE	1.9237	0.000***	2.4716	0.000***	1.5786	0.000***	1.0279	0.000***
FSIZE	-3.3752	0.000***	-4.7118	0.000***	-2.5641	0.000***	-1.3593	0.000***
INDPDIR	0.3028	0.000***	0.3872	0.000***	0.2687	0.000***	0.1828	0.000***
CONS	-4.8098	0.172	-25.1891	0.000***	-0.8642	0.827	35.5046	0.000***
Prob>chi2		0.0000***		0.0000***		0.0000***		0.0000***
Wald chi2		847.69		822.51		424.51		573.96
R2		0.2861		0.2813		0.1722		0.2163
Hausman's test	143.34 (p=0.0000)***		118.32 (p=0.0000)***		76.83 (p=0.0000)***		83.46 (p=0.0000)***	
Hetero. Test	4.6e+33 (p=0.0000) ***		2.7e+34 (p=0.0000)***		1.1e+36 (p=0.0000)***		5.9e+34 (p=0.0000)***	

Notes: *p <0.10; **p <0.05; ***p <0.01 DV means dependent variable
EV means explanatory variables (independent and control)
Source: Authors Computation Using Stata Version 14

Model 1 examines the association between board gender diversity (BGD) and ESG disclosure. The Wald chi2 (1079.37) and p-value (0.0000) suggest that the model is statistically significant at the 1% level, indicating that the model is fit. R2 shows that the BGD and control variables in the model account for 29.42% of the variance in the ESGD score. The regression outcome indicates a strong positive correlation between BGD and ESGD (Coeff = 0.3052, p-value = 0.000). Consequently, the result supports the proposed hypothesis (H1) that there is a significant positive association between gender diversity and ESG disclosure. The result is in line with the findings of most of the prior research, which shows a significant positive correlation between board gender diversity and firm ESG reporting (Adams & Ferreira, 2009; Gurol & Lagasio, 2023; Kamaludin et al., 2022; Manita et al., 2018; de Masi et al., 2021; Mashudi et al., 2021; Wasiuzzaman & Wan Mohammad, 2020). Contrary to the studies indicating a strong negative link between board gender diversity and ESG disclosure of enterprises (Dienes & Velte, 2016; Ismail & Latiff, 2019; Shahbaz et al., 2020). Also, critical mass (CMASS) and ESG disclosure (ESGD) show statistically significant results with ESGD (Coeff = 3.6509, P = 0.031), which are in line with the finding of de Masi et al. (2021). In contrast, FEMCEO and FEMCHAIR are positive but statistically insignificant. At the same time, Control variables CEODUAL, BSIZE, FSIZE, and INDEPDIR had a significant positive correlation with ESGD at 1%.

Model 2 evaluates the influence of board gender diversity (BGD) on environmental disclosure (ENV) of Fortune 500 companies in the United States. The findings indicate that BGD has a significant positive relationship with ENV (Coeff = 0.3802, p-value = 0.000). Therefore, the proposed hypothesis (H2) is accepted: a significant positive association exists between gender diversity and environmental disclosure. The findings validate previous research demonstrating that board gender diversity (BGD) improves environmental disclosure by corporations. Critical mass (CMASS) and environmental (ENV) shows statistically significant results (Coeff = 5.2975, p-value = 0.022), which validates the findings of (de Masi et al., 2021). In comparison, FEMCEO and FEMCHAIR have a positive but statistically insignificant relationship with ENV. Regarding the control variables, CEODUAL, BSIZE, FSIZE, and INDEPDIR are significant at the 1% level.

Model 3 examines the relationship between board gender diversity (BGD) and social disclosure (SOC). The analysis shows a significant positive association between BGD and SOC (Coeff = 0.2717, p-value = 0.000). Thus, the proposed hypothesis (H3) is accepted; that there is a significant positive association between gender diversity and social disclosure. Regarding critical mass (CMASS) and social disclosure (SOC), the results are positive but insignificant (Coeff = 1.7634, p-value = 0.360). This result slightly differs from the study by de Masi et al. (2021), documenting positive and significant results. Also, FEMCEO and FEMCHAIR are insignificant. The control variables BSIZE, FSIZE, and INDPEDIR showed a significant level of 1%, except CEODUAL. CEO duality, one of the corporate governance attributes (Laskar et al., 2022), describes a situation where the CEO works as the board's director. However, in this study, CEO duality shows insignificant results, in line with the finding of Lagasio & Cucari (2019).

Model 4 analyzes the association between board gender diversity and governance transparency (GOV). There is a significant positive relationship between board gender diversity BGD and GOV (Coeff = 0.1319, p-value = 0.000). Also, Critical mass (CMASS) and Governance (GOV) show statistically significant results (Coeff = 2.1511, p-value = 0.020), which supports the findings of de Masi et al. (2021). Therefore, the proposed hypothesis (H4) is supported, indicating a significant positive association between gender diversity and governance disclosure. The results support the findings of some studies (de Masi et al., 2021; Wasiuzzaman & Wan Mohammad, 2020). However, FEMCEO and FEMCHAIR show insignificant results. The association between the control variables BSIZE, FSIZE, and INDEPDIR is significant at 1%. In contrast, CEODUAL shows a positive but insignificant association with GOV disclosure. This CEODUAL result aligns with the finding of Lagasio & Cucari (2019).

Thus, the regression findings suggest that gender diversity on corporate boards positively impacts ESG disclosure ratings. In line with the prior findings (Wasiuzzaman & Wan Mohammad, 2020), higher female board members enhance ESG reporting transparency. The result also confirms Bear's et al. (2010) conclusion that more women on boards improve non-financial reporting. Furthermore, this study's results indicate that gender diversity and ESG (Environmental, Social, and Governance) disclosure can significantly impact communities, government, and the environment. For the community, board gender diversity brings a broader range of perspectives, experiences, and skills to decision-making processes. This diversity can lead to more inclusive and equitable outcomes for communities. It can help address issues such as gender inequality, discrimination, and social injustice.

Furthermore, board gender diversity and ESG disclosure can influence government policies. Companies with diverse boards and transparent ESG practices can be role models and advocate for policies promoting sustainability, social responsibility, and gender equality. Also, ESG disclosure encourages companies to disclose their environmental impact, resource consumption, and climate change strategies. This transparency helps identify environmental risks and opportunities, enabling companies to implement sustainable practices, reduce

emissions, and promote conservation efforts. Overall, board gender diversity and ESG disclosure promote sustainable, responsible, and inclusive business practices. They can positively impact communities by addressing social issues, influencing government policies, and promoting environmental stewardship.

CONCLUSION

The study aims to examine how board gender diversity affects ESG disclosure (and its individual components) employing a dataset from 2013-2022 of 343 non-financial US-listed firms. ESG components have different total firm-year observations. Overall, results show that more women on Board in U.S. firms improve ESG disclosure and its individual components disclosures. Furthermore, this research indicates that achieving a critical mass of female directors, defined as at least three women on boards, improves ESG disclosure. Specifically, the critical mass of women on boards has a beneficial impact on the environmental and governance element of ESG; however, the minimum level of women's involvement is attained for the social score. This research adds to the existing literature on ESG disclosure and board gender diversity in global markets. However, this study also has a few limitations. Firstly, the study is limited to the sample of Fortune 500 non-financial firms across ten sectors in the US. Therefore, future research should consider the rest of the companies in the country. Secondly, this study only uses Bloomberg as a secondary data collection source. Thus, future research can be done by collecting primary data samples and different regions. Thirdly, this study has not covered all governance variables. Thus, future studies should consider other corporate governance attributes of the ESG and its individual components disclosures. Finally, the study is restricted to the US. Thus, future research may consider a cross-country study.

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