The Moderating Effect of Board Characteristics on the Relationship between ESG Disclosure and Corporate Financial Performance: An Empirical Study

By

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Abstract

Purpose – This paper aims to investigate the effect of environmental, social and governance disclosure (ESGD) on firm's financial performance further to exploring moderating effect of board characteristics on this relationship.

Design/methodology– The study uses s data for a sample of 56 non-financial listed companies with a total of 368 firm-year observations during 2017-2022. The data were analyzed using descriptive statistics, Correlation Matrix and panel data regressions such as GLS Fixed effect and pooled OLS. Robustness tests such as multicollinearity, heteroscedasticity and normality test were conducted.

Findings - The results provided that firms with higher ESGD scores have a higher financial performance as measured by ROA and ROE, However, a curvilinear relationship exists between ESGD and ROOA, indicating the existence of an optimal level of ESGD to maximize ROOA. In addition, board size has a positive moderating effect on the association between ESGD and financial performance measured by ROA and ROE; however, board independence has a significant moderating effect on the association between ESGD and financial performance measured by ROE only

Research implications – The findings provide feedback to regulators in developing countries, more specifically, the Egyptian regulators, on the benefits of the introduction of Standard & Poor's (S&P)/EGX ESG index. This study recommends that companies in Egypt should establish committees on ESG activities as a strategic component of the CG strategy.

Originality/ value – This study sheds light on rare prior studies exploring the moderating effect of board size and independence on the relationship between ESGD and financial performance

Keywords ESG disclosure, Sustainability, Financial performance, Board size

1. **Introduction**

In the current global sustainability era, corporate environmental and social responsibility have become fundamental for business growth and survival and this was accompanied with a lack of firms' non-financial disclosure, such as environmental, social and governance (ESG) information and practice (Li et al., 2018). Therefore, there is a growing demand for improving business reporting that resulted in the current popularity of sustainability reporting (Uyar, 2017) to demonstrate companies' sustainability performance and to prove that they are relatively good sustainability performers.

According to the arguments of stakeholder and agency theories, firms have to adopt a more sustainable and long-term value view, as stakeholders are concerned about a company's ESG factors to know where the firm invests and how the firm conducts business (Eccles et al., 2014; Atan et al., 2018). For instance, the environmental concerns of stakeholders might be related to natural environment protection, climate change and environmental impacts arising from a business operation.

Moreover, social factors, which are important to stakeholders, could be human rights, equality, diversity in the workplace and contribution to society. Further, concerns related to governance issues are ownership structure, board independence, minority shareholders' rights, transparency and disclosure quality. Investors may have a preference for products that consider and reflect the relationship between their investments and ESG as challenging (Li et al., 2018). Further to this, by 2030, all firms are expected to disclose information related to their environmental and social effect according to the United Nations Sustainable Stock Exchange Initiative (Sustainable Stock Exchanges [SSE], 2015).

As a result, with the growth of social and environmental concerns, it is no longer enough for companies to perform towards society or environment in isolation. Comprehensive sustainability strategies are expected from companies and to disclose efforts and actions being taken in relation to sustainability issues and, consequently, trust would be created between stakeholders and the company .These information transparencies would satisfy the requirements of different stakeholders.

Accordingly, it can be argued that companies would gain a lot of benefits from the practice of corporate sustainability. For instance, the company will get a lot of support from many stakeholders, get better treatment from the government, get legitimacy from the community, get good news from the media, reduce cost through efficient utilization of resources, attracts ethical investment, and, of course, lower the company's business risk, thereby improving firms' performance. However, because sustainability reporting is voluntary in many countries, ESG has received attention from both academics and practitioners to determine whether companies are indeed acting in good faith to acquire their improved corporate public image.

Based on the above, corporate responsibility reporting has become a standard practice for majority of companies around the world. If corporations fail to respond proactively in the area of sustainability, they may suffer a loss of business, legitimacy, and profit due to fines and penalties and may even fail to exist.

In addition, as the decision on sustainability depends on how the company is governed, therefore, studying the effect of corporate governance on ESG performance is highly important. More specifically, since board of directors are the main parties responsible for making strategic decisions including engagement in sustainability, this raises question about what role the board of directors play and how characteristics of BOD would affect ESG performance.

In general, Research in the areas of sustainability and corporate governance is often treated separately with less attention paid to the interaction of both areas, Therefore, the relationship between ESG, firm's financial performance and BOD characteristics needs to be further investigated in the context of Egypt as a developing country to stand at the real influence of ESG practices in an emerging market. In addition, it is required to be examined in the light of the establishment of a new Egyptian corporate social responsibility index called "S&P/EGX ESG" Index launched by the Egyptian Institute of Directors (EIoD) with the collaboration with Standard and Poor's (S&P) on 2010.

Accordingly , the main interest of this paper is to investigate the impact of environmental, social and governance (ESG) practices on firm's financial performance in emerging markets, using the Egyptian market as an example and to further examine whether board of directors' characteristics shape the relationship between ESG disclosure and firm's financial performance. This debate needs further investigation to stand at the real influence of ESG practices in an emerging market.

2. Literature review and hypothesis development

2.1 ESGD and financial performance

Environmental, social, and governance (ESG) disclosure has become an integral part of corporate reporting in recent years. Companies that voluntarily disclose ESG information via company websites, annual reports, and/or CSR reports need to see an increase in performance. (Minutolo, et al. 2019), hence, Corporate Sustainability performance have remained a prominent area of research with a lot of focus from academic researchers on metrics of corporate environmental, social, and governance performance and their relationship with firm performance

Based on the above, this section reviews a sample of prior studies that investigated the relationship between ESG performance and firm performance. For example, Johari et al. (2019) investigated the relationship between sustainability reporting and firm performance among the Malaysian Listed companies and found that sustainability reporting has a positive relationship with firm performance when using return on asset and earnings per share. However, there was a negative and weak relationship between sustainability reporting and firm performance using ROE. Moreover, the relationship between sustainability reporting and dividend per share does not exist or very weak.

Likewise, Almaleeh (2019) carried out a study in Egypt to investigate the association between adopting sustainability practices by Egyptian companies and their level of profitability. The results showed that sustainability practices are associated with higher level of both market value of equity and return on equity. Furthermore, cash dividends paid to stockholders are proven to be higher for sustainable firms. Taken together, these results suggested that there is an association between the firm being engaged in sustainability practices and its level of profitability.

Similary, Khemir et al. (2019) examined the impact of ESG information on Tunisian investors' decisions and if so what environmental, social or governance dimensions are likely to have more effect on their investment choices. The results highlighted the existence of a significant influence of ESG information on investment decisions in Tunisia. In addition, the results demonstrated that social and corporate governance information had more influence on investment decisions than environmental information.

In the same vein, Ismai et al. (2020) assessed the impacts of environmental, social and governance practices on the financial performance of PLCs in Malaysia and revealed that sustainability performance (ESG) has an influence on the company financial performance (ROA).

In contrast, in a study conducted by Rahi et al. (2021) to examine the impact of sustainability practices on the financial performance (FP) of the Nordic financial industry, both positive and negative impacts of Sustainability practice on FP were found. More specifically, a negative relationship between total ESG and financial performance measured by return on invested capital, return on equity and earnings per share was found, however, a positive relationship between the governance dimension (G) of sustainability practices and ROA was found.

Moreover, Thomas et al. (2021) provided an empirical analysis on the impact of sustainability practices on firm performance in the context of Malaysia using both aggregate and disaggregated environmental, social and governance (ESG) data. At the aggregate level, the results indicated a positive relationship between sustainability (ESG) and firm financial performance measures (ROA, ROE and TQ) but only significant for the ROE. For the disaggregate level of sustainability proxies (E, S and G), the result revealed that there was a significant positive relationship between the S score with (ROE and TQ) and the G score with the TQ. Based on the above, It can be observed that the question of how the ESG performance affects a firm's performance has been the subject of contentious debate – that is, ESG is reported to have conflicting influences on firm performance. Therefore, the current research attempts to provide supporting explanation for the current debate with respect to the combined impact of ESG practices on firm performance by focusing on the Egyptian market. It is argued that firms engaged in ESG practices are more likely to gain competitive advantage and to be perceived more positively by investors. Therefore, the following hypothesis is developed to investigate the relationship between ESG performance and company's financial performance in the Egyptian context.

H1: ESG Disclosure is positively associated with firm's financial performance

2.2 Board characteristics and ESGD:

The rising pressure toward firms' social and environmental accountability has intensified the boards' role in aligning business operations with a sustainable development agenda following agency theory (Yadav et al., 2023). The board of directors is a critical internal corporate governance mechanism to balance the interests of all those who contribute to the company's current and future success. Board members should take into consideration not only shareholders' interests and firm financial performance but also the interests of other stakeholders and the multidimensional aspects of corporate sustainability performance.

By providing expertise, advice and counsel, directly or indirectly, through its connection and interaction with important stakeholders or entities, the board influences the firm's performance (Hillman and Dalziel, 2003), including its social and environmental dimensions. Thus, this research aims to investigate the role of the corporate's board as a key element of corporate governance mechanisms in strengthening ESG performance for the Egyptian listed companies

Accordingly, this section reviews a summary of prior literature that investigated the relationship between board characteristics and ESG performance.

Arayssi et al. (2020) investigated the impact of board composition on environmental, social and governance (ESG) reporting in the Gulf countries. Results of the study provided support for the significance of board independence on ESG disclosure. More independent directors tend to voluntarily disclose more societal information. That is, having a significant number of independent directors on the board balances the financial and societal responsibilities of a firm.

In addition , In Nigeria, Oluwatoyin et al. (2021) examined the effect of board size and board independence on sustainability reporting of listed non-financial firms and provided that size of the board and independence of the board would enhance the sustainability reporting of listed non-financial firms in Nigeria. Moreover, Disli et al. (2022) investigated the effects of board independence and board size on the sustainability performance of publicly-listed companies across 20 emerging countries. Overall, findings of this study suggested that smaller and independent boards achieve better sustainability performance. The authors provided evidence that board independence has a positive impact on two sustainability performance measures, i.e. environmental and governance performance, meanwhile, although board size does not influence aggregate

sustainability measures, the authors found a negative relation between board size and governance performance.

Likewise, Radu et al. (2022) investigated the relation between the board of directors' attributes and corporate social and environmental performance to analyze and compare the effects of governance variables on environmental and social dimensions. The authors examined three characteristics of board of directors, size, independence and gender diversity, and how they interact with industry to affect corporate social performance.

Findings indicated that board independence; size and gender diversity each has a different impact on the environmental and social dimensions of performance, but the industrial sector moderates these effects. In particular, results showed that board independence is positively associated with the environmental dimension of the performance of all the sample industries, but only has a positive association with the social dimension when the firms are in industries other than those that are environmentally sensitive. For these latter industries, board independence is negatively associated with the social dimension. Board size is positively associated with the environmental dimension for environmentally sensitive industries only and with the social dimension for all the industries examined.

To sum up, despite the impact of corporate governance variables, especially board characteristics on sustainability performance being observed in previous research, the results showed uncertainly. Thus, investigation of board characteristics is vital to explaining the governance role of the board in improving firm's ESG performance. As a result, the current research aims to assess the ability of two key board attributes to explain variations in ESG performance: These are Board size, and Board independence

Therefore, to examine the association between the above mentioned board characteristics and ESG disclosure, the following hypotheses are developed:

<u>H2:</u> **There is positive association between board size and ESG disclosure**

<u>H3:</u> **There is positive association between board independence and ESG disclosure.**

2.3 Board characteristics, ESGD and financial performance

Logically, the mechanism through which ESG performance affect corporate performance may be possible through corporate governance mechanisms, as a means of response to particular stakeholders in form of their needs and interests. Thus, it is important to consider the role of corporate governance through one of its mechanisms, boards of directors, in the relationship between ESG and firm performance because it can affect decisions on firm policies related to ESG.

Accordingly, this section reviews prior studies that investigated the relationship between three variables; board characteristics, ESG disclosure and firm's financial performance.

Albitar et al. (2019) investigated the effect of environmental, social and governance disclosure (ESGD) on firm performance (FP) before and after the introduction of integrated reporting (IR) in the UK further to exploring a potential moderation effect of corporate governance mechanisms (i.e. ownership concentration, gender diversity and board size) on this relationship. The results showed a positive and significant relationship between ESGD score and FP before and after 2013.Furthermore, the results provided that ownership concentration, gender diversity and board size moderate the ESGD–FP relationship.

Similary, Lu (2021) examined the moderating effect of corporate governance on the relationship between corporate sustainability performance (CSP) and corporate financial performance. Four attributes of boards of directors are examined: board size, board independence, CEO duality, and female directors. The results showed that all four board attributes are positively associated with CSP. Further analysis revealed that firms with stronger corporate governance are more likely to have higher CSP and that corporate governance contributes additional value to firm value.

In contrast, in a study conducted by Nurlaily and Rahmi (2021) to analyze the moderating effect of the composition of female directors and the composition of independent directors on the relationship between Corporate Sustainability Performance (CSP) and financial performance,   empirical results provided that corporate sustainability performance (CSP) has a significant positive effect on a company's return on assets (ROA) , Furthermore, the female and independent director does not either strengthen or weaken the effect of CSP on the company's ROA. This study implies that the female directors and the composition of independent directors on corporate governance structure are more due to complying with regulatory requirements.

Additionally, in the Egyptian context, Hashad (2023) examined the impact of the board characteristics, namely; Board size, Board independence, Board gender diversity, CEO duality and Board activity, on sustainability performance disclosure and its reflection on the firm value. The results indicated that there was a significant positive impact of board gender diversity and board independence on the disclosure of sustainability performance, while board size, CEO duality and board activity did not have a significant impact. In addition, there was a significant positive effect for the disclosure of sustainability performance on the firm value. Moreover, there was a significant positive impact of the board independence on the firm value in light of sustainability performance disclosure as an intermediate variable in the conducted companies.

From the foregoing, it can be observed that, empirical studies on the moderating effect of corporate governance on the link between ESG and firms' performance are scanty, especially in the Egyptian context, Furthermore; the results of these few studies were mixed. Thus, this research argues that ESG performance has an impact on firm's financial performance through BOD characteristics. Therefore, the following hypotheses are developed:

H4: BOD characteristics moderates (enhance) the relationship between ESG disclosure and financial performance

- *H4a:* Board size moderates the relationship between ESG disclosure and firm's financial performance.
- *H4b:* Board independence moderates the relationship between ESG disclosure and firm's financial performance

3. Research design:

3.1 Sample Selection:

Since the main objective of this paper is to examine the impact of ESGD on firm's financial performance in the Egyptian context, the initial sample was limited to firms in EGX 100 that are listed in S&P/EGX ESG index over the period 2015– 2022. Firms must be listed three times at least in EGX100 during the research period to have an ESG score. Accordingly, the final sample consists of 56 firms (368 firm years), divided into 9 sectors: (materials, consumer staples, industrials, utilities, real estate, consumer discretionary, communication services, energy and health care) and this is after excluding financial institutions and firm-years that miss the necessary data for the variables used in analysis. The following table elaborates the classification of the sample based on these sectors:

Table (3.1): Sample selection

GICS Sector Name	Firms	Freq.	Percent
Communication Services	3	21	5.71
Consumer Discretionary	12	74	20.11
Consumer Staples	10	66	17.93
Energy	1	6	1.63
Health Care	3	18	4.89
Industrials	10	69	18.75
Materials	14	95	25.82
Real Estate	2	14	3.80
Utilities	1	5	1.36
Total	56	368	100.00

3.2 Data sources

Secondary data of this paper was collected from several sources, namely, the financial statements and the published annuals reports of the sample firms, board of directors' reports and governance reports. In addition, ESG scores were obtained from S&P/EGX ESG index over the period from 2015 to 2022, which were available through Thomson Reuters global database, the Egyptian Stock Exchange website (www.egx.com.eg), Mubasher info (www.mubasher.info). The data were collected based on the panel data analysis technique that combines the time-series technique with cross sectional technique.

3.3 Variables measurements
3.3.1 Dependent Variable: Financial performance

The dependent variable is the firm financial performance proxied by Return on assets (ROA), Return of equity (ROE), and Return on operating assets (ROOA).

3.3.2 Independent Variable: ESG Disclosure

  The key source for evaluating ESG activities of Egyptian companies is the "S&P/EGX ESG" Index. Therefore, ESG Disclosure as the independent variable is calculated as the relative score of listed firms based on the ESG index.

The Egyptian ESG index tracks the performance of the top 100 companies listed on the Egyptian Exchange (EGX) that demonstrate leadership on environmental, social, and CG issues.

All companies in the selection are subjected to a scoring process which incorporates ESG indicators against which the company's disclosure practices are evaluated. In cases where a company discloses a well-known public indicator, it is awarded a score of one; if the company did not, it is awarded a score of zero. Similarly, public disclosure of 'extra-point' indicators is awarded a score of three.

All of the EGX100 listed companies are evaluated on an annual basis, in order to select the top 30 that can be listed on the ESG index. Here, the ranking is converted to a relative score in which the maximum value is 30 and is given to the best company in the index, and the second best company is scored as 29 and so on.

3.3.3 Moderating Variable: Board characteristics

Board of directors was used as the moderating variable and was represented by two board characteristics (size of the board and independence of the board). Board characteristics were considered as the most important among the CG mechanisms.

3.3.4 Control variables:

The researcher considers a number of firm-specific control variables that have been used in the literature in order to capture the effects of any omitted variables that may affect the relationship between the main variables of the current study. Among these variables is firm size, leverage, Tangibility, free cash flow to firm, cash dividends, and institutional ownership.

A summary of the definitions and the measurement of all variables of the present study (i.e. independent, dependent, and control variables) are presented in table 3.2

Table (3.2): Research Variables and their Measures

Variable	Symbol	Measurement
Dependent variable (Financial performance)	**FP**	
Return on Assets	**ROA**	Net income / Total Assets
Return on Equity	**ROE**	Net income / Total equity
Return on operating Assets	**ROOA**	Net income / Operating Assets
Independent variable: ESG Disclosure		
ESG Disclosure	**ESGD**	The relative score based on the ESG index
Moderating variable (Board characteristics):	**BOD**	
Board Size	**BSIZE**	Total number of directors on the board
Board Independence	**BIND**	Total number of independent directors divided by total number of board members
Control variables:		
Firm size	**SIZE**	The natural logarithm of total assets
Leverage	**LEV**	The total debt divided by total assets
Tangibility	**Tang**	Property, plant and equipment / total assets
free cash flow to firm	**FCFF**	Cash flow from operations- Capital expenditures
Institutional ownership	**InstitOwnIQ**	Shares held by institutional investors / total number of firms' shares
Cash Dividends	**Div**	Net income-Retained Earnings

3.4 Research Models:

This study uses three models to test the impact of ESG disclosure and board characteristics on firms' financial performance as follows:

- $ROA\ i,t = \beta0 + \beta1\ ESGD\ i, t-1 + \beta2\ BSIZE\ i, t + \beta3\ BINDi, t + \sum controls + £i, t$
- $ROE\ i,t = \beta0 + \beta1\ ESGD\ i, t-1 + \beta2\ BSIZE\ i, t + \beta3\ BINDi, t + \sum controls + £i, t$
- $ROOA\ i,t = \beta0 + \beta1\ ESGD\ i, t-1 + \beta2\ BSIZE\ i, t + \beta3\ BINDi, t + \sum controls + £i, t$

Moreover, the models used to test the moderating effect of BOD characteristics on the association between ESG disclosure and firm's financial performance are presented as follows:

- $ROA\ i,t = \beta0 + \beta1\ ESGDi, t-1 * BSIZE\ i,t + \sum controls + £i,t$

- $ROA\ i,t = \beta0 + \beta1\ ESGDi, t-1 * BIND\ i,t + \sum controls + £i,t$

- $ROE\ i,t = \beta0 + \beta1\ E\ ESGDi, t-1 * BSIZE\ i,t + \sum controls + £i,t$

- $ROE\ i,t = \beta0 + \beta1\ ESGDi, t-1 * BIND\ i,t + \sum controls + £i,t$

- $ROOA\ i,t = \beta0 + \beta1\ ESGDi, t-1 * BSIZE\ i,t + \sum controls + £i,t$

- $ROOA\ i,t = \beta0 + \beta1\ ESGDi, t-1 * BIND\ i,t + \sum controls + £i,t$

4. Empirical Results:

4.1 Descriptive Statistic:

The main statistical features of all continuous variables used to investigate the moderating effect of board characteristics on the relationship between ESG Disclosure and corporate financial performance are shown in table 4.1

Table (4.1) Descriptive statistics						
Variable		**Mean**	**Std. dev.**	**Min**	**Max**	**Observations**
ROA	overall	0.048	0.094	-0.159	0.243	N = 368
	between		0.081	-0.159	0.243	n = 56
	within		0.050	-0.227	0.318	T-bar = 6.57
ROE	overall	0.119	0.180	-0.319	0.508	N = 368
	between		0.131	-0.114	0.470	n = 56
	within		0.125	-0.351	0.698	T-bar = 6.57
ROOA	overall	0.138	0.188	-0.070	0.560	N = 366
	between		0.156	-0.064	0.560	n = 56
	within		0.101	-0.282	0.558	bar = 6.53571
ESG	overall	122.060	8.978	101.707	145.748	N = 368
	between		7.400	110.435	138.402	n = 56
	within		5.050	107.806	138.327	T-bar = 6.57
BOD_Size	overall	8.479	2.975	3.000	17.000	N = 368
	between		2.809	3.500	15.875	n = 56

	within		0.924	4.908	12.879	T-bar = 6.57
BOD_In~p	overall	0.688	0.243	0.000	1.000	N = 368
	between		0.169	0.143	0.940	n = 56
	within		0.177	-0.117	1.078	T-bar = 6.57
Size	overall	21.721	1.406	19.178	24.480	N = 368
	between		1.383	19.178	24.450	n = 56
	within		0.258	20.758	22.580	T-bar = 6.57
Lev	overall	0.512	0.237	0.169	1.072	N = 368
	between		0.216	0.169	1.072	n = 56
	within		0.094	0.147	1.033	T-bar = 6.57
Tang	overall	0.389	0.227	0.040	0.780	N = 363
	between		0.217	0.040	0.767	n = 56
	within		0.076	0.024	0.689	bar = 6.48214
FCFF	overall	0.020	0.100	-0.183	0.234	N = 367
	between		0.075	-0.183	0.230	n = 56
	within		0.067	-0.273	0.243	bar = 6.55357
Div	overall	0.031	0.050	0.000	0.178	N = 368
	between		0.044	0.000	0.178	n = 56
	within		0.025	-0.086	0.152	T-bar = 6.57
Instit~Q	overall	0.498	0.288	0.000	0.957	N = 368
	between		0.263	0.000	0.952	n = 56
	within		0.117	-0.234	0.996	T-bar = 6.57

Table (4.1) presents the basic characteristics of the variables included in the study:

- **Return of assets (ROA)** as a measure of financial performance shows an overall mean of (0.048), which indicates low profitability. With a high dispersion around the mean (overall, between, and within), reflecting high heterogeneity in the profitability of Egyptian listed firms. In contrast, return of equity (ROE) shows an overall mean of (0.119), which indicates moderates' profitability in compared with risk free rate in Egypt during the research period. With a high dispersion around the mean (overall, between, and within), reflecting high heterogeneity in the profitability of Egyptian listed firms. Moreover, return of operating assets (ROOA) shows an overall mean of (0.138), which indicates moderates' profitability in compared with risk free rate in Egypt during the research period. With a high dispersion around the mean

(overall, between, and within), reflecting high heterogeneity in the profitability of Egyptian listed firms. The large difference between ROA and ROE or ROOA is driven by large proportion of total liabilities and cash and cash equivalents for Egyptian listed firm.

- **The environmental, social, and Governance (ESG)** score shows an overall mean of (122.06), with a low dispersion around the mean (overall, between, and within), reflecting high heterogeneity in the investment and disclosure of ESG of Egyptian listed firms.

- **Board of director characteristics measured by board size and board independence,** on average, Egyptian listed firms have nine board members as a measure for board size (BOD_Size), with a low dispersion around the mean (overall, between, and within), reflecting high homogeneity in the board size of Egyptian listed firms. In contrast, Egyptian listed firms have 68.8% independent board members in the board of directors as a measure for board independency (BOD_Indep), with a low dispersion around the mean (overall, between, and within), reflecting high homogeneity in the board independency of Egyptian listed firms.

- Applying the logarithm on total assets caused smoothing in total assets among firms that result in small variances in **firm size** among the sample firms. Thus, the size shows an overall deviation of (1.4) which is very small relative to the overall mean (21.72). Moreover, the between (1.38) and within (0.177) levels of deviation indicate high concentration around the overall mean. In addition, the small range between the overall minimum value (19.2) and the overall maximum value (24.5), reflects the homogeneity in firm size.

- Capital structure as measured by total liabilities **(Lev)** shows an overall mean of (0.551), which means firms have a balanced capital structure, with a high dispersion around the mean (overall, and between), reflecting high heterogeneity in the capital structure of Egyptian listed firms. In contrast, each firm has a low dispersion around the mean (within), reflecting high homogeneity in total liabilities to total assets for each firm during the research period. The maximum value of Leverage is 1.072 which indicates the research sample has firms with negative equity (e.g. Ezz steel in 2019 and 2020 has a negative total equity).

- Assets structure as measured by **plant, property and equipment to total assets (Tang)** shows an overall mean of (0.389), with a high dispersion around the mean (overall, and between), reflecting high heterogeneity in the assets

structure of Egyptian listed firms. In contrast, each firm has a low dispersion around the mean (within), reflecting high homogeneity in assets structure for each firm during the research period.

- The **free cash flow (FCFF)** shows an overall mean of (0.020), with a high dispersion around the mean (overall, between, and within), reflecting high heterogeneity in the FREE cash flow to the firm of Egyptian listed firms.
- The **cash dividends (Div)** show an overall mean of (0.031), with a high dispersion around the mean (overall, between, and within), reflecting high heterogeneity in the dividends policies for Egyptian listed firms.
- **Institutional ownership (InstitOwnIQ)** shows an overall mean of (0.498), with a high dispersion around the mean (overall, and between), reflecting high heterogeneity in the institutional ownership of Egyptian listed firms. In contrast, each firm has a low dispersion around the mean (within), reflecting high homogeneity for each firm during the research period.

4.2 Stationarity test

The stationarity test examines the time series of each variable used in testing the moderating effect of Board characteristics on the relationship between ESG Disclosure and corporate financial performance. The variable has a stationary time series if its statistical properties, such as mean and variance, are time-invariant (constant over time). Therefore, the time series of stationary variables exhibit a mean reversion. Meanwhile, the variable has a non-stationary time series if its statistical properties are time variants (changes over time). Hence, the series has a unit root. Therefore, the results of models that include non-stationary variables cannot be generalized for future periods. A fisher-type unit-root test is conducted to examine whether the time series of each variable is stationary or has a unit root for unbalanced panel data.

Table (4.2) Fasher-Type unit-root test			
Variables	**P-Value**	**Variables**	**P-Value**
ROA	0.000***	BOD Indep	0.000***
ROE	0.000***	Size	0.000***
ROOA	0.000***	Lev	0.000***
PE	0.000***	Div	0.000***
ESG	0.000***	InstitOwnIQ	0.000***
BOD Size	0.4557	BAS	0.000***

Table (4.2) shows board size has a unit root at their original levels because their corresponding p-values are greater than 5%. However, the remaining variables

have a stationary time series at their original levels because their corresponding p-values are less than 5%. Nonetheless, the stationarity of the non-stationary variables can be obtained by taking their first difference.

Table (4.3) Fasher-Type unit-root test after transformation	
Variables	**P-Value**
BOD Size	0.000***

The differencing transformation is taken for board size. Hence, the stationarity of the time series of non-stationary after taking the first differencing transformation, as shown in Table (4.3), the p-values reveal that there is no unit root, and all the study variables are stationary.

4.3 Pearson's Correlation Test

Pearson's correlation coefficient shows the direction and the strength of the linear association between any two variables included in the current research. Moreover, Pearson's correlation coefficients are used to detect the possible multicollinearity between any two independent variables included in the same regression model. Table (4.4) shows Pearson's correlation coefficients for all the study variables.

Table (4.4) Pearson's Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) ROA	1.000											
(2) ROE	0.629***	1.000										
	(0.000)											
(3) ROOA	0.570***	0.713***	1.000									
	(0.000)	(0.000)										
(4) ESG	0.197***	0.188***	0.125**	1.000								
	(0.000)	(0.000)	(0.017)									
(5) BOD_Size	0.242***	0.122**	0.086*	0.311***	1.000							
	(0.000)	(0.019)	(0.102)	(0.000)								
(6) BOD_Indep	-0.028	-0.138***	-0.070	0.073	0.266***	1.000						
	(0.594)	(0.008)	(0.184)	(0.160)	(0.000)							
(7) Size	0.218***	0.143***	0.035	0.324***	0.345***	-0.131**	1.000					
	(0.000)	(0.006)	(0.501)	(0.000)	(0.000)	(0.012)						
(8) Lev	-0.538***	-0.040	-0.084*	0.022	-0.202***	-0.152***	0.157***	1.000				
	(0.000)	(0.440)	(0.110)	(0.671)	(0.000)	(0.003)	(0.003)					
(9) Tang	-0.270***	-0.330***	-0.446***	-0.040	0.065	0.165***	0.040	-0.052	1.000			
	(0.000)	(0.000)	(0.000)	(0.450)	(0.219)	(0.002)	(0.451)	(0.326)				
(10) FCFF	0.643***	0.373***	0.373***	0.159***	0.191***	0.024	0.233***	-0.356***	-0.072	1.000		
	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.652)	(0.000)	(0.000)	(0.172)			
(11) Div	0.679***	0.504***	0.598***	0.155***	0.187***	-0.009	0.144***	-0.379***	-0.238***	0.557***	1.000	
	(0.000)	(0.000)	(0.000)	(0.003)	(0.000)	(0.863)	(0.006)	(0.000)	(0.000)	(0.000)		
(12) InstitOwnIQ	0.029	0.078	0.156***	0.097*	0.049	0.290***	0.099*	0.027	0.080	0.126**	0.201***	1.000
	(0.582)	(0.136)	(0.003)	(0.063)	(0.349)	(0.000)	(0.058)	(0.611)	(0.128)	(0.015)	(0.000)	

From the previous Table (4.4), the following matters can concluded:

ESG model

- There is a positive direct linear association between the board of director size and ESG disclosure (r=0.311, p-value=0.000) for Egyptian listed firms. In contrast, there is no direct linear association between the board of director independence and ESG disclosure (r=0.007, p-value=0.160) for Egyptian listed firms.
- There is a positive direct linear association between ESG disclosure and four firm-specific variables namely, firm size, free cash flow to firm, cash dividends, and institutional ownership (r=0.324 p-value=0.000), (r=0.159 p-value=0.002), (r=0.155 p-value=0.003), and (r=0.097 p-value=0.063), respectively. In contrast, there is no direct linear association between ESG disclosure and two firm-specific variables namely, Leverage and tangibility (r=0.022 p-value=0.671), and (r=-0.040 p-value=0.450) respectively.

ROA model

- There is a positive direct linear association between ESG disclosure and return of assets as a measure of firm's financial performance (r=0.197, p-value=0.000) for Egyptian listed firms.
- There is a positive direct linear association between the board of director size and ROA (r=0.242, p-value=0.000) for Egyptian listed firms. In contrast, there is no direct linear association between board of director independence and ROA (r=-0.028, p-value=0.594) for Egyptian listed firms.
- There is a positive direct linear association between ROA and three firm-specific variables namely, firm size, free cash flow to firm, and cash dividends, (r=0.218 p-value=0.000), (r=0.643 p-value=0.000), and (r=0.679 p-value=0.000), respectively. In contrast, there is a negative direct linear association between ROA and two firm-specific variables namely, Leverage and tangibility (r=-0.538 p-value=0.000), and (r=-0.270 p-value=0.000) respectively. On the other hand, there is no direct linear association between ROA and institutional ownership. (r=0.029 p-value=0.582).

ROE model

- There is a positive direct linear association between ESG disclosure and return of equity as a measure of accounting-based measure of firm performance (r=0.188, p-value=0.000) for Egyptian listed firms.
- There is a positive direct linear association between the board of director size and ROE (r=0.122, p-value=0.019) for Egyptian listed firms. In contrast, there

is a negative direct linear association between the board of director independence and ROE (r=-0.138, p-value=0.008) for Egyptian listed firms.

▪ There is a positive direct linear association between ROE and three firm-specific variables namely, firm size, free cash flow to firm, and cash dividends, (r=0.143 p-value=0.006), (r=0.373 p-value=0.000), and (r=0.504 p-value=0.000), respectively. In contrast, there is a negative direct linear association between ROE and tangibility (r=-0.330 p-value=0.000). On the other hand, there is no direct linear association between ROE and three firm-specific variables namely, Leverage and institutional ownership (r=-0.040 p-value=0.440), and (r=0.078 p-value=0.136), respectively.

ROOA model

▪ There is a positive direct linear association between ESG disclosure and return of operating assets as a measure of accounting-based measure of firm performance (r=0.125, p-value=0.017) for Egyptian listed firms.

▪ There is a positive direct linear association between the board of director size and ROOA (r=0.086, p-value=0.10) for Egyptian listed firms. In contrast, there is no direct linear association between board of director independence and ROOA (r=-0.070, p-value=0.184) for Egyptian listed firms.

▪ There is a positive direct linear association between ROOA and three firm-specific variables namely, free cash flow to firm, cash dividends, and institutional ownership (r=0.373 p-value=0.000), (r=0.589 p-value=0.000), and (r=0.156 p-value=0.031), respectively. In contrast, there is a negative direct linear association between ROOA and two firm-specific variables namely, Leverage, and tangibility (r=-0.084 p-value=0.10), (r=-0.446 p-value=0.000), respectively. On the other hand, there is no direct linear association between ROOA and firm size (r=0.035, p-value=0.501)

4.4 Testing hypotheses

4.4.1 The impact of board characteristics on ESG disclosure

Testing the validity of the developed hypotheses starts by conducting an initial pooled OLS regression; however, some goodness of fit tests should be conducted first to confirm that the hypothesized model best fits the sample data. These tests are multicollinearity, heteroskedasticity, omitted variables, and auto-correlation. If any of the problems are evidenced, they should be considered while estimating the final pooled OLS model.

Table (4.5) OLS Goodness of Fit (model 1)		
Impact of board Characteristics on ESG disclosure		
Variable		VIF
Div		1.807
FCFF		1.542
Lev		1.51
Size		1.467
B Size		1.44
BOD Indep		1.365
InstitOwnIQ		1.227
Tang		1.158
Mean VIF		1.401
Heteroskedasticity	Chi2 Statistics	2.51
	Prob>Chi2	0.1130
Omitted variables	F Statistics	0.65
	Prob>F	0.5848
Autocorrelation	F Statistics	3.588
	Prob>F	0.0636

Table (4.5) reveals that there is no multicollinearity among the regressors for the model of the impact of board of directors' attributes on ESG disclosure. As Landau and Everitt (2004) and Field (2005) state, multicollinearity exists when the variance inflation factor (VIF) of any independent variable exceeds 10 and when the tolerance factor (1/VIF) is less than 0.10. Therefore, there is no multicollinearity among the explanatory variables included in the model because all explanatory variables show a VIF coefficient less than 10, and a tolerance coefficient greater than 0.10. Moreover, there is no heteroskedasticity problem which means that the error variances are constant for research models because the p-value is greater than 5%.

Concerning the specifications, Gujarati (2015) stated that model specification errors may arise from the omission of essential explanatory variables from the model, the inclusion of irrelevant explanatory variables, or the incorrect functional form of independent and dependent variables. As shown in Table (4.5), the p-value of the omitted variables test is greater than 5%. Therefore, the functional form is correct and has no omitted variables in the model. In addition, autocorrelation problems do not exist, which means that the model's residuals are not serially correlated.   In conclusion, researcher add a year fixed effect and a quadratic term of board independence and cash dividends to treat model specification error using generalized least square GLS to test the final fitted model as follows:

Table (4.6) Final fitted model of the impact of board characteristics on ESG disclosure							
ESG	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
B_Size	.617	.163	3.79	0	.297	.937	***
BOD_Indep	12.254	7.569	1.62	.106	-2.634	27.142	*
BOD_Indep2	-11.627	6.493	-1.79	.074	-24.397	1.143	*
Size	1.525	.355	4.30	0	.827	2.224	***
Lev	1.244	2.024	0.61	.539	-2.737	5.225	
Tang	-3.386	1.89	-1.79	.074	-7.105	.332	*
FCFF	2.433	5.331	0.46	.648	-8.053	12.919	
Std_Div	4.369	1.151	3.79	0	2.104	6.633	***

Std_Div2	-2.043	.493	-4.15	0	-3.012	-1.073	***
InstitOwnIQ	3.331	1.592	2.09	.037	.199	6.463	**
Yer fixed effect				Included			
Constant	83.823	7.812	10.73	0	68.458	99.188	***
Mean dependent var			122.087	SD dependent var			8.990
R-squared			0.285	Number of obs			362
F-test			11.105	Prob > F			0.000
Akaike crit. (AIC)			2532.841	Bayesian crit. (BIC)			2606.782
*** p<.01, ** p<.05, * p<.1							

- The overall model can be accepted as a reliable model of ESG because the Prob > F is less than 5%. In addition, board characteristics can explain 28.5% of the variation in ESG disclosure for Egyptian listed firms by using GLS, implying that ESG disclosure is driven by board of directors' attributes and firm-specific characteristics.
- There is a positive direct significant impact of board size on ESG disclosure for Egyptian listed firms. Meanwhile, a curvilinear relationship exists between board independence and ESG disclosure, which means the existence of an optimal level of board independence to maximize ESG disclosure for Egyptian listed firms. Any deviation will lead to a negative impact on ESG disclosure; there is an inverted U shape between them , Turning point in association between BOD_Indep and ESG = 52.3%, this means that board independence ratio from 0 to 0.523 shows a positive association between board independence and ESG disclosure. However, board independence ratio exceeding 0.523 will negatively impact ESG practices and disclosure.
- There is a positive direct significant impact of firm size and institutional ownership on ESG disclosure for Egyptian listed firms. In contrast, there is no direct significant impact of Leverage and free cash flow on ESG disclosure for Egyptian listed firms. Moreover, a curvilinear relationship exists between cash dividends and ESG disclosure, which means the existence of an optimal level of cash dividends to maximize ESG

disclosure for Egyptian listed firms. Any deviation will lead to a negative impact on ESG disclosure; Turning point in association between Div and ESG = 0.083 of total assets, This means Dividends from 0 to 0.08 shows a positive association between Div and ESG. In addition, Dividends exceeding 0.08 of total assets negatively impacts ESG disclosure

4.4.2 The moderating impact of board characteristics on the association between ESG disclosure and firm performance as measured by ROA.

Table (4.7) OLS Goodness of Fit (models 2,3 and 4)					
The moderating impact of board characteristics on the association between ESG disclosure and ROA					
Model 2		**Model 3**		**Model 4**	
Variable	VIF	Variable		VIF	VIF
Div	1.812	Div		1.805	ESGLIndex BSize	4.984
Size	1.55	ESG BSize		1.573	ESGLIndex BInd	4.069
FCFF	1.545	FCFF		1.543	Div	1.803
Lev	1.512	Lev		1.502	FCFF	1.546
B Size	1.471	Size		1.499	Lev	1.415
BOD Indep	1.379	ESG BInd		1.398	Size	1.411
ESG	1.239	InstitOwnIQ		1.235	ESGLIndex BGD	1.216
InstitOwnIQ	1.23	Tang		1.154	InstitOwnIQ	1.185
Tang	1.165	ESG BGD		1.1	Tang	1.145
BOD WR	1.122	Mean VIF		1.423	Mean VIF	2.086
Mean VIF	1.402				
Heteroskedasticity		Chi2 Statistics Prob>Chi2	6.13 0.0133	5.08 0.0243	5.47 0.0194
Omitted variables		F Statistics Prob>F	2.13 0.0956	2.91 0.0347	2.35 0.0720
Autocorrelation		F Statistics Prob>F	3.588 0.0636	46.600 0.000	39.939 0.000

Table (4.7) shows there is no multicollinearity among the explanatory variables included in the model, however, there is a heteroskedasticity problem, which means that the error variances are not constant for research

models. In addition, the functional form is correct and has no omitted variables for all models. Moreover, autocorrelation problems do not exist for model (3), which means that the model's residuals are not serially correlated. In contrast, autocorrelation problems exist for model 4 which means that the model's residuals are serially correlated. In conclusion, the researcher added a year fixed effect and a quadratic term of board size to treat model specification error using generalized least square GLS to test the final fitted model as follows:

ROA	Model 2	Model 3	Model 4
Table (4.8) hypotheses testing			
The moderating impact of board characteristics on the association between ESG disclosure and ROA			
ESG	0.0006**	--	--
B_Size	0.0226***	--	--
B_Size2	-0.0013***	--	--
BOD_WR	0.0159**	--	--
BOD_Indep	-0.003	--	--
ESG_BSize	--	0.0002***	--
ESG_BSize2	--	-0.0001***	--
ESG_BGD	--	0.0001***	--
ESG_BInd	--	0.000	--
ESGLIndex_BSize	--	--	-0.0031**
ESGLIndex_BSize2	--	--	0.000
ESGLIndex_BGD	--	--	0.0135**
ESGLIndex_BInd	--	--	0.0491***
Size	0.0099***	0.0109***	0.0125***
Lev	-0.1427***	-0.1400***	-0.1395***
Tang	-0.0696***	-0.0759***	-0.0736***
FCFF	0.2556***	0.2545***	0.2582***
Div	0.6032***	0.6192***	0.6498***
InstitOwnIQ	-0.0267**	-0.0291***	-0.0269**
_cons	-0.1464***	-0.1994***	-0.2558***
Obs	362	362	362
R2	0.7098	0.708	0.689
Legend: * p<.1; ** p<.05; *** p<.01			

- Models can be accepted as reliable ROA models because Prob > F is less than 5%. In addition, board characteristics and ESG disclosure and their interaction can explain 71.2%, 70.9%, and 69.4% for models 2, 3 and 4, respectively, of the variation in ROA for Egyptian listed firms by using GLS, implying that ROA is driven by board characteristics and ESG disclosure.
- There is a positive, direct, and significant impact of ESG disclosure on firm performance, as measured by ROA for Egyptian listed firms.
- There is no direct significant impact of board independence on ROA for Egyptian listed firms. However, a curvilinear relationship exists between board size and ROA, which means the existence of an optimal level of board size to maximize ROA for Egyptian listed firms. Any deviation will lead to a negative impact on ROA; there is an inverted U shape between them, Turning point in association n between B_Size and ROA: board size = 9 members, This means that the board size ranging from 1 to 9 shows a positive association between board size and ROA. However, a board size exceeding nine members will negatively impact ROA.
- Firm size, free cash flow and cash dividends positively, directly, and significantly impacts ROA for Egyptian-listed firms. In contrast, there is a negative, significant, and direct impact of leverage, tangibility and Institutional ownership on ROA for Egyptian listed firms.

   Moderating effect of board characteristics on the association between ESG disclosure and ROA:
  - Board size mitigates the positive impact of ESG disclosure on ROA.
  - Board independence has no impact on the association between ESG disclosure and ROA.

4.4.3 The moderating impact of board Characteristics on the association between ESG disclosure and firm performance as measured by ROE

Table (4.9) OLS Goodness of Fit (model 5,6, and 7)						
The moderating impact of board Characteristics on the association between ESG disclosure and ROE						
Model 5			**Model 6**		**Model 7**	
Variable		VIF	Variable	VIF	VIF	VIF
Div		1.812	Div	1.805	ESGLIndex BSize	4.984
Size		1.55	ESG BSize	1.573	ESGLIndex BInd	4.069
FCFF		1.545	FCFF	1.543	Div	1.803
Lev		1.512	Lev	1.502	FCFF	1.546
B Size		1.471	Size	1.499	Lev	1.415
BOD Indep		1.379	ESG BInd	1.398	Size	1.411
ESG		1.239	InstitOwnIQ	1.235	ESGLIndex BGD	1.216
InstitOwnIQ		1.23	Tang	1.154	InstitOwnIQ	1.185
Tang		1.165	ESG BGD	1.1	Tang	1.145
BOD WR		1.122	Mean VIF	1.423	Mean VIF	2.086
Mean VIF		1.402				
Heteroskedasticity	Chi2 Statistics Prob>Chi2	2.03 0.1546	1.55 0.2135		2.33 0.1266	
Omitted variables	F Statistics Prob>F	0.34 0.7981	0.27 0.8456		0.36 0.7823	
Autocorrelation	F Statistics Prob>F	3.588 0.0636	90.877 0.000		70.512 0.000	

Table (4.9) shows there is no multicollinearity among the explanatory variables included in the model. Moreover, there is no heteroskedasticity problem, which means that the error variances are constant for research models. In addition, the functional form is correct and has no omitted variables for all models. Besides , autocorrelation problems do not exist for model (6), which means that the model's residuals are not serially correlated In contrast, autocorrelation problems exist for models (7 and 8), which means that the model's residuals are serially correlated. In conclusion, the researcher added a year fixed effect and a quadratic term of board size and leverage to treat model specification error using generalized least square GLS to test the final fitted model as follows:

ROE	Model 5	Model 6	Model 7
Table (4.10) hypotheses testing.			
The moderating impact of board characteristics on the association between ESG disclosure and ROE			
ESG	0.001*	--	--
B_Size	0.0499***	--	--
B_Size2	-0.0026***	--	--
BOD_WR	0.0289*	--	--
BOD_Indep	-0.0730**	--	--
ESG_BSize	--	0.0004***	--
ESG_BSize2	--	-0.0000***	--
ESG_BGD	--	0.0002**	--
ESG_BInd	--	-0.0006*	--
ESGLIndex_BSize	--	--	-0.002
ESGLIndex_BSize2	--	--	0.000
ESGLIndex_BGD	--	--	0.0293*
ESGLIndex_BInd	--	--	0.024
Size	0.005	0.007	0.012
Lev	-0.4338**	-0.4048**	-0.3529*
Lev2	0.4449**	0.4241**	0.3862**
Tang	-0.1606***	-0.1731***	-0.1724***
FCFF	0.3734***	0.3725***	0.3759***
Div	1.2255***	1.2540***	1.3703***
InstitOwnIQ	-0.029	-0.032	-0.036
Cons	-0.197	-0.098	-0.056
Obs	362	362	362
R2	0.4033	0.3754	0.3689
Legend: * p<.1; ** p<.05; *** p<.01			

- Models can be accepted as reliable ROE models because Prob > F is less than 5%. the board characteristics and ESG disclosure and their interaction can explain 40.3%, 37.5%, and 36.9% for models 6,7 and 8, respectively, of the variation in ROE for Egyptian listed firms by using GLS, implying that ROE is driven by board characteristics and ESG disclosure. In addition, there is a positive, direct, and significant impact of ESG

disclosure on firm performance, as measured by ROE for Egyptian listed firms.

- Moreover, a curvilinear relationship exists between board size and ROE, which means the existence of an optimal level of board size to maximize ROE for Egyptian listed firms. Any deviation will lead to a negative impact on ROE; there is an inverted U shape between them, Turning point in association between B_Size and ROE: board size = 10 members, This means that the board size ranging from 1 to 10, has a positive association with ROE. In contrast, board size exceeding ten members will negatively impact ROE. Meanwhile, there is a negative direct significant impact of board independence on ROE for Egyptian listed firms.

- Free cash flow and cash dividends positively, directly, and significantly impacts ROE for Egyptian listed firms. However, there is a negative, significant, and direct impact of tangibility on ROE for Egyptian listed firms. In contrast, Firm size and Institutional ownership has no, direct, and significant impact on ROE for Egyptian listed firms.

- In addition, a curvilinear relationship exists between leverage and ROE, which means there is minimum level of leverage to maximize ROE for Egyptian listed firms. Any deviation will lead to a negative impact on ROE; there is (U) shape between them. Turning point in association between Lev and ROE: Leverage = 48.8%, this means that the leverage ranges from 0 to 48.8%, which shows a negative association between Lev and ROE. In addition, Leverage exceeding 48.8% members will positively impact ROE.

- **Moderating effect of the board characteristics on the association between ESG disclosure and ROE:**

- Board size mitigates the positive impact of ESG disclosure on ROE.
- Board independence mitigates the positive impact of ESG disclosure on ROE

4.4.4 The moderating impact of board characteristics on the association between ESG disclosure and firm performance as measured by ROOA.

Table (4.11) OLS Goodness of Fit (model 8,9, and 10) The moderating impact of board characteristics on the association between ESG disclosure and ROOA						
Model 8			**Model 9**		**Model 10**	
Variable		VIF	Variable	VIF	VIF	VIF
Div		1.816	Div	1.809	ESGLIndex BSize	4.996
Size		1.557	ESG BSize	1.575	ESGLIndex BInd	4.077
FCFF		1.541	FCFF	1.54	Div	1.807
Lev		1.519	Lev	1.509	FCFF	1.543
B Size		1.472	Size	1.509	Lev	1.422
BOD Indep		1.385	ESG BInd	1.403	Size	1.42
ESG		1.234	InstitOwnIQ	1.236	ESGLIndex BGD	1.217
InstitOwnIQ		1.231	Tang	1.157	InstitOwnIQ	1.185
Tang		1.168	ESG BGD	1.101	Tang	1.149
BOD WR		1.122	Mean VIF	1.426	Mean VIF	2.091
Mean VIF		1.405				
Heteroskedasticity	Chi2 Statistics Prob>Chi2	57.55 0.000	56.62 0.000		49.93 0.000	
Omitted variables	F Statistics Prob>F	5.66 0.000	4.75 0.0029		3.70 0.0121	
Autocorrelation	F Statistics Prob>F	109.331 0.000	105.005 0.000		107.950 0.0000	

Table (4.11) shows there is no multicollinearity among the explanatory variables included in the model. Moreover, there is a heteroskedasticity problem, which means that the error variances are not constant for research models. In addition, the functional form is incorrect and has omitted variables for all models. Besides, autocorrelation problems exist for all models, which mean that the model's residuals are serially correlated. In conclusion, the researcher added a year fixed effect and a quadratic term of ESG, board size and leverage to treat model specification error using generalized least square GLS to test the final fitted model as follows:

| ROOA	Model 8	Model 9	Model 10
Table (4.12) hypotheses testing.			
The moderating impact of board Characteristics on the association between ESG disclosure and ROOA			
ESG	0.03391**	--	--
ESG2	-0.00013**	--	--
B_Size	0.02168*	--	--
B_Size2	-0.00122**	--	--
BOD_WR	-0.007	--	--
BOD_Indep	0.006	--	--
ESG_BSize	--	0.00024***	--
ESG_BSize2	--	-0.00000***	--
ESG_BGD	--	0.003	--
ESG2_BGD2	--	-0.00002*	--
ESG_BInd	--	-0.000	--
ESG_BInd2	--	0.000	--
ESGLIndex_BSize	--	--	-0.002
ESGLIndex_BSize2	--	--	0.000
ESGLIndex_BGD	--	--	-0.030
ESGLIndex_BInd	--	--	0.055
Size	0.003	0.004	0.005
Lev	-0.39134**	-0.41481***	-0.34382**
Lev2	0.35606***	0.37811***	0.32470**
Tang	-0.25062***	-0.26045***	-0.25968***
FCFF	0.37256***	0.38229***	0.36731***
Div	1.54118***	1.54105***	1.61303***
InstitOwnIQ	0.011	0.012	0.022
Cons	-2.03744**	0.070	0.134
Obs	362	362	362
R2	0.588	0.563	0.583
Legend: * p<.1; ** p<.05; *** p<.01			

- Models can be accepted as reliable ROOA models because Prob > F is less than 5%. In addition, Board characteristics and ESG disclosure and their interaction can explain 58.8%, 56.3%, and 58.3% for models 8, 9 and 10, respectively, of the variation in ROOA Egyptian listed firms by using GLS,

implying that ROOA is driven by board characteristics and ESG disclosure.

▪ In addition, a curvilinear relationship exists between ESG disclosure and ROOA, which means the existence of an optimal level of ESG disclosure to maximize ROOA for Egyptian listed firms. Any deviation will lead to a negative impact on ROOA; there is an inverted U shape between them, Turning point in association n between ESG and ROOA: ESG = 130, this means that the ESG disclosure ranging from 100 to 130, shows a positive association with ROOA. In contrast, ESG disclosure score exceeding 130 will negatively impact ROOA.

Curve fit for ROOA
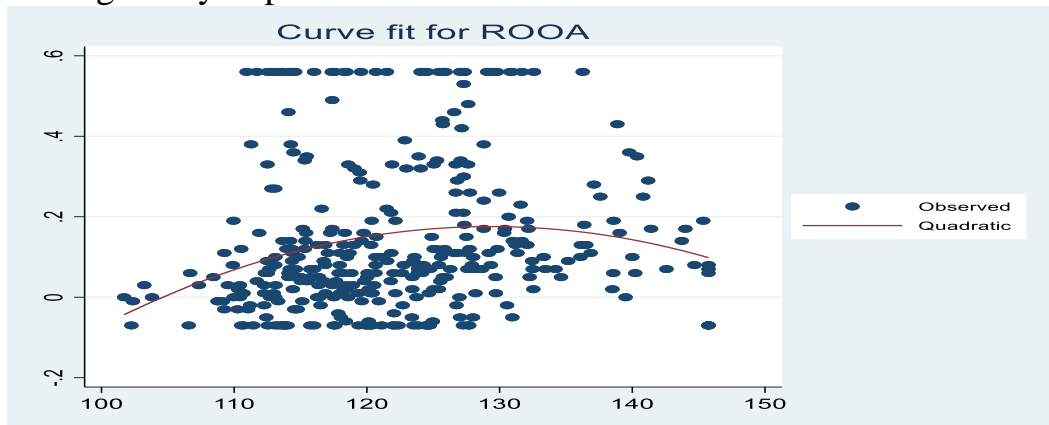
▪ Moreover, a curvilinear relationship exists between board size and ROOA, which means the existence of an optimal level of board size to maximize ROOA for Egyptian listed firms. Any deviation will lead to a negative impact on ROOA; there is an inverted U shape between them, Turning point in association n between B_Size and ROOA: board size = 9 members, this means that the board size ranges from 1 to 9, which shows a positive association between board size and ROOA. In addition, a board size exceeding nine members will negatively impact ROOA. In contrast, there is no direct significant impact of board independence on ROOA for Egyptian listed firms.

▪ Free cash flow and cash dividends positively, directly, and significantly impacts ROOA for Egyptian listed firms. However, there is a negative, significant, and direct impact of tangibility on ROOA for Egyptian listed firms. In contrast, Firm size and Institutional ownership has no, direct, and significant impact on ROOA for Egyptian listed firms. In addition, a

curvilinear relationship exists between leverage and ROOA, which means there is minimum level of leverage to maximize ROOA for Egyptian listed firms. Any deviation will lead to a negative impact on ROOA; there is (U) shape between them, Turning point in association between Lev and ROOA: Leverage = 55% , This means that the leverage ranging from 0 to 55%, shows a negative with ROOA. However, Leverage exceeding 55% will positively impact ROOA.

- **Moderating effect of board characteristics on the association between ESG disclosure and ROOA:**
  - Board size mitigates the positive area and motivates the negative area effect of ESG disclosure on ROOA. An optimal level after interaction (ESG disclosure = 121)
  - Board independence has no effect on the association between ESG disclosure and ROOA.

5. Conclusion, recommendations and suggestions for future research

This paper aimed to investigate empirically whether there is a relationship between a company's environmental, social and governance disclosure (ESGD) practices and firm's financial performance in the Egyptian context and to further examine whether board of directors' characteristics moderates such relationship. In order to achieve the main objective of this study, the impact of ESG disclosure score on firm's financial performance is tested first.

Findings provided that firms with higher ESG disclosure scores have a higher financial performance as measured by ROA and ROE. However, the results revealed that a curvilinear relationship exists between ESG disclosure and ROOA, which means the existence of an optimal level of ESG disclosure to maximize ROOA for Egyptian listed firms. Any deviation will lead to a negative impact on ROOA; there is an inverted U shape between them.

Furthermore, the relationships between BOD characteristics and ESG disclosure for Egyptian listed firms are examined. Findings provided that there is a significant positive impact of board size on ESG disclosure for Egyptian listed firms. In contrast, a curvilinear relationship exists between board independence and ESG disclosure, which means the existence of an optimal level of board independence to maximize ESG disclosure for Egyptian

listed firms. Any deviation will lead to a negative impact on ESG disclosure; there is an inverted U shape between them. More specifically, the results revealed that the board independence ratio from 0 to 0.523 shows a positive association between board independence and ESG disclosure; however, board independence ratio exceeding 0.523 will negatively impact ESG practices and disclosure.

Finally, the moderating effect of BOD characteristics on the relationship between ESG disclosure and firm's financial performance is examined and the following results were provided:

- Board size mitigates the positive impact of ESG disclosure on ROA and ROE. However, it mitigates the positive area and motivates the negative area effect of ESG disclosure on ROOA. An optimal level after interaction (ESG disclosure = 121)
- Board independence has no impact on the association between ESG disclosure and ROA and ROOA; however, it mitigates the positive impact of ESG disclosure on ROE.

Recommendations

The present study findings provide some recommendations to different users of financial statements in the Egyptian context in order to enhance ESG practices as a way to reach sustainable development in a developing country. These Recommendations are presented in details in the following points:

- Egyptian regulators and policymakers need to develop more effective enforcement mechanisms for listed firms to mandatorily integrate their ESG information within their annual reports or in a separate sustainability report and to enforce compliance of Egyptian listed firms with sustainability guidelines
- Professional accounting bodies should work also on developing and encouraging the existence of generally accepted accounting standards to be adopted by the Egyptian firms for measuring and disclosing sustainability performance to ensure standardizing sustainability disclosure practices among Egyptian companies
- The Egyptian Stock exchange should provide database about sustainability practices of companies listed in the stock exchange that is available for all

stakeholders to help them in assessing non-financial performance of such companies

- Egyptian regulators need to modify some regulations related to BOD in Egyptian guide to corporate governance and this is through specifying minimum number of board members and taking required procedure for increasing number of independent board members thereby enhancing companies' decisions related to sustainability policies and practices.

Suggestions for Future Research

There were some limitations in this research that could be considered as suggestions for future research such as:

- This study focused mainly on aggregate ESG data in which there are various indicators under the ESG pillars such as emission, innovation, resource use, community, and human rights. The inclusion of these individual items could contribute to reveal more specific information about the factors that affect the ESG within each pillar.

- This study focuses on examining the moderating effect of one internal corporate governance mechanism, the board of directors. Future research may explore external corporate governance mechanisms, as institutional ownership and legal systems

- Future research may consider other variables related to the characteristics of board members, such as board effectiveness, board culture, foreign directors, board age, board education, and board experience

- Future research can replicate this study in different contexts to test the validity of results. More specifically, comparative studies between several countries or between different sectors like manufacturing and service sectors are strongly recommended in order to analyze the impact of culture and different institutional structures on the consideration of ESG information in decision making in general and in assessing firm performance in particular

- The current study focuses on corporations listed on the EGX, especially "S&P/EGX ESG index", which are large firms. Future studies can also investigate ESG performance for small-and-medium enterprises (SMEs), since they are also facing sustainable development issues, and are dealing with these sustainability issues in an unobservable way.

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الملخص

هدف البحث: تهدف هذه الدراسة إلى فحص مدى تأثير خصائص مجلس الادارة كمتغير معدل على العلاقة بين الإفصاح عن أداء الاستدامة والأداء المالي للشركة

منهجية البحث : تم اجراء هذا البحث على عينة تضم 56 شركة غير مالية من الشركات المسجلة في سوق الأوراق المالية ومدرجة بمؤشر الاستدامة المصري S&P/EGX ESG وذلك خلال الفترة من 2017إلي 2022 باجمالي مشاهدات 368 مشاهدة وتم استخدام خصائص حجم مجلس الادارة واستقلالية مجلس الادارة كما تم استخدام درجات الاستدامة التي توفرها البورصة المصرية للافصاح عن أداء الاستدامة ومقاييس معدل العائد علي الاصول ومعدل العائد علي حقوق الملكية ومعدل العائد علي الأصول التشغيلية للتعبير عن الأداء المالي للشركة وقد تم تحليل بيانات الدراسة باستخدام الإحصاء الوصفي ومصفوفة ارتباط بيرسون ونماذج الانحدار الخطي المتعدد.

نتائج البحث: أظهرت نتائج الدراسة إلى وجود تأثير ذات دلالة إحصائية لمستوي الإفصاح عن أداء الاستدامة على الأداء المالي للشركات الذي يتم قياسه عن طريق معدل العائد علي الاصول ومعدل العائد علي حقوق الملكية، علاوة علي ذلك ، تشير النتائج الي وجود تأثير ايجابي معدل لحجم مجلس الادارة علي العلاقة بين الإفصاح عن أداء الاستدامة والأداء المالي للشركة ، سواء معدل العائد علي الاصول أومعدل العائد علي حقوق الملكية ، ولكن يوجد تأثير ايجابي معدل لاستقلالية مجلس الادارة علي العلاقة بين الإفصاح عن أداء الاستدامة ومعدل العائد علي حقوق الملكية فقط

الأصالة العلمية للبحث: تلقي هذه الدراسة الضوء علي التأثير المعدل لحجم و استقلالية مجلس الادارة علي العلاقة بين بين الإفصاح عن أداء الاستدامة والأداء المالي للشركة واستنادآ الي النتائج ، توصي الدراسة بضرورة الزام الشركات المقيدة في البورصة المصرية بالافصاح عن الاداء البيئي والاجتماعي والحوكمة مع التقارير المالية أو بشكل منفصل تحقيقآ للأداء المستدام ، وتبني الجهات المنظمة إصدار معيار محاسبي يختص بالإفصاح عن أداء الاستدامة.

الكلمات المفتاحية :الإفصاح عن أداء الاستدامة، حجم مجلس الادارة، استقلالية مجلس الادارة، الأداء المالي.