ESG disclosure and corporate profitability: Does board gender diversity matter?

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الملخص:

يكشف هذا البحث عن تأثير الإفصاح البيئي والاجتماعي والحوكمة (ESG) على ربحية الشركات. علاوة على ذلك، تدرس الدراسة التأثير المعدل لتنوع الجنس في مجلس الإدارة على العلاقة بين الإفصاح البيئي والاجتماعي والحوكمة وربحية الشركات في البورصة المصرية. استخدمت الدراسة قاعدة بيانات تضم ٣٨٥ ملاحظة من الشركات غير المالية في البورصة المصرية من عام ٢٠١٩ إلى عام ٢٠٢٣، باستخدام نماذج التأثير الثابت لتقدير نتائج الدراسة. تشير نتائج الدراسة إلى أن الإفصاح البيئي والاجتماعي والحوكمة يعزز ربحية الشركات. ترتبط الشركات التي لديها إفصاح بيئي اجتماعي والحوكمة بربحية أعلى. علاوة على ذلك، تكشف النتائج أن تنوع الجنس فى مجلس الإدارة يعدل من الارتباط بين الإفصاح البيئي والاجتماعي والحوكمة وربحية الشركات. تكمن أصالة الدراسة في استكشاف الدور المعدل لتنوع

الجنس فى مجلس الإدارة على العلاقة بين الإفصاح البيئي والاجتماعي والحوكمة وربحية الشركات باستخدام عينة من الشركات المصرية. يقدم هذا البحث للشركات وصناع السياسات وأصحاب المصلحة رؤى عملية لتعزيز ربحية الشركات. تشجع الدراسة الشركات على تبني الإفصاح البيئي والاجتماعي والحوكمة، مما يعزز ربحية هذه الشركات.

الكلمات المفتاحية: الربحية الشركات، تنوع الجنسين في مجلس الإدارة، الإفصاح عن المعايير البيئية والاجتماعية والحوكمة، الأداء البيئي، حوكمة الشركات.

Abstract :

This research reveals the influence of ESG disclosure on corporate profitability. Moreover, the study examines the moderating influence of board gender diversity on the relationship between ESG disclosure and the corporate profitability of the Egyptian Stock Exchange. The study used a database of 385 observations from non-financial corporations on the Egyptian Stock Exchange from 2019 to 2023, using fixed effect models to estimate the study findings. The study results indicate that ESG disclosure enhances corporate profitability. The companies that have ESG disclosure are associated with higher corporate profitability. Furthermore, the results reveal that board diversity moderates the nexus between ESG disclosure and corporate profitability. The study's originality resides in exploring the moderating role of board diversity on the association between ESG disclosure and corporate profitability utilizing a sample from Egyptian companies. This research offers companies, policymakers, and stakeholders’ practical insights to

enhance corporate profitability. The study encourages companies to adopt ESG disclosure, enhancing their corporate profitability.
Keywords: Corporate profitability, Board gender diversity, ESG disclosure, Environmental performance, Corporate governance.

1. Introduction

Corporate profitability refers to a company's ability to generate profits from its core or non-core operations over a given period of time. Corporate profitability is an important indicator for assessing a company's financial performance and its ability to sustain and grow in the market (Abdi et al., 2022; Chouaibi, 2021). Corporate profitability is a strategic approach that aims to achieve economic success while adhering to environmentally and socially responsible practices (Alvarez-Perez & Fuentes, 2024). Recently, a focus on corporate profitability has become an integral part of successful company strategies. Companies that embrace corporate profitability seek to achieve a balance between financial growth, environmental conservation, and providing added value to society (Carnini Pulino et al., 2022; Whelan, 2021). Companies that adopt this approach not only achieve financial gains but also gain a positive reputation in the market and enhance their ability to compete (Chandrakant & Rajesh, 2023; Zhao et al., 2018). Corporate profitability provides them with the opportunity to build long-term relationships with customers, employees, and investors, which supports continuity and growth in an ever-changing business environment (Saulick et al., 2023).

Environmental, social, and governance (ESG) disclosure is an important aspect of modern accounting and management practices (M. A. Khan, 2022). This disclosure reflects how companies are committed to balancing their environmental, social, and governance goals (Elmghaamez et al., 2024). ESG disclosure provides transparent and reliable information about the activities and policies implemented by the company to support environmental, social, and governance issues that affect stakeholders (Kengkathran, 2018). ESG disclosure is a strategic tool for companies to improve their reputation and achieve a competitive advantage (Abdi et al., 2022; Giannopoulos et al., 2022). With the increasing interest of the international community in sustainability, it becomes necessary for companies to adopt transparent disclosure practices that reflect their commitment to achieving sustainable development and societal well-being (Alodat & Hao, 2024). ESG disclosure activities include environmental sustainability initiatives, charitable activities, and engaging in ethical business practices (Dai et al., 2018; Xie et al., 2019). ESG disclosure initiatives can help reduce labor costs, and ESG disclosure initiatives have a positive impact on society (Chen & Xie, 2022).

On the other hand, board gender diversity, as one of the mechanisms of corporate governance, plays a main role in improving corporate profitability (Boukattaya et al., 2022; Elmashtawy, Che Haat, et al., 2024; Ismail & Latiff, 2019). The impact of board diversity on corporate profitability is an important topic in corporate governance. This impact revolves around how board members' diversity is used to make strategic decisions that lead to achieving long-term sustainability goals (Shakil et al., 2024). In general, the board's gender diversity contributes to enhancing corporate profitability by supporting informed financial decisions directed toward achieving a balance between economic growth and social and environmental responsibility.

The research gap identified through the existing literature, which is not cited in studying and analyzing corporate profitability, ESG disclosure, and board gender diversity (Carnini Pulino et al., 2022; Inamdar, 2024; Kampoowale et al., 2024; Manita et al., 2018), still introduces unexplored rules in the Egyptian context. This study is important and different from previous studies in many aspects. First, it focuses on non-financial Egyptian companies, whereas the previous literature focused on developed countries. Second, corporate profitability studies remain significant and have become a source of concern for regulators and policymakers (Mardini, 2022; Rajesh, 2020). As a result, it is necessary to investigate how ESG disclosure affects corporate profitability for investor protection. Therefore, this study provides an extension of previous studies in an attempt to deepen the literature and reduce discrepancies. Finally, this research differs from previous literature in that it depends on the financial statements of non-financial Egyptian companies. It is contended that in developing countries that have different cultural, regulatory, and institutional contexts, it can be expected to differ from that found in developed countries (Alfalih, 2023; Wentzel et al., 2022).

The study's purpose is to identify the effects of ESG disclosure on corporate profitability in Egypt. The analysis is based on 385 observations spanning the years 2019 to 2023. The findings reveal that ESG disclosure has a positive influence on corporate profitability. The results also concluded that board gender diversity moderates the relationship between ESG disclosure and corporate profitability. The current study aims to contribute to the following aspects: First of all, the study aims to enrich the literature on corporate profitability, ESG disclosure, and board gender diversity. Thus, advancing the relevant literature in these fields. Second, the research is significant because the important influence of gender diversity in company monitoring deserves in-depth research on the various factors that relate ESG disclosure to corporate profitability. Finally, the study provides companies, shareholders, investors, and other stakeholders with practical contributions.

2. Literature review and hypotheses development

The study develops hypotheses that contribute to comprehending the nexus between corporate profitability, ESG disclosure, and board gender diversity. This study derives its variables and hypotheses from stakeholder theory and legitimacy theory. These theories emphasize the importance of ESG disclosure by the corporation's management to enhance corporate profitability in the long term (López-Concepción et al., 2022; Silva, 2021). Numerous studies have used these theories to understand the effects of ESG disclosure and explain the factors affecting corporate profitability (Freeman et al., 2018; Solikhah et al., 2020). In addition, many studies have adopted these theories to explain the effects of board gender diversity as one of the corporate governance mechanisms (Nguyen & Thanh, 2022; Xie et al., 2019). Stakeholder theory is one of the most vital theories for studying corporate profitability due to the impact of performance on the interests of shareholders. According to the stakeholder theory, ESG disclosure initiatives help enhance a business's reputation.

On the other hand, the legitimacy theory in business institutions is related to the principles and rules that govern the actions and orientations of institutions in the commercial and economic fields (Zyznarska-Dworczak, 2018). When the concepts of legitimacy theory and corporate profitability come together, companies can create a system based on achieving economic growth in a way that respects the environment and society (Solikhah et al., 2020), investing in sectors that preserve the environment and contribute to social development (Zyznarska-Dworczak, 2018), and achieving economic and social justice in commercial and financial transactions (Silva, 2021). By focusing on social and economic justice and promoting investment, institutions can achieve long-term sustainability (Kengkathran, 2018; Zyznarska-Dworczak, 2018). Legitimacy theory seeks to achieve a balance between economic growth and ethics, leading to the formation of a sustainable business environment.

According to stakeholder theory and legitimacy theory, when board members are diverse, they can make financial decisions that balance profits with sustainable investments (Naciti, 2019). Board gender diversity helps predict the financial risks associated with sustainability projects and assess their potential impact on corporate profitability (Githaiga & Kosgei, 2023). Board gender diversity can enhance transparency in sustainability reporting, ensuring that financial statements related to sustainable practices are accurate and clear, which increases investor and shareholder confidence (Homroy & Slechten, 2019). Board gender diversity can identify the most financially viable sustainable investment opportunities, which helps integrate sustainability goals with profitability (Lee, 2023). Board gender diversity contributes to better communication with investors regarding the company’s sustainable direction, which increases trust and provides greater support for environmental and social initiatives (Githaiga & Kosgei, 2023).

Numerous studies have investigated the association between environmental, social, and governance (ESG) disclosure and corporate profitability (Alodat & Hao, 2024; Alvarez-Perez & Fuentes, 2024; D'Amato et al., 2024; Elmghaamez et al., 2024; Inamdar, 2024; Risal et al., 2024; Shakil et al., 2024; Terdpaopong et al., 2024; Treepongkaruna & Suttipun, 2024). The study (Alvarez-Perez & Fuentes, 2024) concluded that ESG reporting helps attract investors to corporations that adopt ESG disclosure, which contributes to enhancing the corporation's profitability in the long term. Furthermore, Elmghaamez et al. (2024) pointed out the importance of ESG reporting and disclosure in maintaining current shareholders and attracting new investors, which improves the corporation's performance. On the other hand, many studies have addressed gender diversity within the board of directors and its impact on ESG reporting and corporation profitability (Alahdal et al. 2024; Almaqtari et al., 2024; Kampoowale et al., 2024; Makhija et al., 2024; Tran et al., 2024). Where the study (Kampoowale et al., 2024) concluded that the presence of females on the board of directors enhances the profitability of corporations. Moreover, Almaqtari et al. (2024) confirmed that increasing the percentage of females on the board of directors increases ESG disclosure, which improves sustainability reports.

2.1 The impact of ESG disclosure on corporate profitability

According to stakeholder theory, improving ESG disclosure has the effect of protecting shareholders' interests and improving the company's long-term sustainability (Alvarez-Perez & Fuentes, 2024). Therefore, actions taken by a company's management offer investors signals about the management's vision of the company's future (Yu et al., 2023). Previous studies argue that efficient ESG disclosure enhances corporate profitability, and thus, there is a positive association between ESG disclosure and corporate profitability (Dhingra, 2023; Mardini, 2022; Wentzel et al., 2022). Furthermore, managers use ESG disclosure to boost profitability and impact future cash flow (Inamdar, 2024). The managers make decisions based on their managerial discretion and private information, which might improve corporate profitability (Whelan, 2021). Conversely, Khan et al. (2020) determined that ESG disclosure negatively impacts the accuracy of forecasts by financial analysts on the stock exchanges. Therefore, there is a negative nexus between ESG disclosure and corporate profitability because managers only use their discretion to maximize their utility, resulting in the misalignment of incentives between managers and shareholders and corporate profitability deterioration (Zhao et al., 2018).

Companies that implement ESG criteria are more attractive to investors looking for sustainable investments (Aydoğmuş et al., 2022). Adherence to environmental and social criteria can reduce costs in the long run, such as reducing energy consumption or reducing legal risks (Cerciello et al., 2023). According to Cesarone et al. (2022), disclosing sustainable practices can improve a company's reputation and increase investor and customer confidence, leading to increased profitability. Furthermore, improving governance practices helps reduce financial and regulatory risks, which positively impacts profitability (Terdpaopong et al., 2024). Investing in and disclosing ESG practices can improve profitability in the long run. To achieve this effect, companies must strike a balance between adhering to sustainability practices and achieving their financial goals (Harris, 2022). Numerous studies have emphasized a positive association between ESG disclosure and corporate profitability, especially in markets where investors are concerned about sustainability (D'Amato et al., 2024; Risal et al., 2024; Treepongkaruna & Suttipun, 2024). However, this relationship may vary based on factors such as industry sector, company size, and economic and regulatory environment.s

Several empirical studies on ESG disclosure have been based on developed countries, e.g., Elmghaamez et al. (2024), Dai et al. (2018), and Saygili et al. (2022). Recently, there has been a growing body of empirical literature on ESG disclosure in developing countries. For example, Wentzel et al. (2022) provide evidence that companies can improve share value growth by adopting ESG disclosure. Several studies (Dhingra, 2023;

Mardini, 2022; Wu & Jin, 2022; Yu et al., 2023) have concluded that ESG disclosure has a positive influence on corporate profitability. The studies (Almaqtari et al., 2024; Alahdal et al., 2024; Saygili et al., 2022), implicitly indicate the adverse effect of ESG disclosure on corporate profitability. Wentzel et al. (2022) investigated the association between ESG disclosure through environmental responsibility, social responsibility, and economic responsibility and corporate profitability in emerging markets. Their findings indicated that while ESG disclosure positively influences corporate profitability, this effect is not statistically significant. According to the previous discussions, the next hypothesis was formulated:

***H1: ESG disclosure has a positive and significant influence on corporate profitability*.**

2.2The relationship between board gender diversity, ESG disclosure, and corporate profitability

The Board of Directors can be a vital element in supporting companies to adopt objective ESG disclosure and enhance corporate profitability (Kampoowale et al., 2024; Romano et al., 2020). The characteristics of the Board of Directors reflect the Board’s ability to supervise, monitor, and provide resources in light of the increasing interest in corporate profitability (Shakil, 2021). When the board of directors has knowledge and experience in ESG disclosure, it can provide advice and guidance on the company's strategies and thus enhance corporate profitability (Makhija et al., 2024; Ouni et al., 2020). Board gender diversity is one of the governance mechanisms that limit managers' ability to manipulate corporate profitability assessments by reducing information asymmetry, thereby enhancing corporate profitability (Kahloul et al., 2022). The board's gender diversity can lead to improving decision-making and enhancing the firm’s profitability (Alodat & Hao, 2024; Setiani, 2023). Companies can consider the board gender diversity as a necessary factor to improve their performance (Alkhawaja et al., 2023). By consulting with managers with financial expertise, the board can obtain the information necessary to make effective decisions in improving corporate profitability (Bhatia & Marwaha, 2022). Therefore, boards must be prepared to support companies in adopting ESG disclosure and working toward improved corporate profitability (Alahdal et al., 2024; Wasiuzzaman & Subramaniam, 2023).

Numerous pieces of literature support the board's gender diversity (Khemakhem et al., 2023; Ouni et al., 2020; Romano et al., 2020; Tran et al., 2024). According to Elmashtawy et al. (2023), the board's monitoring functions depend on various aspects, including gender diversity. Previous studies have also explored how a board's gender diversity can enhance a company's strategy (Salsabilla & Kusumawardani, 2023). The board's gender diversity can also effectively reduce corporate risks and minimize the impact of crises on companies (Boukattaya et al., 2022). Similarly, Obeitoh et al. (2023) indicated that gender diversity on the board improves corporate profitability because directors are more competent than others. According to Kouaib et al. (2020), the board gender diversity enhances the board's ability to effectively monitor. Githaiga and Kosgei (2023) highlighted the substantial positive impact of board diversity on corporate profitability. As a result, some indicators show the positive effects of board gender diversity on enhancing corporate profitability due to its tangible impact in ensuring reasonable assurance about the quality of the financial report, on which different stakeholders rely when making investment decisions associated with the company. Hussain et al. (2018) demonstrated that boards that have women exhibit higher levels of conservatism and improved corporate profitability.

The board characteristics affect ESG disclosure through economic responsibility, social responsibility, and environmental responsibility (Ismail & Latiff, 2019). Kim et al. (2023) concluded that a board of directors that has women is likely to work to improve the company's corporate profitability. Furthermore, Johl et al. (2015) indicated that the board gender diversity is positively associated with improving the firm's corporate profitability. Obeitoh et al. (2023) revealed that there is a positive relationship between some board characteristics, such as size, meetings, gender diversity, and corporate profitability.

Several previous research findings concluded a positive nexus between board gender diversity and corporate profitability (Kampoowale et al., 2024; Makhija et al., 2024; Manita et al., 2018; Romano et al., 2020; Shakil, 2021). Similarly, the studies (Khemakhem et al. 2023; Ouni et al., 2020; Shakil et al., 2024) have indicated that board gender diversity is favorably associated with ESG disclosure. Empirical studies concluded that the nexus between ESG disclosure and corporate profitability is affected by corporate governance mechanisms (Alkhawaja et al., 2023; Tran et al., 2024; Wasiuzzaman & Subramaniam, 2023). Accordingly, it is supposed that there is a nexus between ESG disclosure and corporate profitability, and this association is affected by board gender diversity, as well as the importance of board gender diversity because of its tangible impact in ensuring reasonable assurance about the quality of the financial report, on which different stakeholders rely when making investment decisions associated with the company. Based on the above justifications and the purpose of the study, it is suggested that board gender diversity moderates the relationship between ESG disclosure and corporate profitability. Drawing from the preceding discussion, the subsequent hypotheses are proposed:

H2: Board diversity moderates the nexus between ESG disclosure and corporate profitability.

3. Methodology

3.1 Data Collection and Sampling

The study population includes all Egyptian companies registered in the stock market between 2019 and 2023. The final sample was selected according to the following conditions: First, the banking sector, the financial services sector, and insurance companies were excluded because of their nature specific to financial reporting. Secondly, companies whose financial statements were prepared in a foreign currency were excluded other than the Egyptian pound. Third, companies' financial reports must be available regularly and contain sufficient data to measure the study variables. Fourth, companies' financial reports must have been issued on December 31 to meet consistency in the fiscal year. Finally, companies must have been listed on the Egyptian Stock Exchange from 2019 to 2023. After applying the previous conditions, the final sample for the study consists of 77 non-financial companies listed on the Egyptian Stock Exchange and 385 observations, distributed to 14 sectors over the 2019–2023 period. Table 1 presents a summary of the selection process for the sample.

Table 1. The sample of the study

No.	Sectors	Final sample	Observations	
			No.	%
1	Real state	12	60	15.6%
2	Basic resources	5	25	6.5%
3	Industrial goods, services and automobiles	4	20	5.2%
4	Trade and distributors	4	20	5.2%
5	Contracting and construction engineering	8	40	10.4%
6	Health care and pharmaceuticals	7	35	9.1%
7	Telecommunication services, media and information technology	5	25	6.5%
8	Construction and materials	6	30	7.8%
9	Travel and leisure	5	25	6.5%
10	Food, beverages and tobacco	7	35	9.1%
11	Textile and durables	4	20	5.2%
12	Materials	5	25	6.5%
13	Paper & Packaging materials	2	10	2.6%
14	Tourism & Entertainment	3	15	3.8%
Total		**77**	**385**	**100%**

Furthermore, the study utilized secondary data, especially the financial statements, board of directors' reports, and supplementary clarifications of the sample companies. The study also sourced data from the companies' financial reports, which are published on the websites of the Egyptian Stock Exchange and the Mubasher website (http://www.mubasher.info). This study uses data panel regression by ordinary least squares with fixed effects.

The study employs fixed-effects ordinary least squares panel data regression models to examine the nexus between ESG disclosure, board gender diversity, and corporate profitability in

Egyptian non-financial companies. A set of assumptions is related to the panel data analysis according to its type, and the statistical methods that test these assumptions vary. The choice between the pooled and fixed models is made using the F-test. To identify whether the model is pooled or random, the Breusch and Pagan-Lagrange multiplier tests are used. In addition, the Hausman analysis was used to assess the suitability of the panel data for the random effects model or the fixed effects model (Gujarati & Porter, 2013). This study performed these three tests to determine the appropriate panel data model. Accordingly, the fixed effects model was used. Regression diagnostics were performed before each model was tested to ensure that multiple regression assumptions were met and to avoid erroneous results. Normality, outliers, multicollinearity, heteroscedasticity, linearity, and autocorrelation are the most important regression assumptions in the study.

3.2 Variables of the study

The study's dependent variable is the corporate profitability (CP) of the sample companies, gauged through the return on assets (ROA) ratio, which is measured by the ratio of net income divided by the total assets. The study independent variables express ESG disclosure, encompassing environmental disclosure (ENVD), social disclosure (SOCD), and governance disclosure (GOVD). Furthermore, the board gender diversity (BGDIV) is the moderating variable of the interaction between

ESG disclosure and corporate profitability. In addition, the study includes three control variables, which include board independence (BIND), firm size (FSIZE), and leverage (LEV). Table 2 summarizes the definition and measurement of dependent, moderating, independent, and control variables, along with evidence from prior studies that used the same measures.

Table 2. Variables measurements

Variable	Symbol	Measurement	Source
Dependent Variable			
Corporate profitability	CP	Measured by the net income to total assets ratio (ROA).	(Alodat & Hao, 2024; Chen & Xie, 2022; Giannopoulos et al., 2022; Whelan, 2021)
Independent Variables			
Environmental disclosure	ENVD	An index of 31 indicators related to environmental issues.	(Abdi et al., 2022; Almaqtari et al., 2024; Chouaibi, 2021; Elmghaamez et al., 2024)
Social disclosure	SOCD	An index of 36 indicators related to social issues.	(Kengkathran, 2018; M. A. Khan, 2022)
Governance disclosure	GOVD	An index of 13 indicators related to governance issues.	(Alfalih, 2023; Alvarez-Perez & Fuentes, 2024)
ESG disclosure	ESGD	Integrating the index of environmental, social, and governance aspects.	(Carnini Pulino et al., 2022; Giannopoulos et al., 2022; Inamdar, 2024; Yoo & Managi, 2022)
Moderating variable			
Board gender diversity	BGDIV	The presence of women on the board ratio	(Almaqtari et al., 2024; Elmashtawy et al., 2023; Kampoowale et al., 2024; Manita et al., 2018)
Control Variables			
Board independence	BIND	The proportion of independent directors to total board members.	(Boukattaya et al., 2022; Elmashtawy et al., 2023; Setiani, 2023)
Firm size	FSIZE	The total assets logarithm.	(Makhija et al., 2024; Ouni et al., 2020; Zhao et al., 2018)
Leverage	LEV	The total liabilities divided by the total assets' ratio.	(Bhatia & Marwaha, 2022; Elmashtawy, Ateeq, et al., 2024; Salsabilla & Kusumawardani, 2023)

3.3 Econometric tools

The study developed four models to measure the impact of ESG disclosure on corporate profitability and the moderating role of board diversity on the association between ESG disclosure and corporate profitability. The study's models can be formulated as regression models, as follows:

The direct effect models are outlined below:

The direct effect models assess the effect of ESG disclosure on corporate profitability in Egyptian non-financial companies. The study formulated two models, and these models answer hypothesis 1.

$$CP_{it} = \alpha + \beta_1 ENVD_{it} + \beta_2 SOCD_{it} + \beta_3 GOVD_{it} + \beta_4 BGDIV_{it} + \beta_5 BIND_{it} + \beta_6 FSIZE_{it} + \beta_7 LEV_{it} + \varepsilon_{it} \quad (1)$$

$$CP_{it} = \alpha + \beta_1 ESGD_{it} + \beta_2 BGDIV_{it} + \beta_3 BIND_{it} + \beta_4 FSIZE_{it} + \beta_5 LEV_{it} + \varepsilon_{it} \quad (2)$$

The models of moderating role are as follows:

The moderator effect models are to examine the moderating influence of the board diversity on the association between ESG disclosure and corporate profitability in Egyptian non-financial companies. The study formulated two models, and these models answer hypothesis 2.

$$CP_{it} = \alpha + \beta_1 BGDIV_{it} + \beta_2 ENVD_{it} + \beta_3 ENVD * BGDIV_{it} + \beta_4 SOCD_{it} + \beta_5 SOCD * BGDIV_{it} + \beta_6 GOVD_{it} + \beta_7 GOVD * BGDIV_{it} + \beta_8 BIND_{it} + \beta_9 FSIZE_{it} + \beta_{10} LEV_{it} + \varepsilon_{it} \quad (3)$$

$$CP_{it} = \alpha + \beta_1 ESGD_{it} + \beta_2 BGDIV_{it} + \beta_3 ESGD * BGDIV_{it} + \beta_4 BIND_{it} + \beta_5 FSIZE_{it} + \beta_6 LEV_{it} + \varepsilon_{it} \quad (4)$$

4. Results and Discussions

4.1Descriptive statistics

Table 3 shows a summary of the descriptive analysis for the independent, dependent, moderating, and control variables used in the study. The research examines the adherence of variables to the normal distribution through the application of the Kolmogorov-Smirnov and Shapiro-Wilk tests. Findings suggest that the variables conform to the normal distribution, as evidenced by significance values exceeding 0.05 (Pallant, 2020). Table 3 reveals that the mean of corporate profitability is 0.76 with a standard deviation of 1.05. The mean of governance disclosure is 8.32, and the minimum and maximum levels are 0.00 and 92.52, respectively. The mean social disclosure was around 14%, with a standard deviation of 18.74. The mean of environmental disclosure is 6.301, and the minimum and maximum levels are 0.00 and 87.14, respectively. Moreover, the mean ESG disclosure was around 13%, with a standard deviation of 24.23. The average board gender diversity is 17.54, and the standard deviation is 28.55, indicating that 17.5% of the sampled board members are women. Concerning the control variables, the mean board independence is 16.02, and the standard deviation is 32.33. The average firm size is 21.97 with a standard deviation of 1.57. The average leverage is 0.72, and the standard deviation is 1.45.

Table 3. Descriptive Statistics

Variables	Observations	Mean	Minimum	Maximum	Standard Deviation
CP	385	0.76	-1.67	3.24	1.05
GOVD	385	8.32	0.00	92.52	7.75
SOCD	385	13.83	0.00	94.22	18.74
ENVD	385	6.31	0.00	87.14	8.14
ESGD	385	12.58	0.00	92.42	24.23
BGDIV	385	17.54	0.00	98.92	28.55
BIND	385	16.02	0.00	83.95	32.33
FSIZE	385	21.97	14.34	21.49	1.57
LEV	385	0.72	0.00	14.16	1.45

4.2Correlation analysis

It is clear from the results of the correlation analysis in Table 4 that all values of the correlation coefficients within the matrix amounted to less than 0.80. This result indicates that the results of the correlation analysis between the study variables are free from multicollinearity (Gujarati & Porter, 2013). Table 4 also concludes that there are significant correlations among independent, dependent, moderating, and control variables. The highest correlation between corporate profitability and ESG disclosure is 0.52, suggesting that a higher level of ESG disclosure is associated with a higher corporate profitability. The correlation between firm size and corporate profitability is also significant (with a correlation coefficient of 0.50), suggesting that larger companies have a higher corporate profitability. Furthermore, the variance inflation factor (VIF) test findings reveal a very low VIF for each variable (less than 1.30) and a large tolerance (at least 0.77), which indicates that there are no multicollinearity problems in the research variables in the correlation analysis (O'brien, 2007).

Table 4. Correlation Analysis

Variables	CP	BGDIV	GOVD	SOCD	ENVD	CSPD	BIND	FSIZE	LEV
CP	1								
BGDIV	0.45**	1							
GOVD	0.42***	0.01	1						
SOCD	0.10**	0.22*	0.08	1					
ENVD	0.21**	0.03	0.26***	-0.07	1				
ESGD	0.52***	0.01	-0.06	-0.09**	-0.04	1			
BIND	-0.04	0.15**	-0.12	0.47**	0.21***	0.25***	1		
FSIZE	-0.50**	0.20**	-0.04	0.02	0.03	-0.12	0.33**	1	
LEV	0.14*	-0.01	-0.34*	0.28*	-0.01	-0.17**	-0.35	-0.21	1
VIF	1.11	1.21	1.18	1.21	1.14	1.01	1.22	1.12	1.24
Tolerance	0.91	0.82	0.78	0.87	0.84	0.90	0.79	0.88	0.83

Note: **, and * are the significance levels at 0.05 and 0.01, respectively.**

4.3Direct effect model's analysis

Table 5 displays the regression findings of the direct influence analysis. The results in models 1 and 2 are allocated to the direct effect regression models of the effect of ESG disclosure on corporate profitability. The findings in Model 1 concluded a significant positive and negative effect of governance disclosure, social disclosure, and environmental disclosure on corporate profitability at a significant level of 5%, 1%, and 1%, respectively. Furthermore, the findings in Model 2 concluded a positive and significant impact of ESG disclosure on corporate profitability at a significant level of 1% (8.78). This finding indicates that companies exhibiting elevated ESG disclosure demonstrate a greater degree of corporate profitability, and these companies can increase their performance through a high level of ESG disclosure. This finding is supported by the stakeholder theory and legitimacy theory and is consistent with the findings of the studies [10], [12], [23], and [25]. Therefore, H1 is supported.

Table 5. Direct effect models

Variables	Model 1	Model 2
_cons	0.02*** (0.00)	-0.07** (0.02)
GOVD	-4.53** (0.01)	
SOCD	4.63*** (0.00)	
ENVD	-0.27*** (0.00)	
ESGD		8.78*** (0.00)
BGDIV	0.03*** (0.01)	1.32** (0.00)
BIND	0.27*** (0.02)	0.28*** (0.01)
FSIZE	0.27** (0.02)	0.17** (0.00)
LEV	-0.05*** (0.00)	-0.03** (0.01)
R^2	0.46	0.48
Adjusted R^2	0.42	0.45
F-statistic	7.35	12.71
Prob (F-test)	0.00	0.00
Durbin-Watson test	1.08	2.03

Note: *, **, and * are the significance levels at 0.1, 0.05, and 0.01, respectively.**

The results also indicate that the board diversity affects the corporate profitability across the conducted models at a significant level of 1% and 5%, respectively. This finding is consistent with the findings of the studies (Boukattaya et al., 2022; Romano et al., 2020; Setiani, 2023). Moreover, board gender diversity serves as a safeguarding mechanism, mitigating a company's risk exposure while enhancing its overall corporate profitability. Furthermore, the results concluded that the firm size has a positive effect on corporate profitability across the conducted models. These results mean that as the size of the company increases, its level of corporate profitability enhances. The findings also concluded that the board independence positively affects the corporate profitability according to models 1 and 2 at a 1% significant level. This result means that the presence of independent members on the board is important to enhance the corporate profitability. In addition, there is an inverse effect of leverage on the corporate profitability, as the values of corporate profitability are -0.05 and -0.03, respectively. This result reflects the negative impact of the increase in debt and financial insolvency on the corporate profitability. Adjusted R^2 values range between 42% and 45%, exhibiting that the research variables are approximately 45% of the corporate profitability. The models evaluated additionally demonstrated that the D-W result values showed that variables do not have autocorrelation issues.

4.4Moderating analysis

Models 3 and 4 in Table 6 present the analysis of board diversity as a moderating variable on the nexus between ESG disclosure and corporate profitability. The findings of the moderating effect indicate that board gender diversity strengthens the association between ESG disclosure and corporate profitability. These results indicate that companies can enhance their corporate profitability by paying attention to the disclosure of ESG to meet the needs of various stakeholders, in addition to paying attention to the gender diversity of the Board of Directors members, as it has a positive impact on enhancing corporate profitability. These results are consistent with the results of studies (Kampoowale et al., 2024; Wasiuzzaman & Subramaniam, 2023). Hence, H2 is supported. Noteworthy is that the board diversity has strengthened the nexus between ESG disclosure (environmental disclosure, social disclosure, and governance disclosure) and corporate profitability across the conducted models (Model 3 and Model 4), which was obtained when the board diversity was added to the models. This indicates the critical role of the board gender diversity, as the board diversity has stronger incentives to influence operational decisions through management monitoring, resulting in a higher corporate profitability.

Table 6. Moderating effect models

Variables	Model 3	Model 4
_cons	1.01** (0.02)	1.03*** (0.00)
BGDIV	1.66** (0.03)	2.59** (0.02)
GOVD	-0.44** (0.04)	
GOVD*BGDIV	-3.76*** (0.00)	
SOCD	7.45* (0.05)	
SOCD*BGDIV	1.38*** (0.00)	
ENVD	-0.56** (0.03)	
ENVD*BGDIV	0.52*** (0.00)	
ESGD		7.75*** (0.00)
ESGD*BGDIV		1.02*** (0.00)
BIND	1.73* (0.04)	2.37** (0.03)
FSIZE	2.03*** (0.00)	2.24*** (0.00)
LEV	-0.02*** (0.00)	-0.02*** (0.00)
R^2	0.43	0.45
Adjusted R^2	0.40	0.43
F-statistic	23.21	14.35
Prob (F-test)	0.00	0.00
Durbin-Watson test	1.73	1.80

Note: *, **, and * are the significance levels at 0.1, 0.05, and 0.01, respectively.**

It is clear from the regression analysis findings of the direct effect and the moderating effect that the values of adjusted R^2 reached 0.42 and 0.45 for the direct effect regression models and 0.40 and 0.43 for the moderating effect regression models. This indicates the positive effect of inserting the interaction between the ESG disclosure (environmental disclosure, social disclosure, and governance disclosure) and board gender diversity variables in the moderating model. Additionally, it signifies the precision of the models and the autonomy of the factors influencing corporate profitability. Moreover, the outcomes demonstrated that the significance levels were 0.00 across the regression analysis models. The results of the moderating effect analysis can be supported by stakeholder theory and legitimacy theory. According to stakeholder theory, having women board members leads to working to meet the needs of different stakeholders, which has a long-term impact on enhancing the company's corporate profitability. Furthermore, legitimacy theory suggests that ESG disclosure increases transparency between the company and internal and external users, which enhances its corporate profitability in the long term, in light of the presence of women in board members.

4.5Endogeneity analysis

Additional analyses are carried out to evaluate the robustness of the study's findings, and it is revealed that earlier results are robust with alternative measurements of the variables. Table 7 findings indicate similarity in the effect of independent variables and their interactions with board diversity on corporate profitability. The coefficients' S-D are relatively steady, indicating that the predicted parameters vary consistently. The findings reveal that the significance level test yielded a value of 0.0001 for the variable representing the interaction between board gender diversity and ESG disclosure (environmental disclosure, social disclosure, and governance disclosure), which is below the significance level of 0.05. This indicates a substantial influence of the board gender diversity introduction on the association between ESG disclosure and corporate profitability. Furthermore, the significance levels of the control variables, namely board independence, firm size, and leverage, are below 0.05, suggesting a significant relationship with corporate profitability. The models' explanatory power varies from 30% to 34%, demonstrating that including the board gender diversity improves the nexus between ESG disclosure and corporate profitability. Moreover, the coefficient of the regression models exhibits positive significance, as the significance levels fall below the significance threshold of 0.05.

Table 7. Endogeneity analysis

Variables	Model 1	Model 2
_cons	9.32*** (22.57)	8.31*** (21.13)
GOVD	-0.00 (-0.44)	
GOVD*BGDIV	-0.00*** (-7.71)	
SOCD	0.00 (2.41)	
SOCD*BGDIV	0.01*** (8.31)	
ENVD	-0.00 (-0.71)	
ENVD*BGDIV	0.00 (0.77)	
ESGD		0.00*** (8.52)
ESGD*BGDIV		0.01*** (4.25)
BGDIV	0.03*** (5.29)	0.01*** (6.67)
BIND	0.01*** (4.51)	0.00*** (5.63)
FSIZE	0.01*** (26.63)	0.01*** (27.81)
LEV	-0.00*** (-8.26)	-0.00*** (-8.22)
R^2	0.37	0.36
R^2_adjusted	0.34	0.30
F-test	42.67	32.12
Prob.	0.000	0.000

Note: *, **, and * are the significance levels at 0.1, 0.05, and 0.01, respectively.**

5. Conclusion

The study examined the effect of ESG disclosure on corporate profitability and the moderating role of board gender diversity on the association between ESG disclosure and corporate profitability. This research is attributed to a balanced database of 385 firm-year observations of Egyptian nonfinancials spanning from 2019 to 2023. The results indicated that ESG disclosure had a significant and positive influence on corporate profitability. It implies that Egyptian companies have to concentrate on adopting more ESG disclosure to improve corporate profitability. Moreover, the study found that board gender diversity moderates the nexus between ESG disclosure and corporate profitability. The results also concluded that board gender diversity has a vital influence in enhancing corporate profitability. Furthermore, the results confirm the positive influence of introducing the board gender diversity as a moderator variable in the relationship models. Additional analyses were performed to investigates the robustness and endogeneity of the study inferences, and it was discovered that previous inferences are robust with different measurements.

This study makes the following distinct contributions to the existing literature: First, for theoretical contribution, the study adds to the current research on corporate profitability, ESG disclosure, and gender diversity, especially in Egypt. The study is the first to investigate the moderating role of board gender diversity in the association between ESG disclosure and corporate profitability. Second, the study offers various implications for regulators, companies, and stakeholders. The study indicates that board gender diversity, as one of the corporate governance mechanisms, can bolster corporate profitability within non-financial companies listed on the

Egyptian Stock Exchange. Consequently, regulators have the opportunity to advocate for board gender diversity as a means to enhance corporate profitability and incentivize its adoption among companies. Additionally, regulatory bodies can formulate guidelines and regulations that promote board gender diversity integration to bolster corporate profitability. Finally, stakeholders can focus on the board's gender diversity for more ESG disclosure to enhance corporate profitability.

The study is subject to several limitations. Firstly, the analysis spanned six years and focused solely on non-financial firms within a single country, thereby restricting the generalizability of the conclusions and limiting control over all variables influencing the outcomes. Second, the measures used to measure corporate profitability and ESG disclosure in the study might not encompass all dimensions of corporate profitability, given its multifaceted nature. There remains potential for future investigations to explore the corporate profitability using alternative corporate profitability metrics. Subsequent research endeavors could also delve into comparing various corporate governance mechanisms and their respective effects on corporate profitability. Furthermore, future research could investigate the study variables encompassing both non-financial and financial companies. In conclusion, forthcoming research could endeavor to replicate the models developed in this study across diverse countries and extend the comparison over an extended timeframe to enable a more comprehensive analysis.

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