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The Effect of ESG Risk Ratings, Board Size and Gender Diversity on Financial Performance: Econometric Case Study Indonesia 90 Companies 2020-2023

Nabil Umar Bayu Wisanggeni [a] and Ika Yustina Rahmawati [a*]

[a] Management Study Program, Faculty of Economics and Business, Universitas Muhammadiyah Purwokerto, Indonesia.

Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Aims: This study examines the influence of ESG Risk Ratings and the size of corporate boards on financial results. Furthermore, It investigates the impact of gender diversity on ESG Risk Ratings, Board Size, and the subsequent impact on Financial Performance.
Study Design: In this case study, CFP is variable dependent, ESG and BS is variable independent, GD is the moderating variable, while Dar, LV, GR, and SZ are control variables.
Place and Duration of Study: This study employs panel data from enterprises that meet the purposive sample requirements for the period of 2020-2023.

**Corresponding author: Email: IkaYustinaRahmawati@ump.ac.id;*

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Methodology: This study employs EViews 12 statistical software to conduct various tests, including the Descriptive Statistical Test, Model Selection Test, Multicollinearity and Heteroscedasticity Test, and Panel Data Regression Test. This study used purposive sampling method for sample selection. FP evaluated by the ratio of net income to total assets (ROA), ESG obtained from Morningstar Sustainalytics, BS determined by the total number of directors who serve on it, and GD is assessed by calculating the proportion of female board members.
Result: The results of this inquiry indicate that ESG does not have an impact on FP, as demonstrated by the β = 0.0031 and Prob. = 0.3189 value. A different one independent variable, BS, also has no effect on FP, as evidenced by the value of β = 0.0096 and Prob. = 0.2130. As we transition to the moderation variable, it is evident that the GD variable does not moderate the relationship between ESG and FP (β = -0.011, Prob. = 0.3555). Meanwhile, the relationship between BS and FP is weakened by GD (β = -0.058, Prob. = 0.026).
Conclusion: This study conclude that financial performance doesn't influenced by ESG risk ratings and Board size. Beside, gender diversity weakens relationship between ESG and FP. The findings of this study have significant consequences for corporations, as they shed light on the elements that influence a company's financial performance, particularly with regard to sustainability standards. Further research can include variables such as comparison female directors and others.

Keywords: ESG risk ratings; board size; gender diversity; financial performance.

1. INTRODUCTION

All around the globe, people are talking about the importance of sustainable and comprehensive development [1]. Companies and investors are now permitted to integrate a combination of environmental, social, and governance factors, which are often alluded to as ESG, into their decision-making process. The convergence of these elements is intended to facilitate the selection of appropriate and conscientious decisions [2]. The framework of ESG encompasses a comprehensive approach that considers sustainable practices while evaluating and making decisions across many industries for investors and companies. By incorporating these aspects, managerial practices will be enhanced, improving total organizational performance [3]. Companies that promote conserving the environment and social development are inclined to disclose all of their corporate social responsibility (CSR) initiatives in their annual reports [4]. Traditional investment methods frequently disregard ESG factors when evaluating risk or making investment decisions [5]. In truly ESG factors have the capacity to generate long-term value for the company, which benefits shareholders and other stakeholders [6].

According to Brooks and Oikonomou [7] The examination of how ESG performance and disclosure directly affect the economic aspects that benefit corporate entities has been a prominent and continuous subject of discussion for almost forty years. Nevertheless, prior research has yielded inconclusive findings, since certain studies have provided evidence in favor of a direct correlation between ESG ratings and a company's financial performance [8, 9]. Despite differing research findings, Financial performance is negatively correlated with ESG ratings [10, 11].

Moreover, the findings of a study on ESG Risk Ratings exhibit variations across different research subjects. The research conducted by Chininga et al [9] examines the ESG Score's potential impact on the financial performance of enterprises in South Africa. The study employed the two-stage least squares method to assess the correlation between the Environmental Score and accounting profit (specifically, ROA and ROE) as well as market performance (Tobin's Q). The results indicated that the Environmental Score had a statistically significant and positive effect on both market performance and accounting profit. However, both the Social Score and Governance Score significantly and negatively impact market performance. Yet, Chininga et al [9] concluded that South African enterprises are unable to attain good environmental performance. The environmental component of the ESG framework is concerned with the influence of a company's operations on its immediate environment. Furthermore, according to Chininga et al [9], the company's endeavors to enhance its social standing are acknowledged by all stakeholders, albeit they have not directly influenced its financial performance.

Meanwhile, research conducted by Yawika and Handayani [12] investigate the influence of the

Environmental, Social, and Governance (ESG) Score on the financial performance of significant entities in Indonesia. Moreover, the findings of the debate hint at there is no correlation between financial performance and environmental and social evaluations. Additional findings from this study indicate that corporate governance scores exert an impact on financial performance. Yawika and Handayani [12] explains that the environmental and social dimensions of the company only focus on community empowerment rather than on handling environmental impacts due to company operations and internal company development, which can improve financial performance.

Although fellow developing countries, the results of research on ESG have differences. These differences arise from differences in the implementation, goals, and achievements of sustainable practices of companies in the two countries. Therefore, research on ESG Risk Ratings is interesting to conduct because of the differences in implementation and goals.

Corporate governance has been a subject of much discussion among business and academic experts. According Ehikioya [13] the set of processes and institutions that enable stakeholders to safeguard their interests in the company is corporate governance. The emphasis on the business sector is driven by the recognition of the importance of morality and ethical conduct within enterprises. This creates a social and legal environment that encourages effective corporate governance. Financial decisions are clearly made with consideration for adhering to proper procedures [14]. However, the occurrence of companies going public at this period is known as an Initial Public Offering (IPO). Currently, financial data manipulation is prevalent among agencies, organizations, and commercial forums in Indonesia [15]. The confidence of financial statement consumers in the reliability of the report is adversely affected by the issue of financial statement manipulation [16]. The skepticism of financial statement consumers regarding the trustworthiness of financial statements leads to inquiries concerning corporate governance [17].

There is an additional aspect to consider: the actions of interest groups sometimes referred to as stakeholders, can also have an impact on the organization. Society may react unfavorably toward a corporation if it is dissatisfied with its operations. Therefore, individuals have the option to refuse to purchase its products as a form of protest. Consequently, firms may alter their traditional approach to governance, shifting their focus towards social issues that are in line with the principle of prioritizing the well-being of society rather than solely maximizing the interests of shareholders [18]. Furthermore, There is a wealth of evidence that indicates investors are prepared to pay a substantial premium for shares of companies that are perceived to have a corporate governance system that is both robust and efficient [19]. The literature review demonstrates a distinct association between the implementation of corporate governance rules and the financial success of the firm.

When assessing the execution of corporate governance, there are numerous indicators to take into account. The criteria revolve around insider shareholders, audit committees, board independence, board size, CEO duality, and other elements. This study will utilize board size indicators to examine their impact on financial performance. Prior research has yielded inconclusive findings; however, Chin et al [20] research clearly establishes a correlation between financial performance and corporate governance. That said, Chin et al [21] research claims that financial performance is not influenced by company governance.

The presence of research findings that contradict earlier studies serves as a catalyst for investigating other elements that influence firm success, namely gender diversity. The gender diversity of a company's board is positively influenced by corporate social responsibility reporting, which in turn improves its financial performance [8,11,22]. The numerous disparities between the two variables mentioned above exemplify the core of this subject matter. Hence, The purpose of this investigation is to investigate the influence of board size and ESG risk ratings on the financial performance of publicly traded companies on the Indonesia Stock Exchange (IDX).

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 Literature Review

2.1.1 Stakeholder theory

The term "Stakeholder" was coined in 1963 through an internal communication at the

Stanford Research Institute. This term sought to challenge the notion of whether shareholders constituted a select group to which management should be answerable. Consequently, by the conclusion of 1970, scholars and professionals were endeavoring to develop a management theory capable of elucidating issues faced by management that were marked by uncertainty and substantial transformation [23]. In 1984, R. Edward Freeman was recognized as the pioneer of this theory, which suggests that corporate responsibility encompasses all stakeholders rather than just shareholders. In order for a company to thrive, it is crucial to secure the support of all stakeholders. Therefore, our primary goal is to actively pursue and obtain their approval [24]. The theory of stakeholder rights emphasizes the importance of companies considering the interests of all parties involved, not just their own.

At present, stakeholder theory encourages further investigation into the financial performance of enterprises in relation to ESG scores [25,26]. The financial performance of the organization is positively influenced by corporate social responsibility, as evidenced by prior research. The results are derived from stakeholder theory, specifically the social responsibility practice hypothesis, which suggests an advantageous association between financial performance and corporate social responsibility [8, 12].

2.1.2 Agency theory

The conflict of interest between shareholders and management arises from the principles of agency theory. Agency costs climb when there is a divergence of interests between managers and owners. Today, corporate governance principles promote decision-making that comprehensively and ethically takes into account and corresponds with the legal and rational needs, concerns, and expectations of stakeholders [27].

Agents may not consistently prioritize the interests of the principal. Hence, it is imperative to set specific protocols to guarantee that managers behave in the best interests of the principals [28]. Providing appropriate incentives to agents and allocating resources with the aim of controlling the actions of non-compliant agents are ways to minimize conflicts of interest that can be carried out by the principal [29]. To address conflicts of interest and unethical behavior, it is essential to adopt a corporate governance code that aligns with the primary purpose of agency theory. Integrating independent directors onto the board of directors is an effective method of corporate oversight [14].

2.1.3 ESG risk ratings

When implementing an investment company's operational plan, it is imperative to address the environmental, social, and governance components in order to achieve ESG requirements [1]. Rating agencies judge ESG risk ratings by examining a company's business divisions as well as ecological performance using their exclusive research criteria and methodologies [11, 30, 31]. The ESG Risk Ratings are a primary benchmark used by enterprises, financial markets, and academics to evaluate the sustainability of corporations [2]. ESG indicators are a comprehensive measure of a company's environmental, social, and governance performance. They furnish non-financial data that can be employed to evaluate the efficiency of a company's management and to mitigate risks [32].

The Indonesia Stock Exchange (IDX) has formed a partnership with Morningstar Sustainalytics to conduct an assessment on Environmental, Social, and Governance (ESG) factors. IDX solely offers appraisals performed by the appraisal service. Evaluating the implementation of ESG standards in companies requires the assessment of ESG. The Indonesia Stock Exchange (IDX) continually promotes sustainable and responsible investment in the Indonesian capital market as a means to enhance ESG standards. This is achieved by establishing relationships with ESG evaluation service providers who assess the sustainability performance of companies listed on the IDX [8, 31].

Morningstar Sustainalytics employs the methodology of risk decomposition to evaluate ESG (Environmental, Social, and Governance) risks. This approach considers two key aspects of ESG challenges that firms encounter: exposure and management. The company faces a major ESG risk in the form of exposure, which directly impacts the assessment of ESG risks. The corporation can demonstrate its dedication to tackling environmental, social, and governance (ESG) challenges by implementing a range of company policies and work programs under management's guidance. Public corporations are categorized into five distinct classifications based on the assessment of their ESG risk rating. [31] :

Table 1. ESG risk rating categories

ESG Risk Score	Category	Description
0-10	Insignificant	Perceived as having little ESG Risk
10-20	Minimal	Regarded as having a negligible level of ESG risk
20-30	Moderate	Regarded as having a modest level of ESG risk
30-40	Significant	Regarded as having a substantial level of ESG risk
>40	Critical	Considered to possess severe ESG Risk

Source : [30, 31]

A study conducted by [8] demonstrated that ESG risk ratings exert a favorable and substantial impact on financial performance. The importance of enterprises' ESG risk assessment in creating lasting value for all stakeholders is evident. Considering the requirements and preferences of all stakeholders can help firms improve their long-term reputation, mitigate potential risks, and enhance their financial performance.

2.1.4 Board size

The board's dimensions are a critical measure for assessing corporate governance. The board of directors' capacity is determined by the total number of directors who hold positions within the organization [22,32]. The size of a company's board of directors is regarded as a consequential issue that can impact its success. In summary, board members must carefully determine the optimal number of individuals serving on the board and ensure that these individuals possess the necessary skills, are capable of fulfilling their obligations, and can do a range of tasks [14]. Previous research suggests that when the board of directors grows in size, there is a higher chance of conflicts of interest and misunderstandings arising among its members. The effectiveness of boards in managing operations and their involvement in the management process declines as the number of board directors increases. Hermalin and Weisbach [33].

Research findings Abdullah et al [14] prove that the size of the board of directors is directly correlated with financial performance and suggesting that as the board's size increases, financial performance also improves. Therefore, it may be inferred that larger board dimensions are advantageous for the organization. Nevertheless, it is imperative to exercise prudence due to the potential non-linear nature of the relationship. There could be a non-linear relationship between the size of a board and a company's success, where having more directors over a certain threshold may adversely affect the company's performance.

2.1.5 Financial performance

One effective approach to examine a company's financial performance is to thoroughly analyze and evaluate its financial statements. Utilizing a financial ratio is a widely adopted method for evaluating financial performance [8]. Return on Asset (ROA) is a quantitative metric that is employed to evaluate the performance of a company by evaluating its capacity to generate profits from its assets [34]. Many earlier studies have also utilized ROA as a means of evaluating corporate performance [8, 10–12, 35].

Chininga et al [9] studies indicate that ESG Risk Ratings positively impact financial performance, as measured by Return on Assets. This suggests that a company's allocation of resources towards sustainable practices, such as the utilization of reusable materials, the reduction of emissions and water consumption, establishing a more effective management structure, Its financial performance will be improved by the implementation of sustainable policies and a just remuneration system.

2.1.6 Gender diversity

In order to assess gender diversity, we shall employ the female-to-total directors ratio [36]. Women's participation in strategic decision-making that impacts the firm and its shareholders can stem from their competence, particularly when coupled with their commitment and concern for the objectives of others. There is a possibility that women exhibit heightened sensitivity towards decisions and exert influence on them, particularly in the realm of commercial activities such as corporate social responsibility

(CSR) and environmental policies. Therefore, the addition of female directors has the capacity to greatly improve the strategic oversight of a board. Furthermore, boards comprising a greater proportion of female directors are anticipated to exhibit enhanced efficacy in carrying out strategic obligations concurrently [14].

Research undertaken by Ouni et al [35] has disclosed that gender diversity exerts a favorable impact on financial performance, namely in relation to return on assets (ROA). Gender diversity in an organizational setting can increase stakeholder trust and enhance the overall value of the enterprise. Moreover, organizations that exhibit a greater proportion of women on their boards have been seen to exhibit notably improved environmental, social, and governance performance.

2.2 Hypothesis Development

2.2.1 Effect of ESG risk ratings towards financial performance

Environmental, social, and governance factors are combined to create ESG Risk ratings, which are used to evaluate performance. Implementing ESG principles in a company's business operations typically necessitates more ESG spending. Therefore, it is imperative for organizations to spend adequate financial resources in order to enhance and fortify their ESG policies [37]. Two hypotheses can be used to clarify the relationship between financial performance and the influence of ESG risk ratings. Stakeholder theory asserts that numerous study findings support the enhancement of business financial performance as a result of engaging in corporate social responsibility. This viewpoint is based on the stakeholder theory, specifically the social effect hypothesis. The position paper implies that the company's financial performance may be affected by the implementation of corporate social responsibility. This assertion is further corroborated by prior studies indicating that ESG Risk Rating exerts a favorable impact on financial performance [8,38,39].

Another idea is the neo-classical theory, as proposed by Friedman [40] which asserts A company's dedication to social responsibility could potentially incur higher costs, which may subsequently result in a competitive disadvantage and ultimately lead to a fall in financial performance. In comparison to past studies, there is a negative correlation between financial performance and ESG Score [10, 11]. Additional research conducted by Toti and Johan [41] demonstrates that environmental scores have an adverse effect on financial performance.

The ensuing hypothesis is developed after a thorough analysis of the primary theories that elucidate the ambiguous correlation between ESG Risk ratings and business financial performance, namely :

H_1: ESG Risk Ratings have a positive impact on financial performance

2.2.2 The effect of board size towards financial performance

Research conducted in the past has demonstrated that the expansion of the board of directors is linked to a higher likelihood of conflicts of interest and misunderstandings among board members. The effectiveness of boards in managing operations and their involvement in the management process reduces as the number of board directors increases [33]. The main aim of agency theory is to encourage the adoption of a corporate governance code that is widely recognized in order to address conflicts of interest and unethical behavior. Ensuring effective supervision of organizations necessitates the inclusion of autonomous individuals on the board of directors [14].

Prior studies conducted by scholars [14,22] The financial performance is clearly and definitively correlated with how much of the board. Research indicates a direct correlation between the size of a company's board and its Return on Asset (ROA) [42].

The findings of the study [21] pleasantly refuted prior studies that had proved that the size of the board has no effect on financial performance. The following hypothesis is created after conducting a comprehensive evaluation of the main theories and contradictory previous studies on the correlation between board size and financial performance:

H_2: Board Size has a positive impact on financial performance

2.2.3 Moderating role of gender diversity

The uncorrelated factors investigated in this study produced diverse results in comparison to

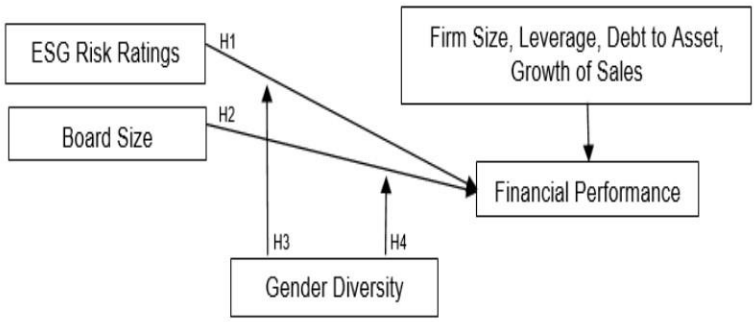

Fig. 1. Research framework

prior research. Past research efforts have firmly shown a strong association between the presence of a diverse range of genders and a company's financial performance. An analysis of the research undertaken by Velte [36] demonstrates that female executives positively influence total economic performance. Research [8] It has been demonstrated that the presence of women in leadership roles increases the connection between ESG Scores and economic performance. Female directors positively impact ESG performance and also influence economic performance.

Conversely, another study by Chin et al [20] discovered that the relationship between the value of a company and the size of its board was not affected by the presence of both male and female members. Moreover, subsequent investigations conducted by researchers [14,22,35] suggest that gender diversity exerts a substantial impact on financial performance. Agency theories propose that the agents of a firm have a tendency to prioritize their own interests, hence influencing the total value of the enterprise. By enlarging the dimensions of the board, the monitoring system will effectively decrease the probability of encountering agency challenges [20]. Following the introduction of the moderating variable of board gender diversity, it is expected that:

> *H_3: Gender Diversity enhancing the connection between ESG Risk Ratings and Financial Performance*
>
> *H_4: Gender Diversity enhancing the connection between ESG Risk Ratings and financial performance*

3. METHODS

This research employs a quantitative methodology, which entails formulating a hypothesis and validating it by analyzing collected data. This investigation employed secondary data obtained from the Indonesia Stock Exchange's financial records, annual reports, and ESG Risk Ratings. The population being studied includes companies that are listed on the IDX. The researcher has employed purposive sampling to choose organizations that meet specific criteria. First is the company listed on IDX. Secondly, the Company has ESG Risk Ratings that have been released by IDX in tandem with Morningstar Sustainalytics period 2020-2023. Third, the Company has published annual reports and financial report for the period 2020-2023. Fourth, it is not contingent upon the company's profitability or lack thereof.

The financial performance of the company is the primary variable being examined, and it is evaluated by calculating the ratio of net income to total assets (ROA) [11], 43]. The ESG Risk Ratings obtained from Morningstar Sustainalytics are the independent variable [8]. The reference specifies that the board size is determined by the total number of directors who serve on it Abdullah et al [14]. The variable of gender diversity is assessed by calculating the proportion of female board members [44]. The control factors examined in this investigation include leverage, debt-to-asset ratio, firm size, and sales growth.

The researcher will look at the collected data using statistical program such as Eviews 12. This study used data panel with unbalanced data panel. Obtained 90 company and 175 data from 2020-2023. A total of 90 companies were observed, representing 12 sectors. These sectors will be explained in Table 2.

At the outset, the researchers will perform a descriptive analysis to determine the data's characteristics, such as the average, standard

Table 2. Sector

Sector	Number of Company	%
Primary Consumer Goods	9	10%
Non-primary consumer goods	8	9%
Energy	14	16%
Technology	4	4%
Health	6	7%
Property & Real Estate	7	8%
Raw Goods	12	13%
Transportation and Logistics	3	3%
Finance	13	14%
Industry	2	2%
Infrastructure	8	9%
Media & Entertainment	4	4%
Total	90	100%

Source : [45]

deviation, highest, and lowest values. Researchers will thereafter use the chow test, Hausman test, and Breusch test to establish the appropriate model among fixed effect, common effect, or random effect [46]. Subsequently, the researcher performed a conventional assumption test, which included a multicollinearity test and a heteroscedasticity test. In panel data regression, just the assumption tests for multicollinearity and heteroscedasticity are utilized, excluding other classic assumption tests in the OLS method, as stated by Napitupulu et al [47]. After that, the hypothesis testing model used for the panel data multiple regression test is as follows:

Hypothesis testing model

$$ROA = \alpha + \beta_1 ESG + \beta_2 BS + \beta_3 GD + \beta_4 ES*GD + \beta_5 BS*GD + \beta_3 SZ + \beta_4 LV + \beta_5 DAR + \beta_6 GR + €$$

ROA = Return on Asset
ESG = ESG Risk Ratings measured by Morningstar Sustainalytics
BS = Board Size
GD = Gender Diversity
ES*GD = Interaction Variable between ESG Risk Ratings with Gender Diversity
BS*GD = Interaction Variable between Board Size and Gender Diversity
SZ = Natural Logarithm of Total Asset
LV = Leverage calculated by Debt to Equity Ratio
DAR= Debt to Asset Ratio
GR = Growth of Sales
€ = error term

4. RESULTS AND DISCUSSION

This subchapter will present the outcomes of data testing conducted using Eviews 12. The tests conducted include descriptive statistical tests, Chow tests, Breusch-Pagan tests, Lagrange multiplier tests, multicollinearity tests, heteroscedasticity tests, and panel data regression tests.

4.1 Descriptive Statistical Tests

Table 3 sets out the results of a descriptive statistical analysis performed on all variables in this study. With regard to the descriptive analysis, the companies in this study had a maximum ESG Risk Rating of 53.1, while the lowest score was 11.31. These findings indicate that, on average, the entities included in this study possess a modest degree of Environmental, Social, and Governance risks. likewise, the study discovered that the board of directors sizes varied among the sample of organizations, ranging from a minimum of 3 directors to a high of 17 directors. On average, companies in the study had approximately 6.9 directors, which can be rounded up to 7 directors. Regarding gender diversity presented in percentages, the descriptive analysis results indicate that the least value is 0.0 or 0.0%. This suggests that some organizations in the research sample lack female leadership in their board of directors. Nevertheless, the maximum value is 0.75, indicating that female directors make up 75% of the whole board of directors. On average, this represents 0,209 or 20,9%.

The percentage of companies in our research sample that have female directors on their entire board of directors. Moreover, in terms of profitability, the data from this company indicates that the lowest value is -1.67, indicating that one company in the observation period had a net loss of 167%. The highest value in the observation

period is 0.348 or 34.8%, with an average profitability of 0.048 or 4.8% among the companies in this sample.

4.2 Chow Test

Table 4 show the result Chow test. Using the Chow Test, the decision between the common effect model and the fixed effect model is made [46]. When the p-value < 0.05, the Fixed Effect Model is implemented. The Common Effect Model is chosen as a substitute if the p-value > 0.05. Napitupulu et al [47]. The chow test results show that the Prob. value is 0.0000 (p-value < 0,05), Indications point to the chosen model being the Fixed Effect Model.

4.3 Hausman Test

Table 5 is the result of Hausman test. The Hausman test is employed to determine whether the panel data regression model adheres to the Fixed Effect Model or the Random Effect Model [46]. If the p-value < 0.05, the Fixed Effect Model will be chosen, while the Random Effect Model will be implemented when the p-value > [47]. The Hausman test indicates that the Prob. is 0.0029 (p < 0,05). This shows that the selected model is the Fixed Effect Model.

The Fixed Effect Model is the most appropriate model for this inquiry, as both the Chow Test and Hausman Test have verified. Consequently, the Lagrange Multiplier Test is not implemented for model testing, as the Fixed Effect Model is the chosen model.

4.4 Multikolinearity Test and Heterocedasticity Test

According to Widarjono (2007) in Napitupulu et al [47], Not all assumption tests in the Ordinary Least Square method are conducted in panel data regression. Only the multicollinearity test and heteroscedasticity test are necessary. Another view from Verbeek (2000), Gujarati (2003), Wibisono (2005), and Aulia (2004) in Ajija et al [48] states that “Another advantage of panel data is that panel data has the implication of not having to test classical assumptions”. Therefore, panel data does not require classical assumption tests such as normality test and autocorrelation test.

The results of the multicollinearity test are displayed in Table 6. An independent variable will exhibit signs of multicollinearity if its value exceeds or is equal to 0.85 [47]. The findings of the multicollinearity test indicate that the moderating variables, specifically the ES*GD and BS*GD variables, have coefficients of 0.92 and 0.86 respectively on the Gender Diversity (GD) variable. This indicates that these variables demonstrate problems with multicollinearity. After careful reassessment, it has been concluded that the moderating variable in this study is the result of the interaction between the ESG Risk Ratings (ES) and Board Size (BS) variables, which behave as independent factors. The moderating variable in question is Gender Diversity (GD). Disatnik and Sivan [49] argue that when two independent variables are multiplied together, this does not indicate multicollinearity issues, but rather suggests a moderated multiple regression (MMR) structure. Thus, all variables in this study are devoid of any indications of multicollinearity.

The findings of the heteroscedasticity test in this investigation are depicted in Fig. 2. Napitupulu et al [47] defines heteroscedasticity as the occurrence when the residual graph (represented by the color blue) crosses the boundaries of 500 and -500. This indicates that the variance of the residuals is not constant, in other words, heteroscedasticity is present. The results of the heteroscedasticity test indicate that the residual graph does not exceed the limits of 500 and -500, suggesting the absence of heteroscedasticity.

4.5 Regression Test

The main results of the regression test performed using Eviews 12 are presented in Table 7. The partial test or t test findings indicate that the ESG Risk Ratings possess β coefficient is 0.0031 and have a significance value that exceeds 0.05, precisely with a Prob. value is 0.3189 (*P* = .05). These findings advise that the ESG Risk Ratings have a negligible impact on the financial performance of the business.

In addition, the statistical study shows that the Prob. value linked to Board Size is 0.2130 (*P* = .05), with β coefficient is 0.009. Put simply, this suggests that the board's dimensions don't have a substantial influence on the financial prosperity of the organization.

Upon examining the moderation effect in this study, it is evident that only the board size variable is moderated by gender diversity on financial performance. Its effect is of statistical importance, as indicated by a Prob. value of 0.0261 (*P* = .05), which is below the threshold of 0.05. Nevertheless, gender diversity actually weakens the relationship between board size and financial performance, as evidenced by the β coefficient of -0.058.

Table 3. Descriptive statistical

	ROA	ESG	BS	GD	ES*GD	BS*GD	DAR	LV	GR	SZ
Mean	0.048461	25.7144	6.954286	0.209082	4.821212	1.445714	0.504889	1.894027	0.085922	24.4800
Median	0.050411	25.7200	6.0000	0.166667	4.346667	1.000000	0.492658	0.971058	0.043501	24.25684
Maximum	0.348868	53.100	17.0000	0.7500	19.5825	6.000000	1.323139	17.0714	6.018914	28.40769
Minimum	-1.673259	11.3100	3.0000	0.0000	0.000000	0.000000	0.030317	-4.094639	-2.735763	21.17066
Std. Dev.	0.169059	8.082282	2.7456	0.179761	4.087791	1.234640	0.243578	2.601552	0.587183	1.569536
Skewness	-6.988932	0.976003	1.0604	0.689077	0.815402	0.832532	0.144803	2.935872	5.992392	0.673495
Kurtosis	67.84643	4.41849	3.9012	2.901328	4.011771	3.871376	2.500678	15.09488	66.74651	3.120989
Jarque-Bera	32086.54	42.45532	38.7208	13.92012	26.85669	25.752250	2.429541	1318.067	30677.88	13.33662
Probability	0.00000	0.00000	0.00000	0.00095	0.000001	0.000003	0.296778	0.0000	0.0000	0.001271
Sum	8.480756	4500.02	1217.0000	36.58941	843.7121	253.0000	88.35566	331.4547	15.03643	4284.007
Sum Sq. Dev.	4.973091	11366.25	1311.6340	5.622624	2907.547	265.2343	10.32346	1177.645	59.99233	428.6389
Observations	175	175	175	175	175	175	175	175	175	175

*Source: Processed Data (2024);Note : Return on Asset (ROA), ESG Risk Ratings (ESG), Board Size (BS), Gender Diversity (GD), ESG Risk Ratings interaction variable with Gender Diversity (ES*GD), interaction variable between Board Size and Gender Diversity (BS*GD), Debt to Asset Ratio (DAR), Leverage (LV), Growth of Sales (GR), Firm Size (SZ)*

Table 4. Chow test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	32.175847	(89.76)	0.0000
Cross-Section Chi-square	639.679705	89	0.0000

Source : Processed data (2024)

Table 5. Hausman test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	25.085503	9	0.0029

Source : Processed Data (2024)

Table 6. Multicollinearity test

	ESG	BS	GD	ES*GD	BS*GD	DAR	LV	GR	SZ
ESG	1								
BS	-0.03	1							
GD	-0.38	-0.01	1						
ES*GD	-0.13	-0.01	0.92	1					
BS*GD	-0.38	0.37	0.86	0.77	1				
DAR	-0.05	0.44	-0.11	-0.07	0.13	1			
LV	-0.01	0.48	-0.01	0.02	0.22	0.67	1		
GR	0.04	-0.02	0.12	0.13	0.02	0.09	0.04	1	
SZ	0.14	0.69	-0.08	-0.00	0.14	0.50	0.52	0.05	1

*Source: Processed Data (2024); Note: Return on Asset (ROA), ESG Risk Ratings (ESG), Board Size (BS), Gender Diversity (GD), ESG Risk Ratings interaction variable with Gender Diversity (ES*GD), interaction variable between Board Size and Gender Diversity (BS*GD), Debt to Asset Ratio (DAR), Leverage (LV), Growth of Sales (GR), Firm Size (SZ)*

Table 7. Partial test

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Result
C	-0.126452	0.788069	-0.60458	0.8729	
ESG	0.003101	0.003091	1.003247	0.3189	Not Supported
BS	0.009650	0.007684	1.255892	0.2130	Not Supported
GD	0.620135	0.380487	1.629847	0.1073	
ES*GD	-0.011922	0.012824	-0.929618	0.3555	Not Supported
BS*GD	-0.058793	0.025913	-2.268893	0.0261**	Supported
DAR	-0.681469	0.073534	-9.267426	0.0000***	
LV	0.047894	0.006852	6.990335	0.0000***	
GR	0.067137	0.020511	3.273161	0.0016***	
SZ	0.011784	0.032114	0.366936	0.7147	

*Source: Processed Data (2024); Notes: Return on Asset (ROA), ESG Risk Ratings (ESG), Board Size (BS), Gender Diversity (GD), ESG Risk Ratings interaction variable with Gender Diverstiy (ES*GD), interaction variable between Board Size and Gender Diversity (BS*GD), Debt to Asset Ratio (DAR), Leverage (LV), Growth of Sales (GR), Firm Size (SZ). * , ** , *** refers to significant level 1%, 5%, and 10%*

Table 8. F Test

R-Squared	0.976508
Adjusted R-Squared	0.946216
S.E. of regression	0.039207
Sum squared resid	0.116826
Log likelihood	391.4730
F-statistic	32.23665
Prob(F-statistic)	0.000000

Source: Processed Data (2024)

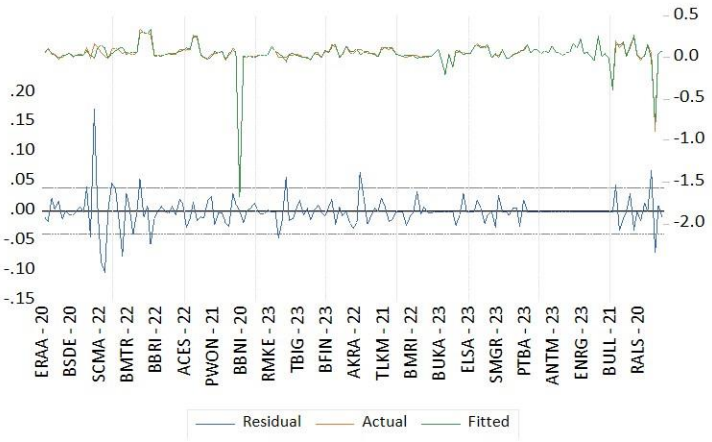

Fig. 2. Heterocedasticity test result
Source: Processed data (2024)

Furthermore, the Prob. value of 0.355 (P = .05) indicates that gender diversity doesn't moderate ESG risk ratings on financial performance. Furthermore, this study found that the control factors analyzed, namely Debt to Asset, Leverage, and Growth of Sales, had a substantial impact on the company's financial performance. Despite this, the financial performance of the organization is not influenced by the variable of company size.

Table 8 displays the outcomes of the goodness of fit test conducted using Eviews 12. The results of the goodness of fit test reveal that the probability value for the F-statistic is 0.00 (P = .05). This suggests that the model used in this study is statistically significant, and it demonstrates that the variables ESG Risk Ratings (ESG), Board Size (BS), Gender Diversity (GD), Moderating Effect of ESG Risk Ratings with Return on Asset (ES*GD), Moderating Effect of Board Size with Return on Asset (BS*GD), Debt to Asset (DAR), Leverage (LV), Growth of Sales (GR), and Firm Size (SZ) can greatly influence the Return on Asset (ROA).

In this investigation, the adjusted R-squared value is 0.9462, which represents 94.62% of the independent variables. These variables include ESG Risk Ratings (ESG), Board Size (BS), Gender Diversity (GD), Moderating Effect of ESG Risk Ratings with Return on Asset (ES*GD), Moderating Effect of Board Size with Return on Asset (BS*GD), Debt to Asset (DAR), Leverage (LV), Growth of Sales (GR), and Firm Size (SZ). They define financial performance as the dependent variable, which is quantified by return on asset.

4.6 Effect ESG Risk Ratings on Financial Performance

Upon careful examination of the regression test findings, it is clear that the first hypothesis cannot be substantiated as the significance value exceeds 5%. This investigation indicates that the financial performance appears to be unaffected by ESG Risk Ratings. The ESG Risk Ratings conducted by Morningstar Sustainalytics are measured in two dimensions: Exposure and management. Exposure evaluates the extent to which the company is susceptible to industrial ESG hazards, while the management dimension evaluates the company's proficiency in managing these ESG risks [30].

This finding aligns with the research conducted by Yawika and Handayani [12] which elucidates that the company's main emphasis lies in empowering the community in relation to environmental and social factors, rather than directly addressing the environmental repercussions resulting from its operations. This strategy is implemented to ensure that the company's financial performance remains unaltered. Furthermore, Galbreath [32] Environmental performance, social performance and corporate governance are a set of non-financial data that includes ESG. Chiningaet al [9] Additionally, it was determined that corporations in South Africa have a notable deficiency in environmental performance. Furthermore, it was found that corporate social performance does not directly influence financial performance. Thus, the ESG Risk Ratings in this study do not directly affect the company's operations, and the company's ESG

performance is below target, so it does not have an impact on financial performance.

This study also corroborates previous research findings that have shown no correlation between ESG Risk Ratings and Financial Performance [50, 51]. Nevertheless, this study contradicts the findings of previous studies conducted by Kahloul et al [11, 52] which indicate that ESG Risk Ratings do impact a company's financial performance.

4.7 Effect of Board Size on Financial Performance

The regression test findings reveal that the second hypothesis is not supported, as the significance value surpasses 5%. Thus, it is established that the size of the board does not exert a substantial impact on financial performance. Put simply, the count of individuals who are members of a company's board of directors does not necessarily correlate directly with its financial performance. In addition, the outcomes of this study support the research and arguments presented by Kurnia et al [21], which assert that the adoption of corporate governance is merely a procedural requirement to comply with legislation.

Jensen [53] additionally, it is elucidated that Each time the number of directors on the board surpasses seven or eight, the board's efficacy diminishes, making it more convenient for the CEO to exert influence over them. Futhermore, Abdullah et al [14] calculated that enlarging the board dimensions would be advantageous for the company. However, it is essential to exercise caution because of the possible non-linear nature of the relationship.

Arora [54] Also, it was shown that an expanded board of directors may not consistently be linked to improved performance, as it can result in decision-making delays, reduced coordination among board members, or inevitable issues. There is no consistent correlation between the extent of a board and financial performance. However, the dimensions of a board are mostly determined by regulatory limitations.

This study opposes the results of previous studies [14, 42] that suggest a correlation between financial performance and board size.

4.8 Moderating Effect of Gender Diversity on Correlation Between ESG Risk Rating and Financial Performance

The regression test results suggest that gender diversity does not have a significant impact on the correlation between financial performance and ESG Risk Ratings (Prob. = 0.355 ; P = .05). Therefore, hypothesis 3 has been disproven. The relationship between ESG Risk Ratings and financial performance is not significantly impacted by the presence of gender diversity.

A study conducted by Manik [55] discovered no correlation between the gender diversity of board members and the relationship among environmental score, governance score, and financial performance. However, the correlation between financial performance and social status is mitigated by the presence of a diverse spectrum of genders. This study refutes the conclusions of prior research conducted by Setiani [8] that indicated a positive correlation between financial performance, ESG Score, and gender diversity. Studies that are cited in sources [56, 57], has established that augmenting the representation of women on company boards can positively influence financial performance. The inclusion of female directors does not seem to significantly impact the company's financial performance, particularly in relation to the management of the company's ESG exposure (as assessed by the ESG Risk Rating dimension).

4.9 Moderating Effect of Gender Diversity on Correlation Between Board Size and Financial Performance

The study findings suggest that the presence of gender diversity diminishes the correlation between board size and financial performance, the statistical evidence is supported by a t-statistic of -2.268 and a probability value is 0.026.

This study does not provide evidence in favor of agency theory, which seeks to promote the implementation of established corporate governance principles as a means to decrease conflicts of interest and unethical conduct [14]. Conflict reduction has the potential to decrease agency costs, resulting in a negative connection. While the coefficient in this study is negative, it specifically pertains to the moderating influence

Instead of focusing on the immediate influence on financial performance.

Aligning with studies [58] there is evidence of a reverse connection between gender diversity and a company's financial performance. The article [58] posits that the inclusion of women on corporate boards can result in heightened levels of oversight. The excessive level of board oversight hampers the efficiency of board decision-making, leading to diminished performance. Thus, it can be inferred that female directors continue to inadequately apply the tenets of corporate governance, resulting in conflicts of interest that undermine the correlation between board size and financial performance.

However, an alternative viewpoint from Brahma et al [59] discovered that the regression analysis conducted using the GMM system It turned out the presence of one or two female representatives on the board of directors did not have a statistically significant influence on the return on asset, which serves as a metric for financial performance. Besides, a study conducted by Chin et al [20], the recent inclusion of women on the board did not affect the relationship between business value and board size.

5. CONCLUSION

Effective economic development requires the application of ESG principles covering environmental, social, and governance aspects [1]. Conventional investment research methodologies frequently neglect to consider ESG concerns when making investment decisions and assessing risks [5]. Corporate governance has been a widely discussed topic among business and academic experts. According to Ehikioya [13], corporate governance refers to a collection of procedures and organizations that empower stakeholders to actively protect their interests in the corporation. This study talks about the effects of ESG Risk Ratings and Board Size on the financial performance of businesses, while considering Gender Diversity as a moderating factor.

This study uses data from 90 companies with certain criteria from 2020-2023. This study provides evidence that (1) ESG Risk Ratings do not affect financial performance; (2) Board Size does not affect financial performance; (3) The presence of individuals of different genders does not impact the relationship between ESG Risk Ratings and financial performance; (4) The correlation between financial performance and board size is diminished by the inclusion of individuals of varying genders.

This study is subject to constraints about the variables factors that influence the company's financial performance. Potential avenues for future research could incorporate additional elements that may exert a sustainability and governance factor that affects the financial performance of the company, such as green activities, green investment, green innovation comparison number of female on board, independent board, board commissioner and others [14,59-62]. In addition, it is recommended to increase the research year period, namely 2024 so that the research results are more relevant and representative.

The findings of this study have significant consequences for corporations, as they shed light on the elements that influence a company's financial performance, particularly with regard to sustainability standards. In order to enhance ESG performance, the corporation must identify appropriate targets for each dimension of ESG and undertake corporate social responsibility initiatives. Furthermore, augmenting the number of boards of directors is similarly ineffectual and is unrelated to the business's financial viability.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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