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The influence of Environmental, Social & Governance (ESG) risk rating on corporate financial risk in companies listed on IDX ESG leaders with board gender diversity as a moderating variable

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***Abstract*---**This study analyzes the impact of Environmental, Social, and Governance (ESG) Risk Ratings on Corporate Financial Risk for companies listed on the IDX ESG Leaders index between 2020 and 2024. A quantitative research approach was employed, utilizing secondary data from the annual reports of companies listed on the Indonesia Stock Exchange (IDX). Data was collected through saturated sampling, including 30 companies from the IDX ESG Leaders for each year over the five-year observation period, resulting in a total of 150 samples. Moderated Regression Analysis (MRA) was applied to the data. The results demonstrate that the ESG Risk Rating has a significantly negative impact on Corporate Financial Risk. However, gender diversity does not exert a significant moderating influence on the relationship between Environmental, Social, and Governance (ESG) performance and corporate financial risk. These findings align with both stakeholder and signaling theories, indicating that firms with reasonable ESG performance exhibit lower total risk. The insights gained from this study will assist investors and portfolio managers in evaluating the influence of ESG and Board Gender Diversity on corporate financial risk, thereby facilitating improved investment decisions.

***Keywords*---**ESG, ESG Risk Rating, Financial Risk, Board Gender Diversity.

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Introduction

Financial risk is a fundamental aspect of corporate financial decision-making, particularly in relation to operational stability and continuity (Hermansson & Jonsson, 2021). This risk can arise from a variety of factors, including the company's financing strategy, especially the use of debt financing, which, while providing leverage benefits, also increases the potential for liquidity pressures and default risk when operational conditions are disrupted (Yang, Yang, Lv, & Luo, 2024). In this context, financial risk management is becoming increasingly complex as expectations for sustainable business practices rise.

In line with global trends, attention to non-financial factors in evaluating corporate performance is increasing. The concept of Environmental, Social, and Governance (ESG) is becoming an important element in modern risk assessment and investment decision-making (Eccles & Klimenko, 2019). ESG not only represents corporate social responsibility but also serves as an indicator of a company's resilience to external pressures of an environmental, social, and governance nature. In Indonesia, the Indonesia Stock Exchange (IDX) has officially adopted the ESG Risk Rating published by Sustainalytics as the basis for compiling the ESG index in the national capital market. This assessment is inverse, where the lower the ESG Risk Rating score, the better the company's ESG performance and the lower the risks faced (Indonesia Stock Exchange, 2024).

Several previous studies have shown that enhancing ESG performance can mitigate a company's financial risk by improving operational efficiency, reducing capital costs, or fostering stronger relationships with stakeholders (Ashwin Kumar et al., 2016; Shafer & Szado, 2020; Sherwood & Pollard, 2018). However, empirical evidence on the relationship between ESG performance and financial risk still shows mixed results, depending on the industry context, country, and methodology used. On the other hand, board gender diversity has emerged as a potential strategic factor in moderating the relationship (Ramadhan, Achsani, & Andati, 2023). Gender-diverse boards are believed to have more inclusive and accountable decision-making capabilities and are more responsive to ESG issues (Shakil, 2021).

Within the framework of signaling and stakeholder theory, the presence of women on the board of directors can provide positive signals to the market regarding the company's commitment to sustainability and good governance. This is expected to strengthen investor confidence and reduce the perception of risk towards the company. However, not many studies have specifically examined the moderating role of Board Gender Diversity in the relationship between ESG performance and financial risk, especially in emerging markets such as Indonesia.

Given the limited studies linking ESG performance and financial risk in the context of the ESG Leaders index in Indonesia, as well as the need for a deeper understanding of the role of gender diversity in the board of directors, this study was conducted. This study examines the effect of ESG Risk Rating on corporate financial risk and explores whether Board Gender Diversity can strengthen the relationship. This research is expected to make an empirical contribution to

enriching the sustainable finance literature as well as providing practical insights for investors, regulators, and capital market players in supporting ESG-based decisions in the Indonesian market.

Methods

Secondary quantitative data for this study was gathered from the Indonesia Stock Exchange website, individual company websites, and pertinent literature. The study's population comprises all companies listed on the Indonesia Stock Exchange that are also part of the ESG Leaders Index, amounting to 30 companies annually over a three-year period. A saturation sampling technique was employed, meaning every member of this population was included as a sample. Due to variations in observations across companies each year, an unbalanced panel data approach was utilized, resulting in a total of 150 samples from the ESG Leaders Index.

This study employs one dependent variable, one independent variable, and one moderating variable. The dependent variable is Debt Financing, the independent variable is ESG Risk Rating, and the moderating variable is Boar Gender Diversity.

Debt Financing is measured using the interest-to-debt ratio, as applied in previous studies (Ambrose, Highfield, & Linneman, 2005; Feng & Wu, 2023). The Interest to Total Debt Ratio assesses the interest burden a company or entity has to pay relative to its total debt. ESG Risk Rating is measured using the ESG Risk Rating values from the IDX ESG Leaders index, provided by Morningstar Sustainalytics(IDX, 2020). Board Gender Diversity uses the number of women on the board, obtained through each company's annual report. One of the simplest measures is to calculate the percentage of board members who are female compared to the total number of board members.

This study uses the Moderated Regression Analysis (MRA) regression model assisted by the SPSS program to analyze the effect of ESG performance and Board Gender Diversity on financial risk with Board Gender Diversity as a moderating variable in ESG Leaders Index companies listed on the IDX in 2020 - 2024. The multiple liner regression equation in this study is as follows:

$$Y = \alpha + \beta_1 X + \beta_2 M + \beta_3 X*M + e$$

Description:
Y = Financial risk
α = Constant
X = ESG
M = Board Gender Diversity
β_1,2,3 = Regression Coefficient
E = error

Results

This study uses panel data with a five-year observation period, from 2020 to 2024. The population in this study consists of all companies listed in the ESG Leaders Index published by the Indonesia Stock Exchange (IDX) on the March and September monthly major evaluations. During the observation period, there were 54 companies cumulatively listed as constituents of the ESG Leaders Index. However, as the composition of companies in the index may change every year, the number of companies sampled for each year is not always the same, and in this study 30 companies per year were selected based on their listing in the annual major evaluation. Thus, this study generated 150 data observations.

The data structure used is unbalanced panel, because not all companies have data for the entire five-year observation period. This is due to the dynamics of the entry and exit of companies in the ESG Leaders index as well as differences in the availability of financial data and ESG Risk Rating from year to year.

After initial data processing and exploration of 150 observations obtained from companies in the ESG Leaders Index during the 2020-2024 period, 13 observations were identified as outliers. Outlier identification is done through descriptive statistical analysis and data visualization, as well as confirmation through extreme values on several key variables in the study.

a. Descriptive Statistic Analysis

Table 1 Descriptive Statistic Result

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Financial Risk	137	.002	.112	.03374	.021465
ESG	137	9.26	29.74	21.9336	5.03023
Board of Gender Diversity	137	.00	.75	.2450	.17288
Valid N (listwise)	137				

Source: Data Processing Result, 2025

In Table 1 of the descriptive statistical analysis of the variables studied, some important information is obtained regarding the distribution and characteristics of the data. The variables analyzed include Financial Risk, ESG Risk Rating, and Board Gender Diversity. This study involved 137 observations for each variable, namely Financial Risk, ESG, and Board Gender Diversity. The table below shows the results of the descriptive statistical test as follows:

The financial risk variables in this study showed a minimum value of 0.002 and a maximum value of 0.112, with an average value of 0.03374 and a standard deviation of 0.021465.

ESG variables were measured based on the ESG Risk Rating score from Sustainalytics. The ESG values in this study ranged from 9.26 to 29.74, with an

average value of 21.9336 and a standard deviation of 5.03023. This indicates that the companies in the sample generally have a medium level of ESG risk.

The variable of gender diversity in the board of directors (Board Gender Diversity) is measured based on the proportion of women to the total number of board members. The results show a minimum value of 0.00 and a maximum of 0.75, with an average of 0.2450 or 24.5%.

b. Classic Assumption Test

1) Normality Test

Normality testing was performed using the One-Sample Kolmogorov-Smirnov Test, supported by visualizations in the form of histograms and normal probability plots (P-P Plots). Table 2 explains that data can be said to be normally distributed if it has an Asymp. Sig. value greater than α = 0.05. Based on the Kolmogorov-Smirnov test results, a significant value of 0.098 (p > 0.05) was obtained, indicating that the residual data is not significantly different from a normal distribution. Therefore, it can be concluded that the model residuals satisfied the normality assumption.

Table 2 One-Sample Kolmogorov-Smirnov Test

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		137
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	.01969068
Most Extreme Differences	Absolute	.070
	Positive	.070
	Negative	-.045
Test Statistic		.070
Asymp. Sig. (2-tailed)		.098[c]
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		

Source: Data Processing Result, 2025

2) Autocorrelation Test

Table 3 Autocorrelation Test Result

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.398[a]	.158	.140	.019912	2.026
a. Predictors: (Constant), ESG*Board Gender Diversity, ESG, Board Gender Diversity					
b. Dependent Variable: Financial Risk					

Source: Data Processing Result, 2025

The autocorrelation test determines if there is a correlation between the residual errors in a linear regression model from one period (t) and the errors from the previous period (t−1). In this particular study, the autocorrelation test was performed using the Durbin-Watson test method. Based on Table 3 showing the SPSS output, a Durbin-Watson value of 2.026 was obtained. With 3 independent variables (k) and 137 samples, the du value is 1.766. Since it meets the condition 1.766 < 2.026 < 2.234 (4 - 1.766), it can be concluded that the regression model in this study is free from autocorrelation.

3) Multicollinearity Test

Multicollinearity testing was not performed in this study because the analysis used was Moderated Regression Analysis (MRA), which involved interaction variables between ESG and Board Gender Diversity. This interaction variable is formed from the product of two variables, which technically will have a high correlation with its constituent variables. Therefore, multicollinearity tests were not used because they could lead to misleading and irrelevant interpretations in the context of the moderation model.

4) Heteroscedasticity Test

A heteroscedasticity test was conducted to determine whether there was constant residual variance (heteroscedasticity) in the regression model, which could cause parameter estimation inefficiency. The decision criterion in this test is that if the significance value (Sig.) of each independent variable is greater than 0.05, it can be concluded that the model is free from heteroscedasticity.

Table 4 Heteroscedasticity Test Result

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.014	.009		1.563	.120
	ESG	.000	.000	.064	.390	.697
	Board Gender Diversity	.023	.030	.352	.764	.446
	ESG*Board Gender Diversity	-.001	.001	-.430	-.928	.355
a. Dependent Variable: ABS_RES						

Source: Data Processing Result, 2025

Based on Table 4, the following significance values were obtained:

- ESG = 0.697
- Board Gender Diversity = 0.446
- ESG × Board Gender Diversity = 0.355

All three significance values are greater than 0.05, which means that there is no significant effect of the independent variables on the residual values. Therefore, it can be concluded that the regression model does not suffer from heteroscedasticity and meets one of the assumptions of classical linear regression.

c. Analysis Moderated Regression Analysis (MRA)

Table 5 Analysis Moderated Regression Analysis (MRA) Test Result

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.080	.015		5.262	.000
	ESG	-.002	.001	-.407	-2.692	.008
	Board Gender Diversity	-.057	.053	-.459	-1.079	.283
	ESG*Board Gender Diversity	.001	.002	.214	.500	.618
a. Dependent Variable: Risiko Keuangan						

Source: Data Processing Result, 2025

Based on table 5 the results of Moderated Regression Analysis, the structural equation that can be formulated is as follows.

$$Y = 0{,}080 - 0{,}002X - 0{,}057M + 0{,}001\ XM + e$$

The Moderated Regression Analysis equation can be interpreted as follows:

- A constant value of 0.080 indicates that if ESG, Board Gender Diversity, and the interaction between ESG and Board Gender Diversity are equal to 0 (zero), then Financial Risk has a value of 0.080.
- The coefficient of the ESG variable has a value of -0.002, indicating that ESG has a negative impact on Financial Risk, meaning that as ESG increases, Financial Risk decreases.
- The coefficient of the Board Gender Diversity variable is -0.057, indicating that Board Gender Diversity has a negative impact on Financial Risk, meaning that as Board Gender Diversity increases, Financial Risk decreases.
- The interaction coefficient between the ESG variable and Board Gender Diversity has a value of 0.001, indicating that if the interaction between ESG and Board Gender Diversity increases, it will increase Financial Risk.

d. Determination Coefficient Test (Adjusted R^2)

Table 6 Determination Coefficient Test Result

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.398[a]	.158	.140	.019912	2.026
a. Predictors: (Constant), ESG*Board Gender Diversity, ESG, Board Gender Diversity					
b. Dependent Variable: Financial Risk					

Source: Data Processing Result, 2025

Based on these results, it is known that the R^2 value is 15.8 percent, which means that 15.8 percent of financial risk is influenced by ESG variables, board gender diversity, and the interaction between ESG and board gender diversity. The remaining 84.2 percent is influenced by other variables that were not examined in this study.

e. Simultaneous Significance Test (F-Test)

Table 7 Simultaneous Significance Test (F-Test) Result

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.010	3	.003	8.350	.000[b]
	Residual	.053	133	.000		
	Total	.063	136			
a. Dependent Variable: Financial Risk						
b. Predictors: (Constant), ESG*Board Gender Diversity, ESG , Board Gender Diversity						

Source: Data Processing Result, 2025

Table 7 shows the results of the ANOVA test, which indicate that the F_{Sig} value is 0.000< 0.05, meaning that the moderation regression model in this study is suitable for analyzing the effect of ESG on financial risk and the role of board gender diversity in moderating the relationship between ESG and financial risk.

f. Hypothesis Test

1) Hypothesis Testing of the Effect of ESG on Financial Risk

   H0 : ESG has no negative effect on Financial Risk

   H1 : ESG has a negative effect on Financial Risk .

   Based on the results of the hypothesis testing of the effect of ESG on Financial Risk, it can be seen that the ESG variable has a regression coefficient value of -0.002 and a Sig. value of 0.008, so it can be said that H0 is rejected and H1 is accepted because the Sig. value is 0.000 < 0.05. This indicates that ESG has a significant negative effect on financial risk. Hypothesis 1 is accepted.

2) The Effect of Board Gender Diversity in Moderating the Effect of ESG on Financial Risk

   H0: Board gender diversity does not moderate the relationship between ESG and financial risk.

   H2: Board gender diversity moderates the relationship between ESG and financial risk.

   Based on the results of testing the hypothesis of Board Gender Diversity in moderating the relationship between ESG and Risk, it can be seen that the interaction between ESG and Board Gender Diversity has a regression coefficient value of 0.001 and a Sig. value of 0.613. Therefore, H0 is accepted and H2 is rejected because the Sig. value of 0.613 > 0.05. This indicates that Board Gender Diversity cannot moderate the influence of ESG on Financial Risk. The moderating effect produced is unable to weaken or strengthen the relationship. Hypothesis 2 is rejected.

Discussions

Effect of ESG Risk Rating on Financial Risk

The analysis reveals that ESG Risk Rating plays a meaningful role in shaping a company's financial risk. Specifically, the regression results show a negative relationship between ESG Risk Rating and financial risk, with a coefficient of -0.002 and a p-value of 0.008. This means that companies with better ESG performance (reflected by lower ESG Risk Ratings) tend to experience lower financial risk. Simply put, the better a company manages its environmental, social, and governance practices, the more financially stable it becomes—likely due to stronger internal controls, better reputation, and increased trust from stakeholders.

This finding aligns with stakeholder theory, which encourages companies to act in the best interests of not just shareholders, but all stakeholders, including lenders. When a company shows genuine effort in addressing ESG issues, lenders are likely to view it as a lower-risk borrower. Even if a company has a higher ESG

Risk Rating, lenders might still offer favorable loan terms if they believe the company is actively working on improvements. This perspective is echoed by Hamrouni (2019), who noted that ESG or CSR disclosures are not always perceived uniformly, and lenders often assess such information through a more nuanced lens. Likewise, Gigante & Manglaviti (2022) found that high ESG scores do not automatically lead to lower debt costs, suggesting that how ESG is interpreted matters just as much as the score itself.

Moderating Role of Board Gender Diversity

Interestingly, the study found that board gender diversity does not significantly alter the relationship between ESG Risk Rating and financial risk. While it was expected—based on signaling and stakeholder theories—that a more gender-diverse board might influence how ESG efforts impact risk, the results tell a different story. The interaction between ESG and board gender diversity was not statistically significant ($p = 0.613$), meaning that having more women on the board didn't noticeably change the effect of ESG performance on financial risk in this sample.

There may be several reasons behind this outcome. First, the average representation of women on the boards was around 24.5%, which might not be high enough to make a strong difference in decision-making or governance outcomes. Second, cultural and institutional norms in Indonesia could affect how gender diversity is viewed or leveraged in corporate contexts. Lastly, the relatively low variation in gender diversity across the sampled companies may have limited the ability to detect a significant moderating effect.

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