

ESG Disclosure and Capital Structure in Explaining the Value of Renewable Energy-Oriented Energy Companies

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ABSTRACT

This study examines the effect of Environmental, Social, and Governance (ESG) disclosure and capital structure on firm value in renewable energy-oriented companies listed on the Indonesia Stock Exchange (IDX) during 2020–2024. Secondary data were obtained from financial, annual, and sustainability reports. Using purposive sampling, 34 observations from 7 companies were analyzed through panel data regression with EViews 12. The results show that ESG disclosure has a negative and significant effect on firm value, while capital structure has no significant effect. This study contributes to the ESG literature in Indonesia's renewable energy sector and underscores the importance of improving ESG implementation and disclosure transparency to enhance investor confidence and support sustainable firm value.

INTRODUCTION

Sustainability issues have become a major focus not only among governments and the public, but also within the corporate world and global capital markets, particularly in the renewable energy sector. Global climate change and international commitments through the Paris Agreement and the *Sustainable Development Goals* (SDGs) have driven the energy transition from fossil fuels to renewable energy worldwide. The renewable energy sector is now a global investment priority, particularly for investors prioritizing *Environmental, Social, and Governance* (ESG) aspects of their investments (Gillan et al., 2021). This trend reflects a paradigm shift in business actors, where they are not only required to generate profits but also to positively impact the environment and society.

Indonesia has the potential to generate more than 443 GW of renewable energy, spanning solar, wind, hydro, biomass, and geothermal energy (ESDM, 2024). The Indonesian government has targeted a 23% renewable energy mix by 2025 and a 31% mix by 2050, as stipulated in the National Energy General Plan (RUEN). In practice, not all energy companies listed on the Indonesia Stock Exchange (IDX) are pure renewable energy companies. Some companies still rely on conventional energy, but have demonstrated an orientation toward renewable energy through project diversification and energy transition commitments disclosed in their annual reports and sustainability reports.

The Indonesia Stock Exchange (IDX) continues to promote ESG disclosure through various sustainability indices, such as the IDX ESG Universe, as an effort to increase

company value through sustainable practices (OJK, 2021) . Company value reflects investor perceptions of a company's prospects, as reflected in its share price and serves as an indicator of confidence in its performance (Nofrian & Sebrina, 2024) . In the renewable energy sector, fluctuations in company value indicate that investor confidence can be influenced by various factors, including a company's sustainability practices and capital structure policies.

Corporate value is an important indicator reflecting investors' perceptions of a company's future prospects. One factor thought to influence corporate value is ESG disclosure. Based on *Stakeholder Theory* and *Legitimacy Theory* , sound ESG disclosure can enhance reputation, legitimacy, and stakeholder trust, thereby increasing corporate value. Furthermore, effective ESG implementation has the potential to reduce corporate risk and expand access to funding sources. Companies must disclose ESG because most organizational stakeholders feel that such efforts will provide benefits such as a company's commitment to sustainability and social responsibility, which can build trust and reputation (Azmiyah & Subardjo, 2024) .

In addition to ESG disclosure, capital structure is also a fundamental factor that can influence company value. According to Modigliani & Miller's (1958) theory , capital structure reflects the composition of a company's funding through debt and equity, which will determine the company's cost of capital and financial risk. Renewable energy companies are capital intensive, *requiring* significant investment in infrastructure and technology development. Based on *the Trade-off Theory* , companies need to determine the optimal capital structure by balancing the benefits of using debt with the risk of financial distress. Therefore, the decision to finance through debt or equity is a crucial aspect in maximizing company value.

Although various studies have examined the relationship between ESG, capital structure, and firm value, previous research findings remain inconsistent. Some studies find that ESG disclosure and capital structure have a positive effect on firm value, while others show insignificant or even negative results.

Based on the above description, this study aims to analyze the influence of ESG disclosure and capital structure on firm value in renewable energy companies listed on the Indonesia Stock Exchange (EI) for the 2020–2024 period. This research is expected to contribute to the development of the literature on ESG and corporate finance and serve as a consideration for management, investors, and regulators in supporting the development of the sustainable energy sector in Indonesia.

RESEARCH METHODS

This study employed a quantitative method with a descriptive approach. Quantitative research is guided by the philosophy of positivism, examining specific populations or samples, collecting data using structured instruments/information, and statistical data analysis to test hypotheses or answer research questions objectively (Sugiyono, 2022) . In accordance with the research objectives, a descriptive quantitative approach was used to describe and analyze the level of ESG disclosure of renewable energy-oriented energy companies on the IDX, their capital structure proxied by DER, and their firm value proxied by Tobin's Q, for the 2020–2024 period. ESG disclosure scores were obtained through a *checklist-* based *content analysis* of annual reports/sustainability reports, while Tobin's Q was calculated using a simple approach based on accounting data. The descriptive approach within a quantitative

framework aims to provide a systematic numerical description of the research variables (Sugiyono, 2022). The research sample was determined using a *purposive sampling method* and the data obtained amounted to 7 companies with a total of 34 observations. The data were processed using Eviews 12 software .

Operational Variables and Instruments

Company Value as Dependent Variable (Y)

This method is derived from a simplified version of the approach introduced by Chung and Pruitt (1994), known as “*Approximate Tobin's Q*”. Firm value is measured by the formula:

$$\text{Tobin's Q} = \frac{\text{MVE} + \text{Debt}}{\text{Total Assets}}$$

Information:

MVE : Closing stock price \times Number of shares outstanding

Debt : Total liabilities (*book value*)

Total Assets : Total company assets (*book value*)

ESG Disclosure as the First Independent Variable (X_1)

ESG disclosure in this study was measured using an ESG Disclosure Score based on a checklist of disclosure items that adhere to the Global Reporting Initiative (GRI) Standards. A higher score indicates that the company's ESG information is excellent. Conversely, a lower score indicates incomplete ESG disclosure.

$$\text{ESG Disclosure Score} = \frac{\sum_{i=1}^n d_i}{n} \times 100$$

Information:

d_i : 1 if item i is disclosed; 0 if not disclosed

n : total number of items applicable to the company (45 items)

Capital Structure as the second independent variable (X_2)

The capital structure in this study is proxied using the *Debt to Equity Ratio* (DER) as the main indicator of the leverage ratio.

$$\text{DER} = \frac{\text{Total Debt}}{\text{Total Equity}} \times 100\%$$

Information:

Total Debt : Total Liabilities

Total Equity : Total shareholder equity

Data Processing Techniques

Descriptive Statistical Analysis

An overview of the variables in this study is presented through descriptive statistical analysis by displaying measures of central tendency and data dispersion, such as mean, median, minimum, maximum values, and standard deviation for ESG Disclosure Score , DER, and Tobin's Q. This analysis aims to determine the distribution of data, the tendency of variable values, and early indications of outliers or data imbalances.

Multiple Regression Equation

Analysis multiple linear regression used For test influence One variables dependent against two or more variables independent with using multiple linear regression model .

$$Y = a + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$$

Information:

Y	: Firm Value (Tobin's Q)
X₁	: ESG Disclosure
X₂	: Capital Structure (DER)
a	: Constant
β₁ , β₂	: Regression coefficient of each independent variable
e	: Error term

Panel Data Regression Model Selection

Panel data regression is used in this study because it is considered capable of accommodating inter-firm heterogeneity (*individual heterogeneity*) as well as changes over time (Gujarati & Porter, 2009). The panel data regression models used include *the Common Effect Model* (CEM), *the Fixed Effect Model* (FEM), and *the Random Effect Model* (REM). The CEM considers all data as a single entity without regard to individual or time differences, the FEM takes into account differences in characteristics between individuals that are fixed, while the REM model assumes that variations in characteristics between individuals are random and are represented through residual components in the model.

F test

The F-test is used to examine the simultaneous influence of independent variables on the dependent variable, while simultaneously evaluating the feasibility of the regression model and the independent variables' ability to explain the variables under study. In this study, the F-test was used to determine whether ESG disclosure and capital structure jointly influence firm value. Independent variables are considered to have a simultaneous influence on the dependent variable if *the Prob(F-statistic) value* is <0.05.

Coefficient of Determination Test (R²)

The coefficient of determination (R²) is used to measure the ability of independent variables to explain variations in the dependent variable. R² values range from 0 to 1, with values closer to 1 indicating a strong explanatory power for the dependent variable. Conversely, values closer to 0 indicate a relatively low ability of the model to explain the dependent variable. The coefficient of determination is used as an additional indicator to assess the strength of a research model.

Partial Test (T-Test)

Partial Test (T Test) is used For test the influence of each variable independent in a way individual to variables dependent . In study this, t test is done For evaluate influence ESG disclosure and capital structure on Tobin's Q. Variables independent stated influential significant if mark significance < 0.05, whereas mark significance > 0.05 indicates No existence influence significant to variables dependent.

Assumption Test Classic Normality Test

A normality test is performed to assess whether the data or residuals in a regression model have a normal distribution. Fulfilling the normality assumption is important in statistical analysis, as it affects the reliability of the interpretation of the resulting regression parameters. This test is performed using the *Jarque-Bera Test* in EViews 12. Residuals are declared normally distributed if *the Jarque-Bera probability value is > 0.05, while a Jarque-Bera probability value < 0.05 indicates that the residuals are not normally distributed.* This test ensures the feasibility of the model in more accurate hypothesis testing .

Multicollinearity Test

Multicollinearity testing is performed to identify strong correlations between independent variables in a regression model. High levels of multicollinearity can impact the instability of regression coefficient values, making it difficult to interpret the influence of each independent variable on the dependent variable. The test is performed using *the Variance Inflation Factor (VIF)* in EViews version 12. A VIF value <10 indicates no multicollinearity, while a VIF value >10 indicates the presence of multicollinearity. This test ensures that ESG variables and capital structure are not strongly correlated, resulting in more accurate and reliable estimates.

Heteroscedasticity Test

The heteroscedasticity test is performed to assess whether there are differences in residual variance between observations in a regression model. In a good regression model, the residual variance should be constant, also known as homoscedasticity. Conversely, if the residual variance shows inequality in each observation, then this condition indicates the presence of symptoms of heteroscedasticity in the model. The test was performed using *the White Test* in EViews version 12. The model is declared free of heteroscedasticity if the probability value of *Obs*R-squared > 0.05*, thus the assumption of homoscedasticity is met.

Autocorrelation Test

The autocorrelation test aims to test whether there is a relationship between the residual value (error term) in a linear regression model in a period (t) and the residual in the previous period (t-1). The test is conducted using Durbin-Watson (dW) in EViews 12. The regression model is declared autocorrelation-free if it meets the following criteria:

$$dU < dW < 4 - dU$$

The dW value is the Durbin-Watson statistic obtained from *the EViews 12* output, while the dU (*Durbin Upper*) value is obtained from the Durbin-Watson table based on the number of samples (n) and the number of independent variables (k) at a significance level of 5% ($\alpha = 0.05$). The model is declared free from autocorrelation if the dW value is between dU and $4 - dU$, so the null hypothesis (H0) is accepted and it can be concluded that there is no autocorrelation problem in the research regression model.

RESULTS AND DISCUSSION

Descriptive Statistical Analysis

Descriptive statistical analysis was used to describe the distribution characteristics of

all research variables, including the mean, median, minimum, maximum, and standard deviation. This analysis was conducted based on 34 panel data observations that underwent a selection process and outlier handling using EViews 12. The results of the descriptive statistical analysis are presented below.

Table 1 Results of Descriptive Statistical Analysis

Variable	Mean	Maximum	Minimum	Std. Dev.
X1 (Esg Disclosure)	0.875163	1,000,000	0.688889	0.079845
X2 (Structure Capital)	0.807750	1.653263	0.223259	0.401416
Y (Company Value)	0.958965	1.641560	0.481900	0.257070

Source: Eviews 12 Output (2026)

Based on the descriptive statistics, the ESG disclosure variable has an average value of 0.8752 with a minimum value of 0.6889 and a maximum of 1.0000, and a standard deviation of 0.0798. This indicates that the sample companies have disclosed ESG at a relatively high level and tend to be homogeneous during the study period. The capital structure variable, proxied by DER, has an average of 0.8078, a minimum value of 0.2233, a maximum value of 1.6533, and a standard deviation of 0.4014, indicating differences in leverage policies between companies, although the data distribution is still relatively controlled. Meanwhile, the company value, proxied by Tobin's Q, has an average of 0.9590, with a minimum value of 0.4819, a maximum value of 1.6416, and a standard deviation of 0.2571. The average value of Tobin's Q which is below 1 indicates that in general the market values the sample companies slightly below their book value, although there are several companies that receive premium valuations from investors.

Classical Assumption Test Results

Normality Test

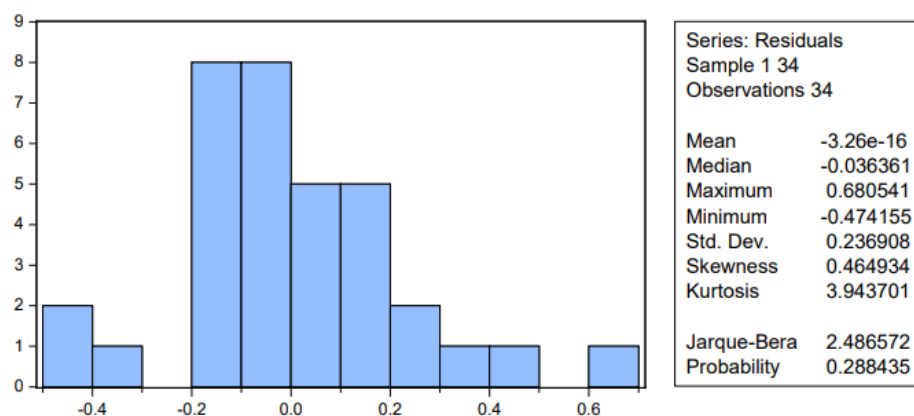


Figure 1 Normality Test Results

the Jarque-Bera statistic value was 2.4866 with a probability value of 0.2884. Since the probability value of 0.2884 > 0.05, H0 is accepted. Therefore, the residuals of the

regression model are declared to be normally distributed and the assumption of normality is met.

Multicollinearity Test

The multicollinearity test aims to detect the presence of correlation between independent variables in a regression model using the Variance Inflation Factor (VIF) value. The model is declared free of multicollinearity if the Centered VIF value is <10. The following presents the results of the multicollinearity test using EViews 12.

Table 2 Multicollinearity Test Results

<i>Variable</i>	<i>Coefficient Variance</i>	<i>Uncentered VIF</i>	<i>Centered VIF</i>
C	0.219746	125.0516	NA
X1 (ESG Disclosure)	0.289417	127.1643	1.019126
X2 (Capital Structure)	0.011451	5.270792	1.019126

Source: *Eviews 12 Output* (2026)

Centered VIF value for variable X1 (ESG Disclosure) was 1.0191 and for variable X2 (Capital Structure) was 1.0191. Both values are well below 10, thus concluding that there is no multicollinearity among the independent variables in the model.

Heteroscedasticity Test

Table 3 Heteroscedasticity Test Results

Heteroskedasticity Test: White				
Null hypothesis: Homoskedasticity				
F-statistic	0.901291	Prob. F (5,28)	0.4940	
Obs*R-squared	4.713509	Chi-Square Prob. (5)	0.4518	
Scaled explained SS	5.767315	Chi-Square Prob. (5)	0.3295	
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.775910	2.253892	-1.231607	0.2283
X1	6.370510	5.693147	1.118979	0.2727
X2	0.380941	0.772370	0.493210	0.6257

Source: *Eviews 12 Output* (2026)

Based on the results of the White test, the *F-statistic value* was obtained at 0.9013 with an F probability of 0.4940, and the *Obs*R-squared value* was 4.7135 with a *Chi-Square probability* of 0.4518. Since both probability values (0.4940 and 0.4518) are greater than 0.05, H0 is accepted. Therefore, it can be concluded that there is no heteroscedasticity in the model and the assumption of homoscedasticity is met.

Autocorrelation Test

Table 4. Autocorrelation Test Results

Dependent Variable: Y			
Method: Panel EGLS (Cross-section random effects)			
Weighted Statistics			
R-squared	0.283095	Mean dependent var	0.242245
Adjusted R-Squared	0.236843	S. D dependent var	0.153161
SE of regression	0.135445	Sum squared residual	0.568708
F-statistic	6.120729	Durbin-Watson stat	1.943477
Prob (F-Statistic)	0.005750		

Source: *Eviews 12 Output* (2026)

Based on the estimation results of the *Random Effect Model* (REM) – Panel EGLS (*Cross-section random effects*), the *Weighted Durbin-Watson* value is 1.9435. With $dU = 1.58$ and $4 - dU = 2.42$, then $1.58 < 1.9435 < 2.42$, so it can be concluded that there is no autocorrelation in the model. Meanwhile, the *Unweighted dW* value (0.4410) is not used because it does not represent the residuals that have been weighted by GLS. Thus, the REM model has met the assumption of being free of autocorrelation.

Data Analysis Results

Panel Data Model Selection

Chow Test Results

Table 5. Chow Test Results

Redundant Fixed Effects Tests			
Equation: UntitledTest cross-section fixed effects			
Effects Test	Statistics	df	Prob.
Cross-section F	14.719812	(6.25)	0.0000
Cross-section Chi-square	51.385217	6	0.0000

Source: *Eviews 12 Output* (2026)

Cross-section Chi-square value was 51.3852 with a probability of 0.0000. Since the probability value of $0.0000 < 0.05$, H_0 is rejected. Thus, the *Fixed Effect Model* (FEM) is more appropriate to use than the *Common Effect Model* (CEM).

Hausman Test Results

The Hausman test is used to determine the more appropriate model between the Fixed Effect Model (FEM) and the Random Effect Model (REM). The hypotheses used are H_0 : REM is better, and H_1 : FEM is better. The following presents the results of the Hausman test based on EViews 12.

Table 6. Hausman Test Results

Correlated Random Effects – Hausman Test Equation: REMTest cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq df	Prob.
Random cross-section	14.719812	2	0.0637

Source: *Eviews 12 Output* (2026)

Chi-Square statistic value was 5.5078 with a probability of 0.0637. Since the probability value of 0.0637 > 0.05, H0 is accepted. Thus, *the Random Effect Model (REM)* is more appropriate to use than *the Fixed Effect Model (FEM)*.

Lagrange Multiplier (LM) Test

Table 7. Results of the Lagrange Multiplier (LM) test

Lagrange Multiplier Tests for Random Effects Null hypotheses: No effects Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided (all others) alternatives			
	Cross-section	Hypothesis Test Time	Both
Breusch-Pagan	15.95355 (0.0001)	0.478266 (0.4892)	16.43182 (0.0001)
Honda	3.994190 (0.0000)	-0.691568 (0.7554)	2.335307 (0.0098)
King Wu	3.994190 (0.0000)	-0.691568 (0.7554)	1.990461 (0.0233)
Standardized Honda	5.457039 (0.0000)	-0.408701 (0.6586)	0.367010 (0.3568)
Standardized King Wu	5.457039 (0.000)	-0.408701 (0.6586)	-0.029985 (0.5120)
Gourieroux, et al.	--	--	15.95355 (0.0001)

Source: *Eviews 12 Output* (2026)

Based on the results of the LM (*Breusch-Pagan*) test, the cross-section probability value was 0.0001. Since the probability value of 0.0001 < 0.05, H0 is rejected. Thus, *the Random Effect Model (REM)* is more appropriate and confirmed as the model used in this study.

Multiple Linear Regression Analysis

Table 8. Model Estimation Results

Dependent Variable: Y Method: Panel EGLS (Cross-section random effects)Periods includes: 5Cross-sections included: 7Total panel (unbalanced) observations: 34Swamy and arora estimator of component variances				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.855242	0.473978	3.914195	0.0005
X1	-1.207443	0.473886	-2.547961	0.0160
X2	0.187128	0.128102	1.460774	0.1541

Source: *Eviews 12 Output* (2026)

The constant of 1.8552 indicates that when ESG (X1) and DER (X2) are zero, Tobin's Q is estimated to be 1.8552. The ESG coefficient of -1.2074 means that every one unit increase in ESG will decrease Tobin's Q by 1.2074, and vice versa if ESG decreases then Tobin's Q increases by 1.2074, assuming other variables are constant. Meanwhile, the DER coefficient of 0.1871 indicates that every one unit increase in capital structure will increase Tobin's Q by 0.1871, and vice versa if DER decreases then Tobin's Q also decreases by 0.1871.

F test

Table 9. F Test Results

Dependent Variable: Y Method: Panel EGLS (Cross-section random effects)			
Weighted Statistics			
R-squared	0.283095	Mean dependent var	0.242245
Adjusted R-Squared	0.236843	S. D dependent var	0.153161
SE of regression	0.135445	Sum squared residual	0.568708
F-statistic	6.120729	Durbin-Watson stat	1.943477
Prob (F-Statistic)	0.005750		

Source: *Eviews 12 Output* (2026)

Based on the F-test results, the F-statistic was 6.120729 with a Prob(F-statistic) of $0.005750 < 0.05$, thus H_0 was rejected. This indicates that ESG disclosure and capital structure simultaneously influence firm value, and the regression model used is appropriate for explaining the relationship between the variables.

Multiple Determination Coefficient Test (*Adjusted R Square*)

The coefficient of determination (R^2) is used to measure the ability of an independent variable to explain variation in the dependent variable. In the *Random Effects Model (REM) panel data model*, the *Weighted R-squared* value is used because it has been adjusted through GLS transformation for greater representativeness. The following presents the estimation results from *EViews* version 12.

Table 10. Multiple Determination Coefficient Test

Dependent Variable: Y			
Method: Panel EGLS (Cross-section random effects) Periods included: 5 Cross-sections included: 7 Total panel (unbalanced) observations: 34 Swamy and Arora estimator of component variances			
Weighted Statistics			
R-squared	0.283095	Mean dependent variable	0.242245
Adjusted R-Squared	0.236843	S. D dependent var	0.153161
SE of regression	0.135445	Sum squared residual	0.568708
F-statistic	6.120729	Durbin-Watson stat	1.943477
Prob (F-Statistic)	0.005750		

Source: *Eviews 12 Output* (2026)

Based on results estimation, obtained Weighted R-squared of 0.2831 and Adjusted R-squared of 0.2368. The *Adjusted R-squared value* show that ESG (X1) and capital structure (X2) are simultaneous capable explains 23.68% of the variation in Tobin's Q, while the remaining 76.32% influenced by other variables outside the model, such as profitability, size company, growth assets, conditions macroeconomics, and factors industry other.

T-test

The t-test is used For test the influence of each variable independent to variables dependent in a way partial with level significance of 5% ($\alpha = 0.05$). Variable stated influential significant If mark probability < 0.05 , and no significant if > 0.05 .

Disclosure (X1)

ESG has coefficient -1.207443 with probability 0.0160 < 0.05 , so influential significant to mark company. However direction coefficient negative No in accordance with hypothesis, so H1 is rejected. This result shows ESG has an impact negative significant to mark company.

Structure (X2)

DER has coefficient 0.187128 with probability 0.1541 > 0.05 , so No influential significant to mark company. Although direction coefficient positive in accordance hypothesis, because No significant then H2 is rejected.

DISCUSSION

The Impact of ESG Disclosure on Company Value

The results of the first hypothesis test indicate that ESG disclosure (X1) has a significant negative effect on Tobin's Q (Y) with a coefficient of -1.2074 and a probability of 0.0160 < 0.05 , thus H1 is rejected. This finding indicates that increasing ESG actually decreases the company value of renewable energy companies on the IDX for the 2020–2024 period. This result is in line with previous research. This negative effect can be explained by the high cost of ESG investments that suppress short-term performance, the character of investors who tend to be short-term oriented, and market doubts about the ESG commitment of companies that have recently transitioned from the coal sector. In addition, the increase in assets due to renewable energy investments without being accompanied by a commensurate increase in market value causes the Tobin's Q value to tend to decline.

The Influence of Capital Structure on Company Value

The results of the second hypothesis test indicate that capital structure (DER/X2) does not significantly influence firm value (Y) with a coefficient of 0.1871 and a probability of $0.1541 > 0.05$, thus H2 is rejected. This is because the capital-intensive energy sector makes debt levels the industry norm and therefore does not significantly influence investor response. The average DER of 0.8078 also indicates moderate leverage and does not provide a strong signal to the market. This finding is consistent with previous research showing that capital structure does not significantly influence firm value in the mining and energy sectors.

CONCLUSION AND SUGGESTIONS

This study shows that ESG disclosure has a negative and significant effect on firm value, while capital structure has no significant effect on renewable energy companies listed on the Indonesia Stock Exchange (IDX) for the 2020–2024 period. This negative effect reflects the Indonesian capital market's lack of full integration of ESG considerations into the valuation process, as well as the high financial burden of ESG implementation amidst the energy transition phase, which simultaneously suppresses market perception of the company's short-term value. Therefore, companies need to improve the quality, consistency, and credibility of ESG implementation and disclosure so that investors can better perceive its economic benefits. Furthermore, companies need to optimally manage their capital structure to support funding needs in the energy transition process. Further research is recommended to expand the sample size and research period, and include other variables such as profitability, company size, and governance factors to obtain more comprehensive results.

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